ImageXpress Confocal HT.ai

## High-Content Imaging System

Discover More

Eliminate the noise and discover more insights

The ImageXpress Confocal HT.ai system increases image intensities and throughput for 3D organoid and spheroid assays, revealing insights other technologies miss.

The ImageXpress® Confocal HT.ai High-Content Imaging System utilizes a seven-channel laser light source with eight imaging channels to enable highly multiplexed assays while maintaining high throughput by using shortened exposure times. Water immersion objectives improve image resolution and minimize aberrations so scientists can see deeper into thick samples.

The powerful combination of MetaXpress® software and IN Carta® software simplifies workflows for advanced phenotypic classification and 3D image analysis with machine learning capabilities and an intuitive user interface.
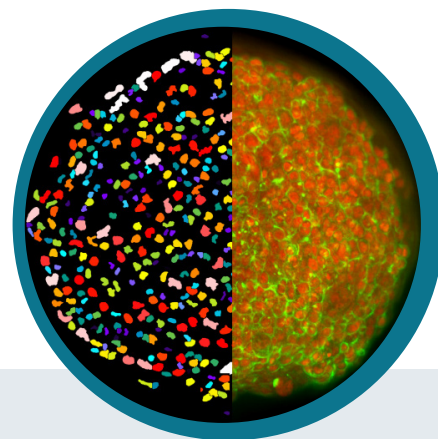
Key capabilities

- **Eight-channel, seven laser light source** generates brighter images with a higher signal compared to LED light sources, while cutting acquisition speed in half for most 3D organoid and spheroid assays.

- **Spinning disk confocal technology** reduces haze from out-of-focus light for deeper tissue penetration, resulting in sharper images with improved axial resolution.

- **Automated water immersion technology** offers up to 4X the signal for greater sensitivity and image clarity without sacrificing speed.

- **IN Carta software** utilizes Modern Machine Learning with accessible, guided workflows for high-content image analysis.

Discover more with accuracy

- AgileOptix™ spinning disk technology removes out-of-focus light and provides deeper insights into thick tissue samples

- Machine learning reduces classification error, enhancing high-throughput screening and analysis of complex models

- Quickly image and identify rare cellular and intracellular events

- Unbiased cell segmentation and phenotypic feature extraction

Discover More with accuracy

Exclusive AgileOptix spinning disk technology offers the right software-selectable configurations for your research

The ImageXpress Confocal HT.ai system features AgileOptix technology. Confocal options, including five swappable disk geometries and seven laser excitation channels, make it easy to select and configure the system to ensure the best results for a specific assay. Intelligently designed optics provide increased sensitivity with high-powered lasers, and a sCMOS sensor.

Eight imaging channels

- DAPI
- CFP
- FITC
- YFP
- TRITC
- TexasRed
- Cy5
- Cy7
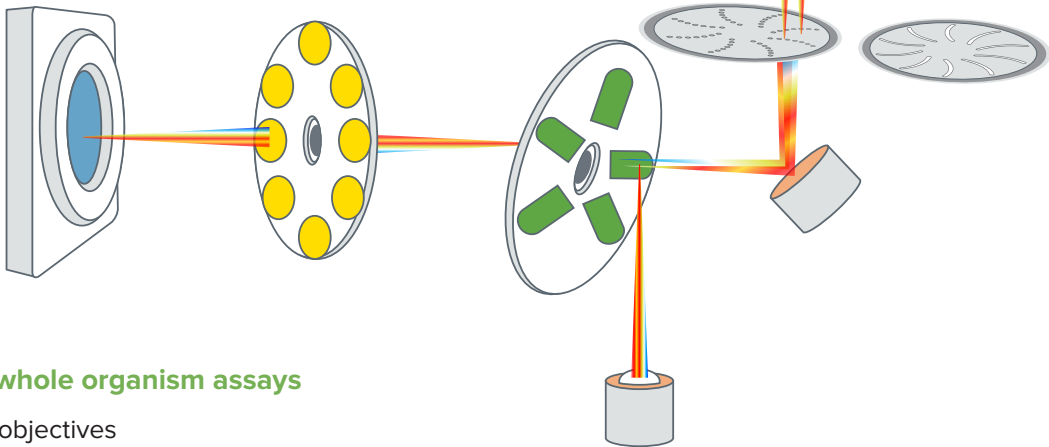
### Supports subcellular through whole organism assays

- Widest selection (> 25) of objectives
- Oil objectives with up to 1.4 NA
- Air objectives with up to 0.95 NA
- Water objectives with up to 1.2 NA

