

# QPix colony picking series

High-throughput, automated colony picking and screening with data management



## Colony pickers that do more

QPix® systems earned a well-deserved reputation for performance and reliability during the race to sequence the human genome with the Human Genome Project, and continues to support important areas of research. Discover why research institutes, sequencing facilities, biotech, and pharmaceutical companies worldwide use over 600 QPix systems every day.

Modular integration with **automation and robotics for increased throughput**

**Flexible bed setup** allows the use of multiple formats of source and destination plates

Barcode reader provides **reliable traceability of data**

Automated plate de-lidding **maintains sterility**

Objective software data analysis and database integration **allow clear and concise record of experimental data**



Acoustic sensors detect agar height, helping high-precision robotics to **pick single colonies gently and accurately**

Organism-specific, interchangeable picking heads offer flexibility to **handle multiple organisms**

Wash baths and halogen heat sterilization **eliminate cross-contamination among pins**

Get the highest level of flexibility in application and experimental design with the QPix HT System.

## Key benefits of automated colony picking

- Screen and pick microbial colonies
- Pick 3,000 colonies per hour
- Get up and running quickly with easy-to-use, application driven software interface
- Future-proof your investment with a modular design that's automation compatible
- Track comprehensive data from start to finish
- Do more than just colony picking—plate replication, cherry picking, plating and streaking

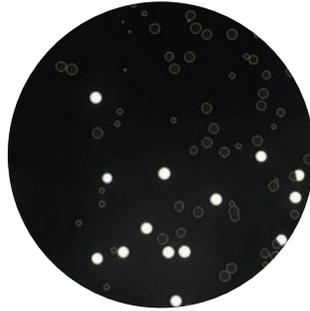
# Accelerate objective, quantitative colony selection

## Develop constructs or target proteins for protein expression more efficiently

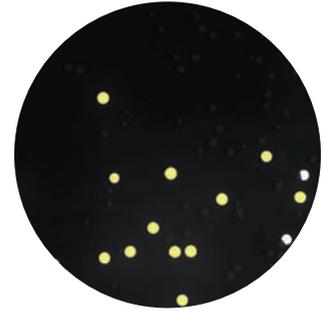
- Prescreen to pick the right colonies
- Identify colonies that have desirable morphological and spectral characteristics
- Automate and track the entire workflow from spreading of transformed cells to colony picking and library management



