MOLECULAR DEVICES

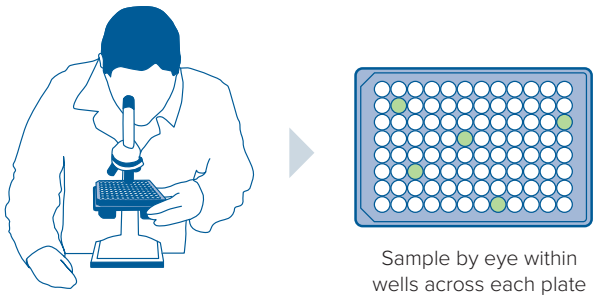
CloneSelect Imager
CloneSelect Imager FL

High-speed fluorescence and white light imaging, intelligent data analysis, and monoclonality report generation

A label-free imaging solution for the assurance of monoclonality and automated confluence across diverse cell types

CloneSelect® Imager estimates cell confluence and cell number.

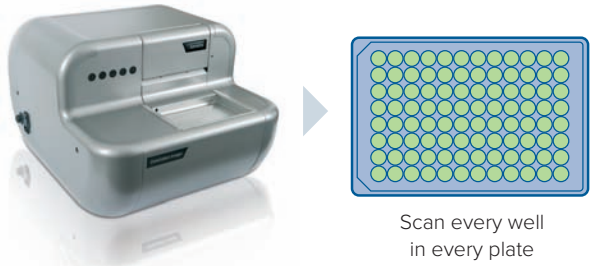
- Automatically scans every well in every plate
- Generates growth curves for each well
- Enables viewing and tracking of every well in every plate
- Reveals additional information on cellular morphology and an understanding of growth characteristics



Sample by eye within wells across each plate

Conventional technique: subjective, time-consuming

Inconsistent results: cannot determine whole well confluence – well after well



Scan every well in every plate

CloneSelect Imager: objective, automatic

Quantitative, whole well cell confluence for every well

Key benefits

- Assess cell confluence objectively and quantitatively
- Streamline workflow: image, analyze, report
- Image every well anytime to track colony formation and verify monoclonality

