



LB 963

Centro Luminescence Microplate Reader

Operating Manual

70325BA2

Rev. No.: 02, 10/2023



Not for use in in-vitro diagnostic (IVD) procedures.

The information in this guide is subject to change without notice.

DISCLAIMER

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This instrument is not designed or intended for use with installations or equipment in hazardous environments. Servicing of the instrument must only be performed by Berthold Technologies Field Service Engineers or service staff authorized by Berthold Technologies.

Please contact our Service Center at service@berthold.com if you have any operational issues.

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1 Prefatory Comments

1.1 Contact Information

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1.2 Typographical Conventions

DANGER



Indicates an imminent, major hazard, which will certainly result in serious injuries or even death if the hazard is not avoided.

CAUTION



Refers to a potentially dangerous situation, which can result in medium or minor physical injuries or damages to property, if it is not avoided.

NOTICE




If this information is not observed, deterioration in the operation and/or property damage may occur.

IMPORTANT



Sections marked with this symbol point out important information on the product or on handling the product.

Symbols	Description
●	Enumerations
1.	Actions are symbolized by numbers
< >	Buttons are printed inside angular brackets in bold type
[]	Menu titles and items, dialog boxes and select lists are printed inside square brackets in bold type
/	Menu items and submenu item are separated by an angular line.
	On screenshots: Reference to submenus or information described in the text.

1.3 Safety Manual and Operating Manual

LB 963 Centro is supplied with two manuals belonging together.

- The Safety Manual, ID No. 70325BA27, contains the safety relevant information to be observed by the user.
- The Operating Manual, ID No. 70325BA2, contains additional information on operating software, and other important information of the manufacturer.

Revision no. and release date can be found in the footer of the manuals. Keep both manuals for future reference.

NOTICE

Validity of Safety Manual and Operating Manual

This revision of the Operating Manual is only valid in conjunction with the Safety Manual ID No. 70325BA27rev. 00 or latest revision.



For safety reasons make a note of the IDs and revision numbers of both manuals in case you need to replace lost manuals.

Always read the Safety Manual completely prior to the Operating Manual and both before first use of the instrument.

1.3.1 The Operating Manual

The operating manual is valid from the delivery of the Berthold product to the user until its disposal. Keep the operating manual for future reference.

Read all instructions thoroughly and completely before working with the product.

The operating manual contains copyright-protected information. None of the chapters may be copied or reproduced in any other form without prior authorisation from the manufacturer.

The information in this guide is subject to change without notice.

However, should questions arise which are not answered in this manual please contact BERTHOLD, bio@berthold.com.

Revision history of the operating manual

Date	Changes
06/2020	Initial document; ID 70325BA2#00
05/2023	Updated with LightCompass® software; ID 70325BA2#01

2 Software Installation

The instrument will be run with the LightCompass® software. Please follow the instructions in this manual for a proper software installation.

IMPORTANT



Precondition for both software packages:

Windows compatible PC or tablet with Windows 10 or newer.

2.1 Installation and Registration of LightCompass® Software

IMPORTANT



Technical Data of LightCompass® Software:

The technical data can be found in chapter 7.

IMPORTANT



Software installation

- Do not connect the instrument to PC during software installation.
 - For installation **local administrator level** is necessary.
-

The LightCompass® operating software is delivered on a USB stick which can be found in the accessories box of the instrument.

Installation

1. Close all Windows applications before you start installing the software.
2. Insert the USB stick into a USB slot and browse to the USB root directory.
3. The USB stick contains the Setup file for the LightCompass® software. Double-click the **.exe file** to start the installation.

Depending on Windows security settings Security Warnings dialogues

may appear during the installation steps. Always confirm the messages to continue the installation.

- Follow the installation wizard. Select / insert your entries. Confirm your entries with **<OK>** or **<Next>**. Close the dialog with **<finished>**.
- The LightCompass® Software icon will appear on your desktop after installation.



2.2 Registration

- Double-click the LightCompass® icon. The software will open and show a **[registration form]** dialog box.
- Use the LightCompass® software within the trial period of 30 days after first run without registration. A prompt to enter a registration password will appear each time the software is started until the registration password is entered.

User may close the **[Registration Form]** dialog box by clicking **<Run now, Register Later>** and continue working with the software. The remaining days of the trial period are decremented.

Registration Form

Registration of LightCompass Software

This unregistered version of the LightCompass Software will run for 30 days after first run. Please register before that time to enable unlimited use.

