

TOKAI HIT[®]

Innovators in microscope environment control systems and technology.

www.tokaihit.com



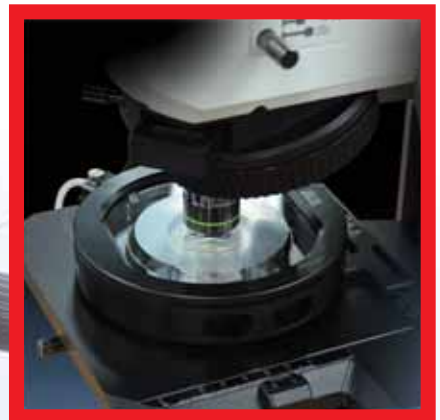
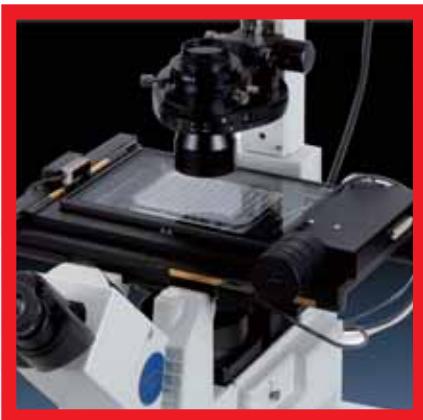
Incubation System for Microscopes

Pat.P

Stage Top Incubator

Offering precision temperature, humidity and CO₂ control, the INU Series makes real-time Live Cell Imaging possible.

Incubation System for Microscopes





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Long-term Stable Environment

INU Series allow short/long duration tissue/cell incubation under the microscope.

Compact Design

The same conditions as in a CO₂ incubator can be created in a compact body on the microscope stage.

Focus Stability

Thanks to Tokai Hit's unique technology, the INU Series is designed to minimize Z-axis focus drift. Exceptional stable focus allows steady confocal imaging, time-lapse, long-term image recording and other imaging applications.

Clear Vision, Clear Image

Clear Glass Heater installed in Top Heater prevents condensation, allowing clear and continuous transmission of illumination and imaging.

No Big Box Needed!

INU provides ideal temperature, humidity and gas environment in a compact chamber, eliminating the need to cover the whole microscope with a bulky box. INU allows easy access to specimen, easy set up and doesn't interfere with related devices when systemized.

Focusing on Live Cells

Clear, Stable, Long-term Live Cell Imaging

INU Series makes it possible

Stage Heater
Anti-Z-Axis Drift Design and
Accurate Temperature Control

The configuration of the Stage Heater is specifically designed to match the microscope stage to be installed.

Tokai Hit's unique technology minimizes focus drift to provide optimal conditions for confocal applications and time-lapse/long-term imaging procedures. Features of INU provide the perfect solution to stable Live Cell Imaging.

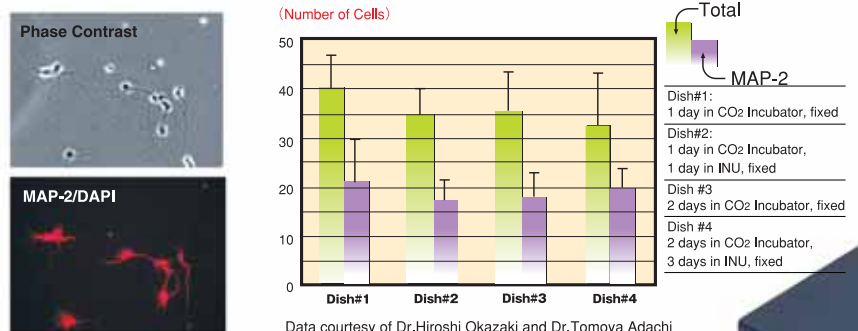
INU Series vs. CO₂ Incubator:

Performance Comparison

Comparison is based on embryonic rat hippocampal neuron cells at 18 days, cultured in the INU Series and in an ordinary CO₂ Incubator, with the number of cells counted in a field under 100x magnification.