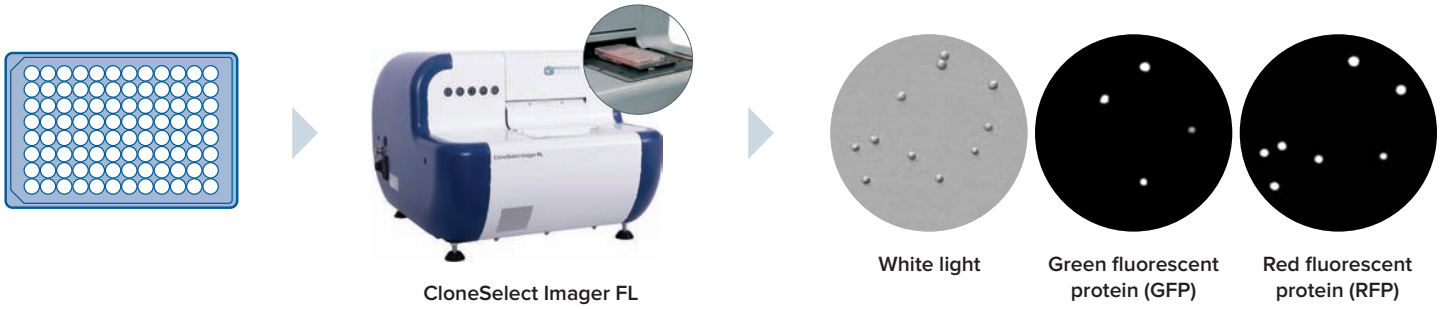
Streamlined workflow

1 Image → 2 Analyze → 3 Report

1 Image

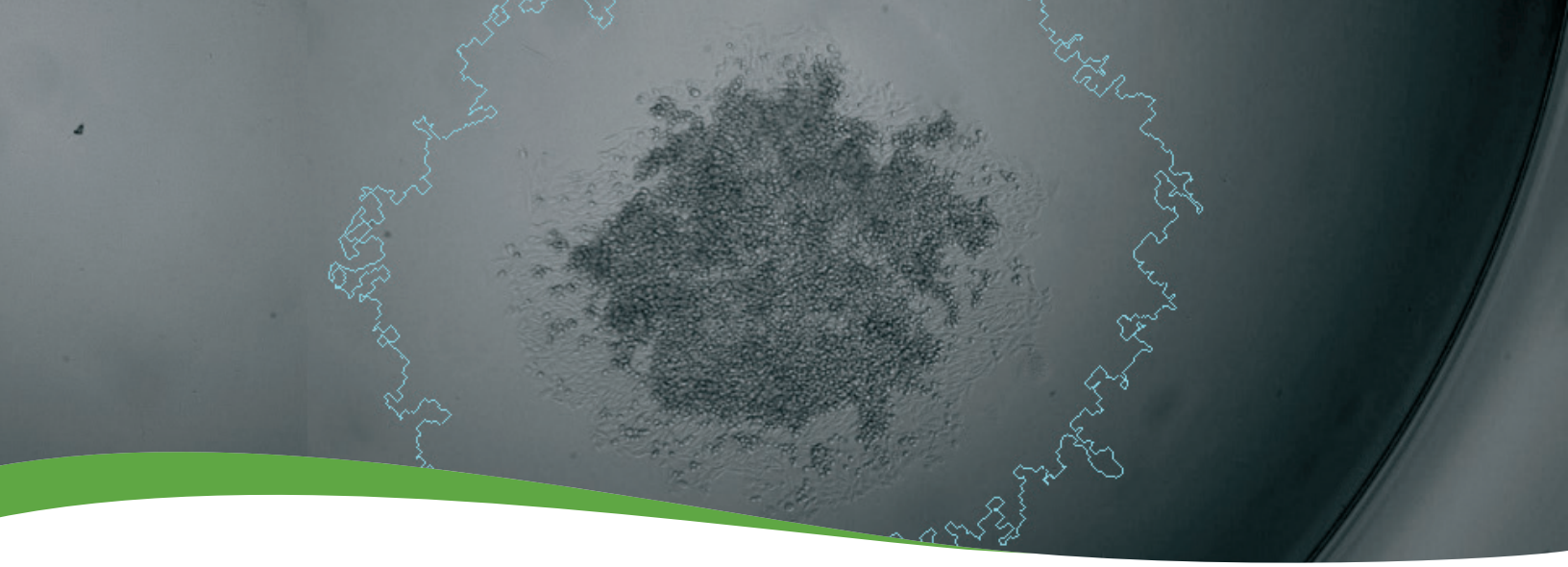
Seed one cell per well and image at any point.

- **Optimize clonal outgrowth**—The system is particularly useful for optimizing clonal outgrowth strategies when platform approaches are not suitable, e.g. when investigating new cell lines or variants
- **Diverse cell types**—Compatible with adherent or settled suspension cell types such as CHO, HEK, hybridomas, iPSCs, and many other cell types



"CloneSelect Imager has become an essential system for verification of monoclonality within our cell line development workflow."

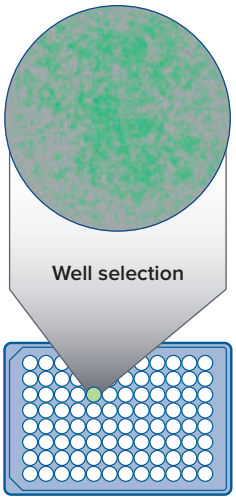
—Dr. Howard Clarke, Senior Staff Scientist in Process Development, CMC ICOS Biologics Inc., USA

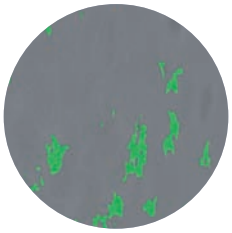


2 Analyze

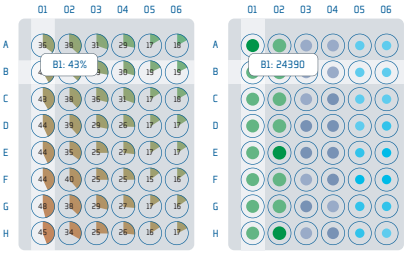
Track colony growth over time.

