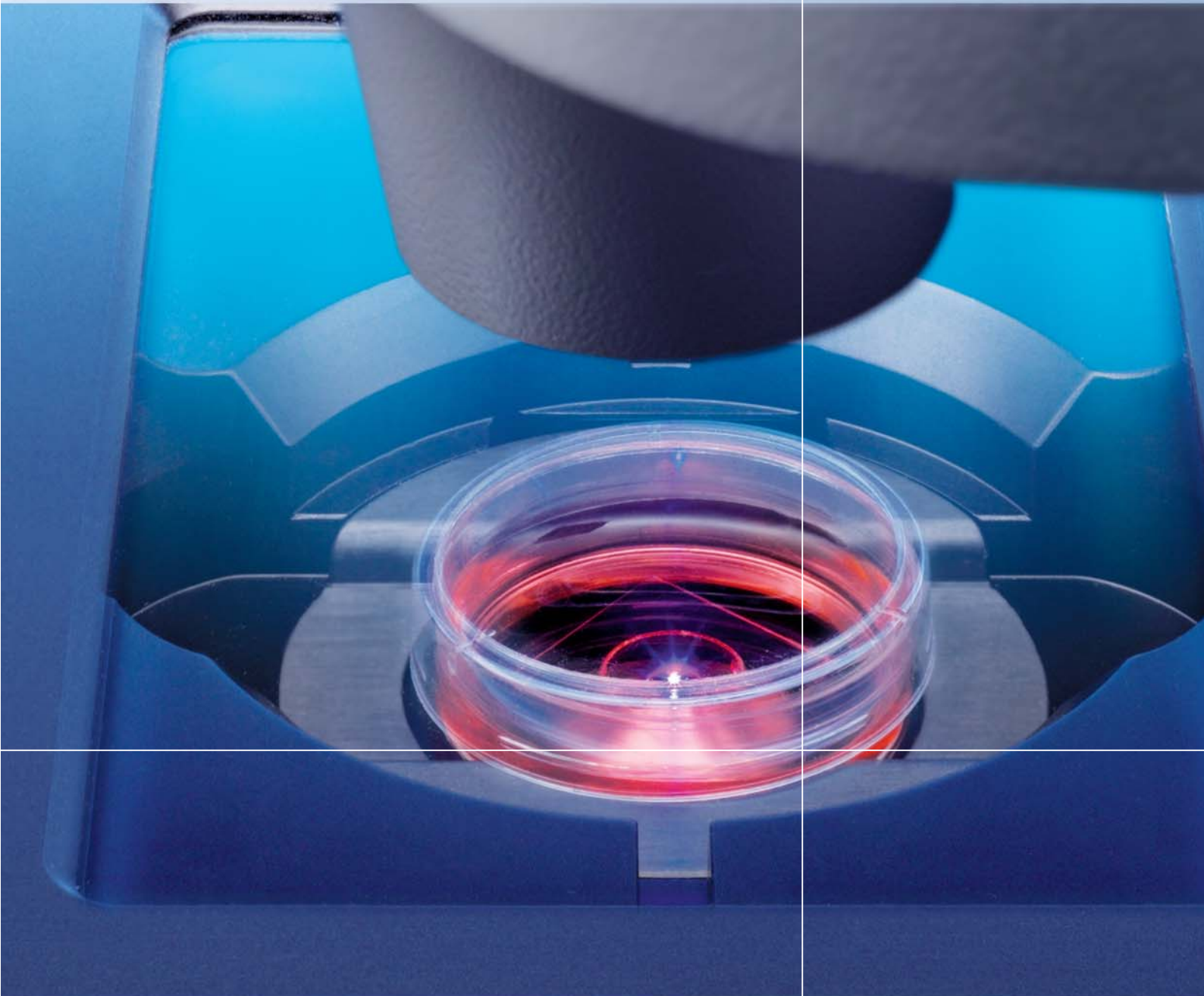


Cells Need the Perfect Climate



**System Solutions for
Live Cell Imaging under
Physiological Conditions**



We make it visible.

Exclusively from Carl Zeiss: a Whole World of Incubation

Metabolic processes, protein folding, cellular transport: the subjects of modern life science research are of an extremely high level, and as a result, system solutions must become more complex. Cultivation conditions have to be created that, as far as possible, simulate the environment of the living organism. This presents a considerable challenge for the corresponding imaging systems and their components. Incubation systems from Carl Zeiss cover every requirement and, consequently, define a new level of performance for incubation.

A complete, integrated system at every level

The performance features of all configurations are perfectly coordinated. From simple heating or cooling through to complex incubation solutions which take all parameters into consideration, the Carl Zeiss system combines maximum precision with complete system integration. This guarantees that you can rely on the meaningfulness of the results and allows a high level of freedom in conducting experiments.

Unique: perfect imitation of In-vivo conditions

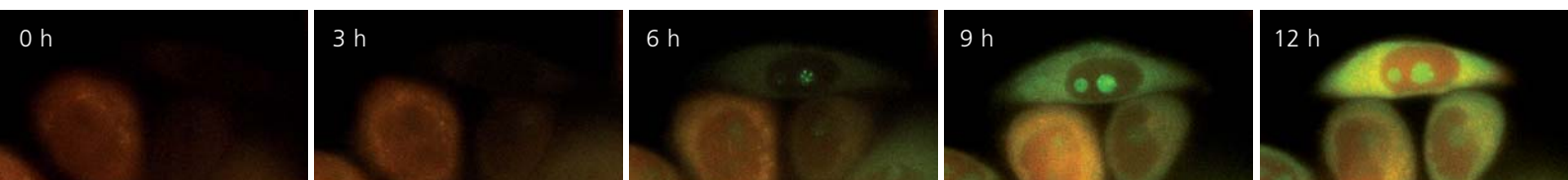
Protection against drying out, the correct temperature, CO₂ control for the correct pH value and physiological O₂ concentrations create an environment that is virtually identical to that found by the cells in



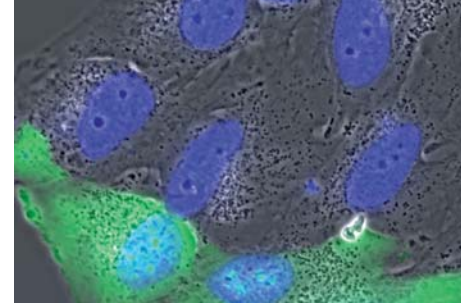
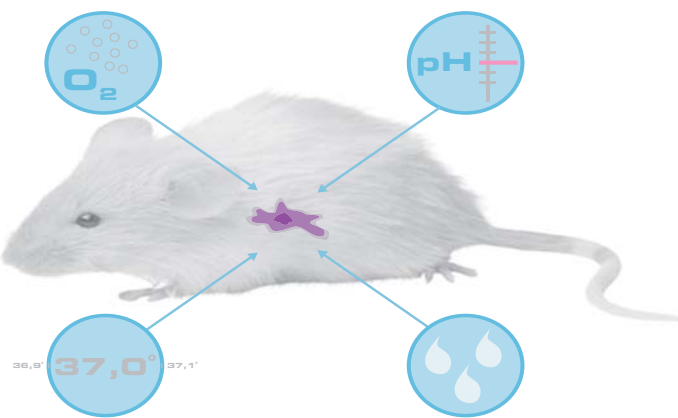
Incubator XL S1 stands for maximum stability



Incubator PM S1 offers maximum space during operation and allows dynamic temperature experiments



*Expression of YFP and DsRed in HeLa cells following induction, duration of experiment: 12 hours
Horst Wolff, GSF Neuherberg*



Human astrocytes. Multi-color Fluorescence in combination with phase contrast. Blue (HOECHST 33342): cell nucleus, green: GFP fused to HIV-1 Rev.

the living organism. This is a basic requirement particularly for experiments over long periods of time and exacting studies, e.g. for cell differentiation. For this purpose, besides providing maximum humidity, the system also allows quick and precise control of the temperature and gas concentrations. The broad temperature range, from 4°C to 45°C, provides a high level of flexibility and, for example, experiments with various species. In addition, the temperature drift into the rear areas of the objective has been reduced with the new thermally insulated objectives. This now makes it possible to achieve a perfect temperature directly in the culture vessel even during stage-top incubation.

Manipulation through variation of incubation parameters

Carl Zeiss' carefully thought out incubation system opens up a wide range of additional manipulation opportunities to the field of research. By programming

changes in temperature, it is possible, in combination with the wide temperature range, to conduct heatshock experiments or carry out optimal analyses of protein folding mutants. The variation of the O₂ concentration, on the other hand, allows studies to be carried out on the influence of oxygen on metabolic processes. With this system, all target parameters can be controlled quickly and conveniently. Processes in the cell can be triggered or stopped. In this way you are optimally equipped for tasks today and in the future.

Convenient: central operation and automated processes

Unique and revolutionary: the microscope and incubation are controlled via the TFT touch screen display or AxioVision system software. The operating element or single workstation saves you from having to operate a large number of individual controls, which can be a time-consuming process.

At a glance:

Configurations and performance features

		Ambient temperature to 45°C*	Ambient temperature to 40°C*	4-45°C*	pH control
Simple Heating (no incubation)	Heatable Universal Mounting Frames S1, Heating Stage S1, etc.	●**			
Stage-Top Incubation	Incubator PM S1	●			○
	Incubator Micromanipulation S1	●			○
Stage-Top Incubation TIRF	Incubator S TIRF S1, Laser Safety	●			○
	Incubator Refl/Transm Light S1				
Large Chamber Incubation	Incubator XL S1, Incubator XL Dark S1		●		○
	Incubator XL TIRF S1		●		○
	Incubator XL S1 LSM		●		○
	Incubator XL PALM S1		●		
Simple Heating/Cooling (no incubation)	Temperable Microscope Stage, Temperable Insert P S1, etc.			●**	
Stage-Top Incubation Heat./Cool.	Incubator PM S1			●	○

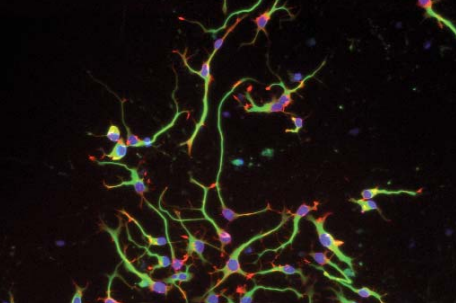
● Standard

○ Optional

* Recommended temperature range for the setpoint setting of the heatable/temperable components

** Due to the principle on which the system is based, differences in temperature may occur between the heatable/temperable component and the culture medium

*** Compromises result for TIRF and LSM applications on account of the simple Heatable Universal Mounting Frame K-H-R



Neural stem cells following 7-day incubation to develop astrocyte-specific features. Blue (DAPI): cell nucleus, red (TexasRed): actin, green (FITC): microtubules
 Horst Wolff, GSF Neuherberg

Full integration into AxioVision provides a new level of automation. Because of this, it is possible to ensure a continuous, complete workflow over long periods of time, or incubation using TIRF.

New: reliability and reproducibility

Completely new and a guarantee for maximum reliability – the newly developed Control Sensor T S1. For the first time, this device makes it possible to precisely measure the temperature of the sample directly at the point of observation. Differences between the sample temperature and the target temperature are ruled out. Additional aspects include the fact that you can see all values clearly on the TFT display throughout the experiment, allowing you, if necessary, to intervene quickly. All incubation data are stored directly with the image data in the AxioVision system software, meaning that your experiment is validated.



You can set all incubation parameters using the TFT touch screen display. The clear display showing setpoint and measured values allows perfect monitoring during the experiment

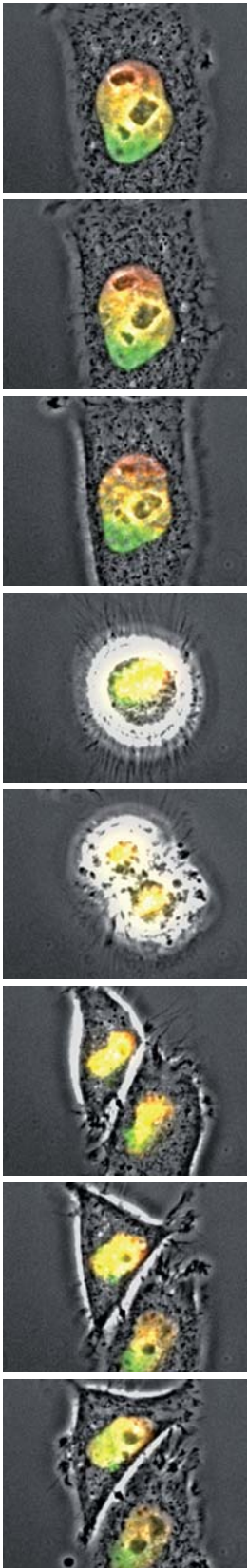
Stacking modules for cost-effective upgrading or modification

The stacking concept for the control modules is space-saving, economical and exclusive to Carl Zeiss. It allows trouble-free upgrading and modification of your system. All the modules can be used in different incubation configurations. A modular system concept and perfect coordination between the high-performance components ensure extremely rapid research results – with an eye to the future, too.

O ₂ control	Upward temperature levels	Upward and downward temperature levels	Quick temperature levels	Integrated TIRF laser safety	Micromanipulation	Micromanipulation and pH control	Laser microdissection	Compatibility with LSM sideport	Maximum space for operation
					●			●	●
○	● ● ●				●	○		● ***	● ●
				●				●	●
○ ○ ○				●	● ● ●	○ *** ○ ***		●	
					●		●	●	●
○	●	●	○					●	●

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Meet a System Design That Satisfies Every Requirement

Developed from practice for practice – the new stacking concept for the control modules is tailored to an extremely wide range of requirements. Assembly is simple and fast and the environmental parameters are provided in a highly efficient manner. The processes of updating and modifying the system are as economical as they are flexible and there is no longer any need for a space-consuming configuration – even when performing complex experiments.

- Performance through focus

Carefully thought out right down to the last detail: each module manages one incubation parameter, which means that, when expanding the system, only the corresponding component needs to be retrofitted. The system meets your demands precisely, at all times.

- **Less is more: the new plug-in system**

The control modules are simply stacked on top of one another. It's so easy to assemble the system. No unnecessary cables or tubes – saving you a great deal of space, particularly as the system grows.

- Integrated interfaces to all modules

Several integrated interfaces in the form of plug-in contacts ensure perfect transfer from module to module. The gas mixture is passed on internally and all the modules communicate with one another via the CAN bus.

