

# Diligent<sup>®</sup> Shaker

## *User's manual*

Version: DSM\_2305.4

Software: 1.2.X



## Index

|  |    |
|--|----|
| Parts of Diligent® Shaker.....   | 3  |
| Versions of Diligent® Shaker.....  | 4  |
| Setting-up.....  | 5  |
| Instructions for programming.....  | 5  |
| Instructions for use.....  | 6  |
| Samples.....   | 7  |
| Sensor.....  | 7  |
| Motor.....   | 7  |
| Blister.....   | 8  |
| Export of data.....  | 8  |
| Advanced programming ( <i>only for Pro version</i> ).....                      | 9  |
| Customizable LED lights colours and theme ( <i>only for Pro version</i> )..... | 10 |
| Maintenance and cleaning.....  | 10 |
| Technical information.....   | 10 |
| Service interval and warranty.....   | 11 |
| Contact information.....   | 11 |
| Declaration of conformity.....   | 12 |

Diligent® Shaker is an easy-to-use instrument part of the Dilucup® System that facilitates the serial dilution process in the laboratory.

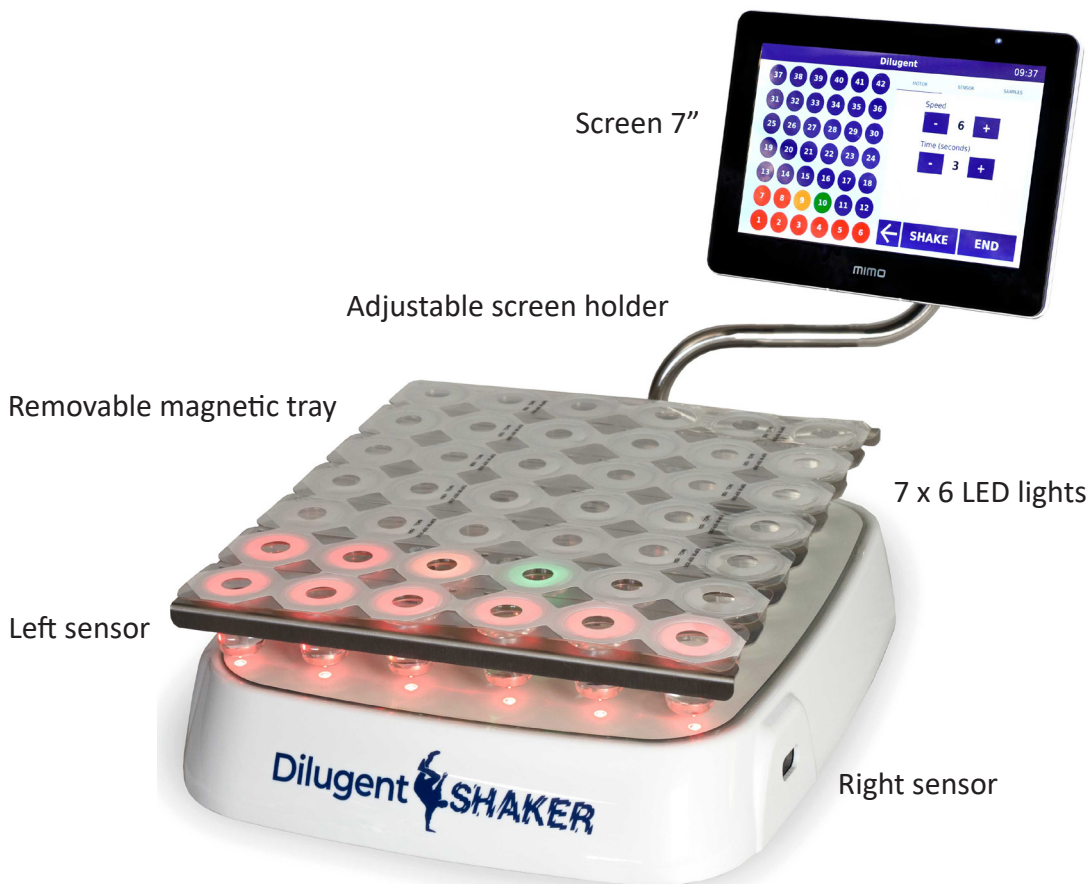
It is manufactured by LabRobot Products AB in Sweden and designed for an easy, full guided and traceable use of Dilucup® Elegance.