- Fluorescence applications

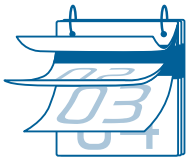




Cell distribution is highlighted by software overlay



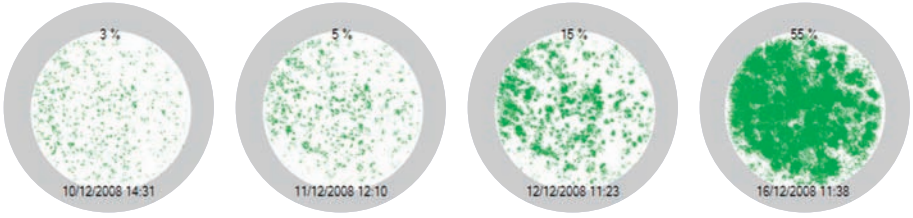
Cell confluence & cell number estimation for each well displayed



Repeated over several days

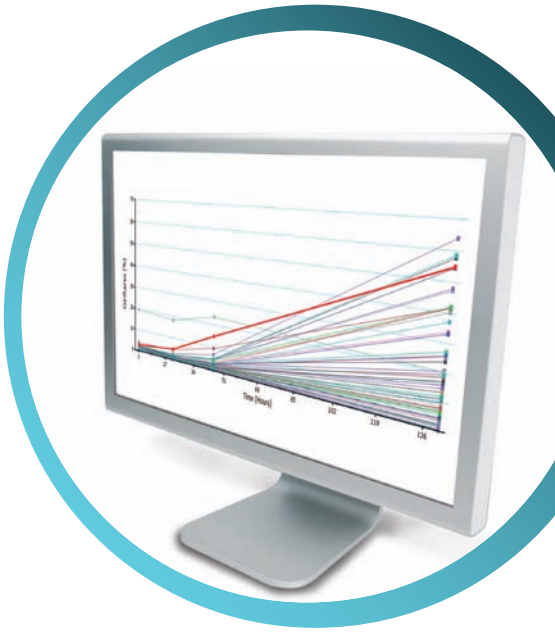
Growth curves calculated and displayed

Electronically track and store plate data: cell confluence, cell number estimation, and growth curve



3% Day 1 | 5% Day 2 | 15% Day 3 | 55% Day 7

View every growth curve in every well



Assess cell growth objectively and quantitatively

Rapid determination of the growth of cell lines is important for a number of processes, such as optimization of cell culture conditions and verification of monoclonality.

However, conventional techniques are time-consuming, subjective, and may risk interference with cell growth: Tracking cell growth in 96-well plates is challenging and labor-intensive.

Produce consistent results – in less time

Save time and produce objective, quantitative, and consistent results by using the CloneSelect Imager to overcome the challenges associated with conventional techniques.

- Growth rates accurately determined in every well of a single-well or multi-well plate
- Cell confluence and cell number estimation displayed for each well
- Growth curves calculated and displayed

NEW!

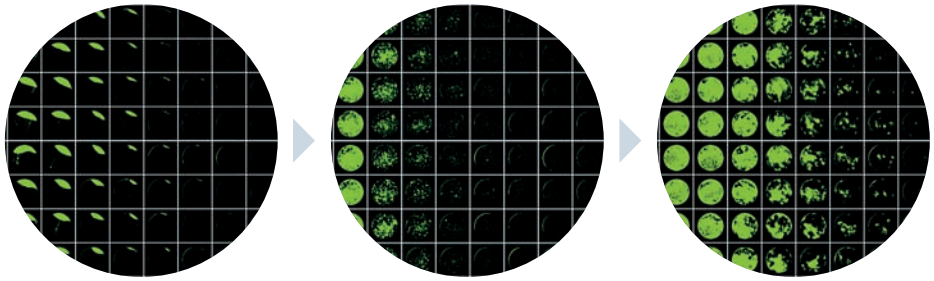
Fluorescence applications with the CloneSelect Imager FL

Perform comparative confluence assays (red vs green) to identify and verify CRISPR edits.