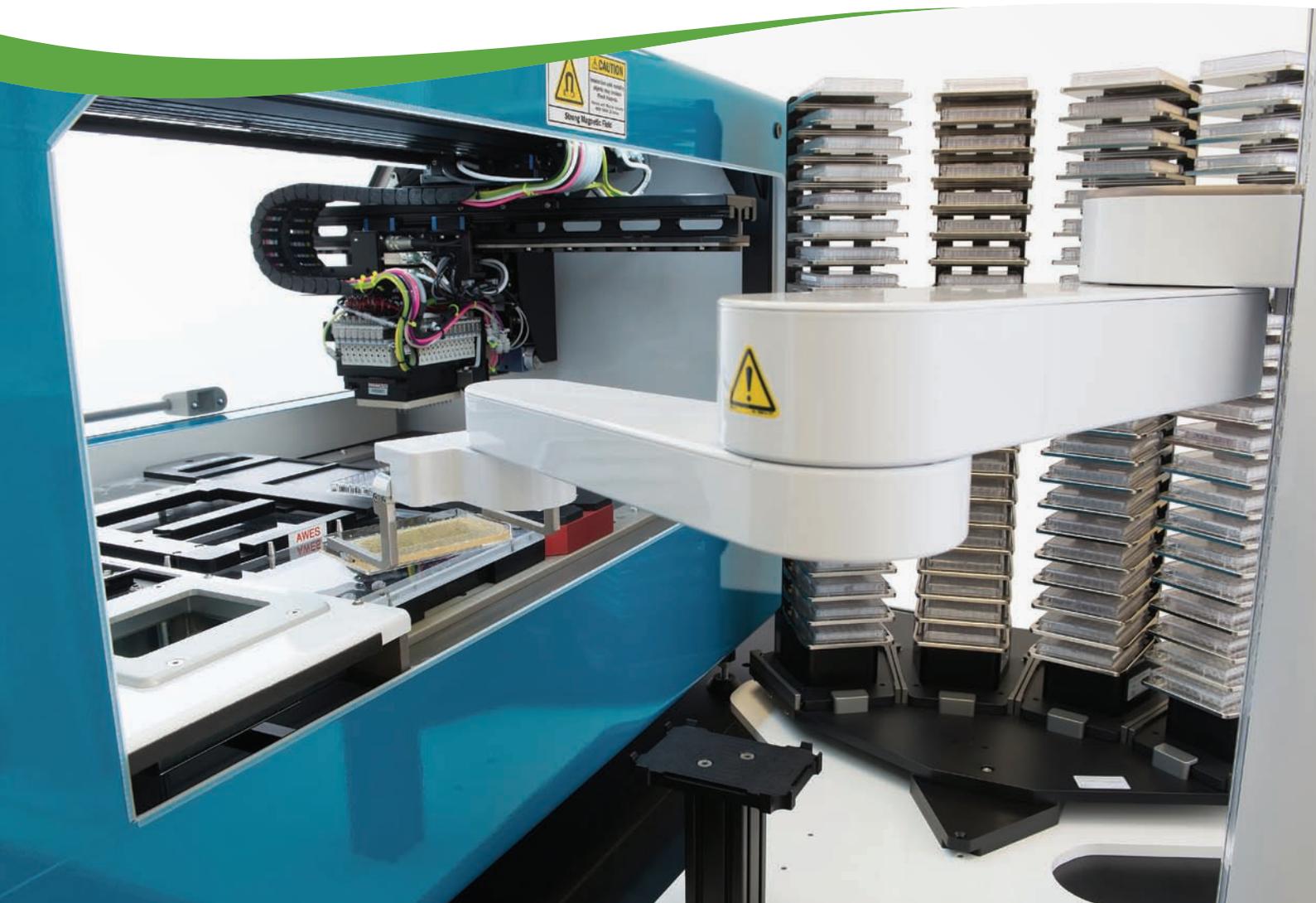
All colonies detected in white light



Colonies expressing required level of target protein identified in fluorescent channel (optional)



Selected colonies ready for picking



# Key applications

For use in synthetic biology, biotechnology, biofuels, agriculture, microbiome, environmental science, food and beverage, academia, and government research

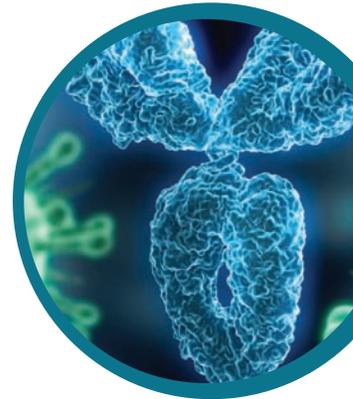
## Protein engineering

Use the QPix system for:

Colony picking

Library management

Protein engineering is an iterative two-step process that involves generating libraries of protein mutants and then screening them to select for desired traits. It can be used for a wide range of applications including antibody discovery, enzyme evolution, and structural biology. The QPix system can be used to increase the throughput of variants to be screened. Its accurate, high-speed picking protocols allow users to screen through a richer genetic library, increasing the chances of a desirable hit. Additionally, library management features provide robust sample tracking.



## Molecular cloning

Use the QPix system for:

Plating and streaking

Colony picking

Library management

Molecular cloning is the assembly of DNA into a vector, leveraging *E. coli* as a host organism to produce plasmids. Using the QPix system to automate the laborious process of plating and streaking, as well as colony picking, frees scientists to analyze data, not perform repetitive, time-consuming tasks. Increase throughput and speed while also increasing accuracy with complete audit trail and sample tracking.

## Microbial strain engineering

Use the QPix system for:

Plating and streaking

Phenotypic selection

Colony picking

Library management

Strain engineering is a broad term that refers to the manipulation of genetic pathways to harness the power of existing biological systems in novel ways (often to manufacture molecules or proteins). The QPix system allows identification and selection of variants with desired characteristics in a high-throughput manner. Optional fluorescence imaging can be leveraged to prescreen colonies and automatically image and select clones of engineered microorganisms.



## Zymergen uses the QPix systems to make better microbes in industrial fermentation

**The Challenge:** Zymergen is a technology company using high-throughput biology to drive the next industrial revolution. Their method of designing, building, and testing microbes rely on advanced molecular biology tools, robotic automation, and proprietary computational and analytical methods.