This instrument, equipped with two sensors located on the sides, allows its use without physical contact. The 42 LED lights guide the operator during the dilution process by showing which cup is to be processed.

You can download the latest version of this manual on the website:

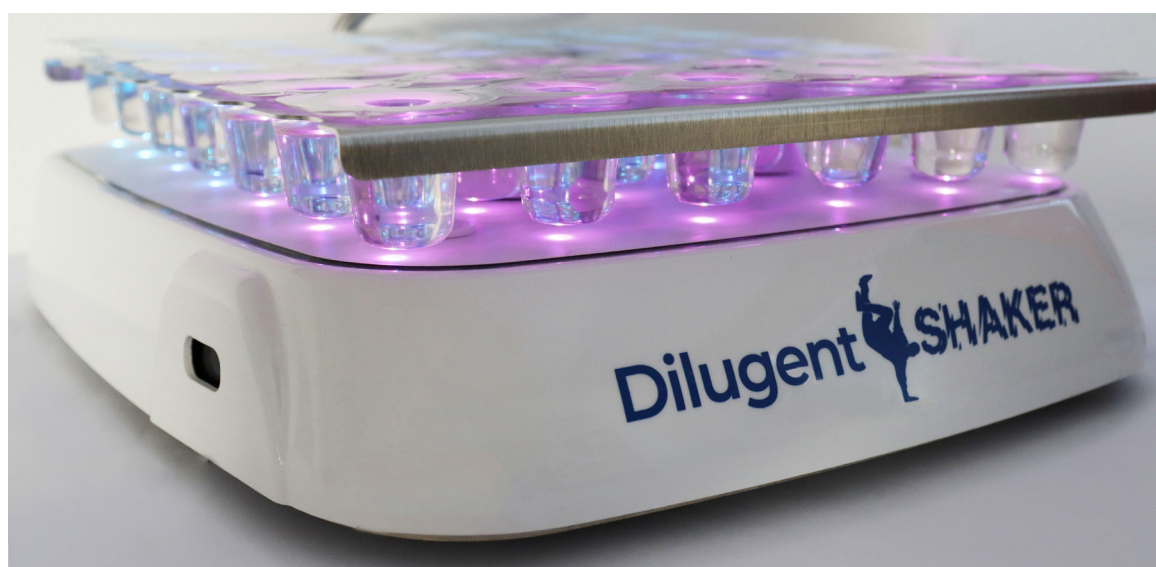
<https://labrobot.com/diligent-shaker/>

## Parts of Diligent® Shaker



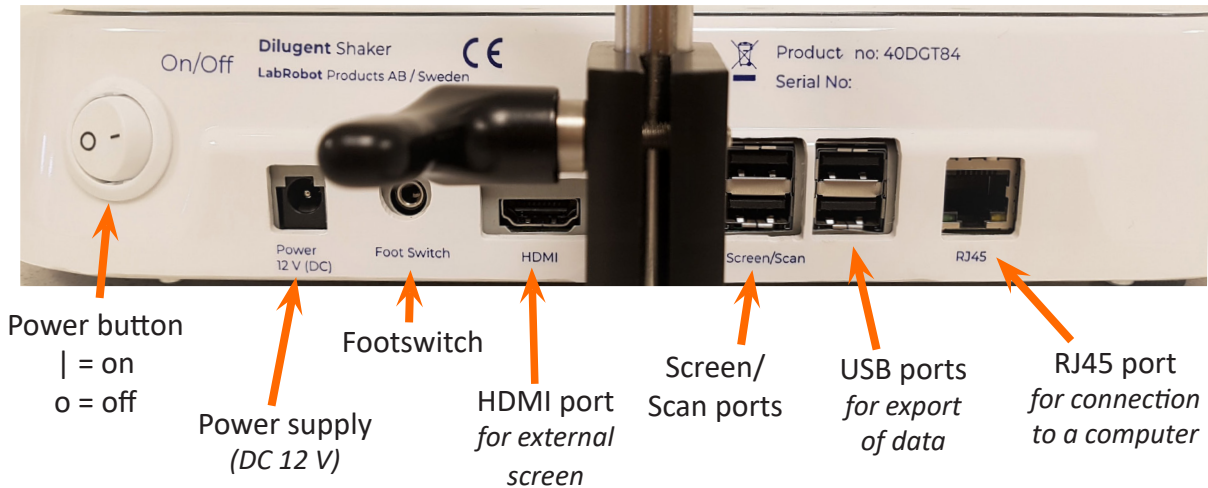
## Versions of Diligent® Shaker

| Features   | Diligent®<br>Shaker<br><i>Light</i> | Diligent®<br>Shaker | Diligent®<br>Shaker<br><i>Pro</i> |
|--|-------------------------------------|---------------------|-----------------------------------|
| Possible steering with foot switch                         | •                                   | •                   | •                                 |
| Selectable working direction ( <i>from left or right</i> ) | •                                   | •                   | •                                 |
| Up to 2 templates can be stored                            | •                                   |                     |                                   |
| Up to 10 templates can be stored                           |                                     | •                   | •                                 |
| Visual "service required" information                      | •                                   | •                   | •                                 |
| Service menu   | •                                   | •                   | •                                 |
| Error codes  | •                                   | •                   | •                                 |
| Possible 2D code (bar or QR) reading                       |                                     | •                   | •                                 |
| Visual information of active sensor                        |                                     | •                   | •                                 |
| Sample identification                                      |                                     | •                   | •                                 |
| User identification  |                                     | •                   | •                                 |
| Dilucup® batch identification                              |                                     | •                   | •                                 |
| Export of information to USB memory                        |                                     | •                   | •                                 |
| Full traceability of operations                            |                                     | •                   | •                                 |
| Advanced programming                                       |                                     |                     | •                                 |
| Step ahead without shaking for doing replicates            |                                     |                     | •                                 |
| Customizable interface colours                             |                                     |                     | •                                 |
| Customizable LED colours                                   |                                     |                     | •                                 |
| Full connectivity ( <i>LIMS interface not included</i> )   |                                     |                     | •                                 |
| Article number   | 40DGT84LT                           | 40DGT84SD           | 40DGT84PO                         |