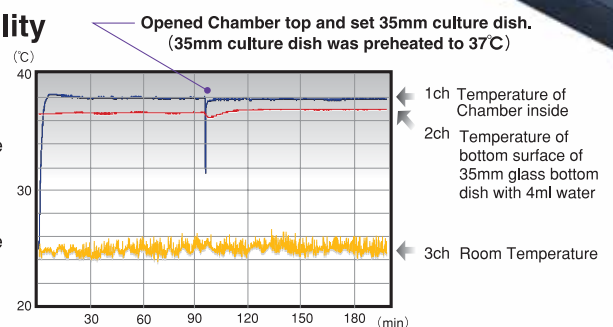
"Total" is the total number of cells observed in the field (under phase contrast) and "MAP-2" is the number of cells compared under different conditions.

showing that the INU Series stands comparison with ordinary CO₂ Incubator.



Temperature Stability of Dish Contents

After 90 minutes of preparatory operation, 35mm culture dish preheated to 37°C was set inside the INU Series Chamber. Some impact from opening the Chamber and cooling of the dish can be observed, but stable conditions recovered within 20 minutes.



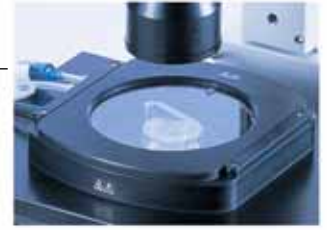
Top Heater Protector

This device protects Top Heater glass.



Clear Vision Top Heater Clear Glass Heater

Clear Glass Heater in Top Heater prevents condensation buildup in top of Chamber Unit, allowing clear, continuous illumination transmission. Constant long- and short-term/time-lapse image quality is the result.



High-humidity Tank Unit Bath Heater

Bath Heater maintains constant high-humidity and CO₂ supply. Provides essential environment factors for cell culture, enabling long-term Live Cell Imaging under microscope. INU expands research possibilities.

Gas Inlet

Water Bath Gas Inlet provides constant premixed CO₂ gas flow.

Water Supply

For long-term incubation, additional distilled water can be supplied from side port. Continuous operation over 2 days is possible.

Water Bath

Water Bath holds sterile water to humidify the Chamber. The Bath Heater is embedded underneath the Water Bath, which maintains Chamber humidity optimally at all times.

Wide Range of Applicable Dishes

The adaptors available for 35mm dish, 50/60mm dish, Chamber Slide, Chambered Cover Glass, Slide Glass.



Optimal Close-Up Objective Temperature Control Lens Heater

Ease of set-up and operation

Lens Heater optimizes objective temperature within 20 minutes and is especially effective for close-up heat control when using high-magnification lenses and oil/water immersion lenses. Lens Heater can be applied up to Φ 40mm objectives.