Multichannel fluorescence

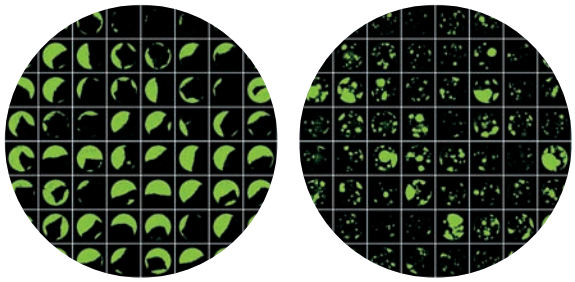
Optimize cell culture conditions

CloneSelect Imager has been used to rapidly screen culture variables to identify optimal culture conditions for low density or clonal outgrowth.

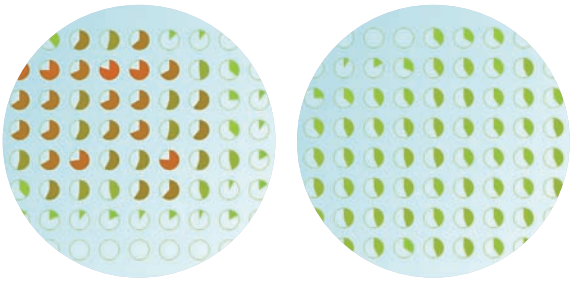


Base-case – Day 7 data

Additional information gained on cellular morphology and understanding of growth characteristics.



Identify multiple nucleation points versus “edge only” growth



Identify sub-optimal environmental conditions or “edge-effects”

Assess cell viability

Replace cumbersome colorimetric MTT assays with a non-invasive technique that enables monitoring over time.*

- Compare growth rates and colony size increase/decrease well to well
  - Track changes in cell density in response to various cellular manipulations or treatments to calculate dose response curves and IC_{50}
- Screen one microplate within three minutes
- Label-free detection, no staining required. Avoid costly colorimetric kits

*Accurate non-invasive image-based cytotoxicity assays for cultured cells, Marques-Gallego et al., BMC Biotechnology 2010, 10:43