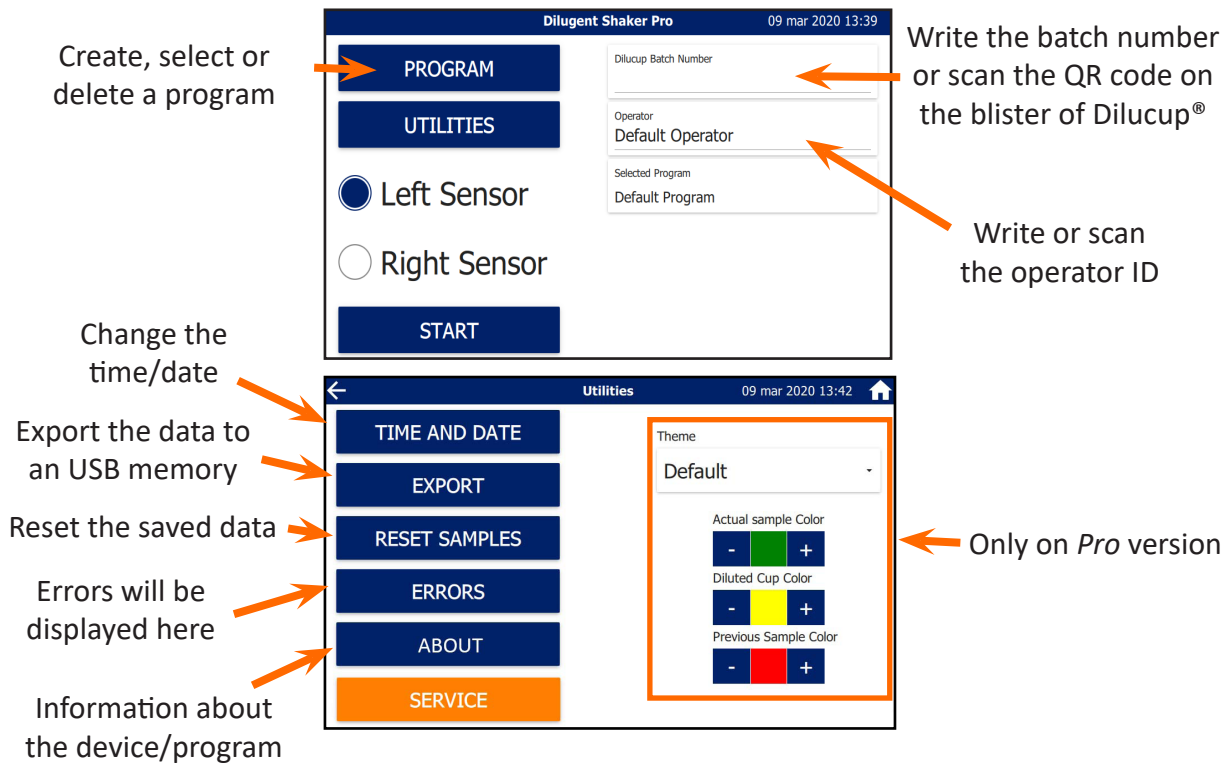


## Setting-up

- Connect the scanner before starting the instrument.
- Place the Dilucup® blister (7x3 or 7x6 cups) on the tray making sure that it is well placed.
- The horizontal position of Diligent® Shaker can be adjusted with the four feet located underneath the device.
- The position of the screen can be adjusted by moving its support.
- The brightness of the screen can be adjusted by two buttons (+ / -) located at the back of the screen.



## Instructions for programming



Every Dilucup® blister has a unique QR code that gives relevant information about its production time which may be useful for identification.

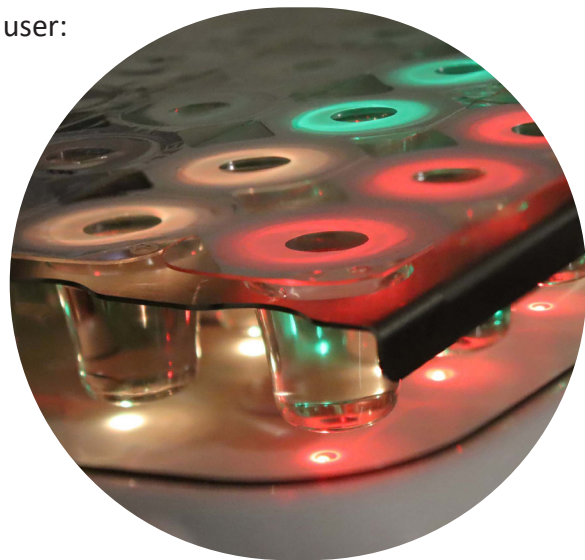
## Instructions for use

1. Remove the protective film from the first row of Dilucups.
2. Pipet 1 mL of the sample into the flashing green cup and shake it by using the active sensor or the footswitch. *The cup will turn orange.*
3. Pipet 1 mL from that orange cup into the following green cup and shake.
4. Repeat the same process until the number of required dilutions is completed.
5. Once the dilution sample is completed, plate 1 mL from the orange cups.
6. Start with a new dilution series in the flashing green cup. *The orange cups will turn red.*