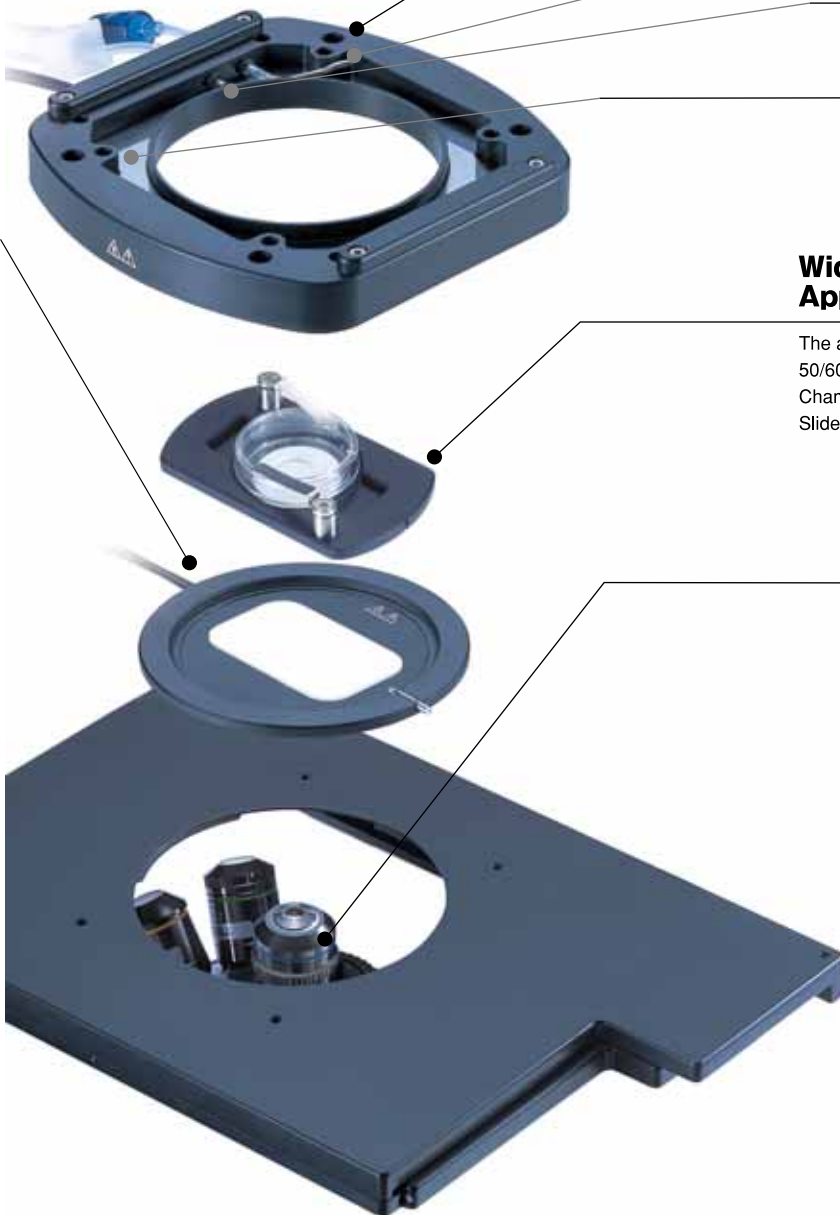
Regulating ideal incubation/ observation environment

Multiple temperature regulators control desired chamber temperature INU Controller

PID control method regulates with high precision Top, Bath, Stage and Lens Heaters, Main Power, Bath and Lens Heater switches are on front panel of Controller. Bath (excluding INUG2 Control Unit) and Lens Heater can be turned off and on as required.



Cell Imaging.. Cell Imaging?



The above demonstrates INU-ONICS components.
Other models for inverted/upright/stereo microscopes differ in configurations.

For Inverted Microscopes

Standard Type

Versatility and basic performance, wide range of applicable dishes

ONICS

Nikon Ti/TE/TMD Series with rectangular stage
Olympus IX Series with cross stage
Leica DMIRB/E with 3-plate mechanical stage



Nikon, Olympus, Leica Microscopes with standard manual stage Round insert type



dish attachments

35mm dish	: ONICS-D35
50/60mm dish	: ONICS-D56
chamber slide	: ONICS-CS
chambered cover glass	: ONICS-CGC
slide glass	: ONICS-SG

※ applicable for 35mm dish as standard
※ ONIOR-BU adaptor is necessary for use with Leica DMIRB/E adaptor for DMIRB: ONIOR-BU

ZILCS

Leica DMI Series with 3-plate stage
Zeiss AxioObserver/Axiovert series with K type stage
Motorized stage Prior, Ludl, Märtzhauer



Leica, Zeiss and Motorized Stages 160 mm x 110 mm insert type



dish attachments

35mm dish	: ZILCS-D35
50/60mm dish	: ZILCS-D56
chamber slide	: ZILCS-CS
chambered cover glass	: ZILCS-CGC
slide glass	: ZILCS-SG