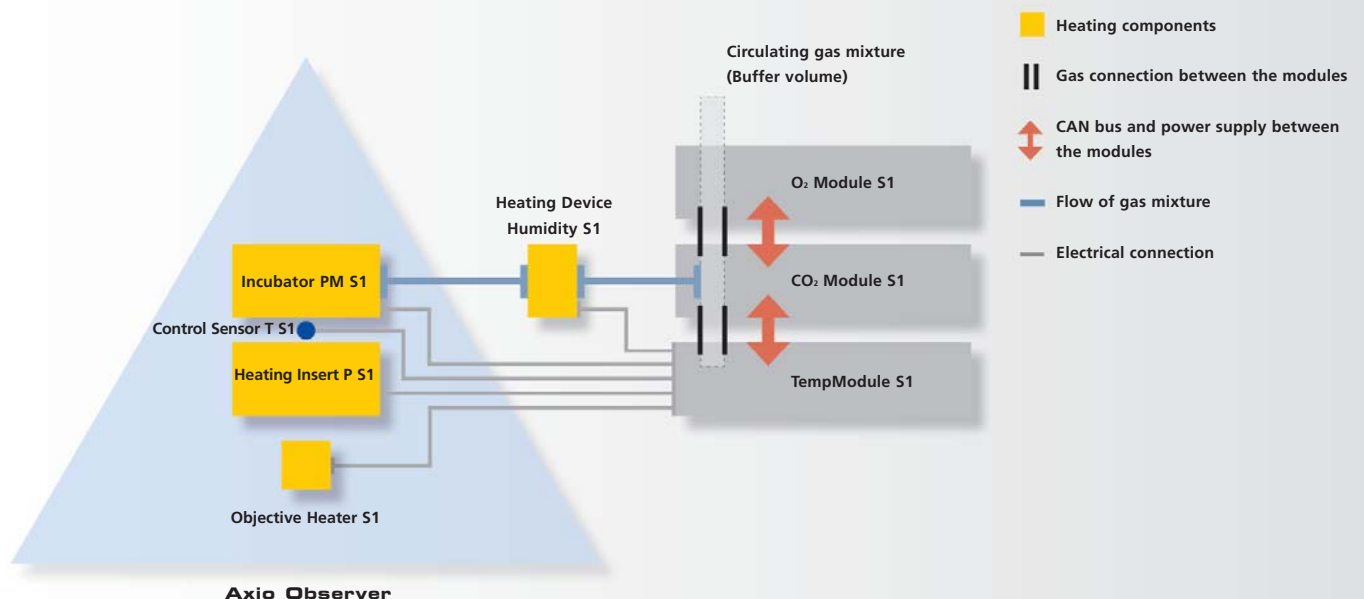
- Defined environmental conditions through stable gas concentrations

A pre-mixed incubation atmosphere circulates in an internal buffer volume, which means that the gas concentration remains stable at all times. A small amount is taken continuously from this buffer volume and led to the incubator or CO₂-Cover.

- **Highly sensitive new sensor technology**

Innovative and a guarantee for perfect results:
all heating components are equipped with a new,
sophisticated temperature sensor – for maximum
precision and fast, precise controllability.

The system design - shown using the example of the Incubator PM S1



Control Modules and Control Sensor T S1. Components for Numerous Configurations



TempModule S1

Basic module for controlling the temperature of 4 independent heating channels

- Supplies additional control modules with power and control signals
- The TempModule S1 is controlled by AxioVision (from version 4.6 upwards) or by the Axio Observer.Z1 TFT touch screen display
- The control characteristic can be freely selected for each channel. Eight parameter sets are available
- An additional channel for the external Control Sensor T S1 allows the temperature to be measured directly in the culture vessel in preliminary experiments (calibration)
- Communication takes place via CAN (microscope) or USB (PC)
- Internal resolution: 0.01°C
- Setpoint value range for connected heating components: ambient temperature to 60.0°C (recommended: ambient temperature to 45°C)



CO₂ Module S1

Control module for CO₂ regulation in incubators or under CO₂-Covers

- CO₂ control, together with a carbonate buffer system, allows a stable pH value in the cell culture medium over a long period of time
- A built-in CO₂ sensor continually measures the current CO₂ concentration
- Fluctuations in concentration are eliminated as a result of the continuous addition of very small amounts of CO₂
- For low gas flows in small incubators and CO₂-Covers or for medium gas flows with Incubator S TIRF S1 or Laser Safety Incubator Refl/Transm Light S1
- Internal resolution: 0.01%
- Setpoint value range: 0.0-8.0%



O₂ Module S1

Control module for O₂ regulation in Incubator PM S1 or under CO₂-Cover PM S1

- Lowering the O₂ concentration allows the best possible imitation of In-vivo conditions over a long period of time
- Functional principle: oxygen is displaced by nitrogen
- A built-in O₂ sensor continually measures the current O₂ concentration
- The O₂ sensor is extremely durable
- Fluctuations in concentration are eliminated as a result of the continuous addition of very small amounts of N₂
- Internal resolution: 0.01%
- Setpoint value range: 0.0-21.0%



Control Sensor T S1

Optional component for perfect temperature conditions in experiments

- For measuring temperatures directly in the culture vessel
- The system is finely adjusted or calibrated in preliminary experiments on the basis of the measurement results
- Sensor position: in the culture medium, directly above the objective
- The height of the sensor can be adjusted and fixed in different positions
- For 35 mm Petri dishes (35-38 mm), 60 mm Petri dishes (53-58 mm) and POC-R

Economical Entry-Level System: Simple Heating

The Simple Heating system is an economical solution that is well-suited to the simple observation of cells and micromanipulation. Incubation is not provided for.

- **System design**

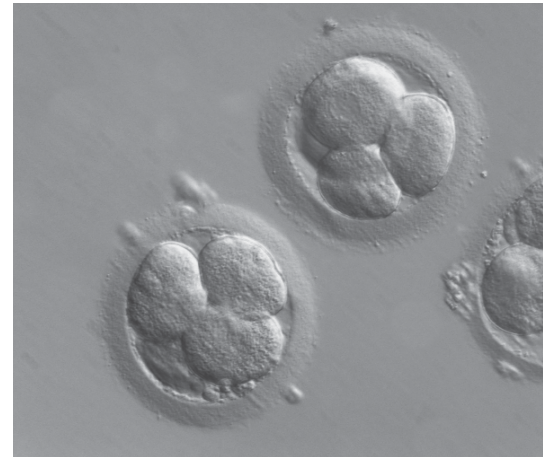
This system is based on a 2-channel controller or a 1-channel controller using Thermo Plate®.

- **Temperature range**

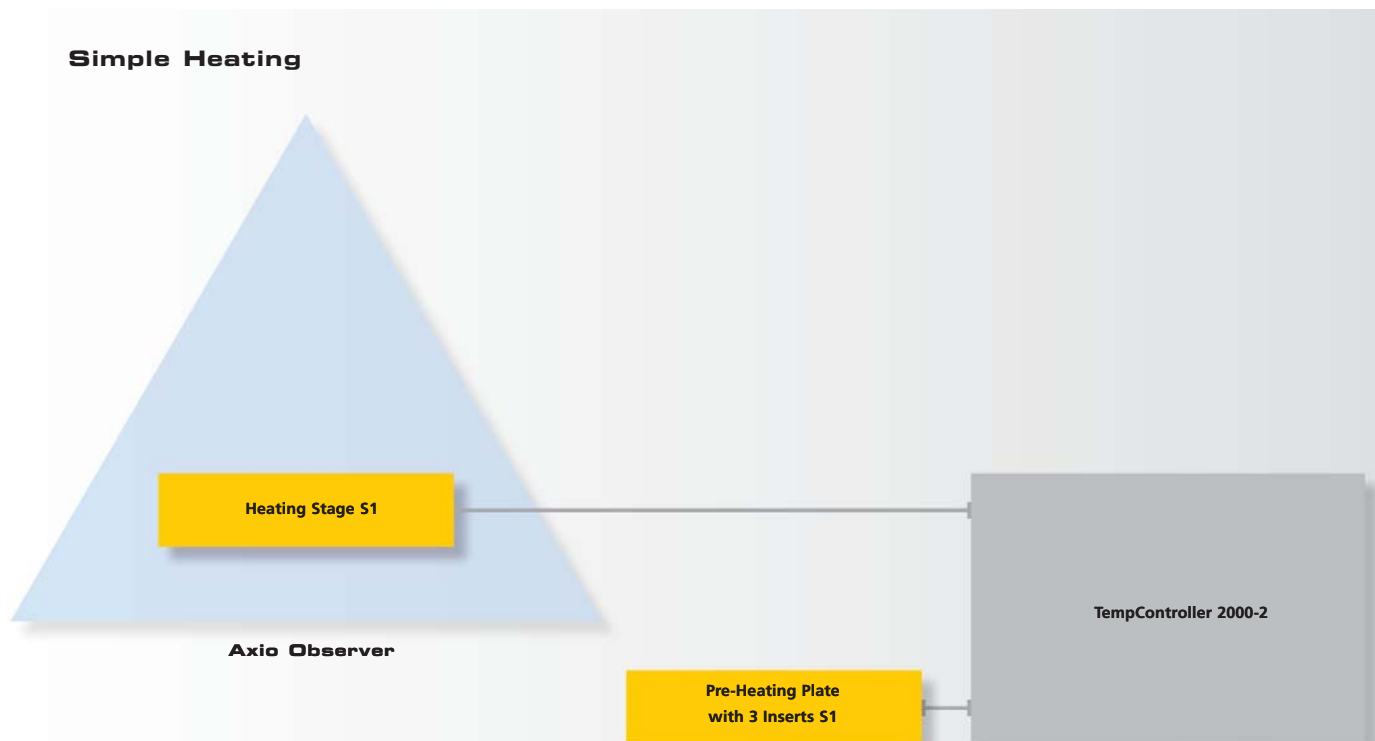
The temperature ranges from ambient temperature to 45°C. Due to the principle on which the system is based, differences in temperature may occur between the heating component and culture medium.

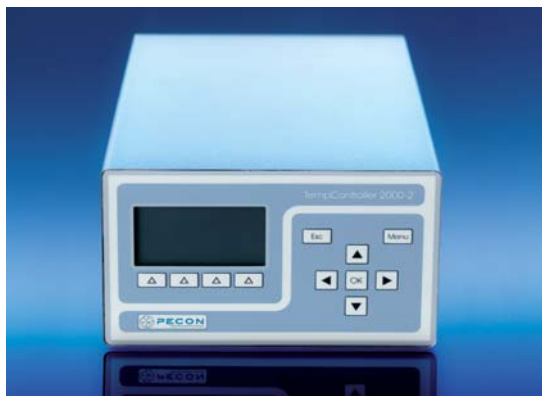
- **Operation and culture vessels**

An advantage of this configuration is that you have great freedom of movement when handling the sample and operating the microscope. Solutions are available for all commonly used culture vessels.



*Human embryos contrasted using PlasDIC
S. Mittmann, IVF laboratory, Göttingen, Germany*





TempController 2000-2

Stand-alone control unit for 2 heating components which can be operated independently from one another and with different setpoint temperatures.

- For all heating components in the S-series
- Displays the setpoint and measured temperatures of both channels in degrees Celsius (internal resolution 0.01°C)
- Setpoint values are maintained after the control unit has been switched off
- Permits external temperature control by means of a PC (USB interface)
- Dimensions (LxWxH in mm): 280x200x130



Heating Stage S1

Universal heating component for all culture vessels commonly used in the laboratory, perfectly suited to all standard methods

- Stable design, anodized black aluminum
- Minimal oval opening for observation ensures excellent heat transfer to the culture vessel
- Object guide and micromanipulators can be attached on the left or right, as required
- Dimensions (LxWxH in mm): 250x230x18

Heating Stage S1 for Axiovert 40/25

as above with the following variations:

- Dimensions (LxWxH in mm): 210x230x18



Pre-Heating Plate with 3 Inserts S1

Universal heating device for heating samples within reach of the microscope system

- With inserts for flasks, centrifuge tubes and reaction vessels
- Green LED operating display
- Dimensions (LxWxH in mm): 400x250x16

Pre-Heating Plate S1

as above with the following variations:

- No inserts
- Dimensions (LxWxH in mm): 210x150x15



Heatable Universal Mounting Frame M-H S1 and Heatable Universal Mounting Frame K-H S1

Mounting frames which can be used universally with a heating function for various culture vessels

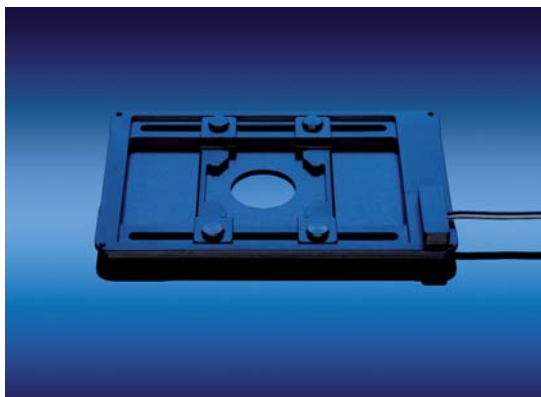
- Culture vessels are held and moved using sliding brackets
- Laminated plate ensures excellent heating from below
- For 35 mm or 60 mm Petri dishes or slides
- Recommended for dry objectives
- Frame: anodized black aluminum
- Laminated plate with circular opening ($d = 35\text{ mm}$) and slot ($30 \times 10\text{ mm}$)
- M-H to be used with object guide, K-H to be used with mechanical/scanning stages
- External dimensions (LxW in mm): M-H 165x100, K-H 160x110



Heatable Universal Mounting Frame K-H-L S1

as above with the following variations:

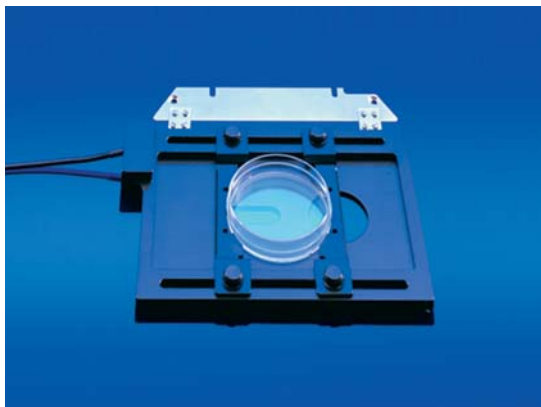
- Laminated plate with central rectangular slot ($47 \times 21\text{ mm}$)
- Suitable for rectangular culture vessels
- For mechanical/scanning stages
- External dimensions (LxW in mm): 160x110



Heatable Universal Mounting Frame K-H-R S1

as above with the following variations:

- Laminated plate with central circular opening ($d = 30\text{ mm}$)
- For mechanical/scanning stages
- Can be used in combination with Incubator Micromanipulation S1 or CO₂-Cover Micromanipulation S1 (see pages 17 and 27)
- External dimensions (LxW in mm): 160x110



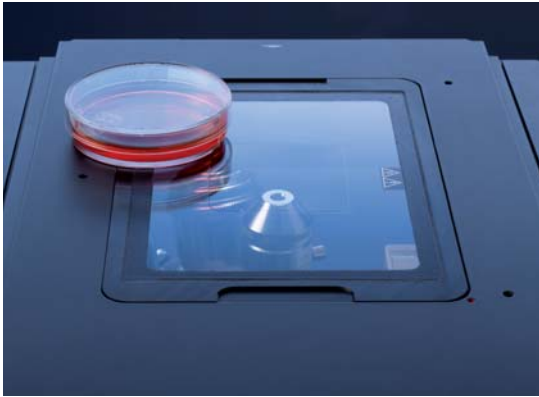
Heatable Universal Mounting Frame A-H S1 for KT 75x50

as above with the following variations:

- Laminated plate with circular opening ($d = 35\text{ mm}$) and slot ($30 \times 10\text{ mm}$)
- For upright microscopes

Heatable Universal Mounting Frame A-H S1 for KT 75x50 Axio Imager (not illustrated)

- Mounting bracket differs from illustration
- External dimensions (LxW in mm): 153x110



Heatable Glass Mounting Frame K Thermo Plate® with Controller

Universal heating device from Tokai Hit for various cell culture vessels, particularly well-suited to IVF applications

- *Heatable glass plate ensures extremely homogeneous heating directly from below*
- *Very safe handling of culture vessels thanks to flush surface of entire stage, including insert*
- *Control unit included. Not compatible with TempController 2000-2 or TempModule S1*
- *Can be used with the mechanical stages and scanning stage 130x85 CAN*
- *Observation area (LxW in mm): central 50x50, glass thickness in observation area 0.5 mm*
- *Only recommended for LD objectives up to 32x*
- *External dimensions (LxW in mm): 160x100*
- *Required with Axio Observer: Z-drive 13 mm travel man or Z-drive 13 mm travel mot*



Simple Heating

Configuration shown on page 8

411860-9005-000	TempController 2000-2 (available for delivery as of March 2008)	If upgrading at a later stage is desired to allow incubation, TempModule S1 is recommended in place of TempController 2000-2
432049-9000-000	Heating Stage S1	
411860-9112-000	Pre-Heating Plate with 3 Inserts S1	

Alternatives to components marked in blue

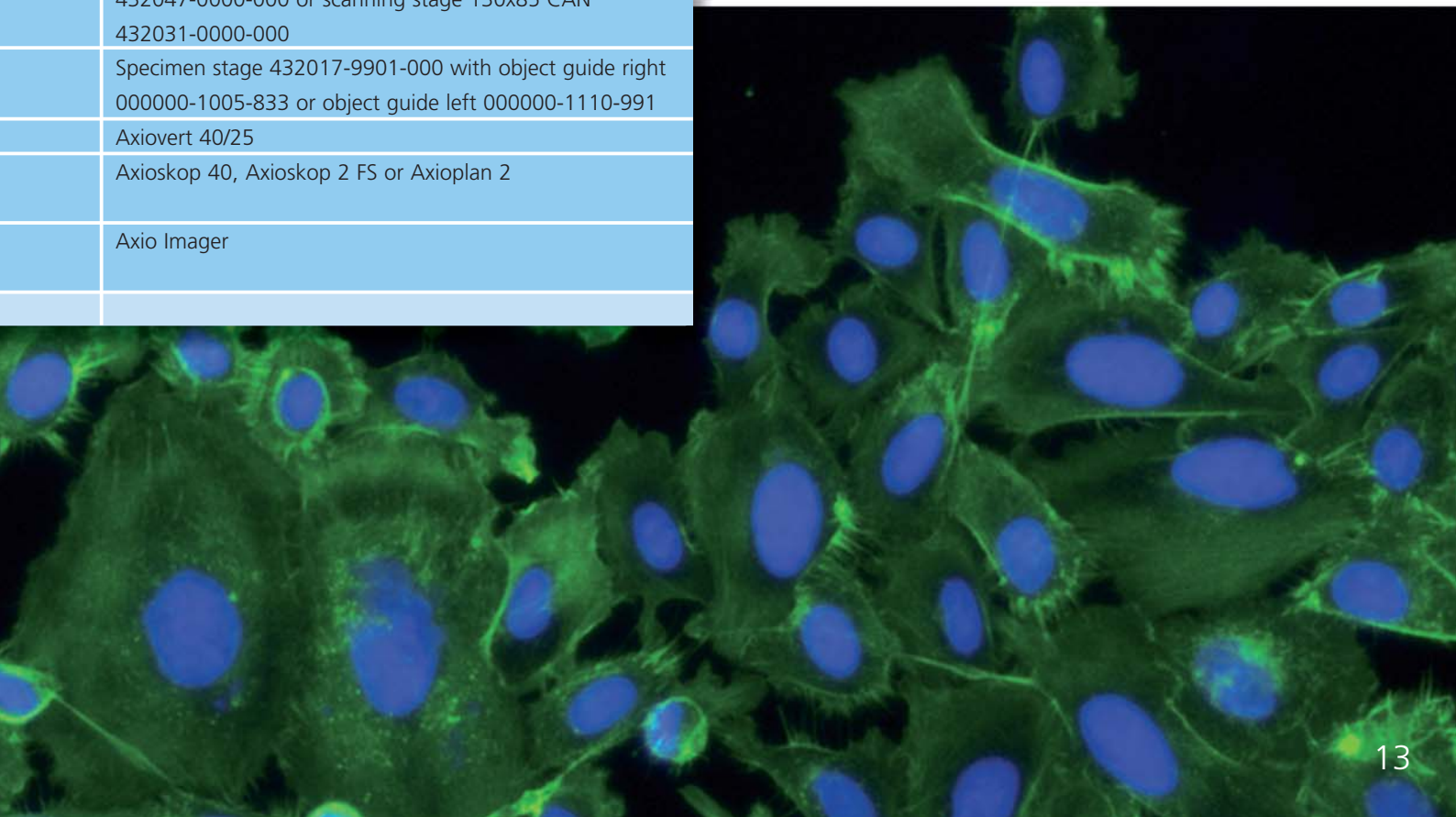
411860-9020-000	Heating Insert P S1	
411860-9025-000	Heating Insert P Lab-Tek™ S1	
411861-9902-000	Heating Insert P S1; compact	
411860-9030-000	Heating Insert M06 S1	
411860-9040-000	Heating Insert M12 S1	
411860-9050-000	Heating Insert M24 S1	
411860-9060-000	Heating Insert M96 S1	
411860-9080-000	Heatable Universal Mounting Frame K-H S1	
411860-9081-000	Heatable Universal Mounting Frame K-H-R S1	
411860-9082-000	Heatable Universal Mounting Frame K-H-L S1	
411860-9090-000	Heatable Glass Mounting Frame K Thermo Plate® with Controller	Item number already includes control unit; TempController 2000-2 and TempModule S1 cannot be used as control units
411860-9086-000	Heatable Universal Mounting Frame M-H S1	
432049-9020-000	Heating Stage S1 for Axiovert 40/25	
411860-9087-000	Heatable Universal Mounting Frame A-H S1 for KT 75x50	
411860-9088-000	Heatable Universal Mounting Frame A-H S1 for KT 75x50 Axio Imager	
411860-9120-000	Pre-Heating Plate S1	

Get the Right Configuration

Prerequisites

	Mechanical stage 432016-0000-000, mechanical stage 432047-0000-000, scanning stage 130x85 CAN 432031-0000-000 or scanning stage 120x100 STEP 432029-0000-000
	Z-drive 13 mm travel man 431017-0000-000 or Z-drive 13 mm travel mot 431018-0000-000, mechanical stage 432016-0000-000, mechanical stage 432047-0000-000 or scanning stage 130x85 CAN 432031-0000-000
	Specimen stage 432017-9901-000 with object guide right 000000-1005-833 or object guide left 000000-1110-991
	Axiocvert 40/25
	Axioskop 40, Axioskop 2 FS or Axioplan 2
	Axio Imager

PC3 carcinoma cells. Blue (DAPI): cell nucleus, green (FITC): actin
E. Gebefuegi, GSF Neuherberg



Strong Performance in a Compact Package: Stage-Top Incubation

Stage-Top Incubation is perfectly suited for making observations over long periods of time and dynamic temperature experiments involving rising temperature levels. As with all configurations involving incubation, all parameters are set with an extremely high level of precision. An outstanding performance feature is the free access to the system. You can upgrade the system with the CO₂ Module and O₂ Module. A special variant is the solution for micromanipulation under a CO₂ atmosphere.

- **System design**

The Stage Incubator PM S1 has been newly developed and is extremely compact. Together with a heating insert, it encases the small incubation volume. This ensures that the target parameters are implemented efficiently and

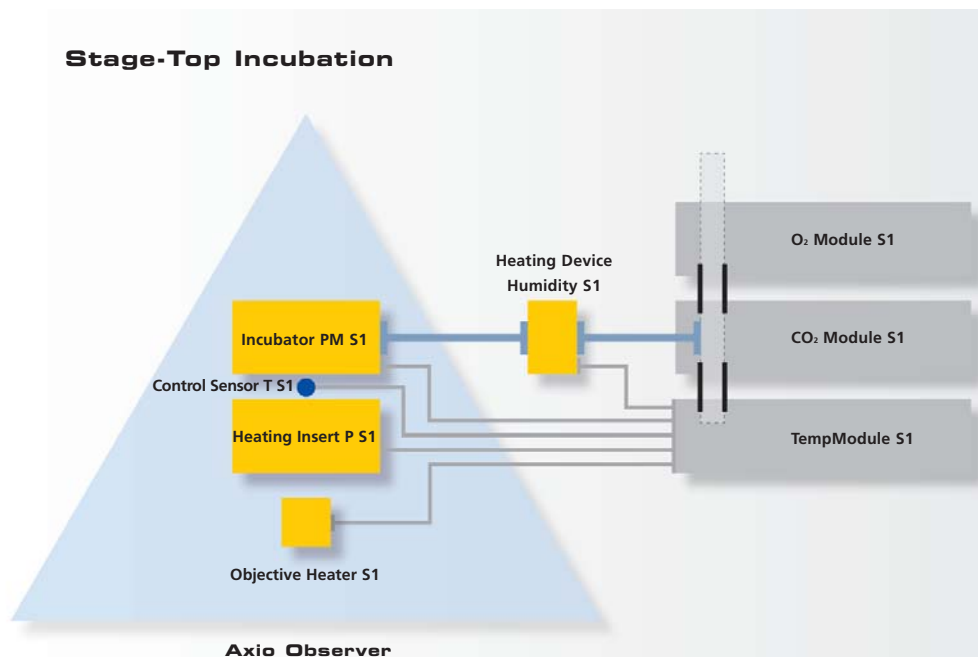
precisely. With objective heaters and the i objectives, this configuration delivers outstanding results.

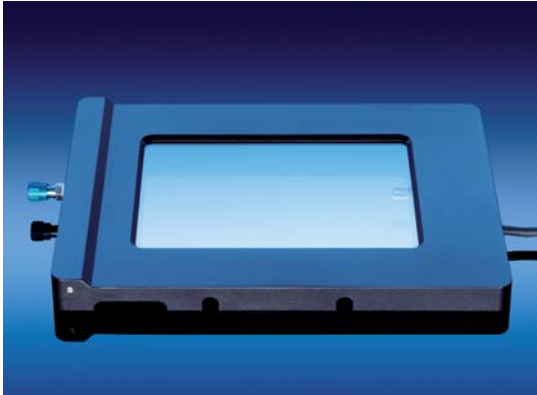
- **Temperature range**

The temperature ranges from ambient temperature to 45°C. Desired rising temperature levels can be programmed into the system in advance and are executed automatically.

- **Operation and culture vessels**

The free access to the system provides you with great freedom of movement when working with the sample and operating the system platform/controlling the parameters. All commonly used culture vessels can be used.

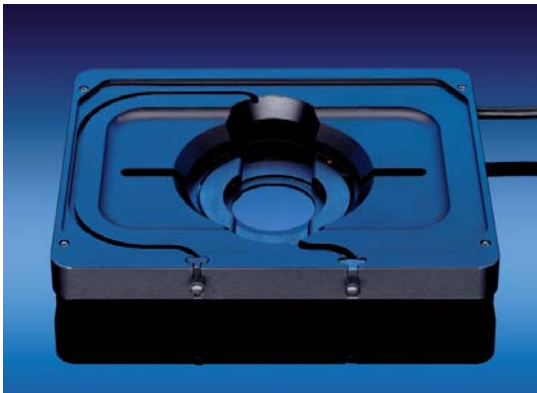




Incubator PM S1

Sophisticated incubator for Petri dishes and multiwell plates: metal frame with heated glass field for direct heating of the culture vessel from above

- *Special coating of glass field to ensure homogeneous electrical heating*
- *Flat construction for maximum space directly above the incubator*
- *6 evenly distributed, internal openings ensure that the supply of the gas mixture is homogeneously distributed*
- *Perfect seal between the incubator and the heating insert*
- *Notches for tubes or cables front and back (e.g. for perfusion or Control Sensor T S1)*
- *Compatible with DIC*
- *Thin, flexible supply tube eliminates tensile stress and, therefore, drifts in xy*
- *Insulation of supply tube eliminates losses in temperature between Heating Device Humidity S1 and the incubator and, therefore, guarantees a high level of humidity*
- *External dimensions (LxWxH in mm): 132x205x18*
- *Observation area (LxW in mm): 120x80*



Heating Insert P S1

Stable heating insert for 35 mm Petri dishes (35-38 mm) with adapter and 60 mm Petri dishes (53-58 mm). Ideal for Live Cell Imaging, high-aperture objectives and LSM applications

- *POC-R and POCmini can also be used*
- *Extremely homogeneous heating of culture vessels thanks to optimal supply of heat; contributing principles: contact, convection and radiation*
- *4 leveling screws for alignment to optical axis*
- *Oval opening in base (32x33 mm), optimized for swinging in high-aperture objectives (e.g. C-APOCHROMAT objectives)*
- *Port for perfusion tubes on both the left and right-hand side, 2 ports for perfusion tubes or Control Sensor T S1 at the front*
- *Heated grooves to guide perfusion tubes, therefore ensuring that the temperature of the supplied medium is perfect during perfusion*
- *Extremely low drifts in x and y thanks to thermal insulation of insert from mechanical and scanning stages*
- *Opening in base may be closed if no Petri dish has been inserted, ensuring that the incubation atmosphere is perfectly maintained when changing the culture vessels*
- *Cover with glass insert (DIC) included*
- *External dimensions (LxWxH in mm): 160x135x22*



Heating Insert P Lab-Tek™ S1

Stable heating for Chamber Slide™ and chamber cover glass systems. Ideal for Live Cell Imaging, high-aperture objectives and LSM applications

- *35 mm Petri dishes (35-38 mm) with adapter and 60 mm Petri dishes (53-58 mm), POC-R, POCmini and standard slides can also be used*
- *Observation opening (LxW in mm): 46x21*
- *For additional features see Heating Insert P S1*



Heating Insert M06 S1

Heating insert for the simultaneous observation of several processes on the microscope; ideal for time lapse imaging using a scanning stage

- Laminated plate with direct heating from below
- Compatible with 6-well multiwell plates from Falcon™ and Corning™ (Falcon™ cat. no. 351146, Corning™ cat. no. 3335)*
- Diameter of observation openings: 22 mm (reduced for thermic reasons)
- Multiwell plates with glass bases are not compatible
- 4 leveling screws for alignment to optical axis
- External dimensions (LxWxH in mm): 160x135x22



Heating Insert M12 S1

as above with the following variations:

- Compatible with 12-well multiwell plates from Falcon™ and Corning™ (Falcon™ cat. no. 351143, Corning™ cat. no. 3336)*
- Diameter of observation openings: 22 mm



Heating Insert M24 S1

as above with the following variations:

- Compatible with 24-well multiwell plates from Falcon™ and Corning™ (Falcon™ cat. no. 351147, Corning™ cat. no. 3337)*
- Diameter of observation openings: 15.5 mm



Heating Insert M96 S1

as above with the following variations:

- Compatible with 96-well multiwell plates from Falcon™ (Falcon™ cat. no. 351172)*
- Diameter of observation openings: 6 mm

* or specially coated variants of specified types



Your choice of i objectives

Special objectives for stage incubation with which loss of heat directly in the observation area is virtually eliminated

- An insulation ring inside the objective efficiently prevents any transfer of heat to the rear areas of the objective and the nosepiece
- Allows the setpoint value to be achieved more quickly and more precisely
- Only useful if an objective heater is used at the same time
- i objectives are particularly recommended for dynamic temperature experiments using Stage-Top Incubation Heating and Stage-Top Incubation Heating/Cooling (see page 32)



Objective Heater S1

Anodized black aluminum rings for heating objectives, each with a built-in heating element, including temperature sensor

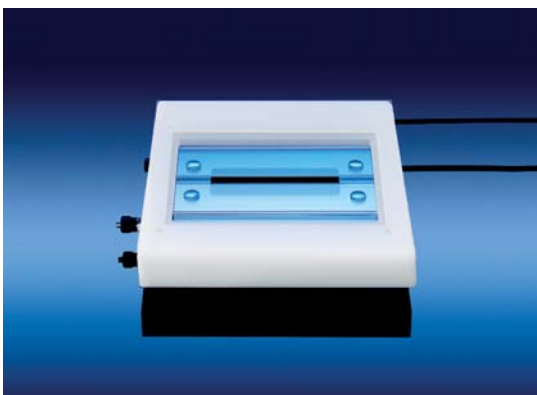
- To reduce loss of temperature in the observation area when using immersion objectives
- With fixing screw to ensure they are held securely and for reliable heat transfer
- Depending on the type, equipped with an oil draining channel, if space permits it
- Types available (see page 18)



Heating Device Humidity S1

Cylindrical heating component for heating Humidifier Module 1 (see page 27)

- Controllable temperature
- Window in outer wall for monitoring liquid level in Humidifier Module 1
- Insulation of outlet tube to incubator prevents loss of temperature, therefore guaranteeing a high level of humidity
- Includes adapter for use with the small version of Humidifier Module 1



Incubator Micromanipulation S1

Stage incubator for micromanipulation under CO₂ atmosphere

- Special coating of glass field and glass sliders for homogeneous electrical heating during the experiment
- Slit-shaped opening can be adjusted, allowing simple installation of micromanipulators and a high level of flexibility in the experiment
- Only compatible with Heatable Universal Mounting Frame K-H-R S1
- O₂ regulation not possible

Stage-Top Incubation

Configuration shown on page 14

		Comments
411857-9020-000	Incubator PM S1	
411860-9010-000	TempModule S1	see page 7
411860-9020-000	Heating Insert P S1	
411857-9010-000	CO ₂ Module S1	see page 7
411857-9040-000	O ₂ Module S1	see page 7
411860-9063-000	Objective Heater 22,5/32,5 S1	
411857-9050-000	Heating Device Humidity S1	
411857-9080-000	Control Sensor T S1	see page 7, not compatible with multiwell plates

Alternatives to components marked in blue

411857-9025-000	Incubator Micromanipulation S1	For micromanipulation under CO ₂ atmosphere, O ₂ control is not possible, Heating Insert P S1 cannot be used
411860-9025-000	Heating Insert P Lab-Tek™ S1	
411860-9030-000	Heating Insert M06 S1	Objective heaters not necessary
411860-9040-000	Heating Insert M12 S1	
411860-9050-000	Heating Insert M24 S1	
411860-9060-000	Heating Insert M96 S1	
411860-9061-000	Objective Heater 17/25 S1	For upright microscopes
411860-9062-000	Objective Heater 17,5/25 S1	
411860-9063-000	Objective Heater 22,5/32,5 S1	
411860-9064-000	Objective Heater 22,5/34 S1	
411860-9065-000	Objective Heater 25,5/33 S1	
411860-9066-000	Objective Heater 32/34 S1	
411860-9067-000	Objective Heater 33/38 S1	

Additions

411860-9112-000	Pre-Heating Plate with 3 Inserts S1	see page 9; if basic configuration is fully equipped, TempController 2000-2 is also required
411860-9120-000	Pre-Heating Plate S1	
	i objectives, as required	see objectives price list 40.21.00
	Additional components for cultivation, as required	see page 36

Get the Right Configuration

Prerequisites

Mechanical stage 432016-0000-000,
mechanical stage 432047-0000-000,
scanning stage 130x85 CAN 432031-0000-000 or
scanning stage 120x100 STEP 432029-0000-000

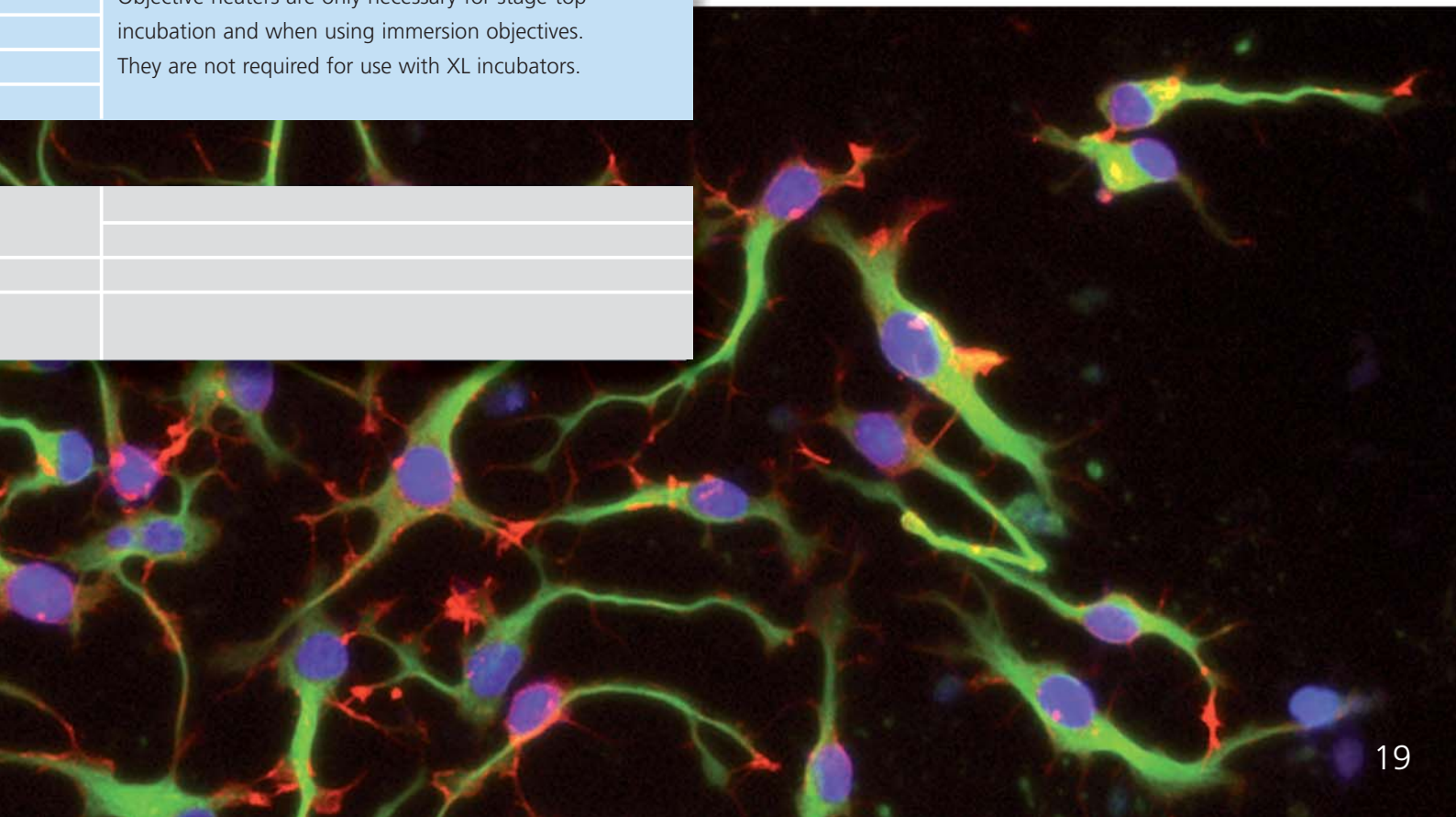
Heatable Universal Mounting Frame K-H-R S1
411860-9081-000

LD objectives necessary, compatible multiwell plates have
a plastic bottom measuring 1 mm

List of objectives that can be used: see objectives
price list 40.21.00

Objective heaters are only necessary for stage-top
incubation and when using immersion objectives.
They are not required for use with XL incubators.

*Neural stem cells following 7-day incubation to develop
astrocyte-specific features. Blue (DAPI): cell nucleus, red
(TexasRed): actin, green (FITC): microtubules
Horst Wolff, GSF Neuherberg*



Developed for Special Applications: Stage-Top Incubation TIRF

With this system it is now possible to carry out demanding TIRF experiments over a long period of time. If required, the pH value in the nutrient medium can also be regulated using the CO₂ module.

- **System design**

The special stage incubator with corresponding heating insert encases a medium incubation volume for the efficient implementation of the target parameters. Also recommended here: objective heaters, which, together with i objectives, guarantee an excellent degree of accuracy.

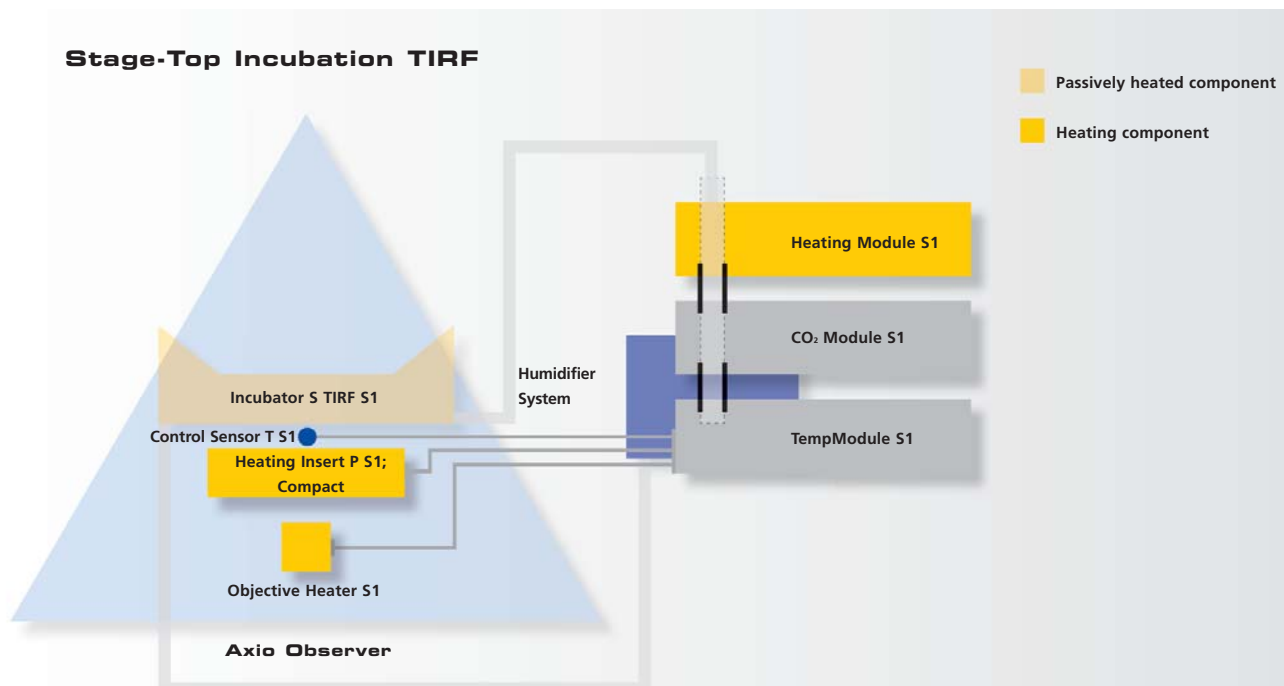
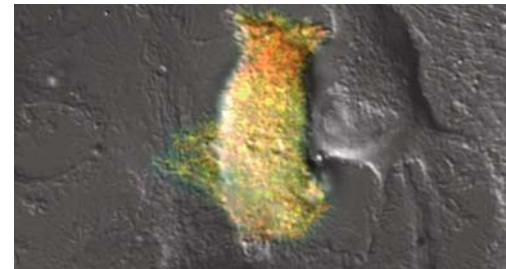
- **Temperature range**

The temperature ranges from ambient temperature to 45°C. Rising temperature levels are possible. These are programmed into the system in advance and executed automatically.

- **Operation and culture vessels**

The free access to the system provides you with great freedom of movement when working with the sample and operating the system platform. All commonly used culture vessels can be used.

