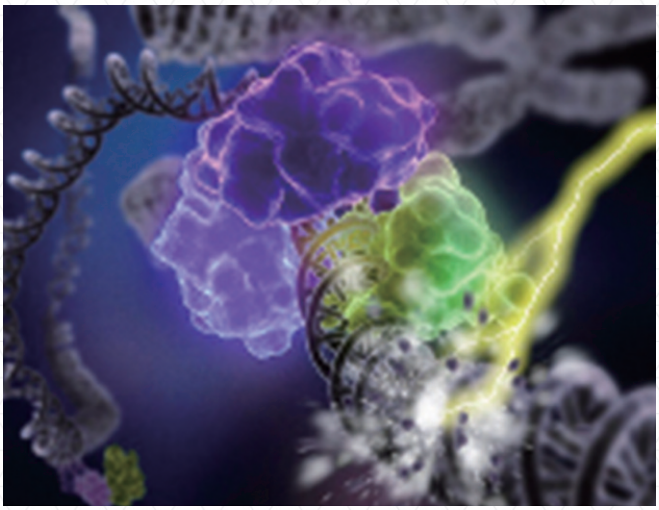
LIFE SCIENCES

2015

Center for Genomic Intergrity

(Campus)



DNA is a building block for entire genome and encodes genetic codes, which determine almost every aspects of life. In some cases, DNA could be damaged by endogenous asserts such as replication errors and oxidation stresses or exogenous challenges such as radiation or toxic chemicals. If such damage were not properly repaired, cells could die or accumulate mutations that would cause aging and genetic diseases including cancers. Cells equip multiple DNA repair pathways that can sense, transduce signals, and ultimately repair damaged DNA. These pathways sometimes participate other DNA metabolisms including DNA replication, transcription, and re-combination. The Center for Genomic Integrity will investigate these multiple DNA repair pathways at the molecular level using small molecules with molecular, cell biological and biochemical techniques and animal models. We anticipate our research will uncover detail molecular mechanisms of DNA replication, repair, and recombination and come up with potential answers the origin of cancers, aging, and evolution.

List of Instruments

Equipments	Model	Maker
Super sensitive high resolution confocal laser scanning microscope for live cell	LSM 880 with Airyscan	Carl Zeiss
High Contents Screening Imaging System	ImageXpress Micro XLS	Molecular Devices
HTS Hybrid Multi-Mode Microplate Detection System	Synergy NEO2 Hybrid Multi-Mode Reader	BioTek
Multifunctional Fluorescent Image Scanner System	Typhoon FLA 7000	GE Healthcare
Variable Angle Pulsed Field Electrophoresis systems	CHEF Mapper	Bio-Rad
Real-Time PCR System	QuantStudio 7 Flex	Life Technologies
High-Performance Large-Capacity Centrifuge System	Avanti JXN 26	Beckman Coulter Inc.
High performance Ultracentrifuge system	Optima XE-100	Beckman Coulter Inc.
Hypoxistation	Whitley H35 Hypoxistation	Don Whitley Scientific
High Performance Sample (DNA) Preparation System	S220	Covaris Inc.
Zebrafish Auto System	Zebrafish Multi System, M type	Genomic Design
Fluorescence Zoom Microscope	Axio Zoom.V16	Carl Zeiss

01

Super sensitive high resolution confocal laser scanning microscope for live cell

Model • LSM 880 with Airyscan
[Carl Zeiss / Germany]

Explanation

LSM 880 with Airyscan has a technique for obtaining high-resolution optical images with depth selectivity. Images are acquired point-by-point and reconstructed with a computer, allowing three-dimensional reconstructions of complex objects. With Airyscan, the revolut ionary detection concept from ZEISS, you can use multicolor samples with any label and get image quality like you have never seen before. You are always able to select the optimal acquisition strategy for your sample: Simply decide whether you want to gain 1.7x higher resolution in all three dimensions resulting in a 5x smaller confocal volume. Or push the sensitivity beyond the limits of all conventional confocals. Or use the increase in signal-to-noise ratio to speed up your image acquisition.

Specification

- 34 Channel : Multi-spectral imaging and linear Unmixing function
- Super Sensitive GaAsp detector for low expression sample
- Constant Focus unit on microscope stand for focus stability
- Full Motorized Inverted Microscope for live cell imaging – ZEISS Axio Observer Z.1
- All optical sections to one 3D images by digital image processing.
- Airyscan : XY-140nm, Z-350nm resolution - Superresolution information from Image
- Laser: 405, 458, 488, 514, 561, 594 & 633nm
- Transmitted Light Source: 100W Halogen
- Fluorescence Light Source: 100W Metal Halide
- Observation: Bright Field, DIC, Fluorescence, Confocal and Superresolution Imaging
- Objectives: 10X, 20X, 40X Water, 63X Oil, 100X Oil
- ROI-HDR, FRET, FRAP and 3D Visualization

02

High Contents Screening Imaging System

Model • ImageXpress Micro XLS
[Molecular Devices / U.S.A]

Explanation

ImageXpress® Micro XLS System is a widefield automated microscope capable of fluore scent, transmitted light, and phase-contrast imaging of fixed- or live-cell assays, tissues and small organisms. Speed, flexibility, and high quality data are assured with a large field-of-view, industry-leading stage and autofocus control, the broadest range of research-grade objective lenses (1x-100x) available, and multiple filter options. Combined with suite of MetaXpress® Software tools for acquisition and analysis, this complete solution will help you interpret your images, understand your data, and explore new ideas.

Specification

- Adjustable field-of-view focuses on sample area most appropriate for your assay
- Widest selection (> 25) of objectives
- 4-position automated objective changer
- Highly robust 100 nm resolution voice coil-driven X, Y, and Z stages enables
- Extensive sample compatibility
- Slides to plates, 6 to 1536 wells, Thin to thick plate bottoms, Glass to plastic, Low- to high-profile
- A truly end-to-end solution for high content imaging

- MetaXpress® Software Application Modules: turnkey solutions for your 100 most common analysis routines
- Environmental Control for live cell time-lapse imaging

03

HTS Hybrid Multi-Mode Microplate Detection System

Model • Synergy NEO2 Hybrid Multi-Mode Reader
[BioTek/ U.S.A]

Explanation

Synergy™ Neo2 Multi-Mode Microplate Reader is designed for speed and superior perfor mance, incorporating BioTek's patented Hybrid Technology™. Independent optical paths optimize diverse assay requirements with continuously variable bandwidth quadruple monochromators, sensitive filter-based optics, laser-based excitation for Alpha assays and up to 4 PMTs for ultra-fast measurements. Advan ced environment controls, including CO2/O2 control, incubation to 65 °C and variable shaking are ideal for live cell assays, and direct bottom illumination optimizes cell-based detection