※ applicable for 35mm dish as standard

WELS

For microscopes with attachable X-Y stage of all makes
To be installed in place of specimen holder



inverted



manual stage



motorized stage



35mm dish



50mm dish



chamber slide



chambered cover glass



slide glass



prevent condensation



Anti Z axis drift



lens heater



dish attachment



dish holder

Compact as Multi-Well Plate



dish attachments

35mm dish	: WELS-D35
50mm dish	: WELS-D50
chamber slide	: WELS-CS
chambered cover glass	: WELS-CGC
slide glass	: WELS-SG

※applicable for 35mm dish as standard

For Galvo Driven Stage Confocal Application

Light-weight and compact design, conforms to precision movement



Leica SP5 Super Z-Galvo Stage



inverted



manual stage



motorized stage



35mm dish



50mm dish



chamber slide



chambered cover glass



slide glass



prevent condensation



Anti Z axis drift



lens heater



dish attachment



dish holder

For Leica SP5 Super Z-Galvo Stage

Weight less than 180g

Compact, but wide range of applicable dishes



dish attachments

35mm dish	: GSI-D35
50mm dish	: GSI-D50
chamber slide	: GSI-CS
chambered cover glass	: GSI-CGC
slide glass	: GSI-SG

※applicable for 35mm dish as standard

For Piezo Driven Stage Confocal Application

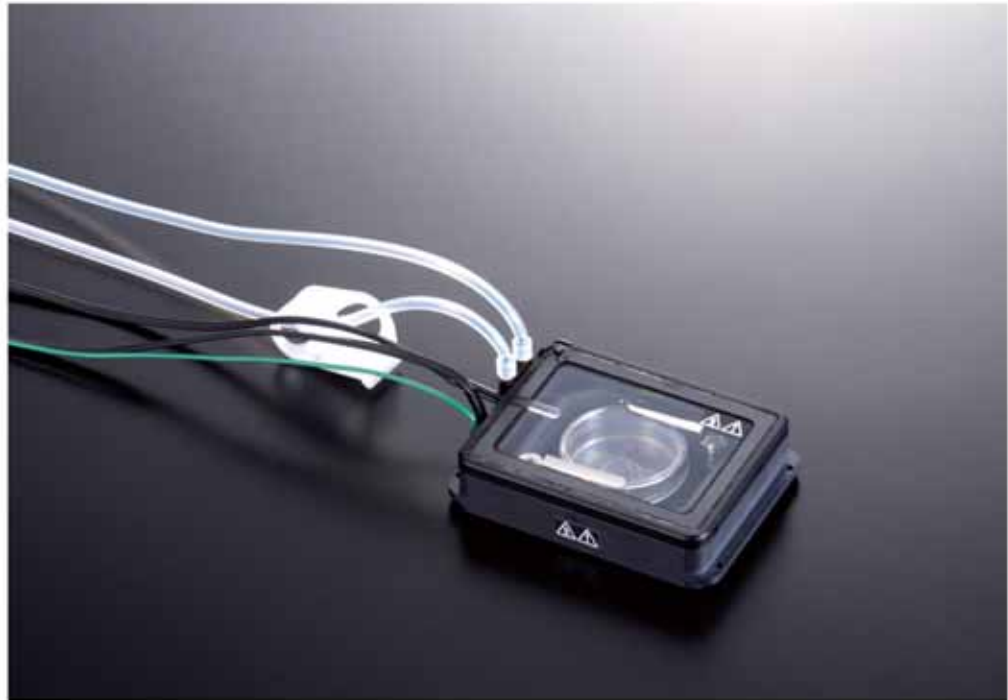
Light-weight and compact design



Prior Nano Scan Z
Andor Piezo Stages



For Prior and Andor Piezo Stages



Ludl Piezo Stage
PI Piezo stage



For Ludl and PI Piezo Stages Compact with wide range of applicable dishes



dish attachments

35mm dish	: PI-D35
50mm dish	: PI-D50
chamber slide	: PI-CS
chambered cover glass	: PI-CGC
slide glass	: PI-SG