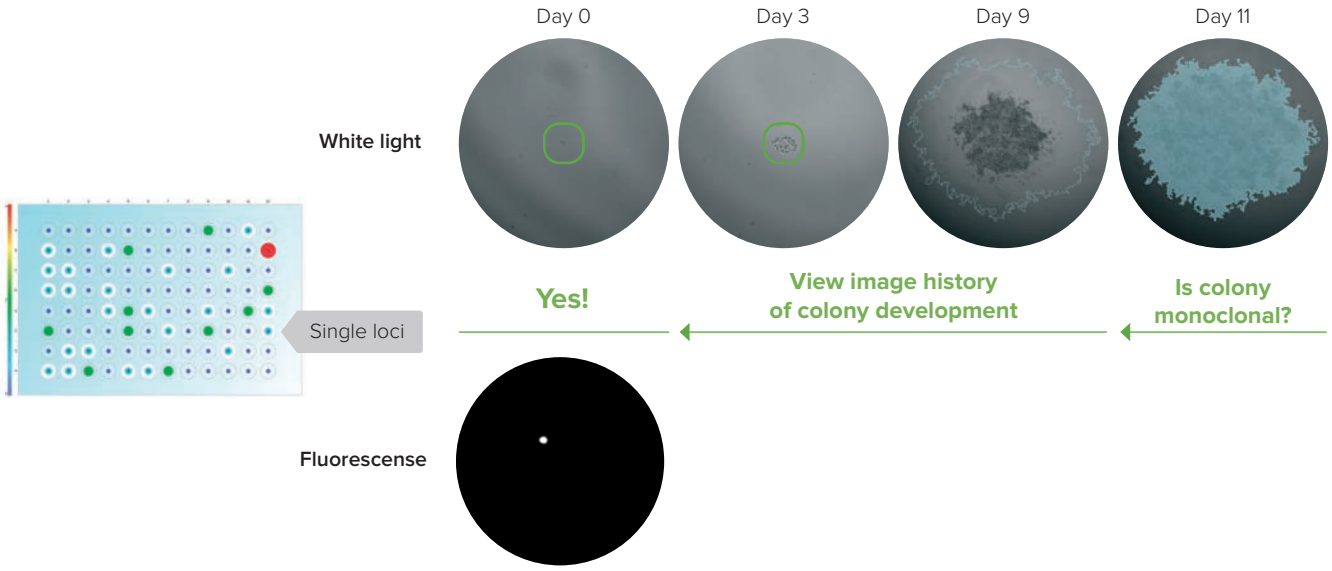
3 Report

Make confident, image-driven decisions throughout plate history

Verify monoclonality

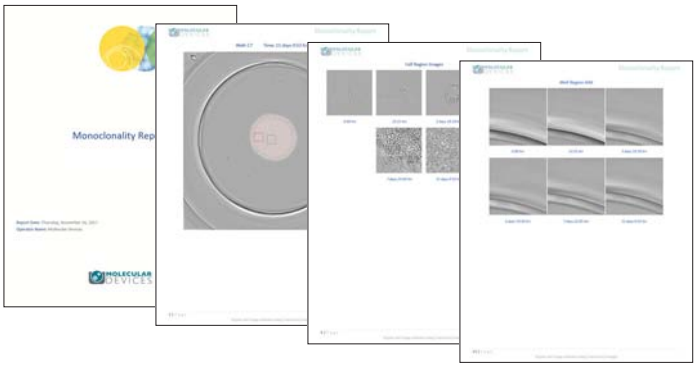
After initial seeding, CloneSelect Imager can image every well, at any time point, using a 'loci of growth' functionality to highlight those wells that contain a single colony.

- Focus on wells with a single loci of growth and view image history to verify monoclonality with the CloneSelect Imager using white light
- Automatically verify monoclonality from day zero with fluorescense on the CloneSelect Imager FL



Demonstrated IND success

With a few simple clicks, the Monoclonality Report feature on the CloneSelect Imager objectively organizes the supporting image evidence needed to establish clonality into an easily shareable report, saving researchers hours typically required to do the same process manually. The Monoclonality Report is an audit-ready document that supports filing for an Investigational New Drug (IND) Application with the FDA (21 CFR Part 312).



Example pages from the Monoclonality Report

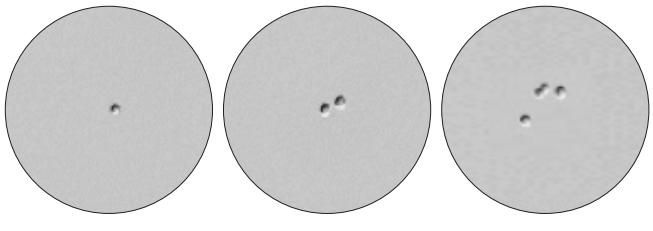
- Easily identify and select single-cell and artifact regions to include in report
- Export high-resolution images of single cells, artifacts, and entire well (optional)
- Automatically identify single cells with the CloneSelect Imager FL on day zero
- Publish Monoclonality Report in PDF or Word format

The reporting feature automatically generates the following data in a presentable format

Monitor cell line development over time

To characterize the growth from a single cell to a colony, cell regions can be designated and adjusted for each time point in a series.

Monoclonal

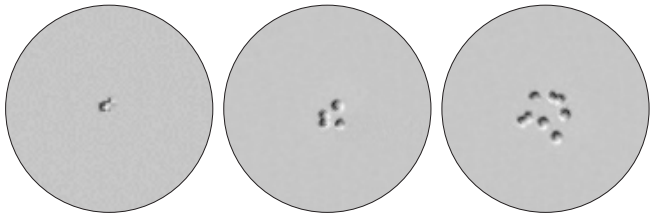


A single cell on Day 0 and two cells on Day 1 confirm monoclonality.

Not Monoclonal

Two cells are visible on Day 0, confirming that the cell line is not monoclonal.