Select a spinning disk confocal geometry matched to specific assay requirements.*

Spinning disk geometry	60 μm pinhole (single disk)	60 μm disk and 50 μm slit disk (dual disk)	60 μm disk and 42 μm pinhole disk (dual disk)
High-sensitivity detection	•	•	•
Fast acquisition	•	•	•
>3 log dynamic range**	•	•	•
Widefield mode for flat biology	•	•	•
Most confocal applications	•	•	•
Highest resolution imaging			•
High-throughput applications		•	

*Two additional geometries available for customers imaging thick samples with laser illumination.
**Powered by our highly responsive sCMOS sensor.
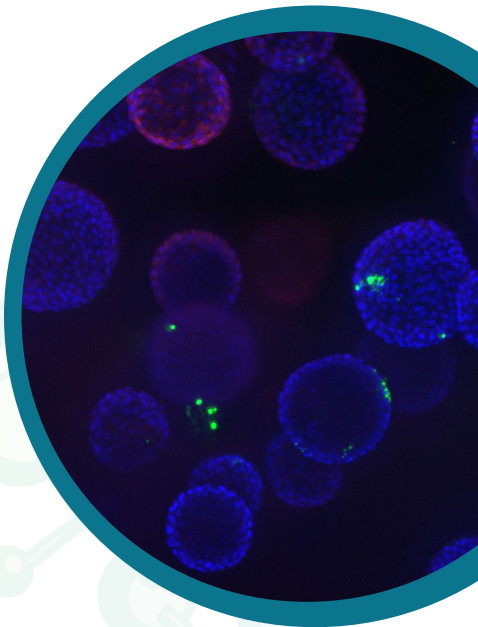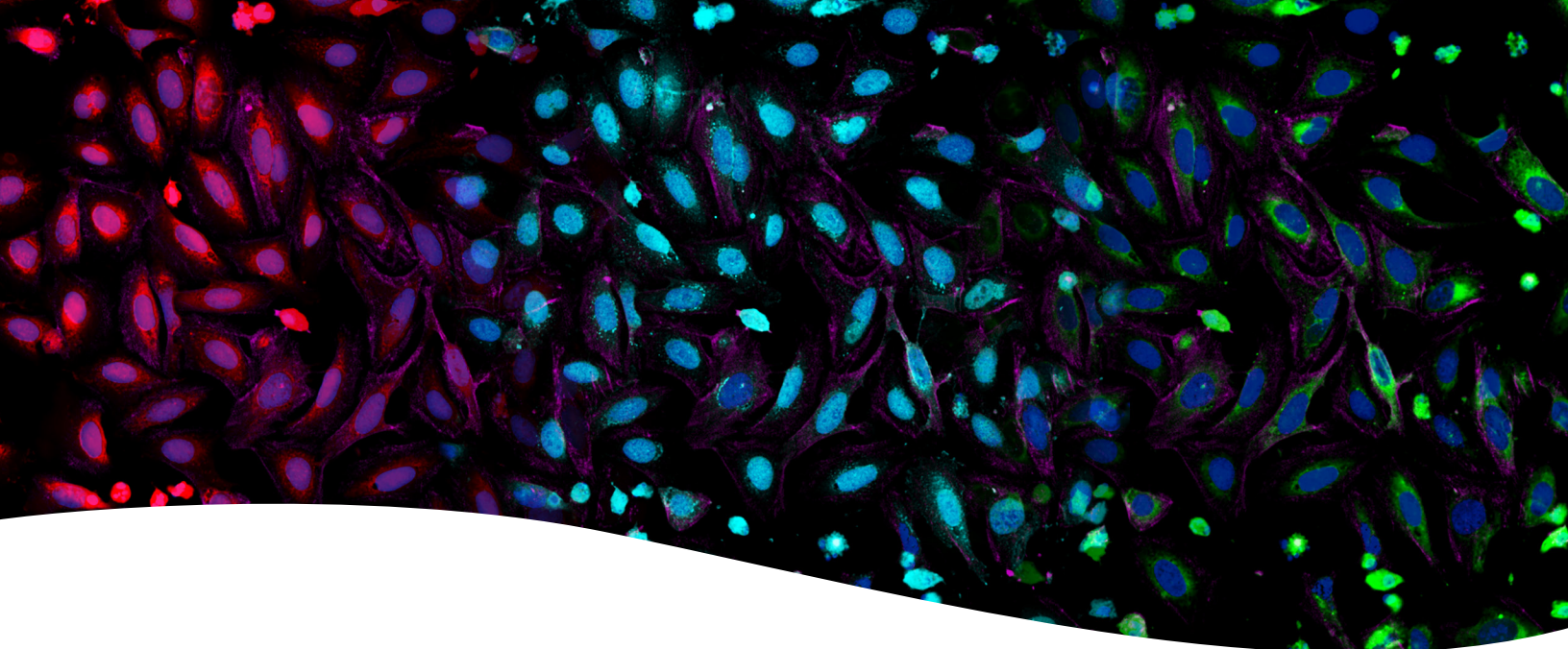
Features