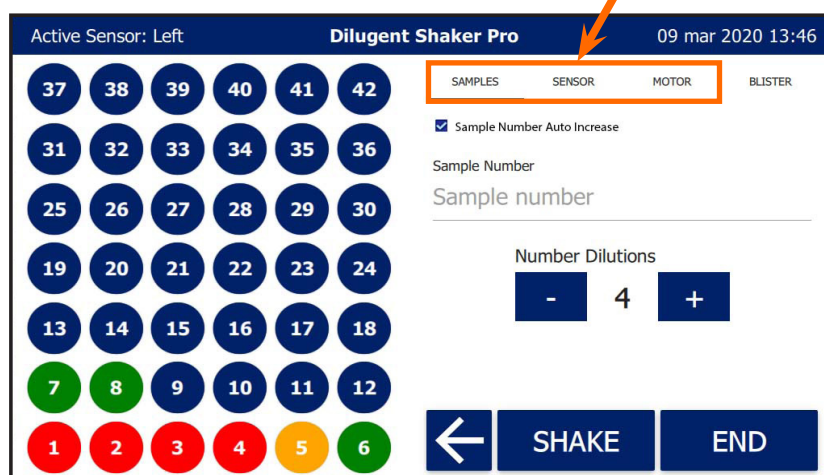
The LED lights will change in order to guide the user:

Colour legend in the default program:

- **Flashing green:** first cup to be used in the dilution series
- **Green:** cup to be used
- **Orange:** cup already used in the current dilution series. The content can be used for further dilution, collecting or plating.
- **Red:** cup already used in the previous dilution series



The sensor used, the sample number, the motor speed and the shaking time can be changed between samples



Undo a step within a sample

Shake without affecting the LED lights

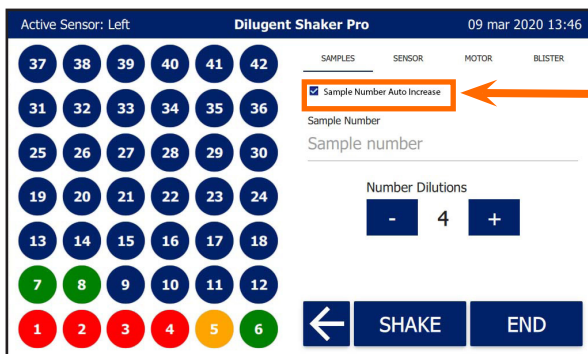
End the program and return to the main menu

## Samples

“Sample Number” is the identification of the sample. Scan the coded label of the sample you are going to use or use the default option where each sample has a different number starting from 1.

If after finishing a sample you try to shake again without changing the name, a warning message will appear saying “Are you sure you want to dilute this sample again?”:

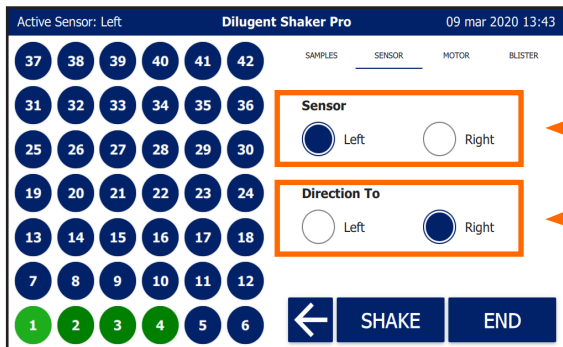
- Press “YES” or use the sensor / pedal to continue diluting.
- Press “CANCEL” for going back.
- Scan another coded label for changing directly the name of the sample.



Click here to increase the sample number automatically when you start by a different number than 1



## Sensor



Choose the “Left” or “Right” sensor

Choose the workflow direction to left or right.