**The Solution:** This capability allows Zymergen to generate novel chemicals, advanced materials, and pharmaceuticals much faster and at a lower cost than current approaches. Zymergen's growing fleet of Molecular Devices QPix® 420 systems allows them to identify and pick large numbers of colonies quickly, accurately, and reliably. The QPix systems are a critical link in their microbe engineering pipeline, integrating seamlessly with their state-of-the-art laboratory information management system (LIMS).

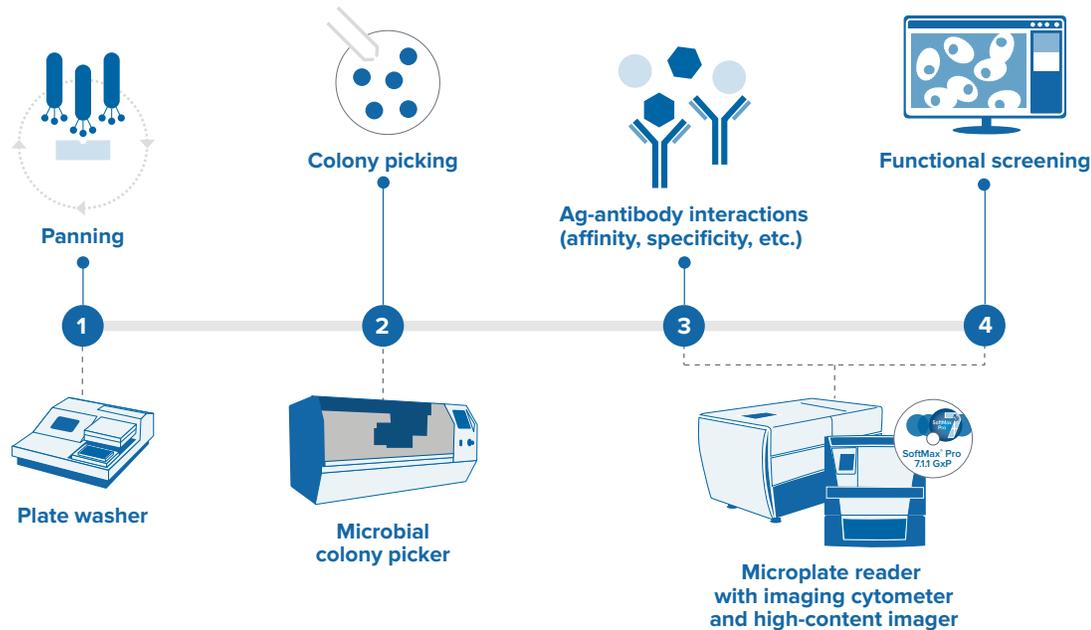
## Phage display

Use the QPix system for:

Colony picking

Library management

Phage display is commonly used to find high affinity interactions between antibodies and antigens, which play a critical role in viral pathogenesis, vaccines, and other treatments. The QPix system can be used to increase the throughput of colonies screened, increasing the chances that you are able to identify a high affinity binder.



## Gene editing/CRISPR in microbes

Use the QPix system for:

Library management

Pooled library picking

Gene editing techniques, such as CRISPR-Cas9, have improved the ability to create precise mutant libraries, allowing scientists to explore the genome more accurately. The QPix system makes it possible to screen a larger library than what could otherwise be done manually.

## Inscripta enables scientists to perform digital genome editing with their Onyx system integrated in a fully automated workflow that includes the QPix system

**The Challenge:** Inscripta's vision is to democratize scalable genome editing to the world by offering a holistic platform consisting of software, instrument, reagents, and consumables to enable forward engineering solutions that are faster, easier, and more cost-effective for their customers. The output of the Inscripta Onyx genome editing system is a pool of cells containing up to 10,000 unique edits that necessitate picking large numbers of colonies (e.g. 1,000 – 10,000) into high-throughput microtiter plate-based screening workflows.

**The Solution:** The QPix and Onyx systems are synergistic tools that allow customers to effectively generate and screen phenotypic diversity to enable successful bioeconomy solutions for the next generation of synthetic biology companies.