※applicable for 35mm dish as standard

Multi-Point Live Cell Imaging with Multi-Well Plate

Ready access of all wells with uniform environment

WDSMP

Nikon Ti/TE2000
Olympus IX Series
Zeiss AxioObserver, Axiovert

Applicable imaging software
WDSMP:
NIS Elements
MetaMolp
FV10-ASW
Image-Pro Plus
SlideBook



For automated multi-point time-lapse imaging and screening Stage Top Incubator + Original Motorized Stage



Stage control unit & Joy-stick



dish attachments

35mm dish	: WDS-D35
50/60mm dish	: WDS-D56
chamber slide	: WDS-CS
chambered cover glass	: WDS-CGC
slide glass	: WDS-SG

※applicable for 35mm dish as standard

WDS

Olympus IX Series
Nikon Ti/TE2000



For observing multi-well plates Stage Top Incubator + Original Manual Stage



dish attachments

35mm dish	: WDS-D35
50/60mm dish	: WDS-D56
chamber slide	: WDS-CS
chambered cover glass	: WDS-CGC
slide glass	: WDS-SG

※applicable for 35mm dish as standard

For Stereo Microscopes

MS1/MS2

Nikon
Olympus
Leica
Zeiss
For various microscopes of all makes



Universal model for various microscopes of all makes

Combine with exclusive Stage Adaptor.

MS1/MS2 are applicable to high magnification observation as they have a slim design for use with short working-distance objectives and MS1/MS2 are also applicable to fluorescence observation.



MS1

With Dish Holder
Dish is fixed in one position



MS2

With Dish Guide
Dish is movable from outside for course position adjustment

For Olympus



MS-SZX2A

Microscope

MVX10
SZX16
SZX10

Lighting installation

SZX2-ILLB
SZX2-ILLK
SZX2-ILLD



MS-SZX2B

Microscope

SZX16
SZX10

Lighting installation

SZX2-ILLT



MS-SZX

Microscope

MVX10
SZX12
SZX9
SZX7

Lighting installation

SZX-ILLK
SZX-ILLB2
SZX-ILLD2

For Leica



MS-TL

Microscope

MZ series
M205C
M165C

Lighting installation

TL-ST
TL-RC
TL-RCI

For Nikon



MS-SMZ

Microscope

SMZ series

Lighting installation

C-DSS
C-DSD
C-BD
C-DSDf
C-DS

For Upright Microscopes

UM/UW



Universal design for upright microscopes

Applicable for 35mm/50mm dishes and slide glass

NOTE:UW is for Olympus BX51WI with cross stage only.



Digital Gas Mixer

CO₂ Concentration
CO₂ Gas Mixing System

An evolutionary step in
Stage Top Incubator
for Microscopes, providing
optimally conditioned mixed gas
during Live Cell Imaging

GM-4000A/GM-4000E

Adjustable CO₂ concentration and
flow rate depending on application
CO₂ concentration: 2.5% - 20.0%
CO₂ flow rate: 50ml/min - 200ml/min



Basic performance specifications

Output gas	: 2.5%-20% CO ₂ +Air
Accuracy	: ±0.5% and less
Output gas flow rate	: 50ml/min - 200ml/min
Input gas type	: 100%CO ₂
Input gas pressure	: 0.1Mpa
Control Method	: PID method
Power source	: AC110V, 120V (GM4000A) AC220V, 230V, 240V (GM4000E)
Maximum power consumption	: 200VA
Outside dimensions	: W160 × D260 × H180 (mm)
weight	: 5.7kg

GM-2000A/GM-2000E

For stable 5%CO₂+ 95% air mixed gas supply



Basic performance specifications

Output gas	: 5% CO ₂ +95%Air
Accuracy	: ±0.5% and less
Output gas flow rate(fixed)	: 160ml/min
Input gas type	: 100%CO ₂
Input gas pressure	: 0.1Mpa
Control Method	: PID method
Power source	: AC110V, 120V (GM2000A) AC220V, 230V, 240V (GM2000E)
Maximum power consumption	: 100VA
Outside dimensions	: W160 × D260 × H180 (mm)
weight	: 4.8kg

Control Units

Individual temperature settings of multiple heaters create optimum temperature and humidity conditions with ease and enable long-duration tissue/cell incubation

Regulating ideal incubation environment

Multiple temperature regulators control desired chamber temperature

PID control method regulates with high precision Top, Bath, Stage and Lens Heaters.