Not Monoclonal

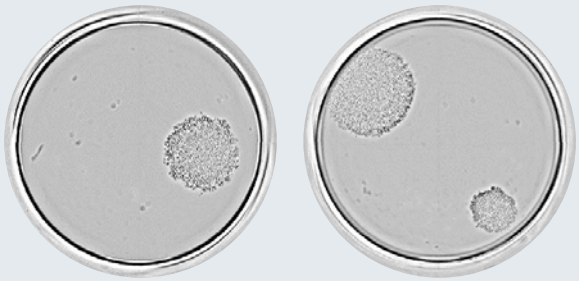


Four cells have developed on Day 1, confirming that the cell line is not monoclonal.

View entire well at final time point

Quickly determine clonality of a cell line by visually inspecting the presence of multiple colonies in a single well.

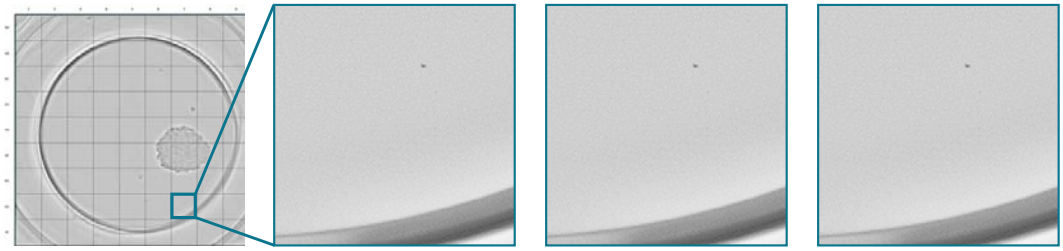
Monoclonal **Not Monoclonal**



Wells captured on Day 10. The well on the left shows one colony while the well on the right shows two colonies.

Divide an entire well into individual images

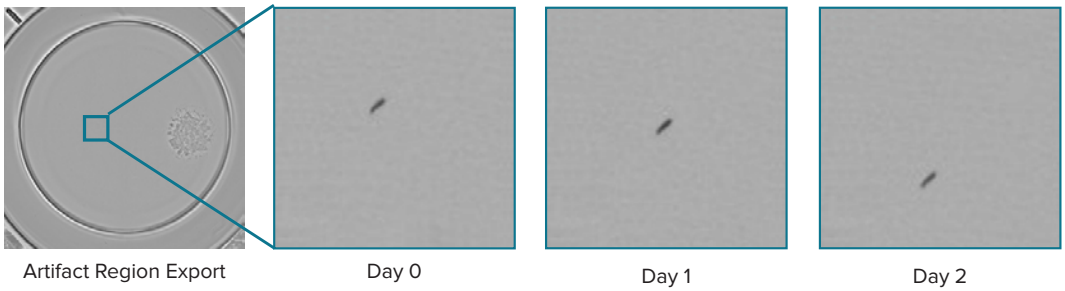
Export an entire well into 81 separate images to objectively confirm the absence of another cell.



An image of a well is divided into regions, and a selected region is displayed over time.

Highlight regions to review non-cell objects

Selectively highlight parts of a well to differentiate cells from ambiguous objects.



A selected artifact region and its corresponding images over time is shown here.

"Maximize success rate for serum-free colony outgrowth in chemically-defined media by prior optimization of growth conditions."

—**Ben Hughes**, Senior Bioprocess Engineer, NCRIS Biologics Facility,
Australian Institute for Bioengineering & Nanotechnology (AIBN), University of Queensland

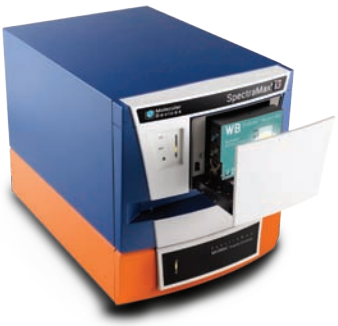
Accelerate cell line development with a range of Molecular Devices platforms

ClonePix 2 Mammlian Colony Picker

Automatically screen more clones in less time than conventional techniques, select cells with optimal expression levels, and pick colonies with accuracy with the ClonePix™ 2 System. ClonePix systems are now used in over 100 laboratories around the world to increase workflow productivity, leaving more time to better characterize target proteins and run new projects.