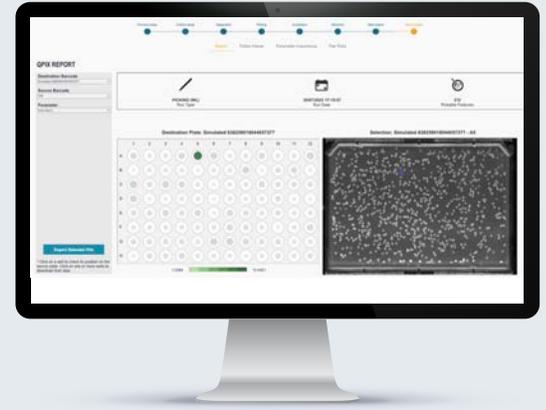


# QPix Insights

Powered by Polar.ai

## Optimize colony picking strategies with advanced AI/ML analysis

Microbial screening can be labor-intensive. Our QPix Microbial Colony Pickers automate colony selection and various sample preparation and plate handling processes. But how do we analyze the large volumes of multi-dimensional data generated? With QPix Insights software, powered by Polar.ai – an AI/ML and advanced analytics & reporting tools – you can identify the best colonies aligned to optimal selection criteria with greater confidence in a shorter time.

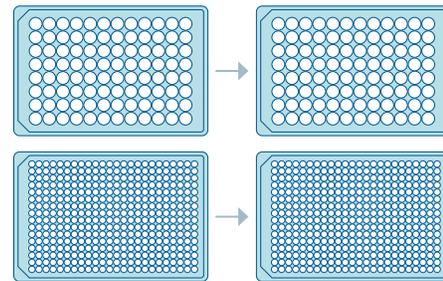


- **User-Friendly Interface:** An intuitive interface simplifies complex data analysis, making it accessible to all levels of scientific personnel
- **AI-Powered Precision:** Reduce errors and increase reliability
- **Streamlined Data Integration:** Seamlessly integrate data from various sources for a comprehensive overview and simplified analysis process.
- **Cost and Time-Savings:** Pick the right colony faster, leading to fewer reruns, less waste, and more time for value-adding work.
- **Optimized Colony Selection:** The software's intelligent algorithms analyze colony parameters and analytical outputs to recommend the best selection criteria

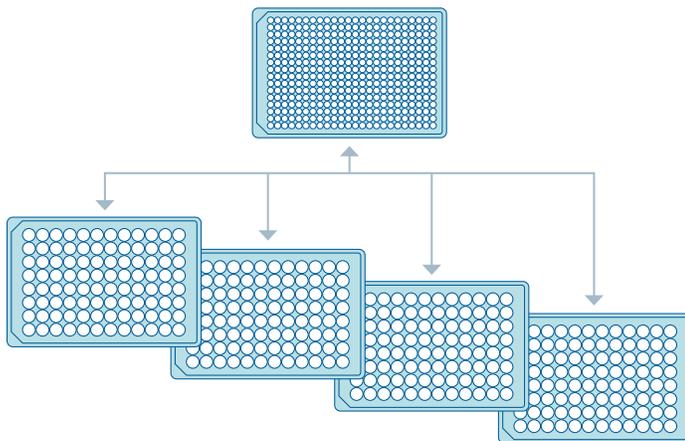
## Plate replication and rearraying—liquid to liquid

### Automate the process of creating sample banks while eliminating errors

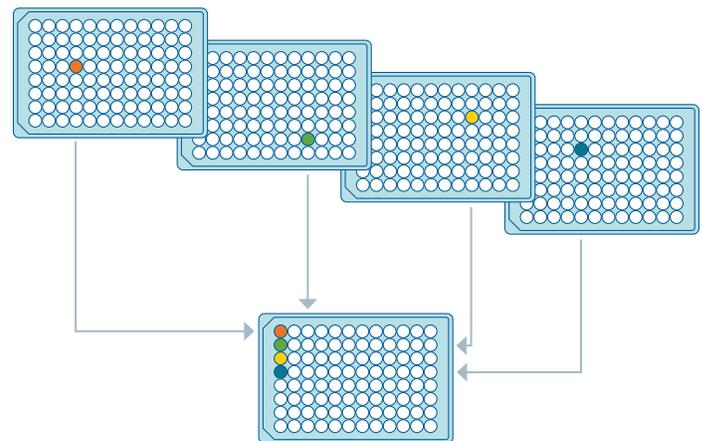
- Create duplicate and sub-libraries to maintain clone viability
- Streamline downstream assays and sample management
- Identical replicates (96- or 384-well)
- Compression (4x96 into 1x384) or expansion (1x384 into 4x96)
- Hit pick/cherry pick selected clones into new destination microplate with high accuracy



Replicate (96x96 or 384x384)



Compression or expansion



Cherry pick best clones

# Tailored solutions for every application and workflow

## Get the highest level of flexibility in application and experimental design

Our expert team of engineers and application scientists can tailor the QPix® systems to meet your workflow demands for automated microbial colony picking and plating.