Specification

- Detection mode : Quad monochromators: FL, Lum., UV-Vis Abs., TRF
  Filters: FL, TRF, FP, Lum., Alpha, TR-FRET, BRET
- Read mode : End point, kinetic, spectral scanning, well area scanning
- Microplate types: 1- to 1536-well plates
- Other lab ware: Compatible with Take3™ Micro-Volume Plates with 2 µL micro spots
- Temperature control: 3 °C above ambient to 65 °C
- Shaking: Linear, orbital, double orbital
- Take3 Micro-volume
- MultiFlo™ Microplate Dispenser
  Microplate types: 6- to 1536-wells in low profile, standard height and deep well formats (manifold dependent)

04

Multifunctional Fluorescent Image Scanner System

Model •Typhoon FLA 7000
[GE Healthcare / Sweden]

Explanation

Typhoon FLA 7000 is a fast and versatile laser scanner for biomolecular imaging applications including sensitive and quantitative measure ments of radioisotopic labels, chemifluorescent Western blots, and single fluorescence (visible excitation), as well as documentation of col-orimetric stains (e.g., Coomassie™ blue and silver-stained gels). Typhoon FLA 7000 offers high speed performance for the sensitive de-tection and precise quantitation of proteins afforded by the chemifluorescent Amers ham™ ECL™ Plus Western blotting system

Specification

- High speed: over 10 gels can be scanned in an hour without compromising sensitivity
- High resolution and quantitation: 16-bit images are generated at up to 25 µm pixel resolution. A linear signal response over five orders of magnitude gives precise quantitation in gels, blots, and tissue sections.
- High sample throughput: simultaneous imaging of up to 8 blots or gels, measuring 10 x 8 cm, facilitates comparisons among blots, and reduces workload and waiting time
- Detection modes: Fluorescence, phosphor imaging, and digitization
- Excitation wavelengths : 473 nm (blue LD laser), 532 nm (green SHG laser), 635 nm (red LD laser), and 650 nm (red LD laser)
- Radioisotopes : 3H, 14C, 32P, 33P, 35S
- Max scanning area : Phosphor imaging- 20 × 40, Fluorescence- 24 × 40 cm
- Standard filters: IP (Phosphor imaging), Y520, O580, R670

05

Variable Angle Pulsed Field Electrophoresis systems

Model • CHEF Mapper [Bio-Rad / U.S.A]

Explanation

Pulsed field electrophoresis is a powerful techni que for resolving chromosomal sized DNAs. The CHEF Mapper system separates large and small DNA fragments with better resolution, speed, and accuracy than traditio nal pulsed field methods. DNAs ranging from 100 bases to over 10 mega bases may be effectively re-solved. Applica tions include top down and bottom up mapping, electroph oretic kary-otyping, analysis of tumor cell DNA rearrange-ments, DNA damage and repair, mammalian DNA analysis, separation of linear and circular DNAs, separation of large proteins, and analysis of bacterial, yeast, and parasite strain homo-geneity. The CHEF Mapper system is based on two leading technologies.

Specification

Algorithm

Embedded algorithm for automated optimiz ation of common electrophoresis conditions

Power Module

- Power Supply: 350V max. to allow max. Gradient of 9V/cm, continuously adjustable; built-in
- Allowable voltage gradients: 0.6-9V/cm in 0.1V/cm increment
- Switching range: 50 msec to 18hr
- Switch angle variable: 0-360 degrees (all electronic switching) in 0.5° increment
- Secondary pulses: Defined by voltage, frequency, angle, and duration
- Field inversion (FIGE): Available with asymmetric forward, reverse voltages
- Max. Program blocks: 8, with automatic execution

Electrophoresis Cell

- Electrode: 24, platinum (0.02 inch diameter)
- Temperature monitoring: Via precision temperature probe mounted through lid

06

Real-Time PCR System

Model • QuantStudio 7 Flex
[Life Technologies / Singapore]

Explanation

This instrument supports at least two homo geneous reaction chemistries, the fluorogenic 5' nuclease assay using TaqMan® probes and the SYBR® Green DNA binding dye chemistry. The instrument is designed to complete a 40 cycle real-time PCR reaction using fluorogenic 5' nuclease assay and fast chemistries in a standard 384-well plate in under 35 minutes. Instrument can also run in standard ramping mode with standard chemistry. The instrument has real-time quantitative PCR installation specifications which demonstrate the ability to distinguish between 5,000 and 10,000 tem-plate copies with a 99.7% confidence level.

Specification

- Block configurations : 96-well, Fast 96-well, 384-well, TaqMan® Array Cards
- Block change design : Block change from front in less than 1 minute; no tools required
- Run time : 30 minutes expected (Fast 96-well), 35 minutes (384-well)
- Excitation source : OptiFlex™ System Lamp
- Detection channels : Decoupled—6 emission, 6 excitation with 21 combinations
- Data export format : User configurable: *.xls, *.txt, and 7900 formats
- Well-to-well variability : +/- 0.25 °C
- Max Sample Ramp Rate : 3.5°C/sec (384-well), 4.0°C/sec (96-well), 6.5°C/sec (Fast 96-well)
- Dynamic Range : Up to 10 logs of linear dynamic range
- Resolution : Detect as little as 1.5 fold changes in target quantities in single plex reaction

07

High-Performance Large-Capacity Cetrifuge System

Model • Avanti JXN 26
[Beckman Coulter Inc. / U.S.A]

Explanation

The high-performance large-capacity centrifuge system, using a strong centrifugal force accor ding to the weight of the sample or a specific material for the various sample groups, the application of a variety of possible devices ac-cording to the sample type and the sample capacity of the rotor. Using these properties and characteristics Genetic engineering and bioche mistry, protein engineering, biology, biotech nology, microbial engineering, clinical medi cine, etc. most of the research in the field of science and technology the laboratory equipment that is used as necessary to secure the base sample.

