![Molecular Devices logo](MOLECULAR DEVICES)

ImageXpress HCS.ai

High-Content Screening System

Deeper insights for every lab

The **ImageXpress® HCS.ai High-Content Screening System** captures your imagination with high-quality imaging and analysis, enabling you to acquire the data you need with ease. The system is configurable to match your requirements and can be upgraded as your research needs evolve. Empower your team to obtain high-definition images and robust data from a wide range of 2D and 3D cell assays, and leverage the power of AI for deeper insights.

Key capabilities

Adapt to future lab needs with easy, cost-effective, on-site upgrades, protecting your initial investment.

Capture exceptional detail in 2D and 3D biological models with swappable spinning disks, optimized pinhole deep tissue disks, and advanced water immersion objectives.

Get clearer images faster with a highly sensitive 95% peak quantum efficiency sCMOS camera.

Streamline complex workflows with the upgraded MetaXpress® Acquire software, accessing robust and insightful data tailored to your needs.

Gain deeper insights with AI-powered IN Carta® Image Analysis Software and the ability to train your own deep learning models within minutes.

Go from image acquisition to data analysis all in a single platform.

Modular and intuitive for optimal versatility

The **ImageXpress® HCS.ai system** features a modular design, a wide array of configuration options and an intuitive acquisition software, enabling you to easily meet both current and future needs.

Future proof your initial investment

The modular design enables additional capabilities to be easily added to your system as your research needs change, eliminating the need to purchase a new solution. Almost all upgrades can be done on-site by our expert technicians, reducing downtime and cost.

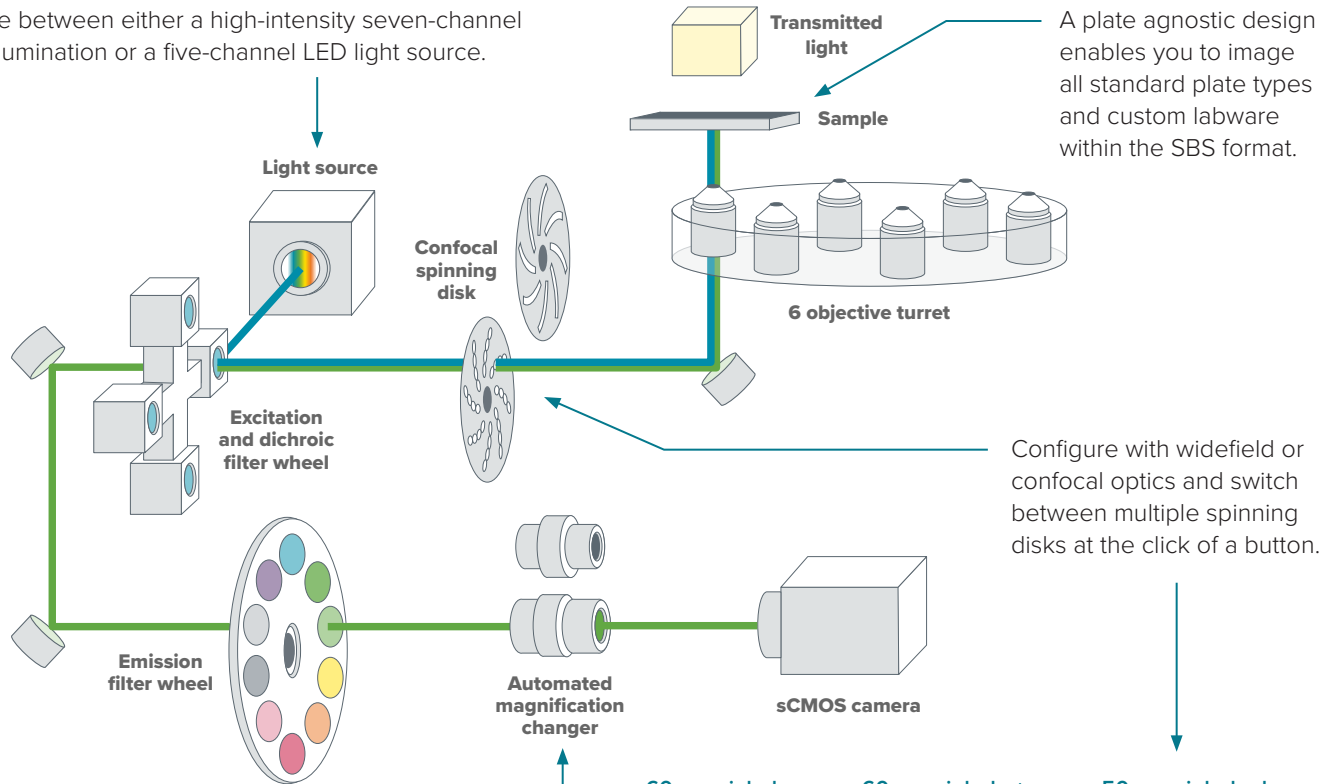| ImageXpress HCS.ai WIDEFIELD	ImageXpress HCS.ai CONFOCAL	ImageXpress HCS.ai ADVANCED
Widefield capability		
2X–60X high NA and 20X–60X ELWD objective options plus a magnification changer option (1X and 1.5X)		
LED illumination, 5 color LED (up to 220 mW per channel)		Laser illumination, 7 color laser (up to 800 mW per channel)
DAPI, FITC, TRITC, TxRed, Cy5 (+ CFP, YFP as optional)		DAPI, CFP, FITC, YFP, TRITC, TxRed, Cy5, Cy7
	Standard spinning disk confocal 60 μm pinhole (single), 60 μm pinhole + 50 μm slit (dual)	
		Deep tissue spinning disk 50 μm pinhole high resolution and high-sensitivity disk (dual)
Water immersion option (20X–60X)		
Environmental control option (temperature, humidity, CO_2, O_2)		