High-intensity laser light source
High-performance laser excitation with seven laser lines and eight filter combinations increase multiplexing flexibility.

Large field of view
Large field of view enables whole-well imaging and eliminates missed targets. New dual micro-lens spinning disk confocal technology with enhanced field uniformity provides a large, flat field of view for more accurate and reproducible analysis

IN Carta Image Analysis Software
Leverages deep learning image analysis and machine learning data classification to improve the accuracy and robustness of high-content assays. Delivers data insights that traditional analysis methods may miss. Reduces the complexity of building an image analysis pipeline with intuitive guided workflows in a modern user interface.

Automated water immersion objective technology
Offers greater image resolution and sensitivity with up to 4x increase in signal leading to lower exposure times.

Accurate 3D measurements
IN Carta Custom Module Editor 3D application is optimized for confocal imaging, enabling 3D measurements of volume and distance.

Exclusive AgileOptix spinning disk technology
Provides increased sensitivity with specially designed optics, high-powered laser excitation, and sCMOS sensor. Swappable disk geometries provide flexibility between speed and resolution.

Multiple imaging modes
The system offers phase contrast and brightfield label-free imaging, fluorescence, widefield, and confocal imaging with water immersion optics as a standard option.

Wide dynamic range
Quantifies low and high intensity signals in a single image with >3 log dynamic range intensity detection.

# *Discover More* with flexibility

More relevant results with 3D assay models into complex biology

QuickID targeted acquisition

QuickID does the sorting by targeting objects of interest or rare events at low magnification, then automatically imaging them in high magnification. It has the flexibility to acquire images in all types of formats and sizes, and it can scale alongside evolving research needs.
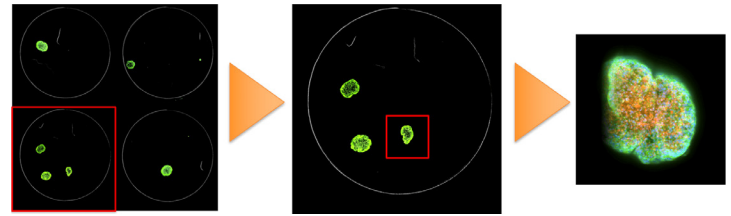
QuickID was used to streamline spheroid image acquisition. An image acquired at low magnification to view the entire well in one field-of-view was used to identify objects for automatic re-imaging at higher magnification using three wavelengths across multiple Z planes.


widefield

confocal
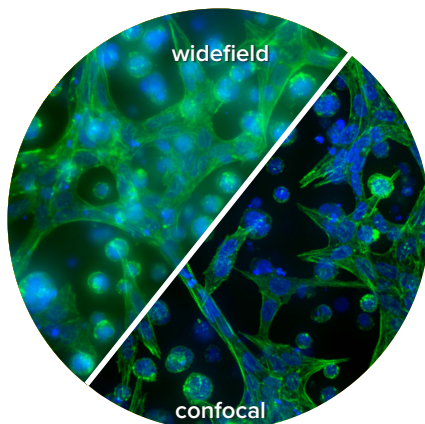
Cell stained for nuclei and actin growing in a 3D gel. Projection image of seven planes acquired with a 40X Plan Apo objective.

Complex, 3D cellular models yield more predictive, physiologically relevant results versus monocultures or other 2D cellular models. Explore the complexities of these models faster and gain better results even in samples grown in a thick extracellular matrices using the ImageXpress Confocal HT.ai system. It offers flexible options to meet specific research needs and ensures the best images for assays. Get more insight into 3D cells with options like water immersion. Water Immersion objectives can improve signal up to four times while decreasing aberrations when imaging deep into samples providing better image and data quality.