Specification

- Max. speed : 26,000rpm
- Max. force : 81,770 x g
- Max. capacity : 6 Liters
- Speed control : 1k to 10k : ±10 rpm 10,001 to max : ±0.1%
- Set temperature : -10 to 40°C increments of 1°C
- Temperature Accuracy : ±2°C of chamber temperature (after equilibration)
- Ambient Operating Range : 16°C to 38°C
- Imbalance tolerant range : ±5ml of rotor volume in opposite tubes
- Refrigeration system : Thermoelectric-no CFCs, ODCs
- Programmed acceleration/deceleration rates : 12 Acc./13 Dec

08

High performance Ultracentrifuge system

Model • Optima XE-100
[Beckman Coulter Inc. / U.S.A]

Explanation

The high-performance ultracentrifuge system, using a strong centrifugal force according to the weight of the sample or a specific material for the various sample groups, the application of a variety of possible devices according to the sample type and the sample capacity of the rotor. Using these properties and characteristics Genetic engineering and biochemistry, protein engineering, biology, biotechnology, microbial engineering, clini cal medicine, etc. most of the research in the field of science and technology the labora tory equipment that is used as necessary to secure the base sample.

Specification

- Max. speed : 100,000rpm (or more) in 100 rpm increments
- Max. force : 802,000g
- Speed control : ±2 rpm at steady state (above 1,000 rpm)
- Set temperature : 0 to 40°C (or wider) increments of 1°C
- Temperature control/display : ±0.5°C of set temperature after equilibration.
- Vacuum system : Moisture purging vacuum system
- Imbalance tolerant range : ±5ml of rotor volume in opposite tubes
- Drive cooling : Air cooled, no compressor for vacuum-encased induction direct drive system
- Programmed acceleration/deceleration rates : 10 Acc./11 Dec
- Single tube sample volume range : 0.5ml ~ 230ml

09

Hypoxistation

Model • H35 Hypoxistation
[Don Whitley Scientific / UK]

Explanation

Specifically designed to create normoxic, hypoxic and anoxic conditions within a controlled and sustained workstation environ ment, this work-station is ideal for all research requiring the ability to accurately control oxygen, carbon dioxide, temperature and humidity. With such accurate control and the ability to manipulate cells in situ without altering the incubation environment, cell biology research can be per-formed over a comprehensive range of oxygen tensions with precision and confidence.

Specification

- The Component gases ranges:O2- 0-20% in increments of 0.1% / CO2- 0-15% in 0.1% increments / N2-Balance
- Temperature control: Between 5°C above ambient and 42°C by adjusting the set point value on the temperature controller. Temperature gradient across incubation area: +/- 0.6 °C
- Leak detection : Alarms and visuals when the chamber is in low pressure.
- Low gas pressure alarms: If the pressure of anaerobic gas mixture fed to the workstation falls below the necessary minimum level, a buzzer will sound and a labelled lamp on the front panel will illuminate.
- Gas pressure demand indicators: a red lamp on the touch screen confirms when gas is flowing into the chamber.
- Continuous flow: if incoming gas flows for more than five minutes, a buzzer will sound and the appropriate lamp on the front panel will illuminate. The gas supply to the workstation will be cut off automatically. This feature is by-passed during system commissioning.

10

High Performance Sample (DNA) Preparation System

Model • S220 [Covaris Inc. / U.S.A]

Explanation

The Covaris™ S220 high performance focused ultra-sonicators represent the continuing evolution of S-series. S220 instruments deliver industry leading sample processing capability directly to the benchtop. The new S-series is a workstation-based instrument capable of extremely rapid and complete homogenization, tissue disruption and sample extraction. The S220 provide single-tube sample preparation with scalable acoustic energy, capable of processing a wide range of sample types and volumes. Both instrument versions can be operated in stand-alone mode or can be easily integrated as part of an automated laboratory system.

Specification

- The Covaris system is an optimized for DNA & chromatin shearing, tissue & cell disruption, biomolecules extraction etc. by high frequency AFA (Adaptive Focused Acoustics) technology.
- The Covaris system can make various fragment size of DNA and Chromatin within several second or minutes by very short wavelength (~3mm) and very high frequency (>500kHz)
- Stable sample condition by highly accurate temperature control
- Protect the sample cross contamination and treat very small amount of sample by non-contact treatment technology.
- Peak Incident Power : Max. 50 Watts / Average. 20 Watts

11

Zebrafish Auto System

Model • Zebrafish Multi System, M type [Genomic Design / Korea]

Explanation

Zebrafish Auto System offers optimal aquatic environment to both zebrafish adults and embryos for their healthy conditions. The system maintains water quality through automatic circulation and draining of water in the system, UV sterilization and monitoring of temperature, pH and conductivity. With the capacity of 300 cages, the system is able to contain more than hundred of different mutant and transgenic zebrafish lines which will be used for our research of DNA repair/re combination.

Specification

- Zebrafish Auto System : Biofiltration tanks, circulation tanks with automatic level control by level sensor, feeding pumps circulation pumps, UV sterilizers, more than 300 cages which can maintain 5000 zebrafish, heaters with automatic temperature control.
- Auto dosing water tank with feeding pump.
- Fry raising system with a heater, pump and temperature sensor
- R/O system : Capacity is 30 liters/hr. Purity is less than 10uS. Size of the storage tank is 400 liters.
  Conductivity control system for water tank : Conductivity range is 0~1999uS. The system includes feeding pump and solenoid valve. Stock storage tank is 20 liters.

12

Fluorescence Zoom Microscope

Model • Axio Zoom.V16 [Carl Zeiss / Germany]

Explanation

Axio Zoom.V16 generates three-dimensional and laterally precise images for your micro scope applications. Axio Zoom.V16 offers large object fields and allows extended working distances. Axio Zoom.V16 combines a 16x zoom with a high numerical aperture of NA 0.25, moving to the forefront of all known zoom and stereo micro scopes. It achieves a very high aperture in the medium zoom range already: You get superior brightness in large object fields. With Axio Zoom. V16, the fluorescence zoom microscope for large samp les you view complete model organisms in fluorescence contrast.

Specification

- Apochromatic motor zoom 16:1 (0.7x ... 11.2x), with more than twice the aperture of stereo zoom.
- Magnifications : 7x to 112x (with 10x eyepiece and 1x objective)
- Real-time display : Total magnification, object field, resolution, depth of field
- Fluar illuminator Z motor : Left-side button panel for choice+display of filter set and shutter position, Shutter motorized synchro nizable with Metal Halide FL illuminator shutter.
- Objective lens : Objective PlanNeoFluar Z 1.0x, N.A 0.25, FWD 56mm, Resolution : 0.3um, Field of view : 0.6 ~ 3.5mm
- Transmitted light equipment : Homogenous brightfield with 67mm dia., Oblique-light contrast by shiftable diaphragm
- Cold light source LED illuminator : Up to 900 lm light flux, ca. 6200 K color temperature, Min. 50,000 operating hours until intensity drop to 70%, Foot button