**!** This feature cannot be changed once the dilution series has started.

## Motor

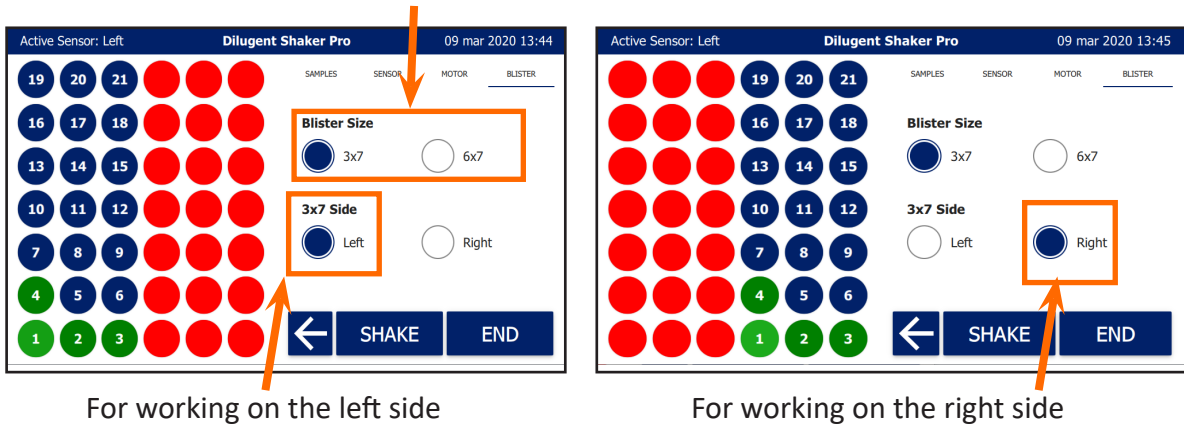


| Motor speed | RPM (± 5 %) |
|-------------|-------------|
| 1           | 410 rpm     |
| 2           | 460 rpm     |
| 3           | 510 rpm     |
| 4           | 560 rpm     |
| 5           | 610 rpm     |
| 6           | 660 rpm     |

Shaking time per dilution: 1 to 60 s

## Blister

Choose the blister size: 3x7 or 6x7



For working on the left side

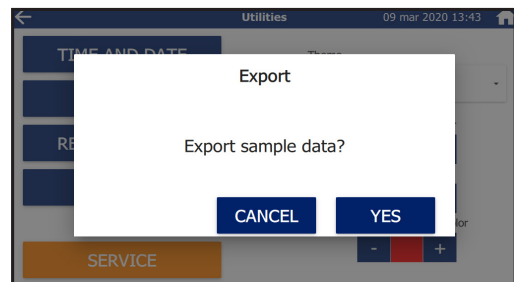
For working on the right side

The cups that are not going to be used can be deselected by touching the corresponding position on the screen.

## Export of data

(Feature not available in Light version)

1. Insert an USB stick into one of the ports on the back side of Diligent® Shaker.
2. In the main menu go to “Utilities” and then press “Export”.
3. An Excel® file called “diluent\_data” will be transferred to the USB stick.



Go to “Utilities” and then “Reset Samples” to delete the data saved on Diligent® Shaker.

Example of data obtained in the Excel® file named “diluent\_data”:

|   | A  | B   | C        | D         | E         | F                                   | G                | H                   |
|---|----|-----|----------|-----------|-----------|-------------------------------------|------------------|---------------------|
| 1 | id | rpm | duration | dilutions | sample_id | dilucup_batch_number                | operator         | timestamp           |
| 2 | 1  | 4   | 3        | 3         | 1         | NACL: 1944 EXP 24-JUL-2024 12:37:48 | Default Operator | 2022-02-23 12:18:20 |
| 3 | 2  | 4   | 3        | 3         | 2         | NACL: 1944 EXP 24-JUL-2024 12:37:48 | Default Operator | 2022-02-23 12:21:46 |

|                             |  |
|-----------------------------|--|
| <b>ID</b>                   | Identification of the dilution             |
| <b>RPM</b>                  | 1 – 6                                      |
| <b>Duration</b>             | Shaking time (1 – 60 s)                    |
| <b>Dilutions</b>            | Number of dilutions of the sample (1 – 12) |
| <b>Sample_ID</b>            | Identification of the sample               |
| <b>Dilucup_Batch_Number</b> | Information about Dilucup® batch           |
| <b>Operator</b>             | Identification of the operator             |
| <b>Time stamp</b>           | Time when the sample was processed         |