Upgradable modular design

Easily configure to meet your needs

The ImageXpress® HCS.ai system can be easily configured to meet your exact assay requirements, allowing you to perform a vast range of assays in a single solution. Benefit from up to 12 effective magnifications in a single system, and AgileOptix™ technology which offers a combination of a powerful solid-state light engine, custom optics, scientific CMOS sensor, and the ability to change between different disk geometries.

Choose between either a high-intensity seven-channel laser illumination or a five-channel LED light source.

Transmitted light

Sample

A plate agnostic design enables you to image all standard plate types and custom labware within the SBS format.

Light source

Confocal spinning disk

6 objective turret

Excitation and dichroic filter wheel

Configure with widefield or confocal optics and switch between multiple spinning disks at the click of a button.

Emission filter wheel

Automated magnification changer

sCMOS camera

An automated magnification changer allows you to have up to 12 effective magnifications in one system, including four water immersion magnification options.

60 µm pinhole (single disk)	60 µm pinhole + 50 µm slit (dual disk)	50 µm pinhole deep tissue (dual disk)
Standard disk: great for a wide variety of 2D and 3D applications	Standard pinhole disk paired with a slit disk: optimized for fast screening	Smaller pinhole, optimized for higher signal or deeper sectioning

Streamline imaging workflows with intuitive, easy-to-use acquisition software

The simplified and upgraded **MetaXpress® Acquire** acquisition package streamlines complex workflows. New users can get started quickly, whereas advanced users can leverage its flexibility to create optimized protocols.

High quality images and superior data analysis for deeper insights

Perform a vast range of assays on more physiologically relevant cell models and unlock deeper insights to maximize research outcomes.

Acquire high-quality images across a vast range of assay types

- Get crystal-clear images faster with a highly sensitive 95% peak quantum efficiency sCMOS camera
- Achieve rich, multiparametric datasets with seven-channel laser illumination including near infrared excitation – ideal for multiplexed phenotypic profiling
- Easily image and segment live, unstained cells with high-contrast transmitted light illumination
- Perform long-term live-cell experiments with precise control over temperature, humidity, CO_2 and O_2 levels with the environmental control option

Obtain exceptional image quality from your 3D samples

- Swappable spinning disk geometries with our proprietary AgileOptix™ technology, enables optimization for your specific assay
- Optimized 50 µm pinhole deep tissue disk for a high signal-to-noise ratio provides crisp images from thicker samples
- Advanced water immersion objectives provides up to 90X magnification and delivers as much as four times greater signal intensity while minimizing optical aberrations


