

**INSTRUCTION MANUAL**  
**CAT. 63154-10, 63154-20, 63154-30**  
**Advanced Protocol Microbiological Incubators**



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# Safety Notes

## Basic Operating Precautions

These operating instructions describe incubators.

These incubators have been manufactured to the latest state of the art and been tested thoroughly for flawless functioning prior to shipping. However, the incubator may present potential hazards, particularly if it is operated by inadequately trained personnel or if it is not used in accordance with the intended purpose. Therefore, the following must be observed for the sake of accident prevention:

- These incubators must be operated by adequately trained and authorized professional personnel.
- These incubators must not be operated unless these operating instructions have been fully read and understood.
- The present operating instructions, applicable safety data sheets, plant hygiene guidelines and the corresponding technical rules issued by the operator shall be used to create written procedures targeted at personnel working with the subject matter device, detailing:
  - the decontamination measures to be employed for the incubator and the accessories used with it,
  - the safety precautions to be taken when processing specific agents,
  - the measures to be taken in case of accidents.
- Repair work on the incubator must be carried out only by trained and authorized expert personnel.
- The contents of these operating instructions are subject to change at any time without further notice.
- Concerning translations into foreign languages, the German version of these operating instructions is binding.
- Keep these operating instructions close to the incubator so that safety instructions and important information are always accessible.
- Should you encounter problems that are not detailed adequately in these operating instructions, please contact Electron Microscopy Sciences immediately for your own safety.

## Operational Safety Rules

The following rules must be heeded when working with incubators:

- Observe the sample weight limits specified for your incubator as a whole and its shelving in particular; see [Chapter 13, “Technical Data.”](#)
- Do not overload the bottom of the interior workspace to avoid the risk of overheating any samples placed there and to prevent the temperature sensor from being damaged.
- Arrange the samples evenly throughout the work space, making sure not to place them too closely to the interior walls to ensure a uniform temperature distribution.
- Do not load your incubator with substances that exceed the capabilities of the available lab apparatus and Personal Protection Equipment to provide sufficient degrees of protection to users and third parties.
- Check the door seal every six months for proper sealing performance and possible damage.
- Do not process any samples containing hazardous chemical substances that may be released into the ambient air through defective seals or may cause corrosion or other defects on parts of the incubator.

## Warranty





Electron Microscopy Sciences warrants the operational safety and functions of the incubators only under the condition that:

- the incubator is operated and serviced exclusively in accordance with its intended purpose and as described in these operating instructions,
- the incubator is not modified,
- only original spare parts and accessories that have been approved by Electron Microscopy Sciences are used (third-party spares without Electron Microscopy Sciences approval void the limited warranty),
- inspections and maintenance are performed at the specified intervals,
- an operation verification test is performed after each repair activity.

The warranty is valid from the date of delivery of the incubator to the customer.

# Explanation of Safety Information and Symbols

## Safety Notes and Symbols Used Throughout These Operating Instructions

	 <p>Indicates a hazardous situation which, if not avoided, will result in death or serious injuries.</p>
	 <p>Indicates a hazardous situation which, if not avoided, could result in death or serious injuries.</p>
	 <p>Indicates a situation which, if not avoided, could result in damage to equipment or property.</p>
	 <p>Is used for useful hints and information regarding the application.</p>

## Additional Symbols for Safety Information

	<b>Wear safety gloves!</b>
	<b>Wear safety goggles!</b>
	<b>Harmful liquids!</b>
	<b>Electric shock!</b>
	<b>Hot surfaces!</b>
	<b>Fire hazard!</b>
	<b>Explosion hazard!</b>
	<b>Suffocation hazard!</b>
	<b>Biological hazard!</b>
	<b>Contamination hazard!</b>

## Symbols on the Incubator



Observe operating instructions



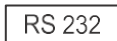
CE-conformity mark: confirms conformity according to EU Guidelines



Mark of conformity USA/Canada



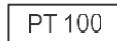
VDE test mark



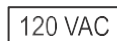
RS 232 interface



Fuse, 2 Ampere slow-blow



PT100 sensor element



120 Volts AC power socket



Interface port

# Intended Purpose of the Incubator

## Correct Use

These incubators are laboratory devices for preparing and cultivating cell and tissue cultures. The devices employ precision temperature control for simulating the specific physiological ambient conditions for these cultures.