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2016

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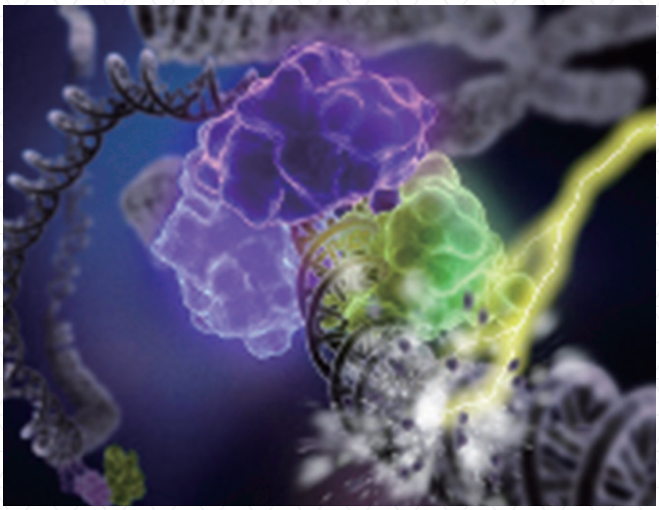

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List of Instruments

Equipments	Model	Maker
Tip-less Nano-liter Liquid Handler using Acoustic energy	Echo 525	Labcyte Inc.
Automated High-performance Flow Cytometer	FACSVerse	Becton Dickinson And Company
Automated High-speed Flow Cytometry Sorter	FACSAria Fusion	Becton Dickinson And Company
Automatic Nucleic Acid Extraction System	epMotion 5075vt	Eppendorf
High Resolution Mass Spectrometer	Orbitrap Fusion Lumos	Thermo Fisher Scientific
Surface Plasmon Resonance system	8K	GE Healthcare

01

Tip-less Nano-liter Liquid Handler using Acoustic energy

Model • Echo 525
[Labcyte Inc./ U.S.A]

Explanation

The Echo Acoustic Liquid Handling technology revolutionizes life sciences by using sound energy to provide highly accurate, fully automated, non-contact dispensing of fluids. By utilizing the unique Dynamic Fluid Analysis™ from Labcyte, each Echo system is able to determine fluid composition, fluid height, and the power needed to eject a precise volume of fluid into the destination well. This analysis happens in milliseconds allowing for precise and accurate transfer of nanoliter (nL) droplets into an inverted microplate. Large volume transfers are achieved by transferring several hundred droplets per second.

Specification

- Drop volume: 25 nL
- Volume transfer range: 25 nL – 5 µL one well to one well
- Transfer accuracy: <10% deviation from target volume
- Transfer precision <8% CV
- Reagents supported: PCR and qPCR reagents, synthetic biology reagents, NGS reagents, primers and probes, cell culture media, proteins, nucleic acids, up to 50% glycerol, serum, plasma, and antibodies
- Source labware compatibility: Echo® Qualified 384 Polypropylene, 384 Polypropylene Plus, Reservoir, Microplates
- Destination labware compatibility: All Echo Qualified Microplates and most ANSI-compliant/SBS-standard microplates in 96-, 384-well formats 8 -16 mm in height. Use of 1536-well plates as destination plates is application dependent

02

Automated High-performance Flow Cytometer

Model • FACSVerse
[Becton Dickinson And Company / U.S.A]

Explanation

1. Automated flow cytometer for high sensitive analysis for the immunology, cell-biology, cytology and etc.

2. For supplying the cytometer from fluidic supply system and compressor with onboard housekeeping reagents.

3. Innovative Blue, Red and Violet Laser with fiber optics steer the laser beams onto the beam prisms system for eight(8) colors analysis.

4. Automatic alignment optimization for optimize optical alignment for certain assays demanding high accuracy CVs and prevent long-term alignment drift.

Specification

- Laser Configuration : 488nm Blue Laser – FITC, PE, PerCP, PE-Cy7, 640nm Red Laser – APC, APC-Cy7(Option)
- Laser Life-time :10,000 hours or more.
- Fluorescence Sensitivity : Less than 100 MESF/ FITC , 25 MESF/PE
- Sample Flow Rate : Three Modes (Low, Medium, High) and High Sensitivity Mode for dim population
- Sample Acquisition Speed : Max. 35,000 cells/ sec.
- Sample Input Formats : 2ml micro-centrifuge tube, 5ml, 15ml and 50ml tube
- Volumetric Absolute Cell Counting : Measure the number of cells or particles in a volume of sample.
- Software Feature : Data acquisition, real-time display, status monitoring and instrument controls.
  -Supports 21 CFR Part 11 Guidelines and Password-controlled login.
  -Available Histogram or Dot-plot data overlay.
  -Directs PDF printing and exporting in XML, ZIP, CSV and PDF formats.

03

Automated High-speed Flow Cytometry Sorter

Model • FACSAria Fusion
[Becton Dickinson And Company / U.S.A]

Explanation

1. Automated flow cytometer for sensitive cell analysis, super sorting in the fields of immunology, oncology, cell-biology and etc.

2. Based on an entirely new design in instrumentation, the bench-top sorter the incorporates a fixed-alignment cuvette flow cell technology.

3. Fiber optics steer the laser beams onto the beam prisms, and upgradable of measuring eighteen(18) detectors simultaneously.

4. High-performance sorting is easy to set up, and monitor with built-in accudrop and sort monitoring features within s/w.

Specification

- Laser Configuration : 488nm Blue Laser – FITC, PE, PI, PerCP, PE-Cy7 / 640nm Red Laser – APC, APC-Cy
- Laser Life-time : 10,000 hours or more.
- Fluorescence Sensitivity : Less than 87 MESF/ FITC , 29 MESF/PE
- Sample Acquisition Speed : Max. 100,000cells/ sec.
- Sample Input Formats : Micro-tubes, 5ml and 15ml tube with temperature controlled in software.
- Sorting Performance : 4-way sorting into the micro-tubes, 5ml and 15ml tube
- Nozzle Tip Range : 70um, 85um, 100um and 130um
- 8. Drop Drive Frequency : 1.0 Hz to 100,000 Hz
- 9. Sorting Purity : More than 98%

04

Automatic Nucleic Acid Extraction System

Model • epMotion 5075vt [Eppendorf / Germany]

Explanation

The epMotion 5075vt is all about productivity and flexibility. With its integrated vacuum station and Eppendorf ThermoMixer® the epMotion 5075vt allows true walk-away automation of nucleic acid extraction protocols that rely on vacuum filtration or magnetic beads.

5075 vt is easily controlled by MultiCon industry PC and is combined integrated vacuum filtration, magnetic separation, mixing, and temperature control in one system to automate even complex applications for IBS-CGI.