Days left: 30

System ID: **LIGHTCOMP-400220-APP**

Step 1: Obtain Password
[Web](https://www.berthold.com/en/bioanalytic/software-registration/)
<https://www.berthold.com/en/bioanalytic/software-registration/>

Step 2: Enter Password

Please enter your registration information here:

Name:

Company:

Password:

Register Now Cancel

Run now, register later...

3. **Obtain Password:** Press the Web button on the registration form, insert the required information in the predefined web registration form and submit it to Berthold Technologies.

Please provide the System ID of the PC. The number is printed in red in the registration dialog of the software (see picture above).

The owner will receive the registration password from Berthold Technologies via E-Mail.

4. **Enter Password:** Enter the password within 30 days to enable unlimited use.

When the **[Registration Form]** dialog box appears, enter the user's name, the company name and the provided password. Click **<Register Now>**. Upon entry of the correct password, continue using the software. The **[Registration Form]** dialog box will not appear again.

3 LightCompass® Software

3.1 LightCompass® Directories and Files

The directories for data and parameter files are defaulted as described below. Any accessible directory on the computer and the local network can be selected though when saving data and parameter files using the “Save ... File As...” command.

Default directories

- Data files ProgramData\LightCompass\Measurement
- Protocol files ProgramData\LightCompass\Protocol

In consequence each Windows user has own directories containing his data and protocol files. Hence, when users log on, individually shared files may need to be copied to each user’s directory.

File Names

There is no limitation in naming data and protocol files other than the Microsoft Windows conventions.

Measurement file names need to be defined prior to the measurement start. Renaming is possible using the [**Save As...**] command producing a copy of the data file with a new name.

Protocol file names can be defined any time during the creation of a protocol. Renaming is possible using the [**Save As...**] command producing a copy of the protocol file with a new name.

File Types

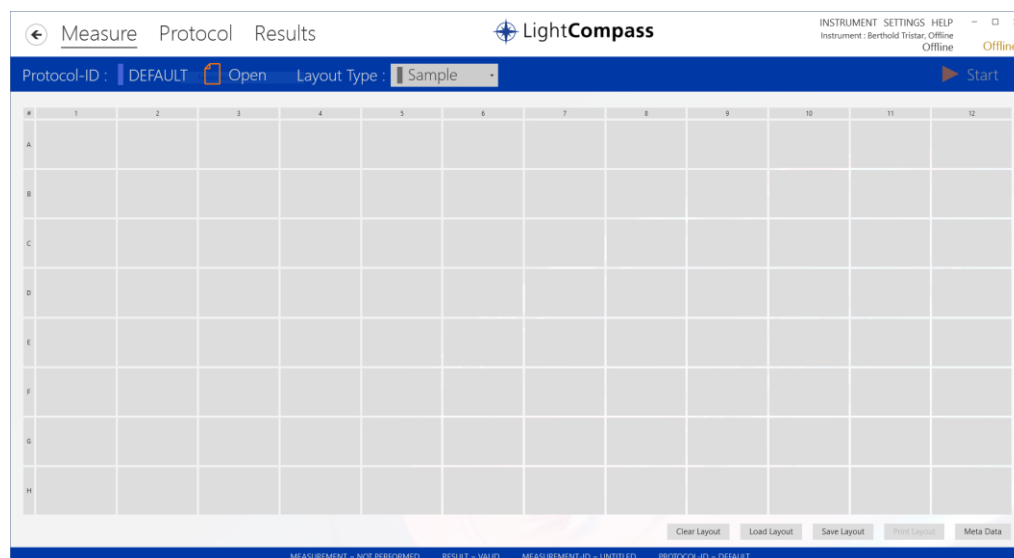
LightCompass® works with different file types indicated by the respective file name extensions.

- Measurement files have the extension **.meas**
- Protocol files have the extension **.prot**

3.2 LightCompass® User Interface

3.2.1 LightCompass® Default Setup

Default main screen of LightCompass®:



3.2.2 Instrument Menu

In the Instrument menu basic instrument settings and communication may be accessed.