Clearer images and improved quantitative screening for:

- Spheroids
- Thick tissue samples
- Organoids
- Cell painting
- Zebrafish and *C. elegans*
- Homogenous no-wash assays
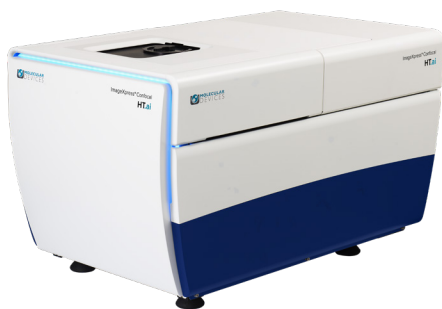
Turnkey, high-throughput long term kinetics

Quickly and easily scale up 3D drug discovery with the ImageXpress Confocal HT.ai system. It can be used to accurately monitor organoid growth and cell kinetics using transmitted light and a variety of fluorescent cell markers. Environmental control of humidity, CO_2 levels, and temperature keep cells thriving for timelapse experiments running from minutes to several days.
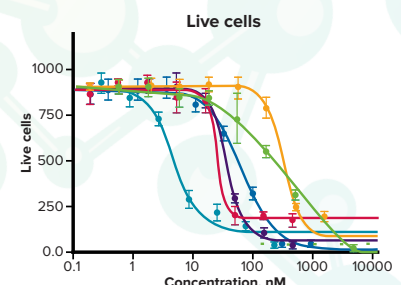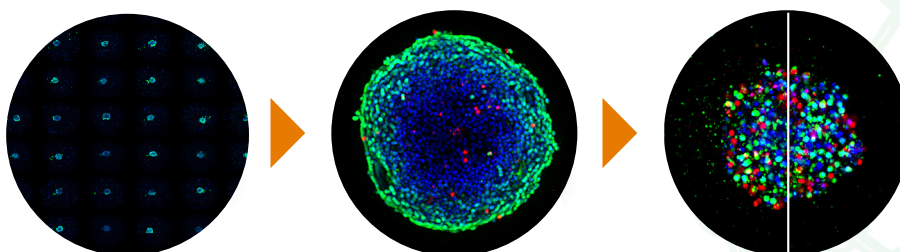
Spheroids in round bottom plates. Dose–dependent effects of selected compounds. Image montage of the 384 plate. Entire spheroid is captured with one image, example segmentation of spheroid, and 4-parametric curve fits for the number of live cells in spheroids.

Discover More with efficiency

Complete solution for screening highly complex biological questions with seamless workflows

Enjoy the benefits of a streamlined high-content screening (HCS) workflow in a fully integrated environment with our complete imaging solution for highly complex biological questions.

DISCOVER MORE

Acquire

MetaXpress® High-Content Image Acquisition and Analysis Software powers the ImageXpress Confocal HT.ai system, providing precise control over image acquisition and analysis, all within a unified interface.

- Laser-based and software configurable image-based auto-focusing system ensures robust focus across a range of sample types

- Acquisition of live cell images in 2D and 3D enables monitoring of cell growth, death, differentiation, and migration; viral or bacterial invasion, cancer metastasis, chemotaxis, drug toxicity, or translocation
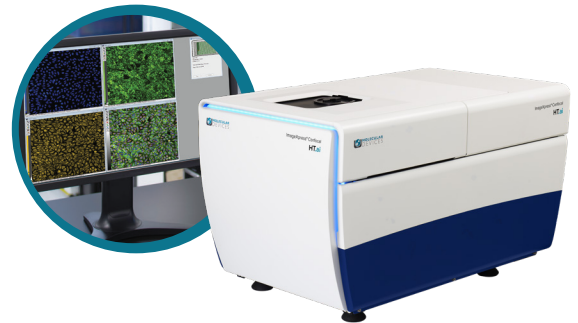
ImageXpress Confocal HT.ai High-Content Imaging System

Analyze

IN Carta® Image Analysis Software solves complex image analysis problems utilizing advanced Artificial Intelligence (AI) transforming images into results, which can be interpreted with ease. User-friendly workflows help you get answers faster from 2D, 3D, and 4D experiments.

- Guided workflows and scalable batch processing increase productivity and reduce time to answer. Analyses can be set up quickly and analysis of multiple wells is run in parallel.

- Machine learning helps you leverage more information and increase accuracy in the analysis of high-content screening data to enable new discoveries with confidence.