Specification

- Volume : 1 µl ~ 1 mL
- Dimensions : Device : (W×D×H cm) : 107 × 61 × 67
- Weight : Device: 90 kg
- Power supply
  - -Voltage : 100 – 240 V ± 10 %
  - -Frequency : 50 – 60 Hz ± 5 %
  - -Max. output : 700 W
- 5. Dispensing tools : 1- and 8-channel
  - -TS50/TM50 : 1 µl ~ 50 µl
  - -TS300/TM300 : 20 µl ~ 300 µl
  - -TS1000/TM1000 : 40 µl ~ 1000 µl
- Conductor
  - -X,Y,Z positioning random measurement error
  - -Positioning ±0.1 mm
  - -Position in MTP-format 12
- Detector
  - -Optical confocal infrared detector : contact-free recognition of fill level of inserted tools, labware, tip types and quantities
  - -Optical sensor : liquid surface must be 90 °±3 ° to the vertical plane of the optical sensor

05

High Resolution Mass Spectrometer

Model • Orbitrap Fusion Lumos [Thermo Fisher Scientific / U.S.A]

Explanation

The Orbitrap Fusion Lumos Tribrid Mass Spectrometer is designed to expand performance in advanced proteomics, biopharma and metabolomics applications, including quantitation using isobaric tags, low level PTM analysis, data independent acquisition (DIA), and top down proteomics. The new instrument features enhanced sensitivity resulting in improved analyte detection, characterization and quantitation, enabling scientists to perform more comprehensive sample analyses faster and with better accuracy than ever before.

The system is the research-leading high-performance mass spectrometer with enhanced sensitivity facilitated by a new High Capacity Transfer Tube, Electrodynamic Ion Funnel, Advanced Quadrupole Technology, Advanced Vacuum Technology, and ETD HD.

Specification

- MS/MS precursor ion selection width : 50 to 3,000 m/z
- Mass range : 50 to 6,000 m/z
- Resolution : up to 500,000(FWHM) at m/z 200
- Scan rate : up to 20Hz
- Mass accuracy :
  - < 3 ppm RMS using external calibration
  - < 1 ppm RMS using internal calibration
- MS/MS electrospray sensitivity : S/N >200:1 with 100 femtogram reserpine injection
- MS scan power : MSn, for n = 1 through 10
- MS/MS fragmentation : HCD, CID, ETD, EThcD can be performed

06

Surface Plasmon Resonance system

Model • 8K [GE Healthcare / Germany]

Explanation

Biacore 8K is a lable-free interaction analysis system for interaction analysis in both screening and characterization for small molecule and biotherapeutic discovery. The eight-needle high-sensitivity surface plasmon resonance (SPR) system rapidly provides kinetics and affinity data shortening time to results by up to eight times compared to single-needle systems. The blend of system flexibility and throughput reduced the experimental cycle time, even for complex targets and new drug formats such as bispecific antibodies. The system is well-suited to the analysis of wide variety of sample including the smallest fragments or large multidomain proteins, even in crude matrices.

Specification

- Typical run time: Clean Screen (384-well plate) : 1h / Binding level screen (384-well plate) : 2h/ Affinity screen (64 sample) : 3h
- Analysis Temperature: 4℃ to 40℃
- Sample refractive index range: 1.33 to 1.39
- In line reference subtraction: Automatic
- Number of flow cells: 16 in 8 channels

109M-1s-1 /LMW molecules up to 107M-1s-1

- Dissociation rate constant (kd): 10-6 to 0.5 s-1
- Sample concentration: ≥1pM
- Molecular weight detection: No lower limit for organic molecules
- Baseline noise: Typically < 0.02 RU (RMS)
- Baseline drift : Typically < 0.3 RU/min

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2017-2019

Center for Genomic Intergrity

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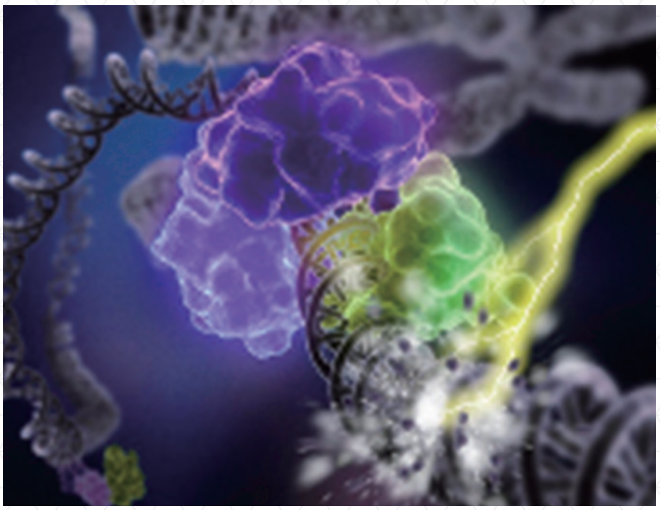

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List of Instruments

Equipments	Model	Maker
Biological X-ray irradiator	RS 2000	Rad Source
Laser Scanning Confocal Microscope	LSM 880	Carl Zeiss
Image Analysis System	Amersham Typhoon RGB	GE Healthcare Bio-Sciences AB
High Resolution Accurate Mass Spectrometer	Q Exactive Focus	Thermo Fisher Scientific
Liquid Scintillation Counter	Hidex 600 SL	Hidex
Solvent Purification System	VAC 103991	Vacuum Atmospheres

01

Biological X-ray irradiator

Model • RS 2000
[Rad Source/ U.S.A]

Explanation

Direct replacement for cesium and cobalt irradiators–no isotopes • Patented chamber technology • Irradiation in a filtered environment (no cross-contamination issues) • Programmable techniques using touch panel screen • Complete dose mapping • Self-cooled and caster mounted for easy installation • Unique shielding design far exceeds U.S. CDRH requirements • No NRC licensing or reporting required • Specialized irradiation equipment configurations available to suit unique applications • Currently in use at some of the finest public and private research institutions in the world

Specification

- The RS 2000 is self-contained and requires no external cooling system
- NO Nuclear Site license or secure/shielded room is needed
- The RS 2000 is ideal for small animal research when using our patented RAD + reflective cage enclosure. This unique and patented feature provides for a dose rate within the cage of 1.2 Gy/min (120 rads/min or the same as gamma irradiator) and the dose distribution is better than 94% across the entire field (much better than a gamma irradiator). The RAD+ is designed to hold one standard Allentown filtered rearing cage. (Three of which are supplies with the system.) This feature improves animal husbandry by allowing transport and irradiation of the animals inside a filtered environment mitigating cross-contamination issues. Because the animals are irradiated in their cage, multiple mice can be irradiated during one cycle. IF it is important for you to have reproducible results that equate to the irradiation standard of Cesium - the only choice is the RS 2000 with .3mm of Copper filter irradiating at 160 kV AT 25 mA (NEW 225 kV available).