They have been designed for installation and operation in the following environments:

- Laboratories for cytobiological and biotechnological experiments of safety levels L1, L2, and L3.
- Medical-microbiological laboratories in accordance with DIN 58 956.
- Laboratories in the central area of clinics and hospitals.

## Incorrect Use

To avoid the risk of explosion do not load the incubator with tissue, material, or liquids that:

- are easily flammable or explosive,
- release vapor or dust that forms combustible or explosive mixtures when exposed to air,
- release poisons,
- do not pour any liquids on the bottom of the interior surface or into a collecting basin inside the unit.
- release dust
- exhibit exothermic reactions
- are pyrotechnical substances

## Standards and Directives

The incubator complies with the following standards and guidelines:

- IEC EN 61010 - 1, IEC EN 61010 - 2 - 010
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC

Additionally, the incubator is in compliance with many other international standards, regulations and directives not listed here. Should you have any questions regarding compliance with national standards, regulations and directives applicable for your country, please contact Electron Microscopy Sciences.

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# Delivery of the Incubator

## Packaging

These incubators are delivered in a rugged packaging box. All packaging materials can be separated and are reusable:

Packaging materials

Packaging carton: Recycled paper

Foam elements: Styrofoam (CFC-free)

Pallet: Chemically untreated wood

Packaging film: Polyethylene


Packaging ribbons: Polypropylene

## Acceptance Inspection

After the incubator has been delivered, check the delivery immediately for:

- completeness,
- possible damage.

If components are missing or damage is found on the incubator or the packaging, in particular damage caused by humidity and/or water, please notify the carrier as well as Electron Microscopy Sciences immediately.

	 <b>WARNING</b>	<b>Risk of injury</b>
<p><b>Should sharp edges have formed in damaged areas or elsewhere on the device, take all necessary precautions to protect personnel handling the incubator. For example, have them wear protective gloves and other personal protection equipment.</b></p>		

## Scope of Supply

### Incubators

Quantity of components supplied (pieces)	IMH Series IMH-S Series
Perforated sheet	2
Support rail for shelf	4
Power cord	1
Connector, potential-free contact	1
Operating manual	1
Contact brackets	4
Clip springs	2



# Installation



## Ambient Conditions

The incubator must only be operated in a location that meets all of the ambient condition requirements listed below:

### Location Requirements

- Installation location indoors in dry areas free from drafts.
- Dust loading should be in keeping with the degree of contamination, which is Pollution Degree 2 according to IEC EN 61010-1. Using the incubator in an atmosphere with electrically conductive dust is prohibited.
- The minimal distance to adjacent surfaces must be observed on all sides (see Section “Space Requirements” on page 3-3)
- The operating room must be equipped with appropriate ventilation.
- Solid, level, fire-proof surface and no flammable materials opposite to the rear panel of the oven.
- Vibration-proof substructure (floor stand, lab table) capable of bearing the dead weight of the incubator and its accessories (particularly if two devices are stacked).
- The incubator has been designed for an operating height of up to 2000 m above sea level.
- Temperature range from 5 °C to 40 °C / 41° F to 104° F.
- Relative humidity up to 80% (maximum; preferably 60-70%), non condensing.
- Should condensation exist, wait until the moisture has evaporated completely before connecting the incubator to a power source and powering up.
- To ensure a constant incubation temperature of 37 °C (98.6 °F), the ambient temperature must be within a range of +18 °C to +32 °C (64.4 °F to 89.6 °F).
- Avoid direct exposure to sunlight.
- Devices that produce excessive amounts of heat must not be placed near the incubator.
- To avoid drying operation without an appropriate fresh air supply make sure that the air inlet (which may be equipped with an optional fresh air filter) is not obstructed or blocked by any adjacent objects.