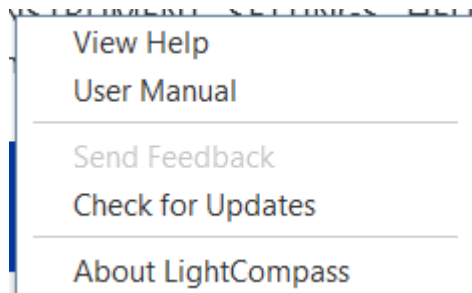
[Detect Instrument]	detects the connected Berthold instrument	
[Unload Carrier]	moves plate out of the instrument	
[Load Carrier]	moves plate into the instrument	
[Prime]	starts the priming sequence (filling the lines)	
[Wash]	starts the washing sequence (cleaning the lines)	
[Refresh]	injects once to fill the tip (e.g. after longer periods of idleness)	
[Unload]	starts the unloading sequence (recovering reagents back into the reservoir)	
[Plate Editor]	dialogue for definition of microplate dimensions. See section 4.1 for details.	
[Boot Instrument]	establishes communication and boots instrument	
[Shipping Brace]	moves XY table to a position enabling the insertion of the transportation lock	

3.2.3 Settings Menu

In the **[Settings]** menu you can define the default root directory for the measurement and protocol files. Also you can manage security settings, instrument drivers and appearance of the software itself.

3.2.4 Help Menu

The **[Help]** menu allows you to view basic software information, open the software manual, send feedback and check online for updates.



4 Operation with LightCompass®

Defining protocols and running measurements on the Centro is straight forward. The procedure is the same for all types of assay types, e.g. Raw Data, Curve Fit and Cut-off.

A measurement can be carried out immediately after a stored protocol is selected. At the end of each measurement the results are stored and may be printed or exported.

Result file names can be given without limitation. The extension for result files as well as measurement files is fixed, though.

4.1 Adding and Editing Microplate Dimensions

Microplates must be defined in the plate editor prior to defining a measurement protocol. Some microplate models are predefined.

Microplates can differ in their dimensions dependent on brand and type. Please refer to the manufacturer's most recent information for exact dimensions of the microplates.

NOTICE



Microplate dimensions

LB 963 Centro is designed for 96 and 384 well microplates with outside dimensions of 86.0 x 128.2 x 17.0 mm (W x L x H).

1. Click **[Instrument]/[Plate Editor]**.

BERTHOLD TECHNOLOGIES - PLATE EDITOR

Plate Type Identifier

Identifier : Berthold 96 - No:23300/23302

Copy Plate Type Remove Plate Type

Plate Type Parameter

Number of rows [1 ... 32] : 8

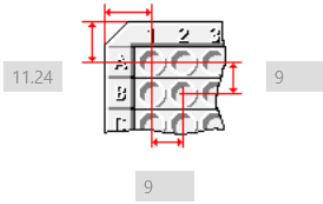
Number of columns [1 ... 48] : 12

Height of plate [mm] : 14.4

Stacking height [mm] : 13.5

Distance from corner and from well to well [mm]

14.38



11.24 9

9

Plate Type Data Usage

Centro Mithras Twinkle TriStar

ok cancel

2. Click **<Copy Plate Type>** to create a new plate and change all necessary information to your new plate and name it accordingly.

[Identifier] insert a descriptive name

[Number of rows] e.g. 8 for a 96 well plate

[Number of columns] e.g. 12 for a 96 well plate

[Height of the plate] insert the plate height in mm.

Most 96 and 384 well plates are between 14 and 15.5 mm.

[Stacking height] the stacking height of the microplate is the resulting height (the visible part) when plates are put on top of each other (e.g. in a plate stacker).

In case this information is not available from the plate manufacturer the stacking height can be derived by stacking 2 plates and measuring the total height; by subtracting the

regular height of one of the plates the resulting value will be the stacking height

[Distance from corner and from well to well]:

Insert the distance between the left outer edge of the plate and the center of well A1.

Insert the distance between to upper outer edge of the plate and the center of well A1.

Insert the distance between the well centers of consecutive rows (vertical well distance).

Insert the distance between the well centers of consecutive columns (horizontal well distance).

[Plate Type Data Usage] check the **[Centro]** checkbox

you may check additional instruments in case you have multiple instruments in operation

3. Click **<ok>** to take over the information. The plate can now be used in the protocol files

4.2 Define a Protocol – Protocol Wizard

IMPORTANT



The protocol setup can be guided through a wizard. Most of the steps passed through the protocol setup are similar in all kinds of protocols, both Raw Data and Curve Fit.