- Modern user experience and cutting-edge technology minimizes the software learning curve and removes barriers to productivity.
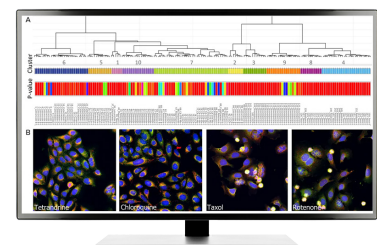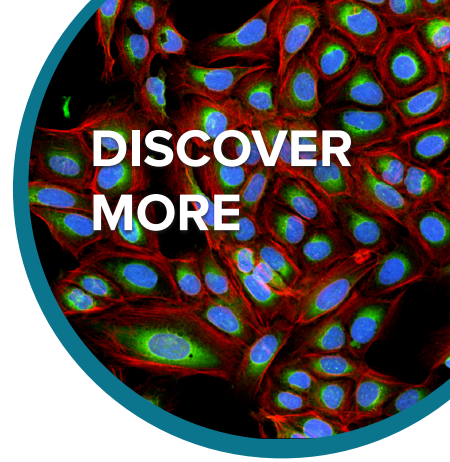

IN Carta Image Analysis Software

Explore

StratoMineR™ software from Core Life Analytics helps biologists analyze the complex data derived from high-content image analysis. A powerful, intuitive workflow allows users to port data analyzed inside IN Carta® Image Analysis Software directly into StratoMineR where it can be used to generate rich phenotypic profiles using advanced data mining methods, and explore them with interactive visualizations.

- Intuitive analytics workflow without any coding required.

- Use all of your high-content data to discover novel phenotypes.

- Build your own AI models to discover the drugs of tomorrow.

StratoMineR Software
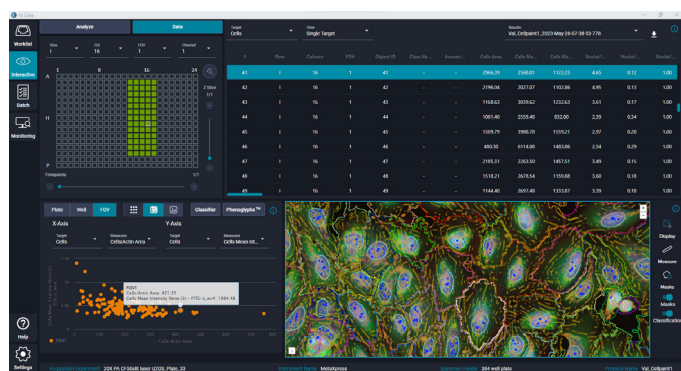
IN Carta Image Analysis Software features

Provides robust, quantitative results from complex biological images and datasets

Deep learning
Improve specificity of your image analysis workflows by utilizing the SINAP module. SINAP relies on deep learning-based image analysis, resulting in robust segmentation for virtually any biological structure.

3D analysis
The Custom Module Editor's 3D application provides unprecedented flexibility in segmenting complex biological structures. Image datasets can be acquired in 3D or 4D (timelapse 3D) and tailored image analysis routines can be developed within a guided workflow.

AI-powered data analytics
Leverage the power of machine learning without being a data scientist. Identify and quantify phenotypic changes in a user-friendly workflow. Explore your data and reveal insights from complex datasets. Find novel and unexpected phenotypes with a few mouse clicks.

Customization
Create image analysis protocols of different complexity and add on-demand data classification. Visualize analysis results using 360° data linking among images, data table and charts.

Results review of cell painting image analysis pipeline.
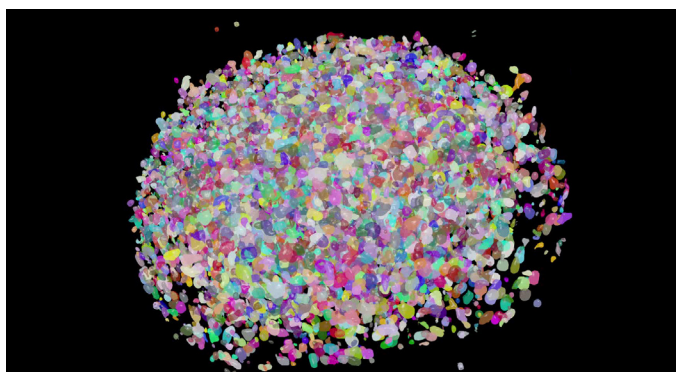
Example segmentation of HCT116 cells forming a spheroid segmented in Custom Module Editor 3D and visualized in 3D viewer.