Image acquired with 60 µm pinhole confocal disk

Image acquired with 50 µm pinhole deep tissue disk

## Unlock new discoveries from complex datasets with AI-powered IN Carta® Image Analysis Software

- Leverage machine learning-enabled object classification to enrich your high-content data analysis. Extract valuable insights from hundreds of measurements per cell, enabling you to answer challenging biological questions and make new discoveries.
- Reliably detect and analyze 3D structures with true volumetric analysis of cell models to extract actionable data from your 3D models
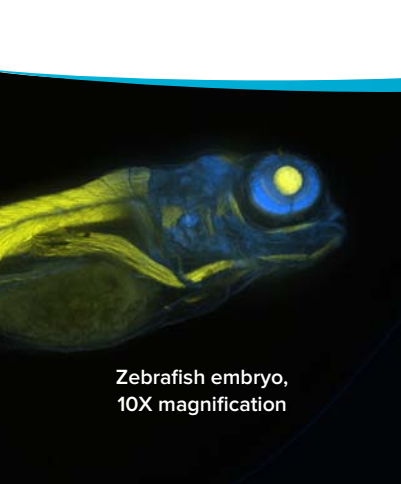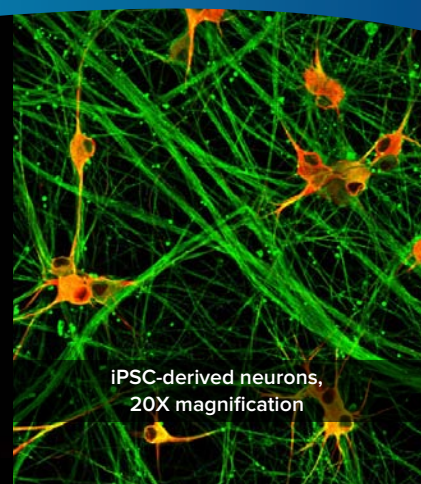

Zebrafish embryo, 10X magnification
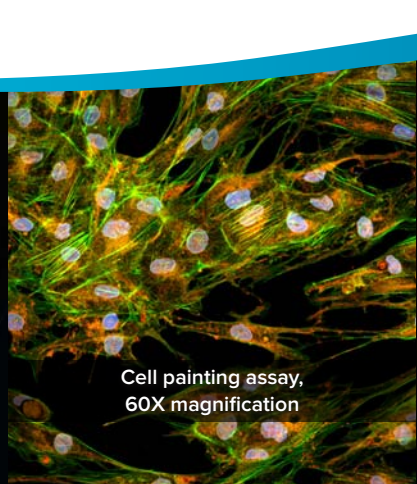
Cell painting assay, 60X magnification
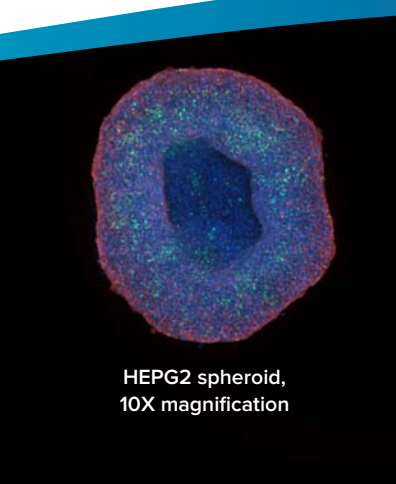
HEPG2 spheroid, 10X magnification

iPSC-derived neurons, 20X magnification

Faster acquisition for accelerated high-throughput workflows

Boost lab productivity by imaging more plates in less time. Simplify the learning curve for new users and integrate easily into automated workflows for faster, more reliable results.

