

Look Ma, no hands!

The a-Hyb™ Hybridization Station —
a revolution in microarray hybridization



Fully automated processing of slides

Versatile applications

Active sample circulation

Walk-away automation

Easy handling



All-in-one instrument

The a-Hyb™ Hybridization Station is a fully automated system for standard slide processing — from the first hybridization step to the dried slide. Experiments from microarray gene expression analysis to *in situ* hybridization can be performed in the a-Hyb Station.

Efficient mixing and temperature control

The unique active circulatory system results in an even distribution of liquid over the surface of the slides and accelerates diffusion-controlled processes. Combined with a tight temperature control, these features lead to greater reproducibility and reliability of the assays.

Complete automation

The a-Hyb Station can be integrated into standard laboratory robot systems for fully automated slide processing. A microtiter plate-format slide carrier facilitates the handling of up to four standard slides in parallel.

Intuitive software

The software offers a highly flexible protocol structure. Users can choose and combine up to 15 standard steps such as incubation, temperature change, washing, and drying. In addition, temperature and media can be selected independently for each slide. Thus, protocols can easily be adapted and optimized for individual applications.

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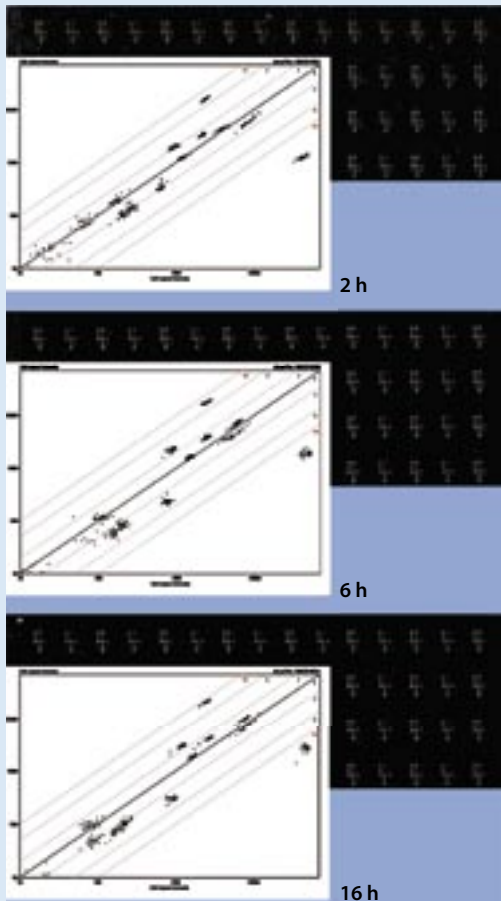
Open system for a multitude of applications

Flexible — versatile — universal

- cDNA and oligonucleotide gene expression microarrays
- Array-CGH
- Micro-RNA microarrays
- Antibody and other protein microarrays
- Tissue microarray
- *In situ* hybridizations, etc.

Many years of experience in slide-based applications culminated in the development of this unique instrument, allowing the a-Hyb Station to run a huge variety of hybridization processes.

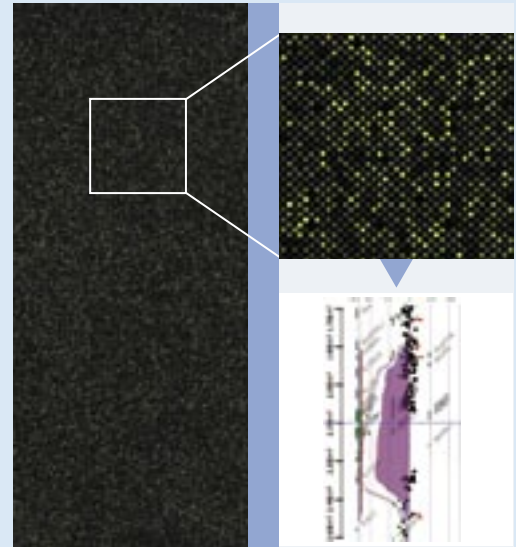
Improved hybridization kinetics



Identical complex cDNA samples were hybridized against a-Hyb™ Test Microarrays with varying incubation times of 2 h, 6 h, and 16 h. Each Test Microarray contains 32 identical oligonucleotide subarrays.