QPix 400 Series Microbial Colony Picker

The QPix™ 400 series of microbial colony pickers offer you the unique option to simultaneously detect colonies and quantify fluorescent markers in a prescreening step before picking. QPix systems are used worldwide in over 600 installations in research institutes, biotech, and pharmaceutical companies. QPix robotics developed a famous reputation for reliability and accuracy in sequencing centers during the Human Genome project.



SpectraMax i3x Multi-Mode Microplate Reader

The SpectraMax® i3x Multi-Mode Microplate Reader measures spectral-based absorbance, fluorescence, and luminescence with the added functionality of modular upgrades for western blot, imaging, and fast kinetics with injectors.

Automate with robotic solutions

Electronic data tracking ensures control of high-throughput processes

CloneSelect Imager integrated with robotics from Beckman Coulter
Photo courtesy of Beckman Coulter Corp., shows first generation CloneSelect Imager

Process up to 75 lidded plates in a single run
automate-it scara robot is recommended and supplied through Molecular Devices – optimized for CloneSelect Imager

Unrivalled solutions based on exceptional imaging and intelligent image analysis

Our products offer scientists unrivaled solutions that utilize imaging and intelligent image analysis to support basic research, pharmaceutical, and biotherapeutic development. The systems continue to establish industry standards in areas such as picking microbial colonies for genomic studies or screening, and selection of mammalian cell lines. Other systems use imaging platforms to monitor cell growth, evaluate cellular responses, and quantify protein production. Through our expertise in robotics, cell and molecular biology, image analysis and interpretation, and supported by a strong IP portfolio, we are committed to the continual development of innovative solutions for life science applications.

CloneSelect Imager specifications

Imaging	CloneSelect Imager	CloneSelect Imager FL
Software	Software dedicated imaging software preinstalled on a high specification PC, Microsoft Windows 10	Software dedicated imaging software preinstalled on a high specification PC, Microsoft Windows 10
Light source	White light imaging, trans-illumination Source: Xenon flash lamp (5 Watts)	White light imaging, trans-illumination Source: Xenon flash lamp (5 Watts)
	Fluorescence: No fluorescence	Multichannel fluorescence (GFP/RFP) Source: AURAIII light engine (LED)
Camera	High-resolution CMOS camera	High-resolution CMOS camera
Imaging speed	96-well microplate: 90 sec	White light: 96-well/ 384 well microplate: <2 min Fluorescence: 96-well/ 384 well microplate: <8 min
Objective	4X	4X
Resolution	Standard: 3.6 micron	High resolution: 1.8 micron Standard: 3.6 micron
Instrumentation		
Source plate type	Range of 6, 12, 24, 96 & 384-well SBS microplates	Range of 96, 384-well SBS microplates
Source plate capacity	1 x plates	1 x plates
Instrument dimensions (height x width x depth)	45.4 cm (17.9 in) X 57.4 cm (22.6 in) x 72.4 cm (28.5 in)	45.4 cm (17.9 in) x 57.4 cm (22.6 in) x 72.4 cm (28.5 in)
		External light source: 16.3 cm (6.4 in) x 12.5 cm (4.9 in) x 26.3 cm (10.8 in)
Instrument weight	45 kg (99 lbs)	45 kg (99 lbs)
		External light source is an additional 3.6 kg (8 lbs)
Regulatory approval		
Compliance	CE	CE
Quality	ISO9001:2008 certified	ISO9001:2008 certified
Automation compatibility		
API suite available for robotic integration. Please contact us for details.		

For more information, visit **www.moleculardevices.com**.

Contact Us

Phone: +1.800.635.5577
Web: www.moleculardevices.com
Email: info@moldev.com
Check our website for a current listing of worldwide distributors.

Regional Offices

USA and Canada	+1.800.635.5577	Taiwan/Hong Kong	+886.2.2656.7585
United Kingdom	+44.118.944.8000	Japan	+81.3.6362.9109
Europe*	00800.665.32860	South Korea	+82.2.3471.9531
China	+86.4008203586	India	+91.73.8661.1198

**Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Spain, Sweden and Switzerland*

1/22 1941F
Printed in USA