### Scalable automation

Modular design allows you to future proof your system by allowing you to add additional pieces of instrumentation down the line. As your workflow changes and adapts, our systems scale with you.



### Biological validation

We work with you to understand your process and biological requirements so we can reproduce and test the actual performance in-house prior to shipment.



### Customized solutions

Offer services from consultation through implementation. Includes throughput analysis, software and hardware customization, factory acceptance, site acceptance, and instrument validation.



### Easy integration

The QPix system can be integrated with other lab components such as incubators, liquid handlers, and robotics for a fully automated work cell. We can tailor QPix systems and deploy the integration, or provide an open API and software support for the integration process.



## QPix XE system

### Compact automated colony picker

The QPIX XE is a compact microbial colony picker ideal for labs that have reduced space, but still need efficient colony picking throughput. The QPIX XE is a great entry level system to replace highly subjective and error prone manual picking with automated colony picking.



## QPix 420 system

### Automated colony picker

The QPix 420 system is ideal for groups looking to increase the throughput and efficiency of their colony screening. The system increases walk away time with the ability to pick up to 12 96-well plates before needing manual intervention, at a throughput of 3000 colonies/hour.



## QPix 450/460 systems

### Plating to picking

Increase throughput with this QPix system, which handles up to 210 destination plates in three stacker lanes. Optional fluidics for plating and streaking allows you to plate samples, as well as pick them.



## QPix HT system

### Flexible, modular, fully automated colony picking and library management system

With a fully automated workflow, this QPix system provides the greatest flexibility in application and experimental design including sample plating and streaking. The system comes ready for integration with robotics for maximum throughput and walkaway time.

*“The QPix 450 system outclasses rival systems, handling fluorescent picking with an unrivaled level of ease and accuracy.”*

—Marc McCarthy, High Throughput Robotics Specialist, Alimentary Pharmabiotic Centre, University College Cork, Ireland

# QPix system specifications

## Instrumentation

Destination plate capacity	QPix 420 system: Picking: 12 plates; replicating and re-arraying, maximum of 20 plate positions
Source plate capacity	QPix 420 system: Without manual intervention: 1 x 15 cm petri dish; 5 x 9 cm petri dishes; 2 x OmniTrays; 1 x 22 cm QTrays
Picking destination plate type	Various, 24-, 48-, 96-, or 384-well including deep well
Picking height	Integrated ultrasonic agar height sensor to set agar height per plate for accurate picking
Picking head	Fully pneumatic, 96 pin picking head. Interchangeable heads for other applications
Picking pin types	Range of organism-specific pins
Picking capacity	3000 colonies per hour in white light, 2000 colonies per hour in fluorescent light
Fluorescent picking	Colonies imaged in white light for location identification and fluorescence for data analysis. WL and FL image multiplexed.
Fluorescence data	Multiple parameters available e.g. interior mean. Fluorescent intensity recorded for picked colonies.
Wash bath	3 x static wash baths
Pin drying	Proprietary halogen pin drying station
Dimensions	QPix 420 system (without table): 1460 mm (width) x 770 mm (depth) x 750 mm (height)

## Compressed air specifications

Air	Clean, oil-free with sub-micron filtration
Minimum operating pressure	6 bar (~90psi)
Minimum operating volume	80L/min

## Imaging

Camera (white light only system)	CCD Camera, image resolution: 22 pixels /mm. Field of view: 62 x 46 mm
White light imaging	Trans-illumination
Camera (white light and fluorescence system)	CCD Camera, image resolution 22 pixels /mm. Field of view: 32 x 24 mm
Fluorescent imaging (optional)	Epifluorescence illumination, five standard wavelengths included: Ex/Em: 377/447 nm for DAPI /Hoechst Ex/Em: 457/536 nm for FITC /GFP Ex/Em: 531/593 nm for Cy3 /DS Red Ex/Em: 628/692 nm for Cy5 Ex/Em: 531/624 nm for Rhodamine /Texas Red
Colony screening parameters	Colonies selectable based on size, proximity, roundness. Selection performed on whole tray image.
Tracking	1 x barcode reader for tracking of source and destination plates. Data tracked through all applications for plates with same ID.

## Software

Plate replication, re-arraying and gridding	Software license and additional picking heads
Zone of inhibition detection	Software license
Colorimetric colony selection	Software license and filters

## Regulatory approval

Compliance	CE
Quality	ISO9001:2008 certified

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