Image more plates in less time and accelerate throughput

- Image an entire 96-well plate with two channels in under 90 seconds* or a 384-well plate for 3D volumetric analysis within 25 minutes**
- Easily integrate your ImageXpress HCS.ai system within an automated workflow thanks to a new, automation-friendly design
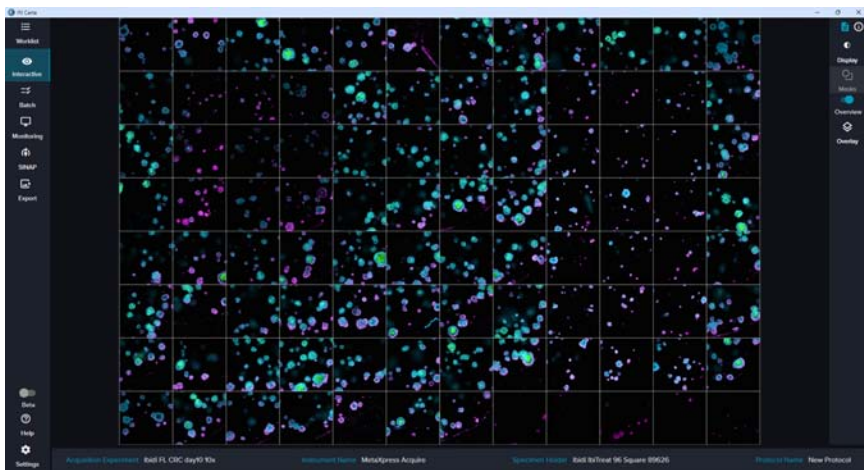
Multiplexed high-throughput screening of 3D colorectal cancer organoids

Get started sooner and boost confidence in your results
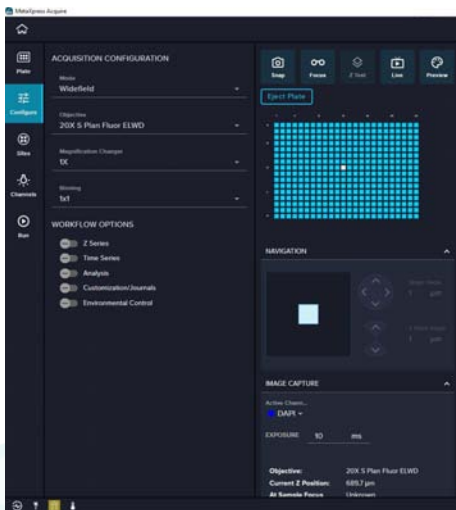
- Get started sooner, reduce training time from days to hours, and minimize error with the redesigned interface and guided workflows of the MetaXpress® Acquire software
- Collaborate easily in multi-user environments and benefit from faster data transfer with a new file-based storage structure

* 2D acquisition: 96-well, 1 FOV, 1 plane, DAPI (14ms), FITC (10ms)
** 3D acquisition: 384-well, 1 FOV, 15 planes, DAPI (10ms), FITC (10ms)

## QuickID Targeted Acquisition enables you to quickly identify regions of interest

QuickID Targeted Acquisition identifies objects or events of interest at low magnification and automatically images at a higher magnification.

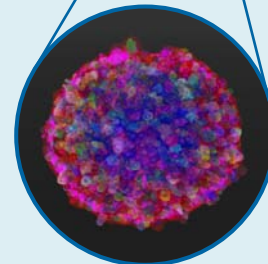Train your system to recognize objects of interest with IN Carta deep-learning segmentation.
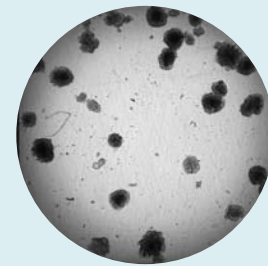
Preview acquisition
Create an acquisition at a lower magnification
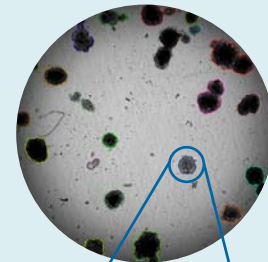
IN Carta analysis
Identify objects of interest

Targeted acquisition
Re-acquire with optimized settings at a higher magnification
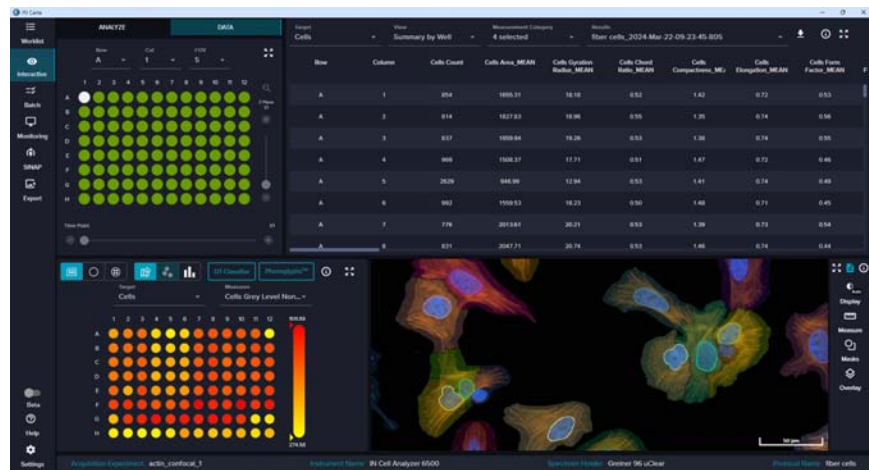
Advanced AI for accurate image analysis