- Place the incubator on a floor stand (option; to be ordered separately), never on the lab floor.
- Power line voltage variations must not exceed  $\pm 10\%$  of the nominal voltage.
- Transient surges must lie within the range of levels that normally occur in the power supply system. The impulse withstand voltage based on surge category II of IEC 60364-4-443 shall be applied at the nominal voltage level.
- Consider installing one dedicated upstream circuit breaker per incubator to avoid multiple device failures in case of an electrical fault.

	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">  <b style="font-size: 1.2em;">WARNING</b> </div> <p><b>Contamination hazard</b></p> <p><b>Do not place the incubator directly on the lab floor, but mount it on the floor stand or on a lab work surface (option; to be ordered separately). Contaminants, such as bacteria, viruses, fungi, prions, and other biological substances may use the open door to migrate easily from the floor into the incubator's work space.</b></p>
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## Intermediate Storage

When the incubator is placed in intermediate storage, which is permissible for a maximum of four weeks, make sure that the ambient temperature is between 20°C to 60°C (68°F to 140°F) and the maximum relative humidity does not exceed 90%, non-condensing.

## Room Ventilation

Heat dissipating from the incubator during continuous operation may cause a change in the room climate.

Therefore, the incubator must only be installed in rooms with sufficient ventilation.

Do not install the incubator in room recesses without ventilation.

When several devices are to be placed in the same room, additional ventilation may have to be provided as necessary.

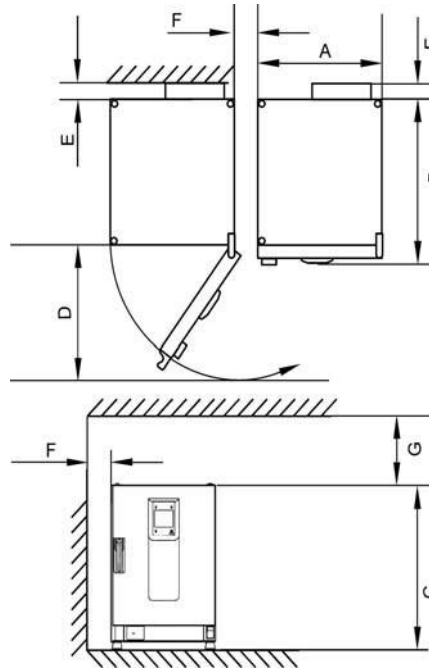
To avoid any impact of the heat dissipated by the incubator on the ambient climate the room must be vented by means of a laboratory-grade ventilation system that complies with applicable local and national health and safety regulations and has sufficient capacity.

If excessive temperatures tend to occur in the operating room, be sure to provide a thermal protection means that cuts out the power supply to mitigate the impact of over temperature scenarios.

## Space Requirements

When installing the incubator, make sure that the installation and supply connections remain freely accessible.

The specified side clearances represent minimum distances.



**Figure 3-1 Incubator Dimensions and Required Clearances**

**Table 3-1 Incubator Dimensions**

Model	A (mm/inch <sup>*</sup> )	B (mm/inch)	C (mm/inch)	D (mm/inch)
IMH 60	530 / 20.8	565 / 25.2	755 / 29.7	540 / 21.3
IMH 100	640 / 25.2	565 / 25.2	855 / 33.7	650 / 25.6
IMH 180	640 / 25.2	738 / 29.1	955 / 37.6	650 / 25.6
IMH 60	530 / 20.8	565 / 25.2	755 / 29.7	540 / 21.3
IMH 100	640 / 25.2	565 / 25.2	855 / 33.7	650 / 25.6
IMH 180	640 / 25.2	738 / 29.1	955 / 37.6	650 / 25.6

\*Dimensions in inches are rounded equivalents specified for information only.

**Table 3-2 Required Clearances**

80 / 3.2	50 / 2	200 / 8	300 / 12
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## Transport

For transport, do not lift the incubator using the doors or components attached to the incubator as lift points.