B16/F1 melanoma cells (mouse). Multi-color TIRF in combination with DIC. Green (CFP): actin, red (YFP): Myrpalm
Oberbanscheidt, van den Boom, Bähler, Institute for General Zoology and Genetics, University of Münster





Incubator S TIRF S1

Special stage-top incubator for exacting TIRF applications with perfect laser-safety concept

- Interlock switches ensure that the laser beam is broken immediately in the event of incorrect operation (e.g. if carrier for transmitted-light illumination is tilted back)
- Good view into incubator with effective protection against laser lines 458, 488, 514 and 532 nm; culture vessels: see Heating Insert P S1 (see page 15)
- Intelligent sliding mechanism in area of contact with condenser ensures laser safety; condenser is perfectly enclosed, irrespective of the stage position
- Incubator for moderate flows of circulating gas
- When the cover is open, a bypass flow prevents the gas mixture from escaping outside. As a result, the incubation atmosphere is restored immediately, e.g. after inserting a new culture vessel



Heating Module S1

Control module for the provision of heated air in combination with TIRF incubators

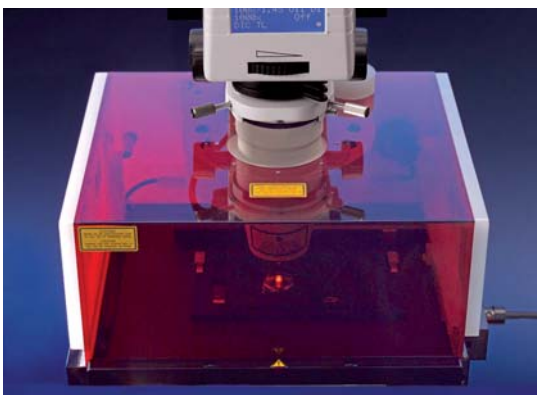
- For moderate flows of circulating gas. The outlet for the gas mixture is located on the upper side, while the inlet is positioned on the rear side of TempModule S1



Humidifier system

System for humidifying air in combination with Incubator S TIRF S1

- Special filter pads with large surface area in upper compartment to ensure optimum uptake/delivery of water
- The lower compartment of the humidifier system ensures that the condensed water is pre-separated
- Increase in humidity to approx. 50-70%



Laser Safety Incubator Refl/Transm Light S1

Stage-Top Incubator for cost-effective TIRF applications, to be used with Heating Stage S1

- Perfect laser-safety concept with interlock switches
- Good view into the incubator, as with Incubator S TIRF S1
- For moderate flows of circulating gas
- Sample is moved in the xy direction using object guide; incubator remains in its position
- Larger incubation volume in comparison to Incubator S TIRF S1
- A high level of humidity is achieved by means of Humidifier Module 2 (a liquid reservoir in the incubator (supplied))
- Culture vessels depending on mounting frame used

Stage-Top Incubation TIRF

Configuration shown on page 20

		Comments
433612-9901-000	Incubator S TIRF S1	Use of Control Sensor T S1 is not possible
411860-9010-000	TempModule S1	see page 7
411860-9070-000	Heating Module S1	
411861-9902-000	Heating Insert P S1; Compact	Special version for use with Incubator S TIRF S1. Heating Insert P S1 cannot be used as it is not compatible with Incubator S TIRF S1. O ₂ control is not possible with this configuration
411857-9010-000	CO ₂ Module S1	see page 7
411860-9065-000	Objective Heater 25.5/33 S1	see page 17
000000-1116-065	Humidifier System	
411857-9080-000	Control Sensor T S1	see page 7

Alternative to component marked in blue

433611-9901-000	Laser Safety Incubator Refl/Transm Light S1	Humidifier system is not required O ₂ control is not possible with this configuration
-----------------	---	---

Additions

411860-9112-000	Pre-Heating Plate with 3 Inserts S1	see page 9
411860-9120-000	Pre-Heating Plate S1	
	Additional objective heaters, as required	see page 18
	i objectives, as required	see objectives price list 40.21.00
	Additional components for cultivation, as required	see page 36

Get the Right Configuration

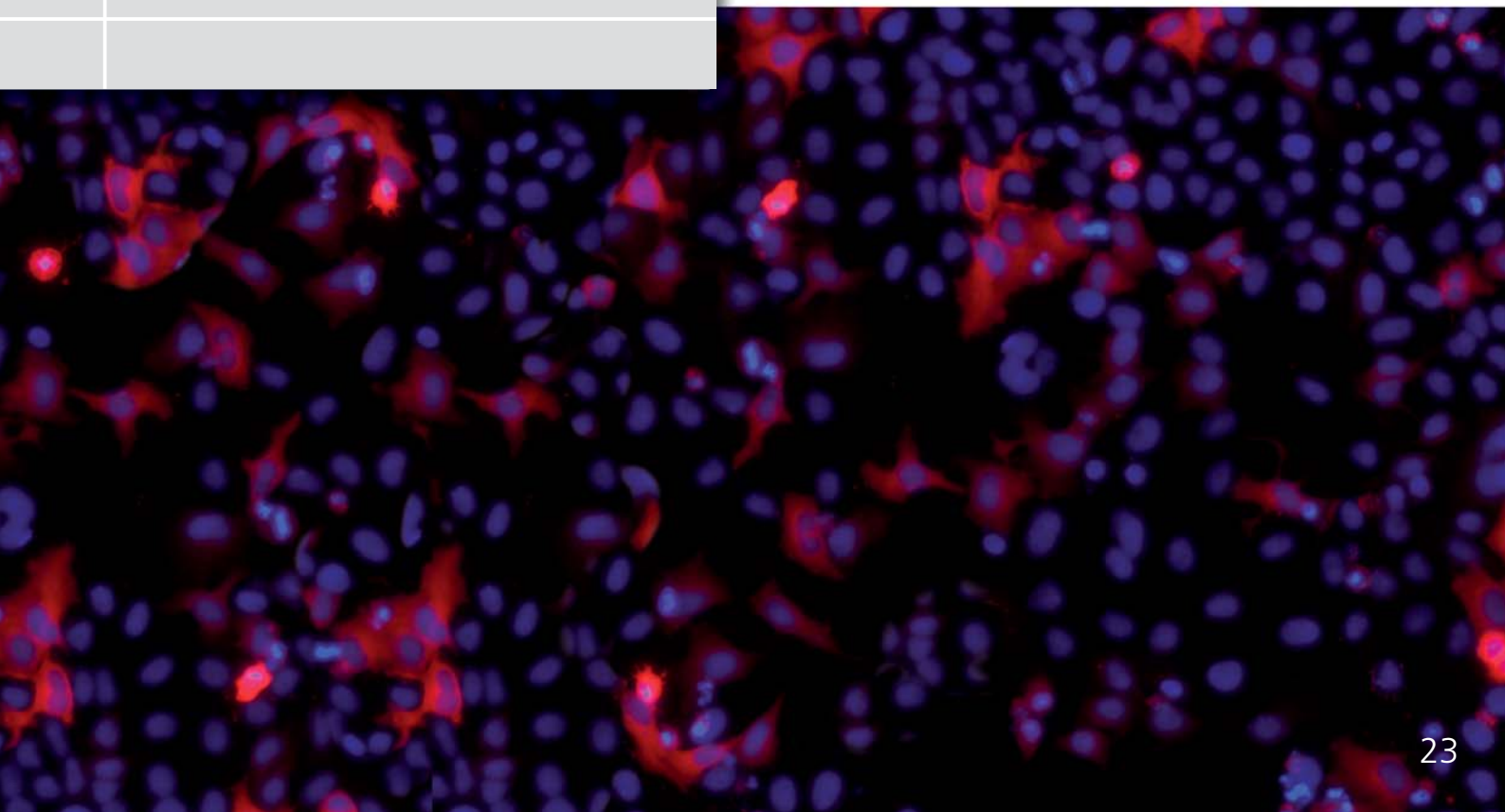
Prerequisites

Condenser 0.55

Mechanical stage 432016-0000-000, mechanical stage
432047-0000-000, scanning stage 130x85 CAN
432031-0000-000 or scanning stage 120x100 STEP
432029-0000-000

Heating Stage S1 432049-0000-000 and object guide
130x85 mm right 000000-1005-833

HeLa cells. Blue (HOECHST 33342): cell nucleus, red (DsRed): cytoplasm
Horst Wolff, GSF Neuherberg



For Maximum Stability: Large Chamber Incubation

Large Chamber Incubation is the ideal solution for demanding experiments over long periods which are conducted at a constant temperature over the entire duration. It guarantees absolute freedom from drift following the warm-up phase without the need for additional components. Large Chamber Incubation is a high-performance incubation system for exacting, complex applications. A CO₂ and O₂ module may also be added as an upgrade, if required.

- **System design**

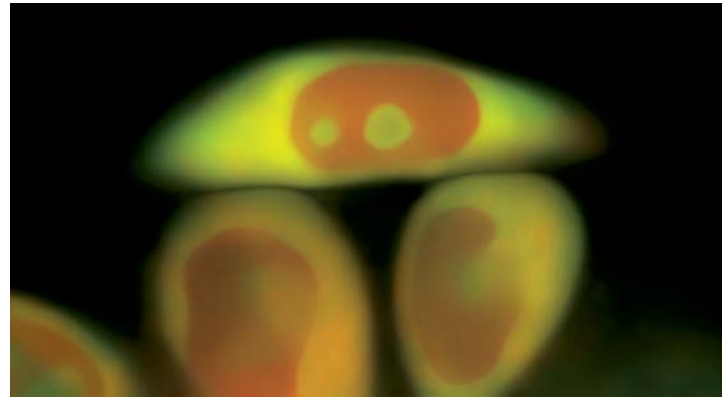
The Incubator XL S1 encases large areas of the microscope. This keeps the temperatures absolutely stable during the entire experiment. CO₂, O₂ and humidity are controlled underneath the CO₂-Cover. Besides Incubator XL S1, a whole range of incubators are available for XL Incubation Heating for specific applications. This incubation system meets even the very highest requirements of high-end research.

- **Temperature range**

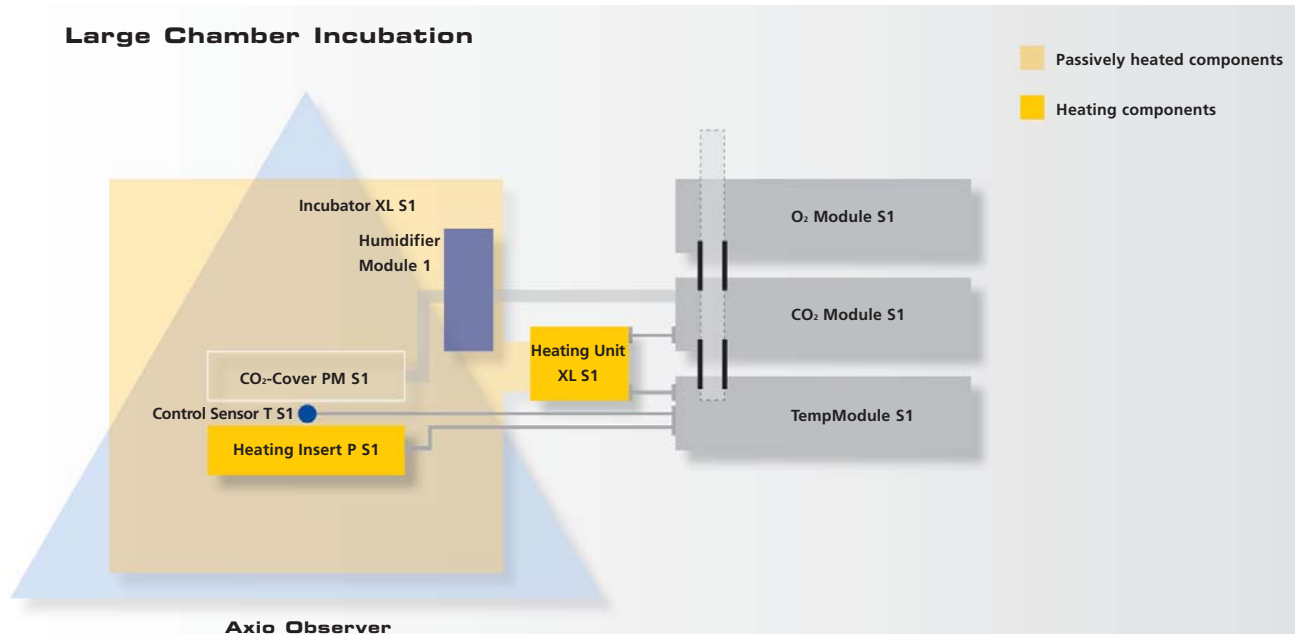
Possible temperatures range from ambient temperature to 40°C. This opens up an enormous range of applications.

- **Operation and culture vessels**

In comparison to Stage-Top Incubation, freedom of movement is limited to a certain extent. All commonly used vessels can be used for cultivation.



Expression of YFP and DsRed in HeLa cells following induction.
Duration of experiment: 12 hours. Horst Wolff, GSF Neuherberg





Incubator XL S1

Universal incubator in XL format for Axio Observer

- For extremely stable temperature conditions and absolute freedom from drift in x, y and z following the warm-up phase
- Large doors above and below the stage plane allow access to the specimen and to microscope components
- Objective heaters are not necessary
- Compatible with ApoTome
- Simple assembly which does not require tools
- Slide-in floor panels with openings for the stage drive (right or left)
- Internal dimensions (LxWxH in mm): 600x370x380

Incubator XL S1 LSM (not illustrated)

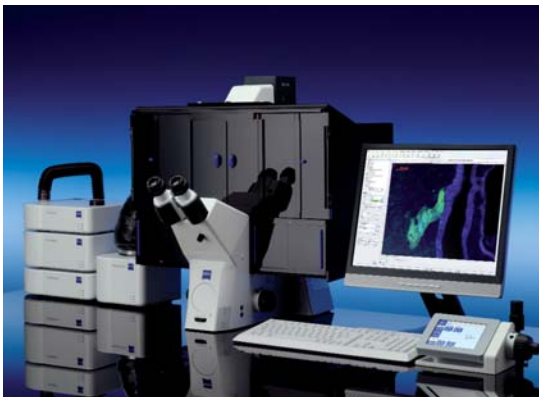
Specifically for LSM on the left sideport of the Axio Observer

Incubator XL PALM S1 (not illustrated)

Compatible with PALM MicroBeam for Laser microdissection from Carl Zeiss

Incubator XL S1 for Axiovert 200 (not illustrated)

Takes different head of carrier for transmitted-light illumination into account



Incubator XL DARK S1

Incubator in XL format specifically for extremely demanding fluorescence applications, e.g. those with weak fluorescence signals

Like Incubator XL S1, but with the following variations:

- Disruptive external light influences are eliminated
- Double doors on the front; black door components can be moved, e.g. for brief observations without disturbing the incubation atmosphere



Incubator XL TIRF S1

Incubator in XL format specifically for demanding TIRF applications

- Interlock switches ensure that the laser beam is broken immediately in the event of incorrect operation (e.g. if the sliding cover components and doors are opened)
- Good view into the incubator with effective protection against laser lines 458, 488, 514 and 532



Heating Unit XL S1

Universal component for the provision of warm air for all XL incubators

- A black insulation tube leads the warm air into the incubator via a central connector
- Positioned directly next to the incubator
- Receives control signals directly from TempModule S1
- Dimensions (LxWxH in mm): 210x206x154



Heating Insert P S1 and CO₂-Cover PM S1

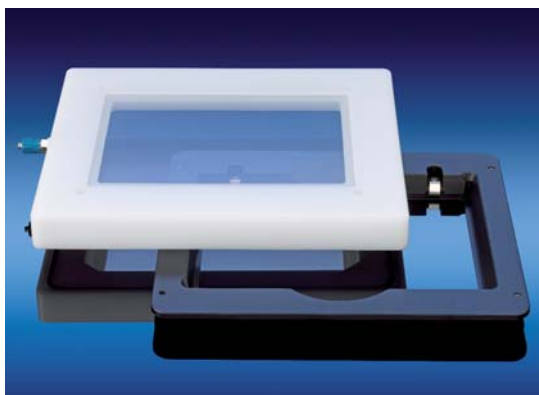
The heating insert and CO₂-Cover form a mini incubator within Incubator XL. CO₂, O₂ and humidity only are set here. The CO₂-Cover is heated passively by means of the incubation air in Incubator XL S1.