IN Carta® Image Analysis Software, powered by machine learning, delivers robust insights from challenging assays, making advanced analysis accessible to every scientist. Seamless integration with the MetaXpress Acquire software enables a single, streamlined workflow from image acquisition to data analysis and insights.
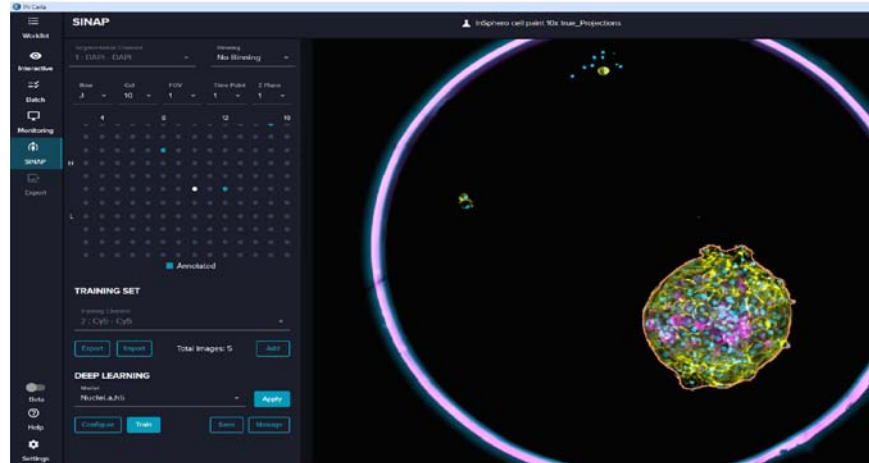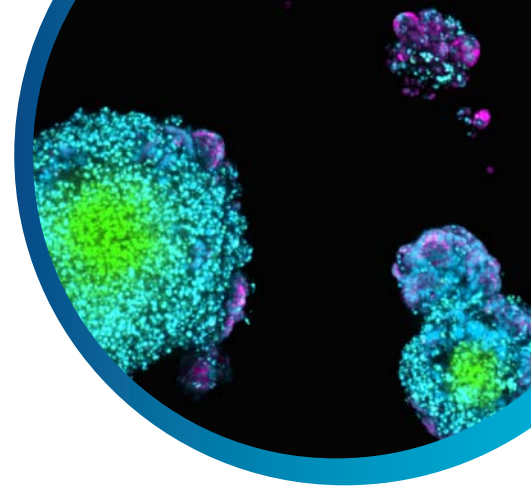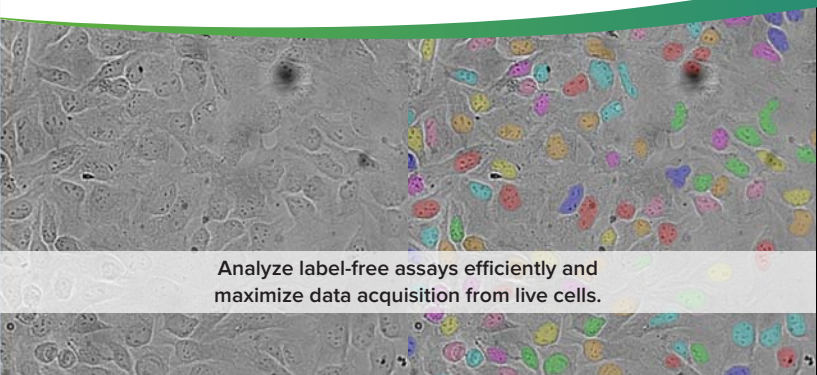

Easily train your own deep learning algorithms in just a few clicks – and reuse whenever you need them.

Use IN Carta software to visualize your results for quicker insights.