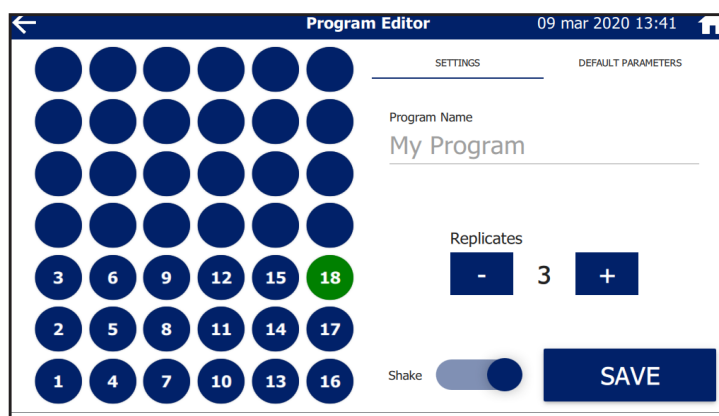


## Advanced programming (only for Pro version)

Advanced programming is useful for working with cups located in different positions than the default or for doing replicates or parallel working.

1. Select “Program”, “New program” and then “Advanced”.
2. Write the program name and choose the “time”, “number of dilutions” and “speed of the shaking” in “Default Parameters”.
3. Make sure that the bottom “Shake” is off.
4. Choose the cups that you want to use without shaking and then press “Shake” to shake.
5. Choose the next cup and press “Shake” for turning it off.
6. Repeat steps 3 to 5 as many times as you need.
7. Press “Save” for saving the program.

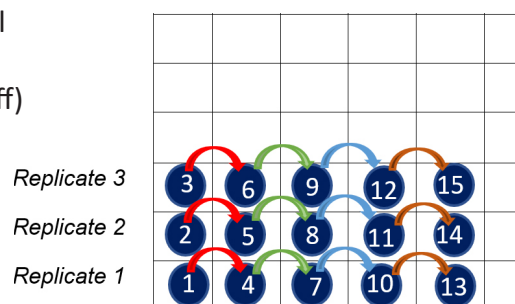
Remember that you must select the program before starting the process.



### Example for programming replicates:

If you want to do 3 replicates of 5 dilutions each, you can program the following:

1. Make sure “Shake” is off
2. Press cups 1, 2, 3 and “Shake” (the shaking will start after cup 3)
3. Press cup 4 and “Shake” (the shaking will be off)
4. Press cups 5, 6 and “Shake” (it will be on)
5. Press cup 7 and “Shake” (it will be off)
6. Press cups 8, 9 and “Shake” (it will be on)
7. Press cup 10 and “Shake” (it will be off)
8. Press cups 11, 12 and “Shake” (it will be on)
9. Press cup 13 and “Shake” (it will be off)
10. Press cups 14, 15 and “Shake” (it will be on)



When using the sensor in this program, it will not shake between cups 1 to 3; 4 to 6; 7 to 9; 10 to 12 and 13 to 15, but it will shake between cups 3 and 4; 6 and 7; 9 and 10 and between 12 and 13. The idea is to pipet 1 mL first to cups 1, 2 and 3, to shake the samples for mixing, and then to pipet from 1-3 to 4-6, etc.

## Customizable LED lights colours and theme

(only for *Pro* version)

Diligent® Shaker Pro has the possibility to personalize the colours of the LED lights as well as the theme of the program. For that, go to “Utilities” and choose the different options.

There are seven different LED light colours; red, dark blue, dark green, orange, white, purple and light blue; and four different themes for the display; “Default”, “Dark”, “Teal” and “Dark Teal”.



## Maintenance and cleaning

- Diligent® Shaker can remain (with the power off) in a laminar flow cabinet even when the ultraviolet light is turned on.
- The metal tray is fastened with magnets and can be removed by lifting one of the corners.
- It is recommended **not** to apply alcoholic solutions directly onto the instrument. You may disinfect moderately with a paper towel dipped in an alcoholic solution.
- Avoid using the Diligent® Shaker when wearing clothes with reflective elements as these may interfere with optical sensors.