- The microarrays show highly specific results already after a two-hour hybridization period followed by four one-minute washes (six hours for cDNA microarrays)
- Extraordinary high reproducibility in serial hybridizations

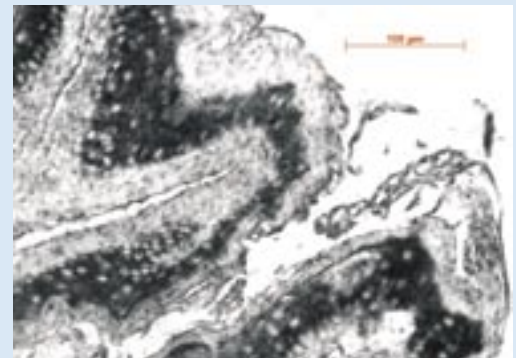
Fast array-CGH hybridization



Agilent human CGH microarray: complete active area with enlargement and partial gene map. For each sample, 3 µg of human DNA from whole blood and Jurkat (human T cell leukemia) cells were prepared according to the Agilent protocol.

- Processing times reduced as compared to the Agilent protocol: 20 hours instead of a 42-hour hybridization
- Reliable, reproducible, and low-background data due to optimized signal-to-noise ratio and low CVs (around 7%)

Sensitive *in situ* hybridization



In situ hybridization of a mouse stomach section incubated with digoxigenin-labeled RNA probe for suprabasin and detected with AP-conjugated anti-DIG antibody.

- Processing times reduced as compared to standard protocols: 8 hours instead of 2–3 days
- Improved signal-to-noise ratio

Enhanced hybridization kinetics and specificity

Fast sample movement and mixing plus tight temperature control of the a-Hyb™ Station both speed up the hybridization process by improving hybridization kinetics and stringency — and thus quality — of the results.



Designed for easy handling

Fully compatible for robotic integration

Software control via touch screen

The a-Hyb™ Control Software is easy to use, extremely flexible, and guides the user through the complete process. By using the touch screen, protocols are set up from predefined, application-optimized steps.

The temperature control and liquid supply of up to eight media is independently regulated in each slide position. Thereby, diverse conditions can be run in parallel.

Several a-Hyb Stations can also be controlled in parallel via PC when integrated into laboratory robotic systems.

The a-Hyb™ Sealing Plate — simple but effective

When a hybridization protocol starts, the slide drawer opens, allowing the loading of the Slide Carrier with the microarrays. The a-Hyb™ Sealing Plate leaves only the hybridization area uncovered. Then, the drawer re-enters the instrument and the hybridization chamber gets established.

The microtiter plate-format of both Slide Carrier and Sealing Plate allows fully automated handling within standard automated robotic systems.

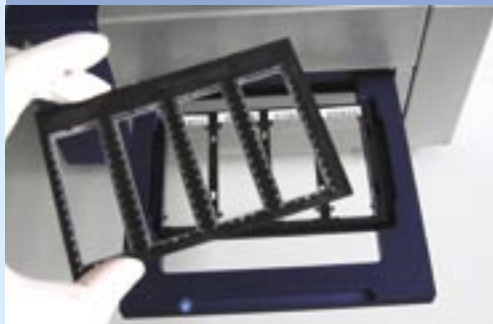
Sample application — just like pipetting into a reaction tube

The hybridization sample is applied manually by pipetting into the sample reservoir, which is located atop of the hybridization chamber. From here, the unique a-Hyb Fluidic System fills the samples into the hybridization chamber. Even viscous media is processed by the instrument.

The sample application can also be performed by an automated pipetting system.



Instrument control via touch screen.



Slide Carrier with microarrays inserted into the drawer. The Sealing Plate is about to be placed on top of the microarrays.



Pipetting of hybridization sample into sample reservoir.

Fully automated processes lead to reproducible performance, minimizing the risk of handling errors and allowing walk-away operation.

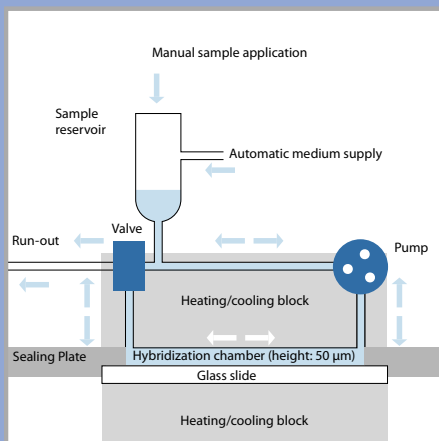
Active circulation and sandwich temperature control system

Active sample circulation

The proprietary active sample circulation technology is the core technology of this instrument: Hybridization samples, as well as all buffers, are automatically pumped from the sample reservoir into the hybridization chamber by a tightly controlled microfluidic system. Then, the liquid is actively rotated over the slide ensuring highly reproducible results. At the same time, air bubbles are removed from the solution.