To set up a protocol, start at the Main Screen and proceed as follows:

1. To set up a protocol via the Wizard proceed as follows:
 - Switch to the **[Protocol]** tab, click **[Open]** and then **[Protocol Wizard]** on the right side of the software window.
 - Click **[Add Step]** or **[Remove Step]** to edit your protocol
 - Click **[Next]** to get to the next page
 - After finishing all steps click on **[Finish]** so end the protocol wizard
 - Your protocol is loaded and ready to run
2. To set up a new protocol manually proceed as follows:
 - Switch to the **[Protocol]** tab, click **[Reset]** to set everything to default
 - Click **[Add Step]** or **[Remove Step]** to edit your protocol
 - Set the Step Properties for each Step you add

- After finishing the setup click on **[Save As...]** to save the Protocol and give it a descriptive name
- Your protocol is loaded and ready to run

4.3 Settings

1. [Plate Type]

The screenshot shows the 'Plate Settings' dialog box with the following fields and options:

- Plate Settings**
 - Plate Type : Berthold 96 - No:23300/23302
 - Measurement Order : Berthold 96 - No:23300/23302
 - Plate Speed :
- Layout Settings**
 - Measurement Source :
 - Injector Source :
- Repeat Settings**
 - Number of Repeats :

The dropdown menu for 'Plate Type' is open, showing the following options:

- Berthold 96 - No:23300/23302 (Selected)
- Berthold 384 - No:32505
- NUNC 384
- Costar 96 clearbottom
- Costar 384
- Costar 96 clear
- Greiner 96
- Costar 96 HalfArea
- Berthold 96 clearbottom - No:24910/38840
- Berthold 96 sterile - No:51838/51839

Some microplates are predefined in the software.

Additional microplates have to be defined in the **[Plate Editor]** prior to defining a protocol. See section 4.1 for details.

2. [Measurement Order]

Define if the plate shall be measured by row or by Column. Choose Meander and the plate will be moved in a meander-shape inside the machine. This will make the measurement faster as it saves time in plate movement.

3. [Plate Speed]

Define how fast the plate shall be moved inside the machine. Please don't choose fast if the wells are filled to the maximum to prevent spilling.

4. [Measurement Source]

This defines the wells to be measured with this protocol file. Choose **Layout** and all wells that you define in the **Measure tab** will be measured.

5. [Injector Source]

This defines the wells that will be injected into with this protocol file. Choose **Layout** and all wells that you mark with the available injectors in the **Measure tab** will be injected into.

6. [Repeat Settings]

Here you can define the number of repeats and the corresponding cycle time.

7. [Temperature Settings]

If you have an instrument with temperature control you can activate the temperature control here and set the desired temperature. The current temperature of the instrument can be observed in the status bar in the upper right corner of the software.

8. [Plate movements]

Here you can define how the handling of the plate should be before and after a measurement.

4.4 Endpoint

1. [Label Settings]

Here you can define a name for this specific step and give a description.

2. [Measurement Settings]

Choose the Technology with which you want to measure. Please note that the list may vary depending on the features your instrument is equipped with.

You can set a delay before each reading of a well and define the measurement time (counting time) for each well. Depending on the selected technology you may also be given more options to choose from e.g. voltage setting for the photomultiplier.

3. [Operation Mode]

Choose to measure by well or by plate.

4.5 Kinetic

1. [Label Settings]

Here you can define a name for this specific step and give a description.

2. [Kinetic Settings]

Here you can set up the total time the measurement should last, the counting time for each well and an optional delay time for each well. From these data the number of repeats is calculated automatically.

3. [Operation Mode]

Choose to measure by well or by plate.

4.6 Repeated

1. [Label Settings]

Here you can define a name for this specific step and give a description.

2. [Repeat Settings]

Here you can set up the total time the measurement should last, the counting time for each well and the cycle time for one cycle. From these data the number of repeats is calculated automatically.

3. [Injector Settings]

Here you can choose to use 1 or more Injectors and choose at which cycle, speed and volume the injectors should be operational.

4. [Operation Mode]

Choose to measure by well or by plate.

4.7 Area Scan

1. [Label Settings]

Here you can define a name for this specific step and give a description.

2. [Measurement Settings]

Choose the Counting Time with which you want to measure.

3. [Scanning Settings]

Here you can select the numbers of steps per well scan, the displacement between each scanning step and the scanning mode.

4. [Operation Mode]

Choose to measure by well or by plate.

4.8 Dispense

With this step you define an injection with one injector. To dispense with more than 1 injector just select this step multiple times and place it at the desired position in your protocol workflow.

1. [Injector Settings]

Here you can define which injector shall be used for the injection, which volume shall be dispensed and at what speed.

2. **[Repeat Settings]**

In case you have programmed more than 1 plate repeat you can choose here in which cycle the injection shall take place.

3. **[Operation Mode]**

Choose to operate by well or by plate.