Main Power, Bath and Lens Heater switches are on front panel of controller.

Bath (excluding INUG2 Control Unit) and Lens Heaters can be turned off and on as required.

INUG2A INUG2E control unit



With built-in digital gas mixer
(for 100%CO₂ cylinder use)

Basic performance specifications	
Control method	: PID method
Setting temperature range	: Ambient to 50°C
Maximum power consumption	: 200VA
Power source	: AC110V,120V (INUG2A) : AC220V, 230V, 240V (INUG2E)
Input gas type	: 100% CO ₂
Input gas pressure	: 0.1Mpa
Output gas (fixed)	: 5%CO ₂ +95%Air
Accuracy	: ±0.5% and less
Output gas flow rate (fixed)	: 160ml/min
Outside dimensions	: W175 × D260 × H270 (mm)
Weight	: 6.9kg

INU-F1 control unit



With a gas flowmeter for premixed gas
(for premixed gas cylinder use)

Basic performance specifications	
Control method	: PID method
Setting temperature range	: Ambient to 50°C
Maximum power consumption	: 200VA
Power source	: 100-240V
Input gas type(suggested)	: 5%CO ₂ +95%Air mixed gas
Input gas pressure	: 0.1Mpa
Maximum gas flow rate	: 250ml/min
Outside dimensions	: W160 × D260 × H180 (mm)
Weight	: 3.8kg

INU control unit



With no gas supply function
(For use with external gas supplier or
when no gas supply is required)

Basic performance specifications	
Control method	: PID method
Setting temperature range	: Ambient to 50°C
Maximum power consumption	: 200VA
Power source	: 100-240V
Outside dimensions	: W160 × D260 × H180 (mm)
Weight	: 3.4kg

Thermometer

Thermometer with Super Fine Sensor Probe – 0.25mm diameter

TSU

For temperature measurement of:
Heated plate surface
Medium
Atmosphere
Liquid etc...

Super-Fine Sensor Probe minimizes heat loss from subject (e.g.,specimen).

Probe also minimizes influence from ambient for accurate temperature measurement.



Digital Thermometer

Thermo Probes



TSU-0125:
For K type thermocouple display with switchable resolution of 1°C or 0.1°C.
With built-in flip-up stand.