- Even, gradient-free spreading of sample solution over the complete hybridization area leads to equal distribution of signal intensities over the hybridization area
- Continuous and fast movement of the liquids over the entire microarray for improved stringency and hybridization kinetics
- Efficient sample mixing allows for maximized signal intensities even for genes expressed at low levels
- Reliable removal of air bubbles reduces background artifacts

Scheme of active circulation in hybridization chamber



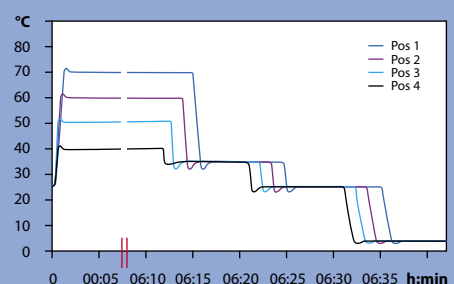
Flow rate 0.25 – 2.5 mL/min
 Total sample volume 200 µL
 Active area 21 mm × 63 mm

Sandwich temperature control

The microfluidic system, which includes the hybridization chamber, is embedded in a sandwich of heating and cooling peltier elements for rapid and precise temperature control of the hybridization reaction.

- Tight temperature control from 4 – 75 °C, independent for each position
- Fast and reproducible heating and cooling rates for high reproducibility between positions and experiments

Temperature profile during hybridization



| Prehybridization and hybridization | Wash I | Wash II | Cool |
|---|---------------------|---------------------|------|
| Four different temperatures: 40 °C, 50 °C, 60 °C, and 70 °C | Two cycles at 35 °C | Two cycles at 25 °C | 4 °C |

Temperature range 4 – 75 °C
 Heating/cooling rate > 0.6 °C/s | > 0.4 °C/s
 Temperature accuracy < 1 °C

Superior technical solutions make a difference

- The intuitive a-Hyb™ Software allows the setup of complex protocols with multiple steps for varying conditions
- The active sample circulatory system can handle even viscous buffers and removes air bubbles
- The sandwich temperature system as well as the tight temperature control enhance experiment-to-experiment reproducibility

Related products

| | | |
|---|-------------------|----------------------------|
| Topic-Defined PIQOR™ Microarray Kits ¹ | Human, rat, mouse | Please inquire |
| Cell Death, Cytokines&Receptors, Immunology, Kinase, Oncology, Skin, SkinPatho, Stem Cell, Toxicology, Ubiquitin-PS | | |
| Custom PIQOR Microarray Kits ² | Human, rat, mouse | Please inquire |
| PrepProtect RNA Stabilizing Solution | 10 mL 100 mL | 130-092-642 130-092-643 |
| µMACS™ and MultiMACS™ mRNA Isolation Kits | Various sizes | Please inquire |
| µMACS One-step cDNA Labeling Kit | | 130-092-443 |

PIQOR™ Microarray Kits¹

The kits offer a system for high-quality, topic-defined gene expression analysis:

- Premium gene selection and probe design based on intensive bioinformatics data mining
- Consistent data and optimal results due to high-quality microarrays produced with stringent quality controls
- Optimized kit components include hybridization and wash buffers as well as control RNAs and primer mixes for fluorescent labeling
- Optimized protocols cover the complete microarray experiment with or without amplification

¹ PIQOR Microarrays are available in Europe only.

Technical specifications of a-Hyb™ Hybridization Station

| | |
|---------------------------------|--|
| Slide format (W×L×H) | 25.65 mm ± 0.65 × 75.65 mm ± 0.65 × 1 mm ± 0.5 (1.00 in ± 0.03 × 2.97 in ± 0.03 × 0.04 in ± 0.02) |
| Active area | 21 × 63 mm (0.83 × 2.48 in) |
| Height of hybridization chamber | 50 µm |
| Total sample volume | 200 µL ² |
| Volume atop the active area | 66 µL |
| Flow rate | 0.25–2.5 mL/min; disengageable |
| Reagents | Six reagent flasks — plus manual loading for additional arbitrary media |
| Temperature range | 4–75 °C |
| Temperature accuracy | <1 °C |
| Heating/cooling rate | >0.6 °C/s >0.4 °C/s |
| External dimensions | 310 × 170 (front) to 270 (back) × 460 mm, w/h/d |
| Line voltage | 100–240 VAC |
| Frequency | 50–60 Hz |
| Current | 3 A |
| Serial port | RS48 5 |

² Circulation of the hybridization solution accelerates hybridization kinetics beyond the diffusion limit, ensuring even sample distribution and outbalancing possible effects of lower sample concentration.

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