## Obtain robust, quantitative results from complex images and datasets – with minimal training

- Enhance efficiency, shorten the learning curve and minimize the time needed to get actionable data with guided workflows and batch- and automatic-processing

- Easily extract features from challenging samples such as label-free cells or 3D structures with deep learning algorithms

- Benefit from unbiased target detection and minimize human error with the Segmentation-Is-Not-A-Problem (SINAP) module

- Train your own AI deep-learning models in minutes, removing a key bottleneck in the image analysis workflow

Analyze label-free assays efficiently and maximize data acquisition from live cells.
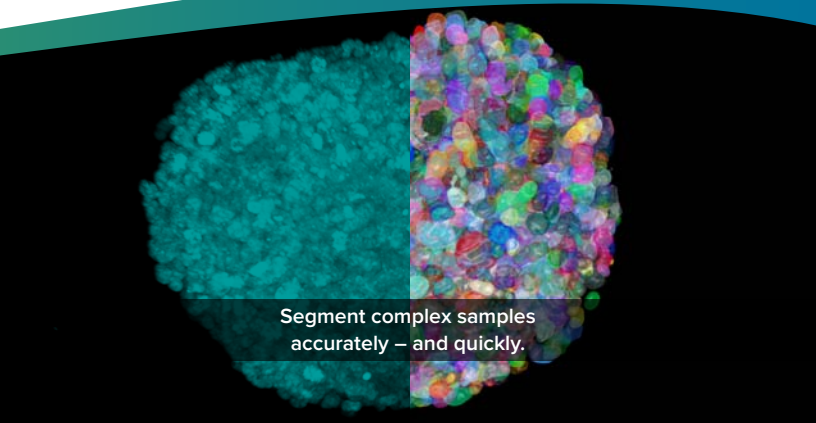
Segment complex samples accurately – and quickly.

Specifications

ImageXpress® HCS.ai system

Focus	• High-speed hardware autofocus with multi-surface detection • Integrated image autofocus option
Camera	• >5 mega pixel sCMOS sensor with large sensor size ($224mm^2$) • >3 log dynamic range with 16-bit detector, 95% peak quantum efficiency
Stage	Linear encoded voice coil driven X, Y, and Z stages with better than 25 nm resolution
Filters	• 4-position software selectable excitation and dichroic filter wheel • 10-position software selectable emission filter wheel
Transmitted light	High-contrast imaging where unstained cells are easily viewed or separated from background
Objectives	• 6-position automated objective changer • High NA air objectives: 2X–60X (up to 0.9 NA) • Extra long working distance objectives 20X–60X (up to 0.7 NA)
Sample compatibility	Microplates (1–1536 wells), round or flat bottom, low to high profile, slide holder

Options (all models)

Magnification changer (optional)	• 1X (standard) and 1.5X modifies objective capability: to provide 2X–90X magnification • Automated switching with software control
Water immersion (optional)	• 20X, 40X, 60X objectives available (up to 1.2 NA) • Increase signal up to four times 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

Options (all models)

Environmental Control (optional)	• Multi-day, live cell time-lapse imaging • Controls for appropriate atmospheric conditions • Temperature: heating up to 40°C • Integrated gas mixer: CO_2 (0–15%), O_2 (1–21%) • Controls humidity and minimizes evaporation (0.5 µL/well/hour for 96- or 384-well formats) • Robot-friendly loading design

Acquisition — MetaXpress® Acquire software

Digital Confocal	2D real-time deconvolution technology
Quick ID Targeted Acquisition	Use 2–step acquisitions to identify and selectively image objects of interest
MetaXpress Developer	Utilize journal macro capability for advanced customization
Output data format	16-bit TIFF image files format with folder-based storage management

Analysis — IN Carta® software

SINAP	• Deep-learning segmentation analysis tool • Train custom AI models for segmentation • Link segmentation in 3D to perform volumetric analyses
Phenoglyphs™	• Machine learning object classification • Leverage hundreds of measurements to classify identified objects
Custom Module Editor	Analysis toolbox with wide variety of functions to build analyses for 2D and 3D assays
3D Viewer	Visualize 3D datasets and analysis masks with an immersive viewing tool

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.

Discover how the ImageXpress HCS.ai High-Content Screening System can accelerate your research today. Contact our expert team to learn more.
molecptowardslardevices.com/imagexpress-hcs-ai

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