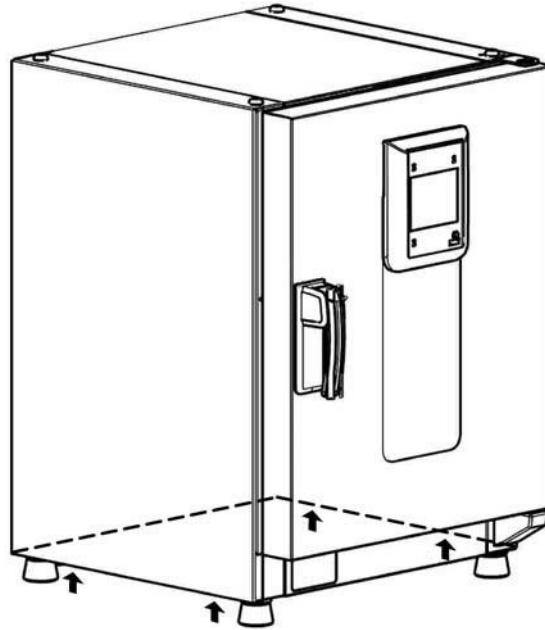



Figure 3-2 Lift Points

	<div data-bbox="533 1061 896 1151" style="background-color: yellow; border: 1px solid black; padding: 5px;">  <b>CAUTION</b> </div> <div data-bbox="916 1115 1302 1146" style="margin-left: 10px;"> <b>Heavy loads! Lift with care!</b> </div> <p data-bbox="518 1182 1426 1350"> <b>To avoid injury through physical strain, such as strain traumata and slipped discs, do not attempt to lift the incubator alone!</b>  <b>To avoid injury through dropped loads, be sure to wear Personal Protection Equipment, such as safety shoes, when lifting the incubator.</b> </p> <p data-bbox="518 1357 1426 1456"> <b>To avoid crushing your fingers or hands (particularly in a closing door) or damaging the incubator, do not use any other lift points than those indicated in the illustration above.</b> </p>
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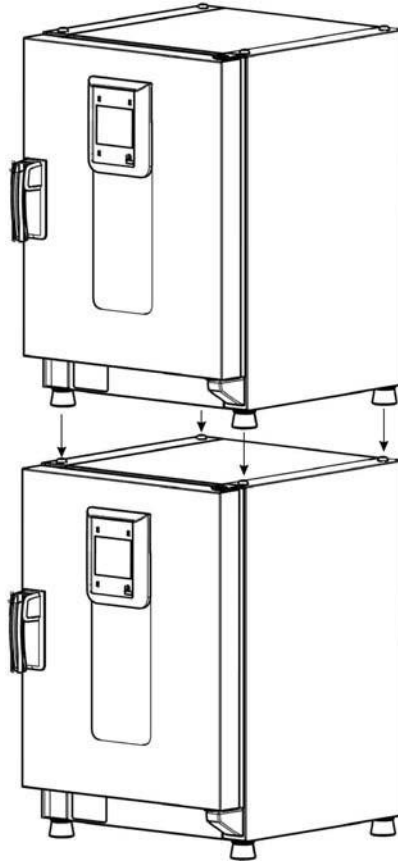
## Stacking

These devices are suited for single-row stacking, that is, one incubator maximum may be stacked on another device with the same type of enclosure and same footprint.

Stacking requires a stacking frame (available as an accessory).

This is easily achieved without any need for tools by placing the feet of the top device exactly on the two stacking pads provided on the top panel of the bottom device or by installing a stacking frame between the units.

The devices are secured to each other by their own dead weight and the half dome shaped mating surfaces of the feet and stacking pads.



**Figure 3-3 Stacking Devices**



## Stacking Instructions

To prevent the top incubator from slipping and dropping down, the following requirements must be fulfilled before devices may be stacked:

- Stack as follows when using a stacking frame:
  - 60/100/180 on 180
  - 60/100 on 100
  - 60 on 60
- Only two units may be stacked together.

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- If the two incubators have different surface areas, or if one of the units is an oven, a stacking frame (accessory) must be used between the two units.
- the bottom incubator must be correctly levelled;
- the levelling feet on the top incubator must be screwed in all the way;
- the levelling feet of the top device must be aligned with and placed exactly on the stacking pads of the bottom incubator.