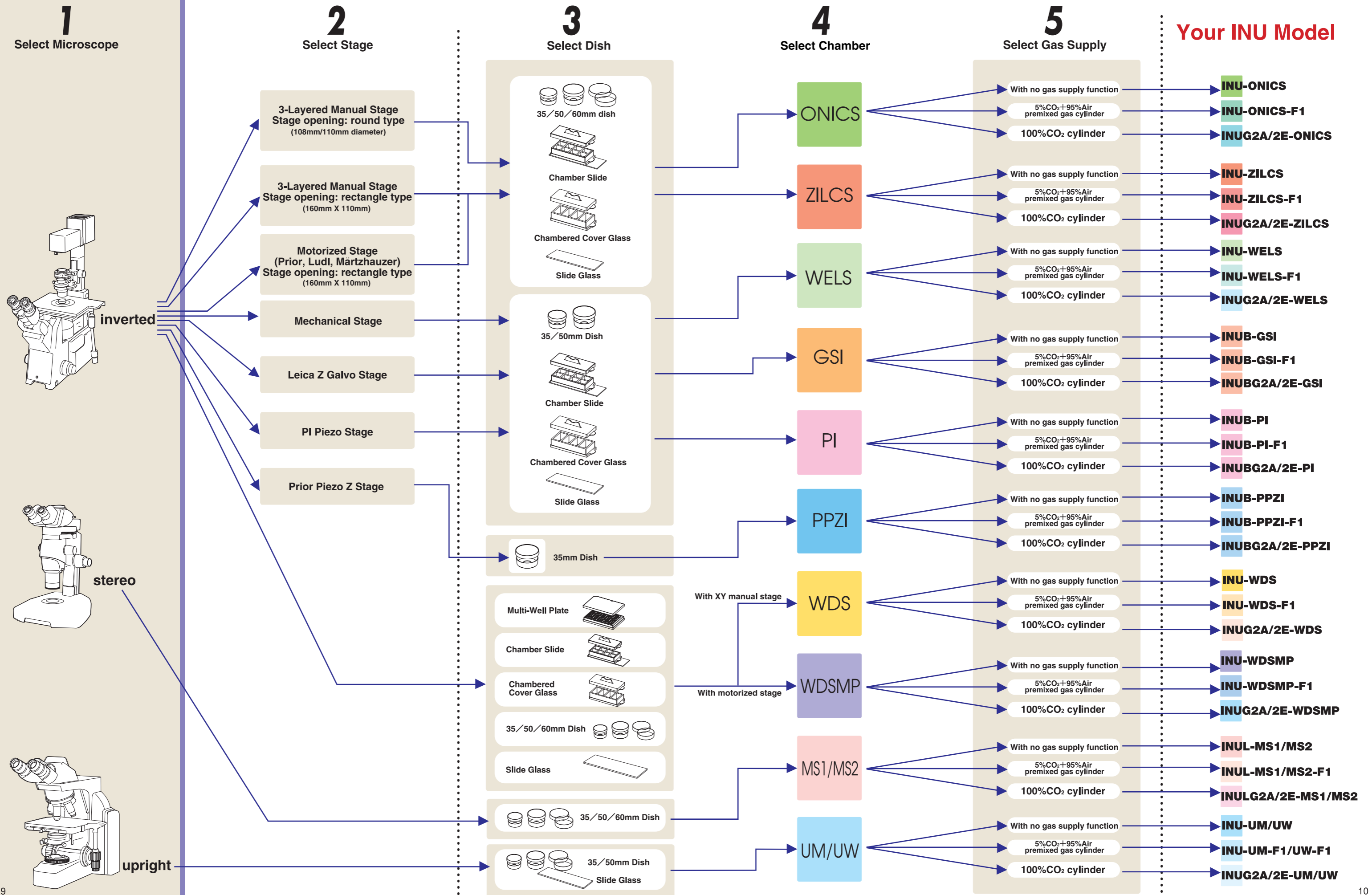


TSU-7225:
Telescopic holder type
Telescopic holder-type probe mounted on microscope stage with micro-manipulator bracket enables stable, easy measurement of specimen, etc.



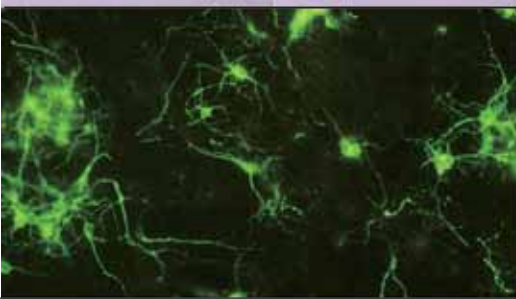
TSU-25:
Stand alone sensor type
Sensor wire is bendable so that sensor can be positioned in various shapes.