StratoMineR features

An intuitive and powerful platform for phenotypic profiling

Phenotypic characterization
Gain Insights into the mechanisms of action of novel compounds and small molecules.
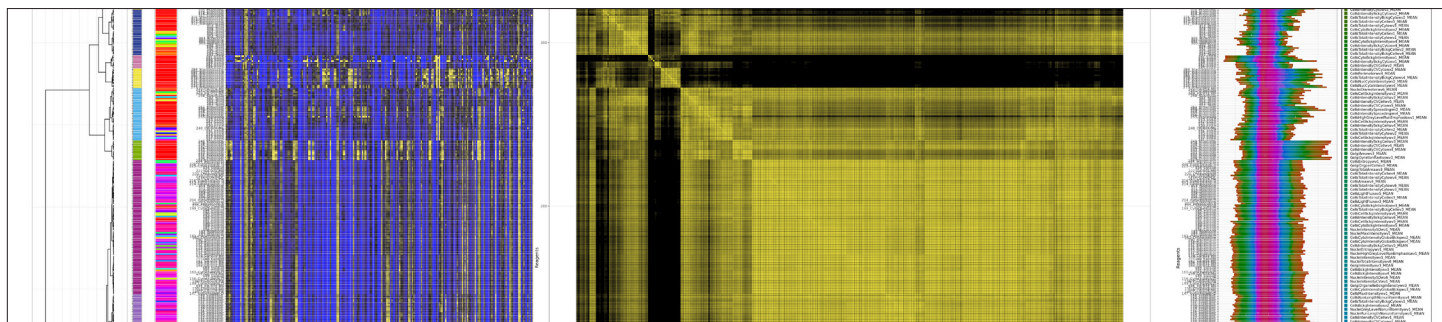
Artificial Intelligence
Machine learning models can be applied to leverage AI technology in data analytics.

Reduced data complexity
Data reduction decreases complexity and increases focus on key biological interactions.

Quality control
Use built-in data visualization tools for quick assessment of data quality and remove outliers.

Specifications

System

- High-speed laser autofocus with integrated image autofocus option

- Linear encoded voice coil driven X, Y, and Z stages with better than 25 nm resolution

- 4-position automated objective changer*

- 5-position software selectable dichroic filter wheel

- 8-position software selectable emission filter wheel*

- Sample compatibility: slides and one to 1536-well microplates, round or flat bottom, low to high profile

*User changeable

AgileOptix optical path

- AgileOptix technology enables the ImageXpress Confocal HT.ai system to deliver the sensitivity and throughput needed for demanding applications by combining a powerful laser light source, high-quantum efficiency 16-bit, >4 megapixel scientific CMOS sensor, and selectable confocal geometries

- Large field of view (1.96 mm^2 at 10X) imaging maximizes collection of publication-quality images and statistically relevant data

- >3 log dynamic range is available in both widefield and confocal modes

- Confocal can be purchased in one of the following three configurations:

  - Single-disk configuration with 60 μm confocal pinhole and widefield modes

  - High-throughput dual disk configuration with 60 μm confocal pinhole, unique and exclusive 50 μm slit confocal and widefield modes

  - High-resolution dual disk configuration with 60 μm and 42 μm confocal pinholes and widefield modes

- High-intensity seven channel laser illumination from 405 nm to 730 nm

Option	Feature
Water Immersion Objectives	• 20X, 40X, and 60X (up to 1.2 NA) • Increase signal up to 4X for brighter intensity at lower exposure times • Increase in penetration depths dependent on sample • Improve Z-resolution and decrease optical aberrations • Auto water replenishment enables screening or imaging across a plate
Environmental Control	• Multi-day, live cell time-lapse imaging • Provides appropriate atmospheric conditions (e.g. 5% or 10% CO_2) • Mimics physiological environment (30–40 °C ± 0.5 °C) • Controls humidity and minimizes evaporation (0.5 μL/well/hour for 96- or 384-well formats)
Phase Contrast	• High contrast imaging where unstained cells are easily viewed or separated from background (4X–60X) • Ideal for non-fluorescent histochemically stained samples • Nikon 100W Pillar Diascopic Illuminator with TE-C ELWD Condenser • 0.3 NA with 65 mm WD and PhL, Ph1, and Ph2 selectable phase rings • Fluorophore-independent morphology visualization with fluorescent imaging overlay

Note: all options, filters, and objectives are available at point of sale or as after market upgrades. Configurations shown herein do not encompass all configurations available. Contact your sales and support team today to identify the system configuration most suitable for your applications.