	<div data-bbox="534 533 895 622" style="border: 1px solid black; padding: 5px; display: inline-block;">  <b>CAUTION</b> </div> <div data-bbox="922 551 1219 618" style="display: inline-block; vertical-align: top;"> <b>Risk of overheating with stacked devices</b> </div> <p data-bbox="518 656 1453 757"><b>To avoid the risk of electrical components and the outer enclosure overheating or temperature control failing due to insufficient ventilation, do not exceed the specified stacking height!</b></p>
	<div data-bbox="534 824 895 913" style="border: 1px solid black; padding: 5px; display: inline-block;">  <b>CAUTION</b> </div> <div data-bbox="922 819 1366 887" style="display: inline-block; vertical-align: top;"> <b>Risk of tipping and dropping of stacked devices</b> </div> <p data-bbox="518 925 1453 1126"><b>You should be aware at all times that stacked devices do not form a stable unit, even when the stacking pads and feet are correctly used. The top device may tip over and drop down when being transported in a stack. To avoid injury to persons and damage to equipment, do not attempt to move stacked devices as a unit! Separate and move each device one by one, then restack them.</b></p> <p data-bbox="518 1155 1426 1223"><b>Electron Microscopy Sciences cannot be held liable for stacking of third-party units; this is done at the user's risk.</b></p>
	<div data-bbox="534 1283 895 1373" style="border: 1px solid black; padding: 5px; display: inline-block; background-color: #0056b3; color: white; text-align: center;"> <b>NOTE</b> </div> <div data-bbox="922 1312 1302 1339" style="display: inline-block; vertical-align: top;"> <b>Installation in mobile racks</b> </div> <p data-bbox="518 1402 1433 1536">The units can be placed on a mobile roller cart (option to be ordered separately). Make sure that the rollers are secured with locking brakes during the operation of the incubator and that the rollers are oriented toward the outside for increased stability.</p> <div data-bbox="534 1563 895 1653" style="border: 1px solid black; padding: 5px; display: inline-block; background-color: #0056b3; color: white; text-align: center;"> <b>NOTE</b> </div> <div data-bbox="922 1608 1324 1675" style="display: inline-block; vertical-align: top;"> <b>Condensation forming while operating stacked devices</b> </div> <p data-bbox="518 1697 1426 1899">If stacked devices are operated at an ambient temperature of more than 26 °C (79 °F), temperature control may be adversely affected on the top device while the decontamination routine is running on the bottom device. To prevent any impairment of temperature control, make sure that the space between and around any two stacked devices is well-ventilated for optimum heat removal.</p>

## Product Description

This section describes advanced protocol microbiological incubators for high-end laboratory applications, which are available in two different versions distinguished by safety level:

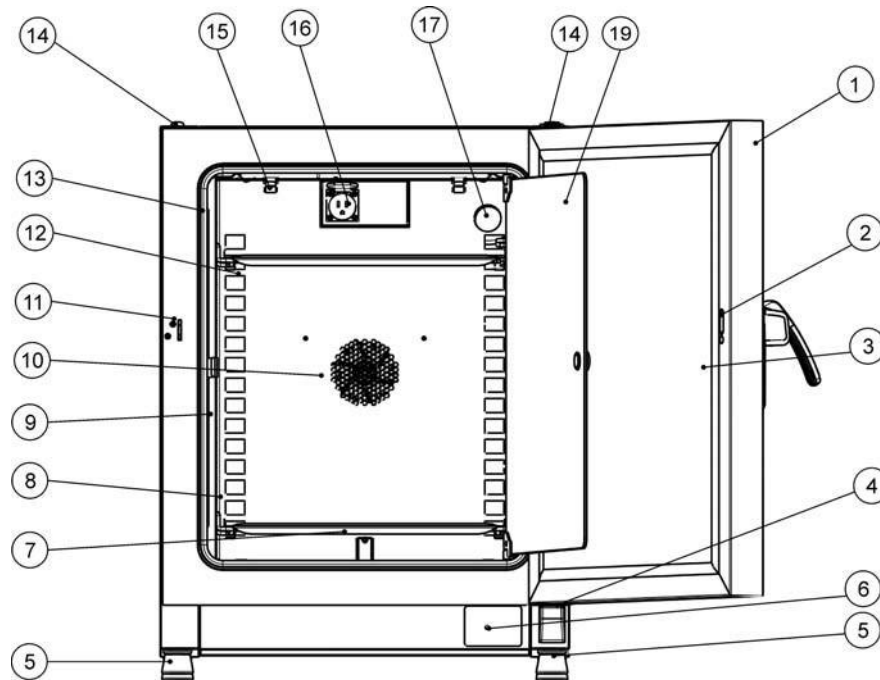
- IMH Series advanced protocol microbiological fan convection incubators (see “[IMH Series Incubator Overview](#)” on page 4-1);
- IMH-S Series advanced protocol security microbiological fan convection incubator for more exacting safety level requirements (see “[IMH-S Incubator Overview](#)” on page 4-3).