Selection Table for Stage Top Incubator/Microscope Model Conformity

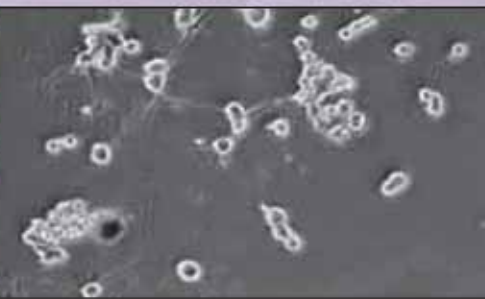




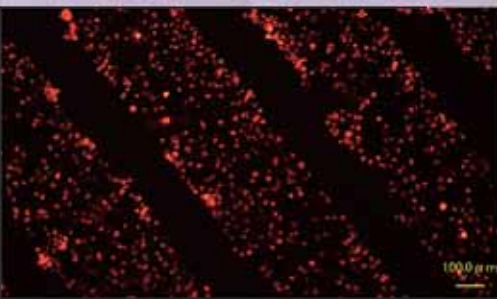
Human Embryo Development in vitro
Pictures courtesy of Dr.Nikica Zaninovic, Dr.Richard Bodine and Dr.Lucinda Veeck Gosden,
Center for Reproductive Medicine and Infertility, Weill Medical College of Cornell University, New York, USA



Rat Neuron Development
Courtesy of Dr. Wataru Ukai
Sapporo Medical University, Japan



NGF-induced PC12 cell differentiation
Courtesy of Dr. Tomoyuki Kaneko
Tokyo Medical and Dental University, Japan



HeLa cell culture by Bio-printing method
Courtesy of Dr. Makoto Nakamura
Tokyo Medical and Dental University
Kanagawa Academy of Science and Technology, Japan

TOKAI HIT Stage Top Incubator INU series Culture Results

No	attribute of the cell	name	details	period
1	Cultured cell	STO	Embryo; fibroblast, mouse	5 days
2	Cultured cell	PC12	Pheochromocytoma; adrenal gland, rat (male)	10 days
3	Cultured cell	HeLa	Adenocarcinoma; ervix, human (Black, female, 31 years)	5 days
4	Primary	Human Embryo	Human embryo in vitro: from fertilization to hatching blastocyst over 7 days	7 days
5	Primary	Neurons	Development of rat cerebral cortical neurons	4 days
6	Primary	Neural Stem Cells	Proliferation of neural stem cells of 14-day-old rat embryo	7 days
7	Primary	Neural Stem Cells	Differentiation of rat neural stem cells to neurons and glial cells	7 days
8	Primary	Hippocampal Neuron	E18 rat hippocampal neurons, cultured in CO ₂ incubator for the first day, followed by observation in INU up to five days	3 days
9	Primary	Cardiac Myocyte	Neonatal rat heart, fetal mouse (13 days embryo) heart, Observation of heart beat synchronization	3 days

INU basic performance specifications

Type	Heat-insulation by Heating Plate, double layer chamber type
Control Method	PID controller with Solid State Relay regulates temperature
Setting Method	Digital switch, Up and Down Keys. Increment 0.1°C
Setting Limits	Ambient - 50°C
Achievable Temperature Accuracy (Stage Heater)	Heating plate surface temperature within ±0.3°C of set temperature
Humidification Function	Forced increase of humidity through water in chamber
Condensation Prevention	Clear Glass Heater applied to Top Heater



Configurations and outside Dimensions Note: Chamber height, from dish bottom to top surface of Top Heater

Chamber	ONICS	W150mm × D156mm × H27.5mm
	ZILCS	W160mm × D110mm × H25.5mm
	WELS	W127.5mm × D85mm × H22mm
	GSI	W129mm × D87mm × H22mm
	PPZI	W92mm × D64mm × H20.5mm
	PI	W127.5mm × D85mm × H22mm
	WDSMP	W230mm × D153mm × H25mm
	WDS	W230mm × D153mm × H25mm
	MS1/MS2	W150mm × D156mm × H22mm
	UM /UW	Φ126mm × H24mm / W141 × D141 × H25

Stage Heater	ONICS	Outer diameter Φ112mm
	ZILCS	160mm × 110mm
	WELS	127.5mm × 85mm
	GSI	129mm × 87mm
	PPZI	92mm × 64mm
	PI	127.5mm × 85mm
	WDSMP	300mm × 195mm
	WDS	300mm × 195mm
	MS1/MS2	148mm × 148mm
	UM/UW	Outer diameter Φ120mm / Φ110mm

! Please pay special attention to items marked with Caution and Warning symbols as seen on the left. It is essential to read the Instruction Manual when using this device.

TOKAI HIT
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