- Desired gas concentrations are achieved without compromises and with little effort. Uncritical CO₂ amounts in terms of safety. No humidity-related condensation problems on the inner walls of the incubator
- Like Incubator PM S1, CO₂-Cover PM S1 has six evenly distributed internal openings for supplying the gas mixture, meaning that it is distributed extremely homogeneously
- The best temperature conditions and maximum mechanical stability are ensured in combination with the heating insert



Heating Inserts M06/M12/M24/M96 S1 and CO₂-Cover PM S1

- Heating Inserts M06/12/24/96 S1 can also be used in place of Heating Insert P S1
- Also suitable for O₂ control
- Shown: configuration with Heating Insert M06 S1



Universal Mounting Frame K-M and CO₂-Cover HM

For use with multiwell plates with glass bottom

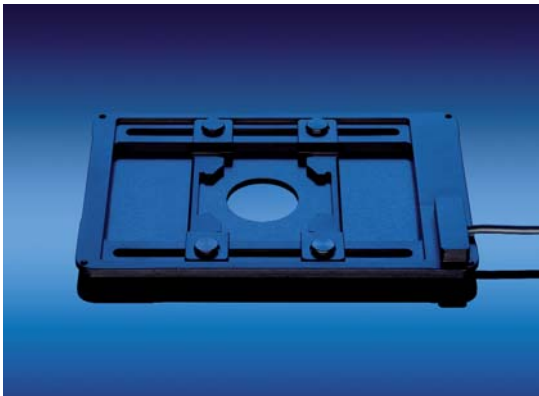
- Use of immersion objectives is possible
- Universal Mounting Frame K-M is not heated. The multiwell plates are heated passively by means of the incubation air
- Compatible with all multiwell plates of all manufacturers thanks to its universal clamping device
- Warm-up phase is somewhat longer in comparison to configurations that use heating inserts or heatable mounting frames
- Cannot be upgraded to include O₂ control



CO₂-Cover Micromanipulation S1

For micromanipulation under a CO₂ atmosphere in XL incubators

- *Ideal solution for imaging in stem cell research or transgene applications thanks to stable temperature*
- *Sliding glass strips leave an opening free for micromanipulation*
- *Cannot be upgraded to include O₂ control*
- *Heatable Universal Mounting Frame K-H-R S1 (see below) is required*



Heatable Universal Mounting Frame K-H-R S1

Heatable universal mounting frame for micromanipulation under a CO₂ atmosphere

- *For specifications see page 10*



Humidifier Module 1

Universal component for increasing humidity

- *Located in Heating Device Humidity S1 with stage-top incubators*
- *Located within the incubator in the case of XL incubators, where it is passively heated*
- *Humidifier Module 1 is included with the CO₂/O₂ Modules S1*

Large Chamber Incubation

Configuration shown on page 24

		Comments
411857-9061-000	Incubator XL S1	Objective heaters are not required with XL incubation
411860-9010-000	TempModule S1	see page 7
411857-9030-000	Heating Unit XL S1	
411860-9020-000 +411857-9110-000	Heating Insert P S1 and CO ₂ -Cover PM S1	If CO ₂ control is not required, the CO ₂ -Cover is not necessary
411857-9010-000	CO ₂ Module S1	see page 7
411857-9040-000	O ₂ Module S1	see page 7
411857-9080-000	Control Sensor T S1	see page 7, not compatible with multiwell plates

Alternatives to components marked in blue

411857-9065-000	Incubator XL DARK S1	
411857-9091-000	Incubator XL TIRF S1	
411857-9095-000	Incubator XL S1 LSM	
415101-6000-111	Incubator XL PALM S1	
000000-1441-993	Incubator XL S1 for Axiovert 200	
411860-9030-000/ ...-9040-.../...-9050- .../...-9060-... +411857-9110-000	Heating Inserts M06/12/24/96 S1 and CO ₂ -Cover PM S1	
411860-9025-000 +411857-9110-000	Heating Insert P Lab-Tek™ S1 and CO ₂ -Cover PM S1	
411861-9902-000 +000000-0441-341	Heating Insert P S1; compact and CO ₂ -Cover HP for Heating Insert P	Compatible with Scanning Stage XY DC 100x100 with top plate Z-Piezo 000000-0473-167 and 000000-0495-117
411860-9080-000 +000000-0441-340	Heatable Universal Mounting Frame K-H S1 and CO ₂ -Cover KH	
411860-9081-000 +000000-0441-340	Heatable Universal Mounting Frame K-H-R S1 and CO ₂ -Cover KH	
411860-9082-000 +000000-0441-340	Heatable Universal Mounting Frame K-H-L S1 and CO ₂ -Cover KH	
411860-9081-000 +411857-9100-000	Heatable Universal Mounting Frame K-H-R S1 and CO ₂ -Cover Micromanipulation S1	For micromanipulation under CO ₂ atmosphere in Incubator XL S1
000000-1272-644 +000000-0441-342	Universal Mounting Frame K-M and CO ₂ -Cover HM	System configuration for the use of multiwell plates with glass bottom Heating: only via Heating Unit XL S1, which means that heating-up time is longer
411860-9086-000 +000000-0441-343	Heatable Universal Mounting Frame M-H S1 and CO ₂ -Cover MH	

Additions

411860-9112-000	Pre-Heating Plate with 3 Inserts S1	see page 9
411860-9120-000	Pre-Heating Plate S1	
	Additional components for cultivation, as required	see page 36

Get the Right Configuration

Prerequisites

Axio Observer, in case of Stand Z1 only with docking station

Axio Observer, in case of Stand Z1 only with docking station

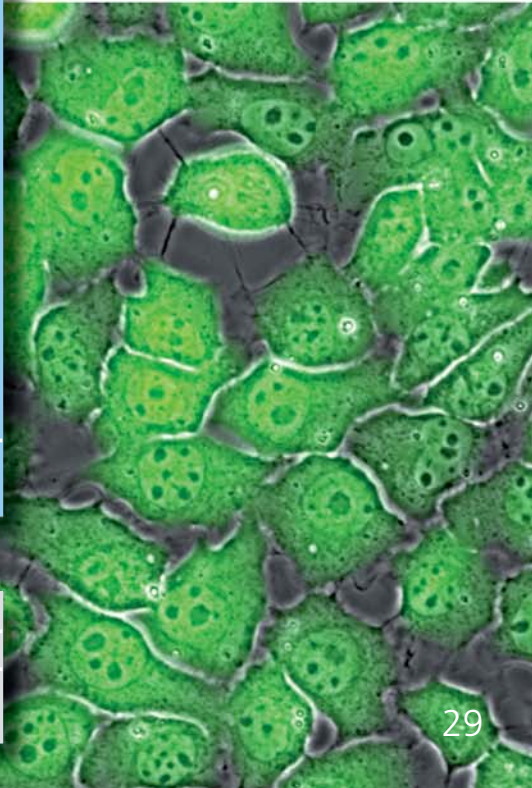
Axiovert 200

Mechanical stage 432016-0000-000, mechanical stage 432047-0000-000, scanning stage 130x85 CAN 432031-0000-000 or scanning stage 120x100 STEP 432029-0000-000

O₂ control is not possible

Specimen stage 432017-9901-000 with object guide right 000000-1005-833 or object guide left 000000-1110-991

*GFP expressing V79 cells.
Incubation for 70 hours
Jeroen Buters, GSF Neuherberg*



Observing Under an Extended Temperature Range: Simple Heating / Cooling

In addition to the simple observation of cells, this configuration is well-suited to micromanipulation. Temperatures below ambient temperature are possible. Simple Heating/Cooling is also perfectly suited to electrophysiology: potential interfering pulses are completely eliminated.

- **System design**

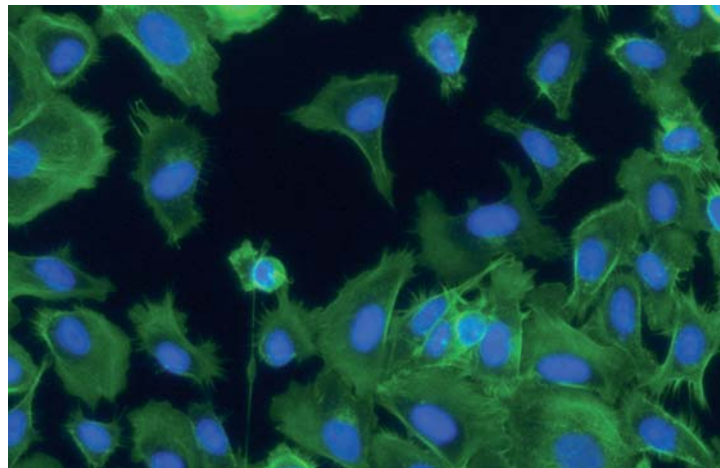
The system is based on a circulator: the temperable liquid flows through the controlled components. Incubation is not provided for.

- **Temperature range**

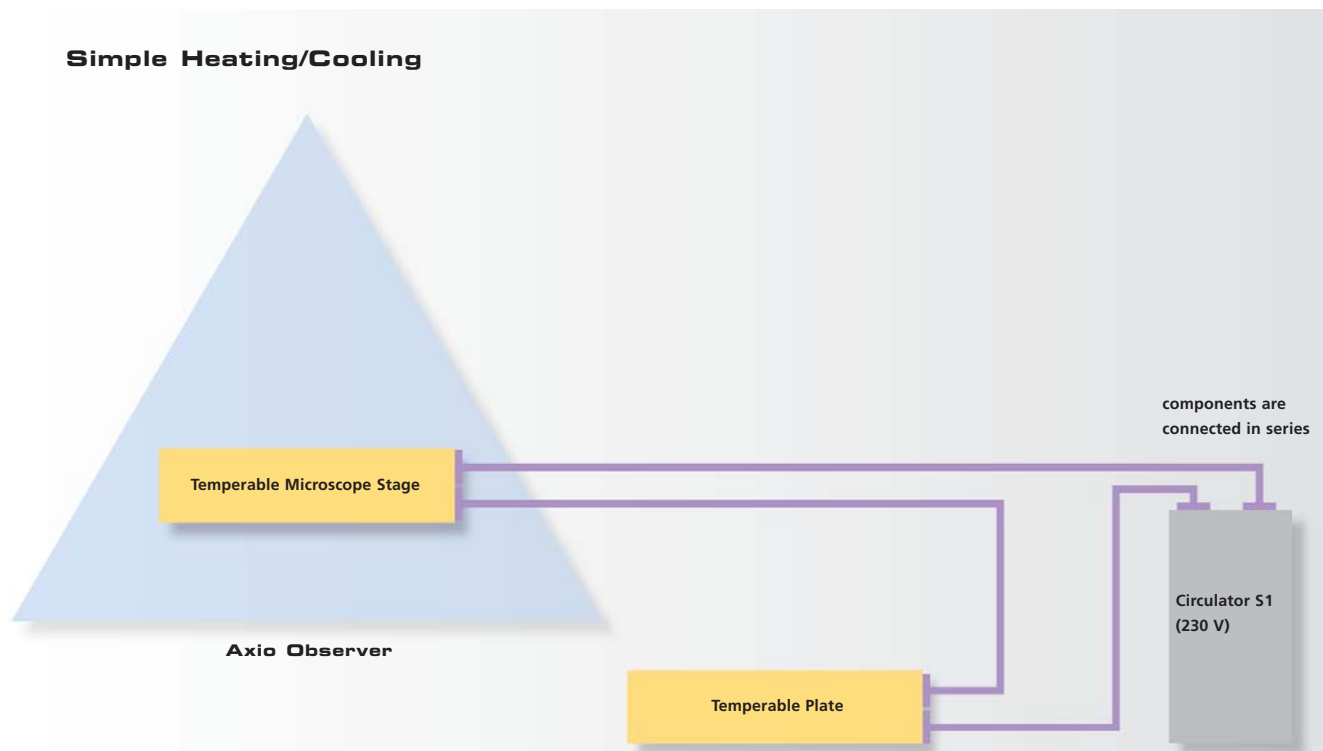
The system is capable of a temperature range of 4°C to 45°C. Due to the principle on which the system is based, differences in temperature may occur between the temperable component and the culture medium.

- **Operation and culture vessels**

This system allows great freedom of movement to move the sample and to operate and control the microscope and its components. All commonly used culture vessels can be used.



PC3 carcinoma cells. Blue (DAPI): cell nucleus, green (FITC): actin
E. Gebefuegi, GSF Neuherberg





Circulator S1

Universal circulation thermostat for heating or cooling

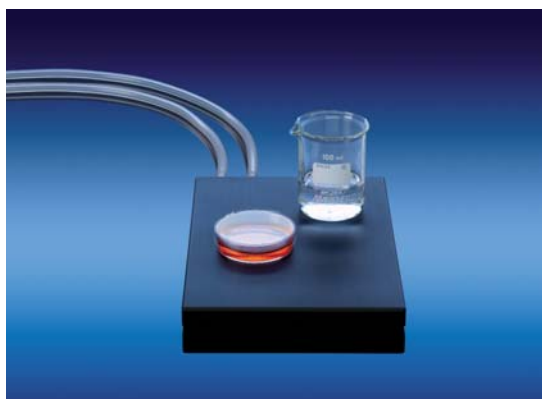
- For all temperable components
- Different temperable liquids may be used
- 2 versions available, 230 or 100 Volts
- Temperature range differs depending on temperable liquid used.
Recommended temperature for setpoint value setting: 4°C to 45°C



Temperable Microscope Stage

Universal temperable component for average requirements

- Well-suited to all standard methods
- Excellent temperature transfer to culture vessel thanks to smallest possible oval opening for the objective
- No electrical interference fields; can, therefore, be used without restriction in electrophysiology
- Object guide can be attached on either the left- or right-hand side
- Dimensions (LxWxH in mm): 250x230x18



Temperable Plate

For controlling the temperature of samples that need to be directly next to the microscope

- Dimensions (LxWxH in mm): 210x160x15

Configuration shown

411882-9020-000	Circulator S1 (230V)
000000-1116-066	Temperable Microscope Stage
000000-1116-067	Temperable Plate

Prerequisites

Alternatives to components marked in blue

411882-9021-000	Circulator S1 (100V)	
411882-9010-000	Temperable Insert P S1	Mechanical stage 432016-0000-000, mechanical stage 432047-0000-000, scanning stage 130x85 CAN 432031-0000-000 or scanning stage 120x100 STEP 432029-0000-000

For an Extended Temperature Range and Quick Changes in Temperature: Stage-Top Incubation Heating/Cooling

When it's a question of performing demanding observations over long periods in wide ranges of temperature, Stage-Top Incubation Heating/Cooling is the answer. This configuration makes it possible to conduct time lapse experiments in which temperatures below ambient temperature are also required. Quick changes in the temperature level, like those necessary for characterizing protein folding mutants for instance, are programmed in advance and take place automatically. Extremely rapid changes in the temperature level are possible in combination with perfusion. Options include pH and O₂ control.