02

Laser Scanning Confocal Microscope

Model • LSM 880
[Carl Zeiss/ Germany]

Explanation

1. Your samples tend either to be very small, move very fast or bleach very quickly. Or do all of that at once. To get unbiased data from live cells or other weakly labelled samples, there's no such thing as too much sensitivity, resolution or speed. Each photon of emission light is precious. Now you can use multicolor samples with any label and get image quality like you've never seen before. With Airyscan you are always able to select the optimal acquisition strategy for your sample: Simply decide whether you want to gain 1.7x higher resolution in all three dimensions – resulting in a 5x smaller confocal volume. Or push the sensitivity beyond the limits of all conventional confocals. Or use the increase in signal-to-noise ratio to speed up your image acquisition. The choice is yours.

Specification

1) Scanners o 2 independent, galvanometric scan mirrors with constant monitoring and calibrating the scanner position. o Absolute linear scanner movement to ensure equal pixel dwell times as a prerequisite for any quantitative study.
2) Scan Zoom o 0.6x to 40x; digitally variable in steps of 0.1
3) Scanning speed o 13 frames/sec with 512x512 pixels, up to 6875 lines/sec.
4) Image scan o Scan resolution : 4 x 1 to 8192 x 8192 pixels; also for multiple channels. o Any shapes of scanning format is possible, for example, round, star shape, potato shape etc. o Scanning rotation : Free rotation (360°), in steps of 1° variable; free xy offset.
5) Scan field o 20 mm field diagonal in the intermediate image plane, with full pupil illumination.
6) Data depth o 8-bit or 12-bit or 16-bit; up to 35 channels simultaneously detectable.
7) Pinholes o 1 pre-adjusted master-pinhole, individually adjustable for Multi tracking and short wavelengths. 8) Lasers o V/VIS-lasers directly mountable into the scanning module with individual connections. o Multi Argon laser (455, 488, 514nm) 25mW o UV laser (355nm) 30mW o DPSS laser (561nm) 20mW o HeNe laser (633nm) 5mW o Laser life expender function : The lasers are shut off when not in use this significantly prolongs the life span of the lasers

03

Image Analysis System

Model • Amersham Typhoon RGB
[GE / Sweden]

Explanation

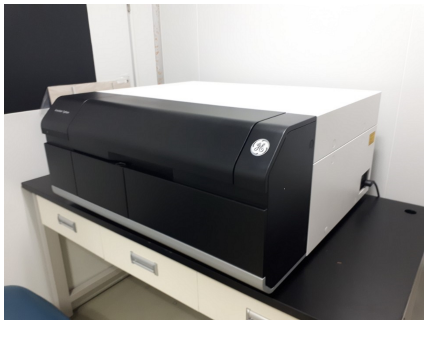
1. Versatility: use one system to image multifluorescent-, radioisotope-labeled, and colorimetric samples on gels, membranes, multiwell plates, culture dishes, glass slides, and tissue sections. The IP model is for phosphor imaging only but can be upgraded

2. Accurate quantitation: detect signals from as low as 3 pg of protein and differences across a dynamic range with greater than 5 orders of magnitude

3. High resolution: resolve fine details in your sample with a pixel resolution of as low as 10 µm

Specification

- 1) Detection modes : Fluorescence, phosphor imaging, densitometry, and chemiluminescence (Dark scan)
- 2) Excitation wavelengths : LD488, SHG532, LD635
- 3) Radioisotopes : 3H, 11C, 14C, 125I, 18F, 32P, 33P, 35S, 99mTc
- 4) Dynamic range : Five/four orders of magnitude
- 5) Max scanning area Phosphorimaging : 40 × 46 cm
- Fluorescence: 40 × 46 cm
- 6) Pixel sizes : 10, 25, 50, 100, and 200 µm, selectable



04

High Resolution Accurate Mass Spectrometer

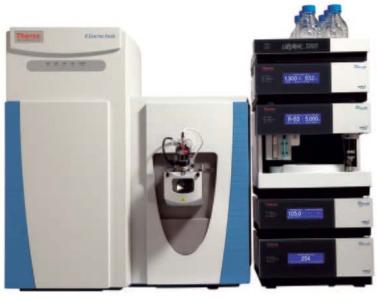
Model • Q Exactive Focus [Thermo Fisher Scientific / U.S.A]

Explanation

• Scan speed up to 12 Hz with Orbitrap Analyzer Technology for best screening and quantitative results • Resolving power of up to 70,000 (FWHM) at m/z 200 • Routine sub ppm mass accuracy • Linear Dynamic Range up to 6 orders of magnitude • Multiple approaches to quantitation including Selected Ion Monitoring (SIM), Parallel Reaction Monitoring (PRM), and Data-Independent Acquisition (DIA) • Polarity switching for maximum compound coverage • Higher-Energy Collisional Dissociation (HCD)

Specification

Performance Characteristics
Resolving power 70,000 @ m/z 200
Mass range 50 to 3000 m/z
Scan rate* Up to 12 Hz at
resolution setting of 17,500 @ m/z 200
Mass accuracy * Internal: <1 ppm RMS
External: <3 ppm RMS
Sensitivity Full MS: 500 fg buspirone on column S/N 100:1 SIM: 50 fg buspirone on column S/N 100:1
Dynamic range >5000:1
Linear Dynamic >1,000,000 range
Polarity switching One full cycle in <1 sec (one full positive mode scan and one full negative mode scan at a resolution setting of 35,000)
Analog inputs One (1) analog input (0–1 V)
One (1) analog (0–10 V)



05

Liquid Scintillation Counter

Model • Hidex 600 SL [Thermo Hidex / Finland]

Explanation

Demands in centralized laboratories require high sample load capacity. Several multiuser labs require possibility to load samples and leave them queuing. To fulfill such needs Hidex is proud to introduce a high throughput automatic TDCR liquid scintillation counter.

The Hidex 600 SL uses the robust and convenient triple to double coincidence ratio TDCR counting well known from the 300 SL series. With the added sample capacity of over 500 small vials or 210 large vials even the most crowded labs can rely on this work horse. Samples are loaded in racks with barcode template identifier which makes multi user environment with different needs extremely easy.