## Technical information


|                                |   |
|--------------------------------|---|
| Power supply                   | AC input: 100-240 V, 50/60 Hz<br>DC output: 12 V – 5 A, 60W max |
| Size of the tray (l x w x h)   | 30 x 26 x 2,2 cm  |
| Size of the base (l x w x h)   | 38 x 30,5 x 5,5 cm  |
| Size of the screen (h x w x d) | 12,7 x 18,4 x 1,1 cm / (7")                                     |
| Weight                         | 5,1 kg  |

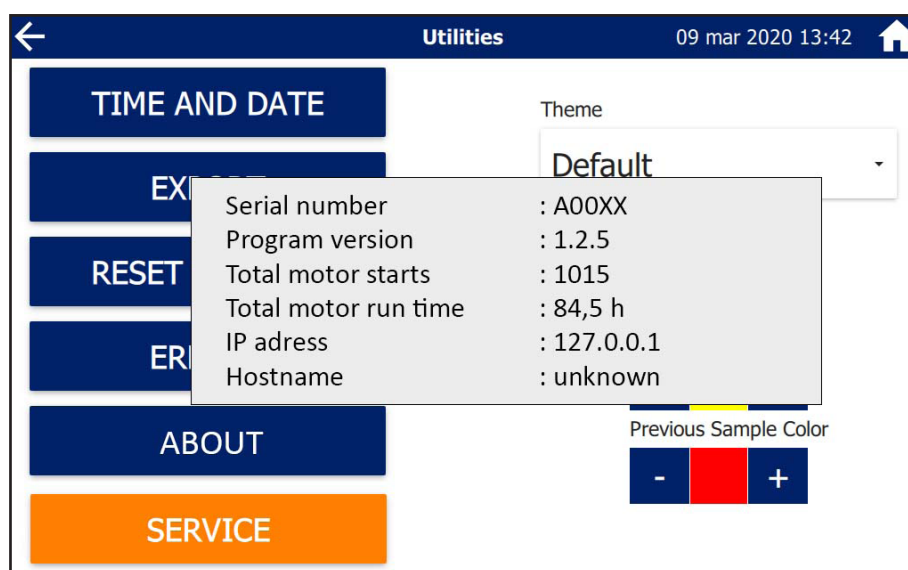
## Service interval and warranty

Diligent® Shaker has a 2-year warranty from the purchase date.

If “SERVICE REQUIRED” appears in the main menu contact the technical service.

LabRobot recommends that Diligent® Shaker is always serviced after 75,000 starts or 100 hours operating time after the 2-year warranty period to ensure a trouble-free use of the instrument.

 This information can be seen in “About” under “Utilities”.



## Contact information

Contact us if you have any further question. We will be happy to answer.

Visit our website for updated information.

You can also download this manual at <https://labrobot.com/diligent-shaker/>

LabRobot Products AB  
Munkerödsvägen 4  
444 32 Stenungsund, Sweden

+46 303 846 73  
[kontakt@labrobot.com](mailto:kontakt@labrobot.com)  
<https://labrobot.com/>

Follow us on social media!



## Declaration of conformity



### Declaration of Conformity

LabRobot Products AB  
Munkerödsvägen 4  
SE-444 32 Stenungsund

Declares responsibility that the product, Diligent® Shaker to which this declaration relates, is in conformity with the following European product standard and directives:

#### EMC, Electromagnetic compatibility

SS-EN 61326-1      Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements

#### RoHS

Directive 2011/65/EU      Restriction of the use of certain hazardous substances

By conformance with the above referenced standard and directive, this product follows the provisions of the directive below:

2014/30/EU      Electromagnetic compatibility directive

Date of issue: 2020-03-11, Stenungsund, Sweden



CEO, Hervé Laisis



Technical Manager, Nicklas Larsson

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