- **System design**

The small incubation volume is encased by electrically heated Incubator PM S1 and Temperable Insert P S1. Liquid flows through the temperable components, which are linked to the circulator via a heating/cooling circuit. At cool temperatures, Incubator PM S1 is set at ambient

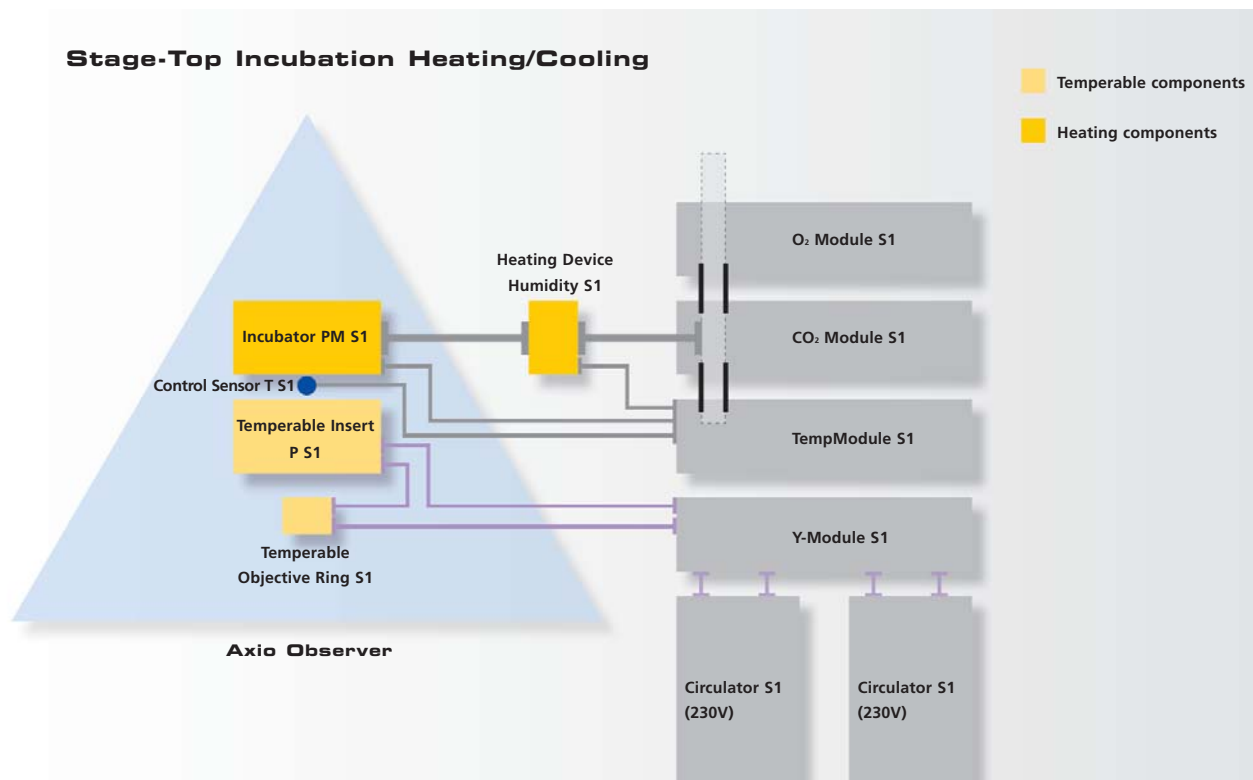
temperature. A temperable objective ring is recommended. The system delivers outstanding performance with the use of i objectives.

- **Temperature range**

Spanning a range from 4°C to 45°C, this system enables use of an extremely broad range of temperatures. Desired rising and falling temperature levels are set in advance and executed automatically. A sensor is located in Temperable Insert P S1 which allows optimal temperature control.

- **Operation and culture vessels**

Stage-Top Incubation Heating/Cooling offers great freedom of movements thanks to the system design. Except for multiwell plates, all other commonly used culture vessels can be used.





Incubator PM S1

Sophisticated, universal incubator; for specifications and function see page 15

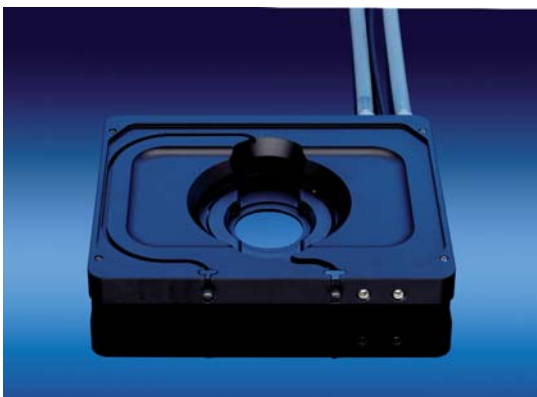
- *If cool temperatures are required for experiments, the heating of this component is set to ambient temperature*



Y-Module S1

Module for controlling 1 or 2 independent thermostats via AxioVision or the Axio Observer.Z1 TFT touch screen display

- *Ideal for quick, automatic changes in the temperature level in experiments; extremely rapid changes in temperature possible using perfusion (see page 36)*
- *The different temperatures of both circulators are kept stable. The active circulator is selected either directly by the user or automatically in accordance with the plan for the experiment*
- *Internal valves control the switching of the circuit for the temperable liquid*
- *Option: for maximum precision, the sensor of Temperable Insert P S1 can be used to control the temperature of the temperable liquid*
- *Y-Module S1 is also required if just one circulator is controlled using AxioVision software or TFT touch screen display*



Temperable Insert P S1

Sophisticated, stable temperable component with internal channels for temperable liquid

- *Well-suited to high-aperture imaging and LSM applications*
- *Temperature-controlled grooves to guide perfusion tubes ensure immediate change in temperature of perfusion medium and, therefore, extremely fast changes in temperature directly in the culture vessel*
- *Culture vessels that can be used and specifications are the same as for Heating Insert P S1*
- *With integrated temperature sensor*

Features that differ from Heating Insert P S1 (see page 15):

- *No electrical interference fields, can be used without restriction in electrophysiology*
- *No supply openings on the side for perfusion*
- *2 ports for perfusion tubes or Control Sensor T S1 at the front*



Temperable objective rings S1

Anodized black aluminum rings with internal temperable channel

- *For reducing any loss of temperature in the observation area when using immersion objectives*
- *Available in different diameters, depending on the immersion objective used*
- *With fixing screw to ensure they are held securely and for reliable heat/cold transfer*
- *A temperable objective ring is absolutely necessary for temperatures below 15°C and quick changes in the temperature level*

Stage-Top Incubation Heating/Cooling

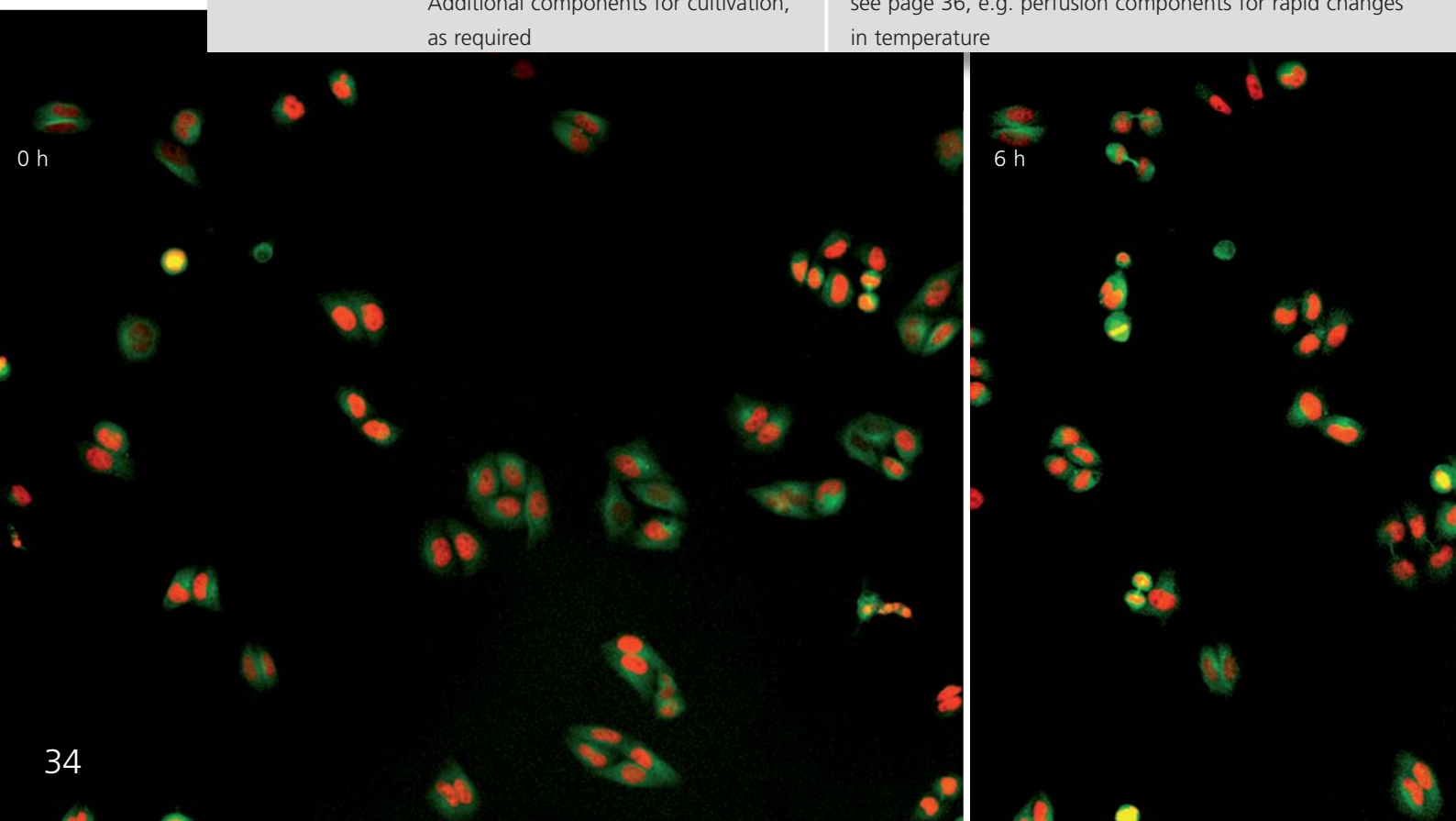
Configuration shown on page 32		Comments
411857-9020-000	Incubator PM S1	
411860-9010-000	TempModule S1	
411882-9070-000	Y-Module S1	The Y-Module is required to control the circulators online, even if only one circulator is used
411882-9020-000	2x Circulators S1 (230V)	For slow changes in temperature, 1 thermostat is sufficient
411882-9010-000	Temperable Insert P S1	The system cannot be used with multiwell plates
411857-9010-000	CO ₂ Module S1	
411857-9040-000	O ₂ Module S1	
411882-9081-000	Temperable Objective Ring 22.5/32.5 S1	A temperable objective ring is essential for temperatures below 15°C
411857-9050-000	Heating Device Humidity S1	
411857-9080-000	Control Sensor T S1	see page 7

Alternatives to components marked in blue

411882-9021-000	Circulator S1 (100V)	
411882-9080-000	Temperable Objective Ring 17.5/25 S1	

Additions

000000-1116-067	Temperable Plate	
	i objectives, as required	see objectives price list 40.21.00
	Additional components for cultivation, as required	see page 36, e.g. perfusion components for rapid changes in temperature

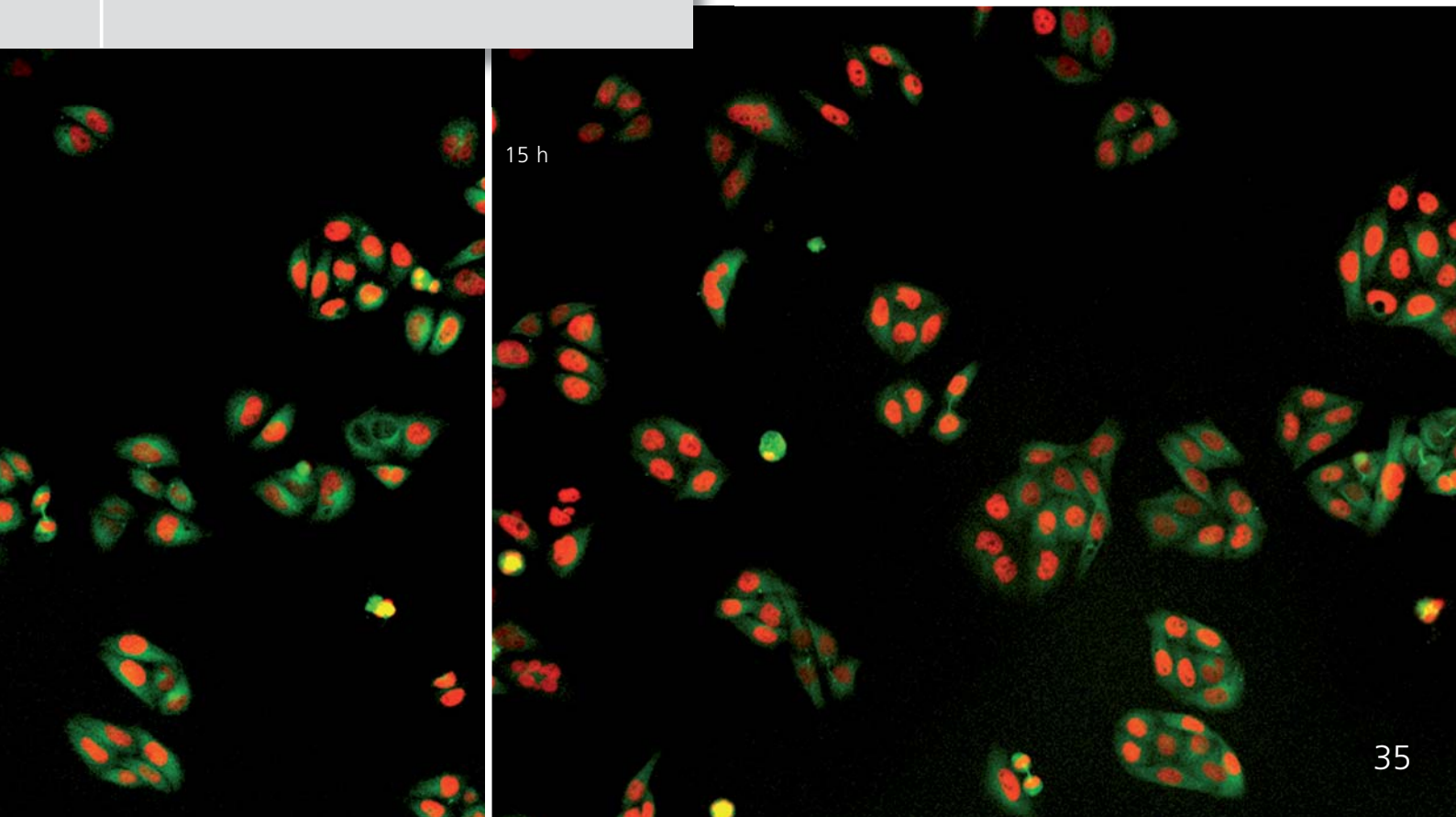


Get the Right Configuration

Prerequisites

Mechanical stage 432016-0000-000,
mechanical stage 432047-0000-000,
scanning stage 130x85 CAN 432031-0000-000 or
scanning stage 120x100 STEP 432029-0000-000

HeLa cells, transfected with mCherry (cell nucleus) and GFP (cytoplasm)
Jan Ellenberg and Rainer Pepperkok, EMBL, Heidelberg



Cell Cultivation Systems for the Most Demanding Requirements

A broad range of incubation systems demands an equally broad range of products for cell cultivation. Here too, Carl Zeiss has precisely the right additional component for every requirement.