Specification

1. Number of PMTs : 3PMTs
2. Efficiency (Normal Count mode)
   3H : 70%
   14(: 96%
3. Figure of Merit (E2/B)- (Normal Count mode)
   3H : 180
   14(: 420
4. Observed Background (Normal Count mode)
   3H : 12 CPM
   14C : 36 CPM
5. Energy Range: 0-2,000 keV
6. Dual logarithmic multichannel analyzers(MCA) each 1,024 channels.
7. Sample capacity for 7ml vial : 500 sample
8. Sample Transport : pneumatic Robotic arm mechanism system

06

Solvent Purification System

Model • VAC 103991 [Vacuum Atmospheres / USA]

Explanation

Vacuum Atmospheres Company's patent pending solvent purifier removes moisture in organic solvents. The moisture is removed by circulating the solvent through a purification cartridge and a stainless steel reservoir. VAC's solvent purifier allows for quick and easy delivery of high purity anhydrous solvents. Sample sizes can range from milliliters to liters. The compact design (installs into 33high x 10" wide x 20" deep space) allows the solvent purifier to mount inside a fume hood, on a bench top, inside a glovebox, or under a glovebox. The purifier is sized to be filled/refilled from a standard liter solvent bottle. The purifier eliminates the need to store largquantities of unstable solvents and reduces potential waste of largamounts of solvent due to accumulation of impurities, such as peroxides. There are no fire proof storage cabinets or large solvent kegs in this design. VAC's design also eliminates the possibility of pumping solvent through the vacuum pump. Drip free, quick release connections allow easy replacement of the purification cartridge. The user can easily replace the media using a VAC recharge kit or senthe reusable cartridge to VAC for recharging at a nominal cost.

Specification

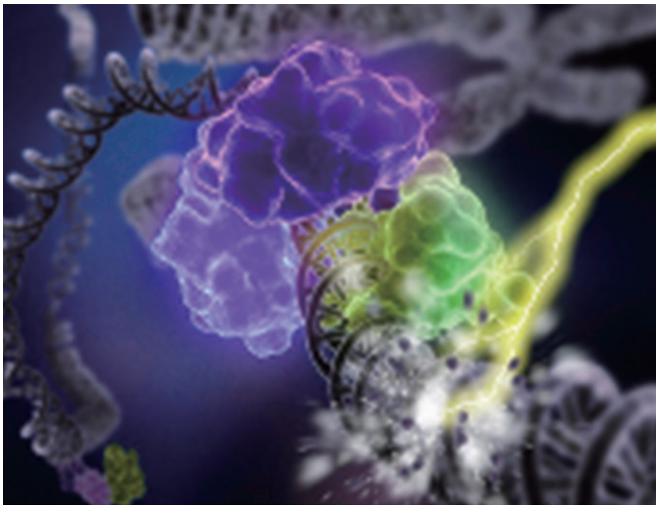
1. 솔벤트 순환 정제 기능 : 0.56ppm 이하
2. 솔벤트 수분 제거능 : 1 ppm 이하 3.
Purification cartridge : moisture adsorption 48g
cartridge life : > 250L at 200ppm cartridge
capacity : 2.5 L media treatement : pre-activated
4. Purification volume : > 8 L/day
5. Fill capacity : 4 L
6. Purge & filling pressure : 5 PSIG
7. Sparging & circulation pressure : 1 PSIG
8. Dry vacuum pump : 1.2 CFM
9. Regulator kit : 10 PSIG

LIFE SCIENCES

2020-2022

Center for Genomic Intergrity

(Campus)



DNA is a building block for entire genome and encodes genetic codes, which determine almost every aspects of life. In some cases, DNA could be damaged by endogenous asserts such as replication errors and oxidation stresses or exogenous challenges such as radiation or toxic chemicals. If such damage were not properly repaired, cells could die or accumulate mutations that would cause aging and genetic diseases including cancers. Cells equip multiple DNA repair pathways that can sense, transduce signals, and ultimately repair damaged DNA. These pathways sometimes participate other DNA metabolisms including DNA replication, transcription, and re-combination. The Center for Genomic Integrity will investigate these multiple DNA repair pathways at the molecular level using small molecules with molecular, cell biological and biochemical techniques and animal models. We anticipate our research will uncover detail molecular mechanisms of DNA replication, repair, and recombination and come up with potential answers the origin of cancers, aging, and evolution.

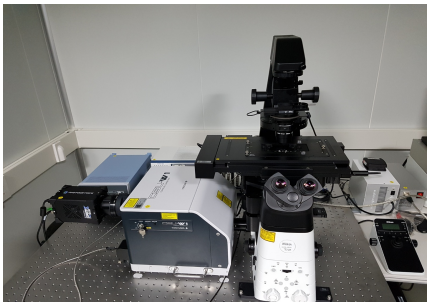
List of Instruments

Equipments	Model	Maker
Spinning Disk Confocal Microscope	Ti2-E	Nikon
Multi-Range Large Particle Flow Cytometer	COPAS VISION	Union Biometrica
Yeast Tetrad Dissectio System	MSM400	Singer Instruments
4D Microscope System	Zeiss Imager M2	Carl Zeiss
Automatic autoclave system	Media clave 10	Swiss
Plate pouring System	MediaJet	Swiss

01

Spinning Disk Confocal Microscope

Model • Ti2-E
[Nikon/Japan]



Explanation

1. The technology is based on a tandem-disc system containing a microlens array and a Nipkow disc. 2. Bleaching and phototoxicity are reduced to a minimum. 3. The excitation light is supplied by a laser module with up to 4 powerful solid-state lasers and efficient coupling, while the lines and intensity are controlled by an AOTF. 5. Wavelength and time can be controlled automatically .6. Apochromatic correction offers good contrasting and homogeneous illumination in fluorescence beam path. 7. Two step perfect z-focussing system : perfect focus and auto focus 8. Laser manipulation system for FRAP experiment.