4.9 Shake

With this step you define a shaking step. If you want to shake the plate more often during the protocol just select this step multiple times and place it at the desired position in your workflow.

1. **[Shake Settings]**

Here you can define the duration of the shaking in seconds (0.1 – 3600 seconds), at what speed the shaking shall take place, how far the plate carrier shall move and how the movement shall look like.

2. **[Repeat Settings]**

In case you have programmed more than 1 plate repeat you can select to only perform this shaking step within the first repeat.

3. **[Operation Mode]**

Choose to operate by well or by plate.

4.10 Delay

With this step you define a delay step. If you want to insert a delay time more often during the protocol just select this step multiple times and place it at the desired position in your workflow.

1. **[Delay Settings]**

Here you can set the delay time from 0.1 to 3600 seconds.

2. **[Repeat Settings]**

In case you have set up more than 1 repeat you can select if the delay should be performed with every repeat or only with the first repeat.

3. **[Operation Mode]**

Choose to operate by well or by plate.

4.11 Unload

With this step you define an unload step of the microplate. If you want to insert an unload step more often during the protocol just select this step multiple times and place it at the desired position in your workflow.

1. [Unload Settings]

Here you can set up the time how long the microplate shall remain outside of the instrument (from 0.1 to 3600 seconds).

2. [Repeat Settings]

In case you have set up more than 1 repeat you can select if the unload should be performed with every repeat or only with the first repeat.

3. [Operation Mode]

Choose to operate by well or by plate.

5 Warranty and Technical Issues

5.1 Special Spare Parts

Special spare parts, to be purchased from the manufacturer or his representative, are listed in the safety manual, chapter 5.2.

5.2 Warranty Statement

The instrument is sold in accordance with the general conditions of sale of Berthold Technologies GmbH & Co KG and its affiliates and representatives.

Berthold Technologies warrants this product to be free of defects in material and workmanship for a period of 12 months from the date of delivery, ex works Bad Wildbad.

Berthold Technologies or its authorized representative will repair or replace, at its option and free of charge, any product that under proper and normal use proves to be defective during the warranty period.

Berthold Technologies shall in no event be liable or responsible for any incidental or consequential damage, either direct or indirect.

The above warranty shall not apply if:

- the product has not been operated in accordance with the operating manual
- the product has not been regularly and correctly maintained
- the product has not been repaired or modified by a Berthold Technologies authorized representative or user
- parts other than original Berthold Technologies parts are used
- the product and parts thereof have been altered without written authorization from Berthold Technologies GmbH & Co KG
- the product has not been returned properly packed in the original Berthold Technologies packaging

This warranty does not apply to any third party product involved in the application.

5.3 Customer Service

Customer service will be provided in the first instance by the network of Berthold Technologies representatives. In the event of any problem experienced with your instrument, the first recourse should be your local Berthold Technologies representative. For further problems requiring hardware or software expertise, the Technical Support group at Berthold Technologies GmbH & Co KG will be available by phone, fax or email to deal with your queries. Here is their address, phone, fax and e-mail:

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Calmbacher Str. 22
75323 Bad Wildbad
Germany
Phone: +49 7081 177 114
Fax: +49 7081 177 301
Email: service@berthold.com

If a problem arises with the instrument which you are not able to resolve, please contact the technical support. Please also make sure that you have the relevant information available before contacting Berthold Technologies. Helpful information would include:

- serial numbers, part number, revision: see production label on instrument
- software and firmware versions
- monitor and log files (refer to the respective service manuals)

Confirmation on Decontamination

If you return an instrument to BERTHOLD TECHNOLOGIES for servicing purposes which is not properly decontaminated, there will be a health risk for BERTHOLD TECHNOLOGIES employees.

We therefore need your confirmation that the instrument was decontaminated and cleaned properly before shipping. Follow the instructions in the safety manual, chapter 5.4 – 5.6.

In addition a RMA-number is required to ship an instrument for repair and identify your instrument when it arrives.

In case of an instrument repair please refer to our website and follow the instructions:

<https://www.berthold.com/en/company/service/form-rma-return-material-authorization/>

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Technical Data of LightCompass® Software

Operating system	Win 10 (32/64bit) or newer
PC requirements	Pentium like CPU (2 GHz or better/intel Core iX recommended), 1 free USB 2.0 port
Interface(s)	USB
LightCompass® Software	Wizard support for parameter entries Selection of wells Endpoint Kinetic Repeated Scanning Ratio calculation or subtraction Data export: EXCEL

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Modifications due to technical advancement reserved.