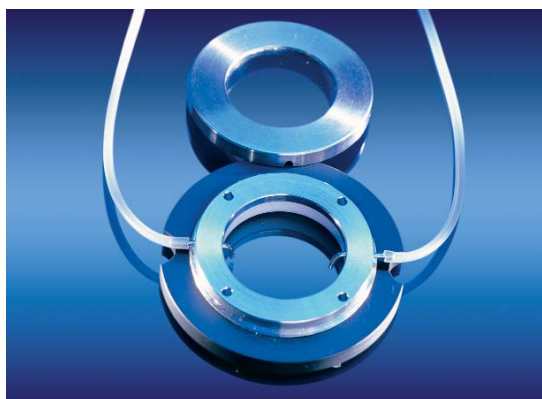
- Sophisticated, flexible cultivation systems, e.g. for high magnifications and a defined cultivation volume
- Hardware solutions for perfusion with medium, activators or inhibitors
- Foil Cover for experiments over long periods (> 6 hours) to reduce evaporation in the culture dish



POC-R Cell Cultivation System or POCmini Cell Cultivation System

Cell cultivation system for closed and open cultivation or perfusion

- Open: cover rests loosely on top and can be easily removed
- Closed: a round cover-glass cover is fixed by means of a threaded ring (see ill.)
- Base: anodized aluminum ring, equipped differently depending on cultivation conditions
- Possible to set defined cultivation volume by means of various spacer rings
- High-resolution oil immersion objectives can be used, DIC compatible
- Perfusion insert for closed perfusion supplied
- Can be used with all heatable universal mounting frames, Heating Insert P S1 (and variants) or Temperable Insert P S1
- Observation range POC-R: 29-32 mm, depending on the configuration
- Observation range POCmini: 17-22 mm, depending on the configuration



Perfusion insert, open, with lid for POC-R

Supplement to POC-R Cell Cultivation System or POCmini Cell Cultivation System

- For open perfusion
- DIC compatible
- Observation range 29 mm (POC-R) or 22 mm (POCmini)



Multichannel Peristaltic Pump

Peristaltic pump for the exchange of medium in microscopic analysis

- Required for exchange of medium or rapid temperature changes in experiments
- 4 channels
- Can be used in combination with POC-R or POCmini
- Excellent delivery and dosage accuracy at low pulsation
- Different modes of operation (pumping, dosing, repeated dosing)
- Flow rate 0.002-44 ml per minute per channel
- Dimensions (LxWxH in mm): 180x150x130



Foil Cover and CultFoil

Foil covers extend the incubation time considerably by reducing evaporation. A special foil (CultFoil), gripped between 2 thin, high-grade steel components, replaces the usual cover of the culture vessel. The foil effectively reduces the amount of water vapor that is able to escape. Gas exchange is not affected.

- Recommended for long experiments (upwards of 6 hours)
- Sterilizable, gas-permeable
- Available for 35 mm and 60 mm Petri dishes, POC-R and POCmini and multiwell plates by Falcon™ and Corning™ (see page 16) that are compatible for use
- Additional replacement foil (CultFoil) can be ordered

Cultivation

000000-1116-079	POC-R Cell Cultivation System
000000-1116-080	Perfusion insert, open, with lid for POC-R
000000-1116-081	Foil Cover for POC-R
000000-1116-082	CultFoil (25 µm) for POC-R
000000-0441-336	POCmini Cell Cultivation System
000000-0441-337	Perfusion insert, open, with lid for POCmini
000000-0441-338	Foil Cover for POCmini
000000-0441-339	CultFoil (25 µm) for POCmini
000000-1116-111	Multichannel Peristaltic Pump
000000-1116-083	Foil Cover for 35 mm Petri dishes
000000-1116-084	CultFoil (25 µm) for 35 mm Petri dishes
000000-1116-085	Foil Cover for 60 mm Petri dishes
000000-1116-086	CultFoil (25 µm) for 60 mm Petri dishes
000000-1156-838	Foil Cover for multiwell plates
000000-1156-839	CultFoil (25 µm) for multiwell plates

The Perfect Live Cell Experiment: Arrive at the Desired Result Reliably and Conveniently

1. Set the desired incubation parameters on the Axio Observer.Z1 TFT display or in AxioVision. You will benefit here from the high level of system integration: it is no longer necessary to operate several different control boxes.

For a perfect temperature setting, use Control Sensor T S1 directly in the culture dish. Ensure that the ambient temperature is stable. Eliminate potential fluctuations in temperature between day and night. Eliminate direct sunlight or any currents of air directed onto the microscope (e.g. from an air-conditioning unit).

3. Place your sample on the microscope and select the cell that is to be observed.

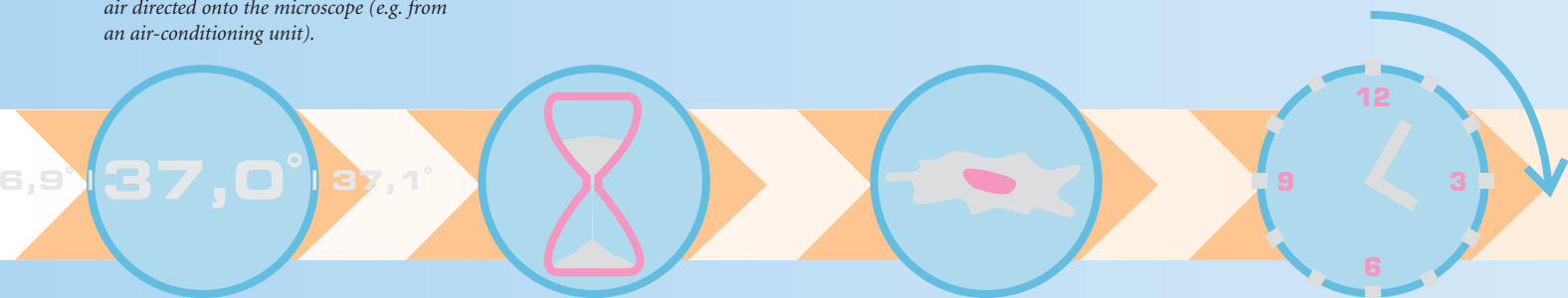
As you do so, only open the incubator briefly in order to avoid fluctuations in the incubation atmosphere. Make sure that that culture vessel is fixed perfectly in a horizontal position. Avoid phototoxic effects by ensuring as little exposure to light as possible, even during preparation. Stray light, transmitted light and excitation light for fluorescence can all have negative effects.

2. Wait until all the incubation values have been reached. The time this takes will differ depending on the configuration. You can see the setpoint and measured value for all incubation parameters immediately at a glance on the Axio Observer.Z1 TFT display or in AxioVision.

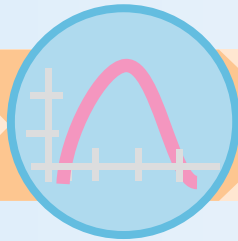
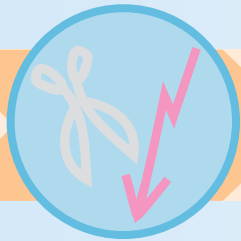
Avoid drifts simply by allowing a 2 to 3-hour warm-up period before starting the experiment. This will ensure that all microscope components reach their ultimate temperature. Alternatively have the system running over several days, for example.

4. Now start your time lapse experiment. All incubation values are acquired continuously during the experiment for the purposes of documentation.

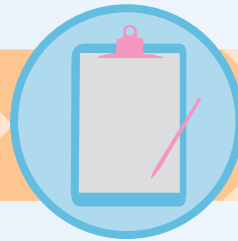
Once again, avoid phototoxic effects by using the smallest possible amounts of light for the imaging. Avoid bright ambient light to ensure that even weak fluorescence signals can still be detected. For extremely exacting experiments, select Incubator XL DARK S1. This allows disruptive ambient light to be reliably excluded.



5. Perform any manipulation that may be required for your application, e.g. changing the temperature, micromanipulation, FRAP, uncaging, ablation, etc. Cell Observer® is open to all further applications that will provide you with even more information about your cells.



7. As all incubation values are stored in AxioVision directly with the image data, your experiment is perfectly documented. You can view the development of the temperature or of other incubation parameters at any time.



6. Analyze your experiment using one of the various modules for analysis in AxioVision. Benefit from the possibility of carrying out an analysis while the experiment is running, for example with the "Physiology" module.

Perfect Coordination: Cell Observer® from Carl Zeiss

Optimum performance for Live Cell Imaging: as it allows different elements to be combined freely, the Cell Observer® system solution offers the user extreme flexibility in all aspects of image acquisition – from 2D Imaging through to three-dimensional time lapse imaging in several channels. From simple observation, documentation and individual applications through to quantitative analyses of processes in living cells, Cell Observer® can be used in a wide variety of applications and offers a complete workflow.

Equal to every task:

Cell Observer® from Carl Zeiss

With the total Cell Observer® system you can fully exhaust every possibility. The system components for incubation perfectly complement the Axio Observer research platform. Everything is coordinated to the highest level – down to the AxioVision software platform, the third pillar of this fully integrated

high-end system, and options such as TIRF and ApoTome. All in all, this system offers a huge range of applications. You can do everything that modern research with living cells demands: observe, manipulate and analyze.

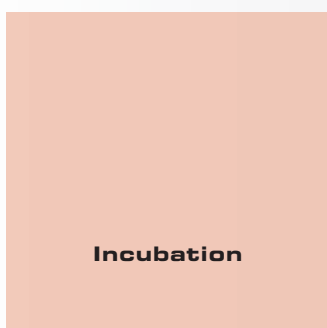
Top-class microscopy: the Axio Observer research platform

The high-performance Axio Observer microscope stands for perfect results – from simple observation through to high-end applications.

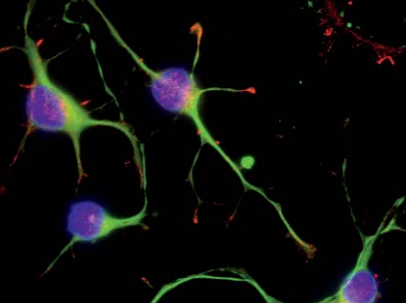
- Outstanding fluorescence with excellent contrast and absolute brilliance
- A DIC contrast that also allows maximum resolution and optimum contrast in the periphery of the field of view thanks to the strong homogeneity of the background
- A completely new operating concept – from the “keyring” on the Z-drive to the TFT display integrated into the docking station – meets every demand

Cell Observer®

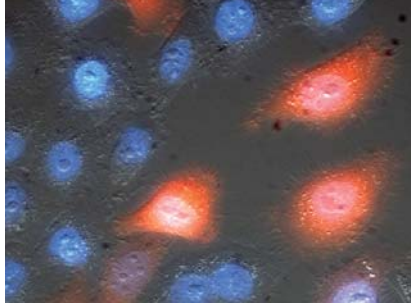
The optimal total system for all life science disciplines



Cell Observer® is based on three pillars: the components for incubation, the Axio Observer research microscope and the AxioVision system software



Forebrain neurons (rat) cultivated on poly-D-lysine/laminin cover glasses. Dyed using DAPI (blue), TUJ1 anti-beta-tubulin (green) and anti-ActRII (H65) (red)
J. Perron, Columbia University, Columbia



HeLa cells, Multi-color Fluorescence in combination with DIC. Blue (HOECHST 33342): cell nucleus, red (DsRed): cytoplasm
Horst Wolff, GSF Neuherberg

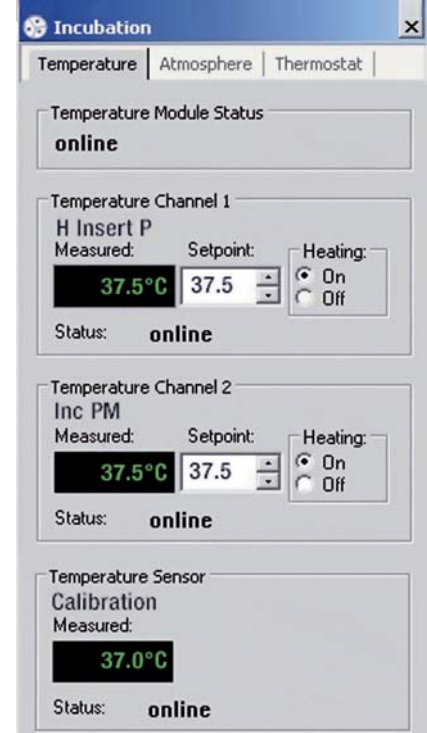
- Open system architecture with unique solutions for Live Cell Imaging
- Optimal integration into Cell Observer® HS for observing rapid processes in living cells
- High-performance objectives for Live Cell Imaging: e.g. special LCI objectives and new thermally insulated objectives for stage incubation

Modular intelligence:

AxioVision software platform

With numerous carefully thought out functionalities and automated processes, the AxioVision microscope software from Carl Zeiss makes your work a great deal easier when using the system. It allows you to control the microscope, all incubation configurations and other additional components interactively and fully automatically. Advantages for the user include the wide variety of modules, the quick and simple operation and the clear user interface. User guidance, individually structured workflows and the broad performance spectrum make it possible to perform complex applications involving living cells highly economically. The basic AxioVision package can be expanded to meet extremely demanding analysis requirements – with Multichannel, Time Lapse, Z-stack or Mark&Find, for example, for multi-dimensional image acquisition, and with the Incubation module for the performance of dynamic

In the AxioVision system software you can also see all incubation parameters clearly at a glance



temperature experiments. Additional modules help with the position analysis of different fluorophores (Colocalization), optimize the allocation of emissions to fluorophores (Unmixing) or determine, for example, the relative fluorescence intensity of defined regions in ratio experiments (Physiology). And the performance spectrum is growing all the time.



Incubation from Carl Zeiss – Greater Performance on Every Point

Perfectly imitated In-vivo conditions

- Temperature, CO₂ and O₂ concentrations can be controlled precisely and quickly
- Broad temperature range
- Perfect temperature directly at location of sample also during stage incubation thanks to thermally insulated objectives in combination with objective heaters

Perfectly conducted experiments

- Automatic temperature change and broad temperature range for heatshock experiments or the analysis of protein folding mutants
- Rapid temperature change using i objectives, temperable objective rings and the Y-module
- Automatic change in concentration, e.g. of O₂

Perfect operation

- Microscope and incubation components are controlled via the TFT touch screen display
- Extremely high level of automation thanks to integration of incubation into the system software

Perfect reliability

- Temperature measured directly at point of observation
- Monitoring of all parameters at a glance on TFT touch screen display
- Validation thanks to storage of incubation data together with image data

Perfect investment

- Modular stacking concept for simple, cost-efficient upgrading or modification
- Compatible with Fast Imaging, TIRF, LSM and Laser Manipulation (FRAP, etc.)
- Tailored system solutions for rapid research results