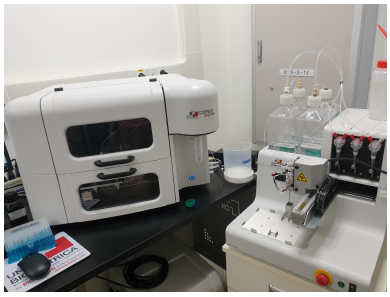
Specification

1. Spinning disk module
A) Confocal Scanning method : Microlens-enhanced Nipkow disk scanning
B) Spining Speed : 1500~4000 RPM, (75 ~ 200 fps)
C) Disk Unit : pinhole size 25um
D) Bright Field : Motorized exchange between confocal and brightfield
E) Field of View : 17 x 16 mm
F) Excitation Wavelengths : 405nm to 785 nm
G) Observation wavelength : 420nm to 850nm
H) Emission filter wheel : 10-position filter wheel
I) Filter size : Φ25mm
J) Switching speed : 100 msec max.(Standard mode), 40msec max.(High speed mode)

02

Multi-Range Large Particle Flow Cytometer

Model • COPAS VISION
[UnionBiometrica/ USA]



Explanation

1. large particle flow cytometer designed to image, analyze, sort and dispense biological materials
and other objects ranging in size from 2 to 850 microns in diameter.
2. The system is designed to handle objects which are too large or too fragile for traditional flow
cytometers.
3. Examples include small multicellular organisms, delicate large cells, cell clusters, small seeds, and
beads used as micro-carriers or for combinatorial libraries

Specification

1) Technical Specifications

(1) Realtime brightfield imaging
(2) 10-750μm objects
(3) 4 excitation lasers, 4-8 fluorescence detectors
(4) Profiler™ graphically displays optical density and fluorescence intensities along the axis of each particle
(5) Sorting by size, optical density, scatter, fluorescence and Profiler measurements
(6) Sorting principle by gentle air diverting, maintains sample integrity
(7) Collection in multiwell plate, tubes, and various receptacles

2) Performance specification
(1) Flow Cell Channel : 500um (one out of 250 um, 500um, 1000um)
(2) Object Size Range : 6-400um
(3) Recommended Object Size : 30-350um
(4) Minimum Sorted Drop Size : 2ul or less
(5) Field of View : 500 x 1300um or more
(6) Image Resolution : 2.0um or more
(7) PMT 4 : Cy5, 659-701nm
(8) PMT 6 : GFP, 500-525nm
(9) PMT 7 : YFP, 532-554nm
(10) PMT 8 : DsRed, 603-627nm

03

Yeast Tetrad Dissection

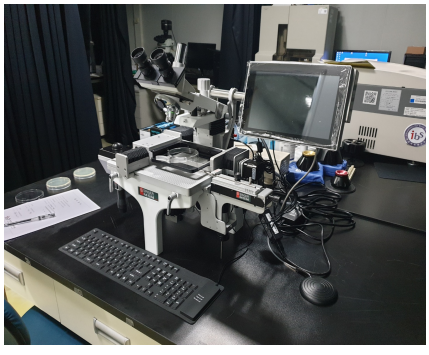
Model • MSM400
[Singer Instuments / UK]

Explanation

1. Tetrad dissection is a vital tool for yeast geneticists. It is a method by which sporulating yeast cells are teased apart, and the individual cells isolated. Specially designed micromanipulation tools are used to carefully separate the cells of interest, which are then transferred to a new growth medium for further study.

Specification

1 #MSM-400, Tetrad Dissection System
Complete, computer controlled, motorised microscope platform for the dissection and documentation of yeast and fungal cells and spores
Equipment supplied
Step-by-step installation and user guides
included One box of 10 Dissection Needles
is included Power Cable (Type F)
MSM Packing & Transit Pack



04

4D Microscope System

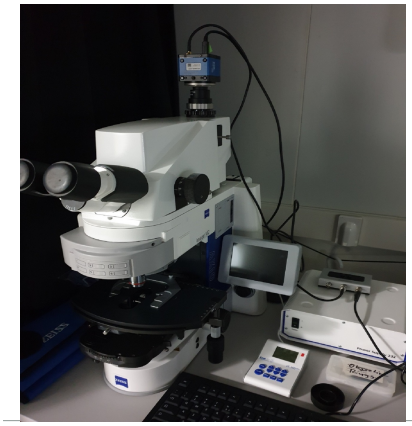
Model • Zeiss Imager M2
[Carl ZEISS / Germany]

Explanation

1. Microscopic 4D recording (time and 3 dimensions) of C. elegans embryonic, larval and germ line development using DIC / Nomarski optics combined with fluorescent imaging using narrow range GFP protect, Triple DAPI, GFP select and mCherry filter-sets 2. Minimizing potential for photobleaching 3. Determining cell lineages during development 4. Documentation and storage of cell lineage data 5. Comparing cell lineage data to existing reference lineages 6. Monitoring cell and cell type specific reporter gene expression during development 7. Documenting subcellular dynamics in real time 8. Preparing setup for allowing precise temperature control and temperature shifts. 9. Software for 4D visualization and documentation of nuclei in living organisms

Specification

1. Upright microscope with motorized Z -drive
2. Suitable light source for fluorescent microscopy
3. High resolution camera for image acquisition
4. Software for recording of C. elegans embryonic , larval and germ line development
5. Software for analysis of the recording and lineage tracing
6. Using above mentioned items assembly of functioning 4D recording setup



05

Automatic Autoclave System

Model • Mediaclave10
[Integra Bioscience /SWISS]

Explanation

NTEGRA has designed a dedicated media sterilizer which eliminates these disadvantages. MEDIACLAVE allows for a much shorter process in which medium formulation and sterilization is carried out in one single step. The temperature of the agar medium is precisely monitored and controlled during the entire process. Permanent stirring guarantees homogenous temperature throughout the whole batch and an efficient plate heat exchanger facilitates rapid cooling. All these features prevent the medium from excessive heat exposure and thereby maintains its fertility.

Specification

MEDIACLAVE 10 w/o printer, 200-240V, 50/60 Hz, EU plug
with cuvette, lid seal, magnetic stirrer, decanting tubing, fitting for dispensing
tubing, integrated printer and printer splash guard

06

Plate pouring machine

Model • Mediajet
[Integra Bioscience / SWISS]

Explanation

Instruments designed to automate the process of filling plates and petri dishes with agar or liquid media.

Specification

Automatic culture media standard filler base ;
. Main functions : Integral Combined system for Hands free auto-dispensing media, buffers, various suppliments, Broth to petridishes, test-tube each 5type, and available flask, bottle, containers.
. Filling rate : 900-1,100 dishes / hour
. Carrousel version : Fully automatic robot carrousel 360 dishes capacity.
. Carrousel capacity : up to 360
. User dialog : Fill dish, Load carrousel, Cleaning, Dose, Parameter,
. System parameter : 7 type
. System application : 8 type
. System cleaning program : 1 program Installed or similar
. Tube cleaning mode : Prime key 1ea
. Calibration before filling : 1 program Installed
. Shaker mode for pour plate : Yes, standard function
(Shaker level 1-2step, 3step, 4-5step)
. Dosing range : 1-99.9ml or more
. Value range of Dish number : 0-9,999
. Media program quantity : 19 program or more
. Pause time : Adjustable 0-9.9s
. Display monitoring : Full size screen nevigation
. Interface : 2xRS232 to multifunctional