### IMH Series Incubator Overview

IMH Series advanced protocol microbiological incubators come equipped with the following features:

- high-precision work space temperature control, adjustable in steps of one-tenth of a degree up to 105°C (221°F)
- a variable-speed work space fan, adjustable on the control panel
- countdown, fixed-time, and weekly timers for timed process control
- two perforated sheets
- an access port for tubing, sensor leads, etc.

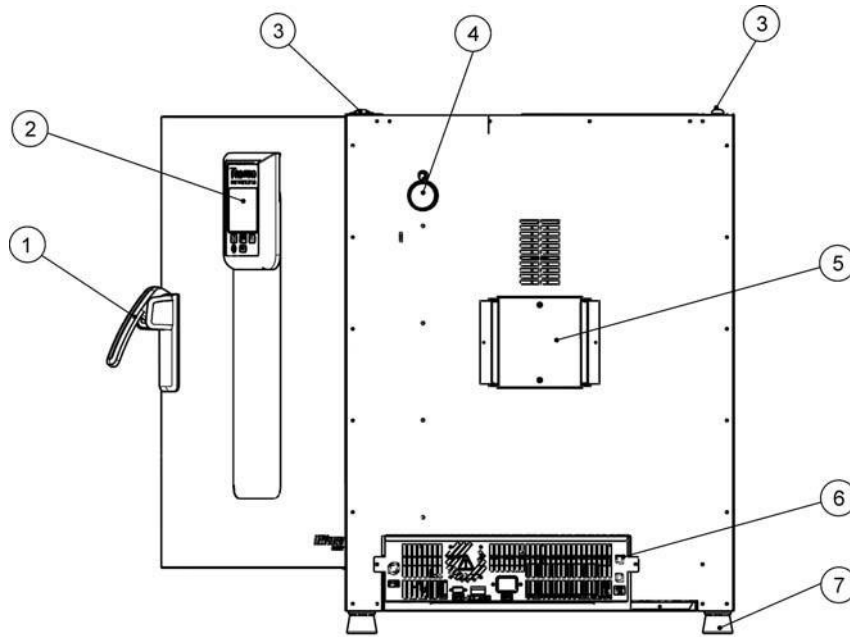
The individual features of IMH Series incubators are shown in [Figure 4-1](#) and [Figure 4-2](#) below.



**Figure 4-1 IMH Series Incubator Front View**

- [1] Outer door
- [2] Locked opening
- [3] Door latch and handle
- [4] Door hinge, lower
- [5] Levelling foot
- [6] Nameplate
- [7] Temperature sensor
- [8] Support rail for perforated-sheet shelf
- [9] Shelf rack
- [10] Air baffle
- [11] Door hook catch
- [12] Air baffle
- [13] Door seal
- [14] Stackingpad
- [15] Spring
- [16] Power outlet
- [17] Access port
- [18] Glassdoor





**Figure 4-2 IMH Series Incubator Rear View**

- [1] Door latch and handle
- [2] Control panel
- [3] Stacking pad
- [4] Access port
- [5] Fan
- [6] Electronics compartment
- [7] Levelling foot

## IMH-S Incubator Overview

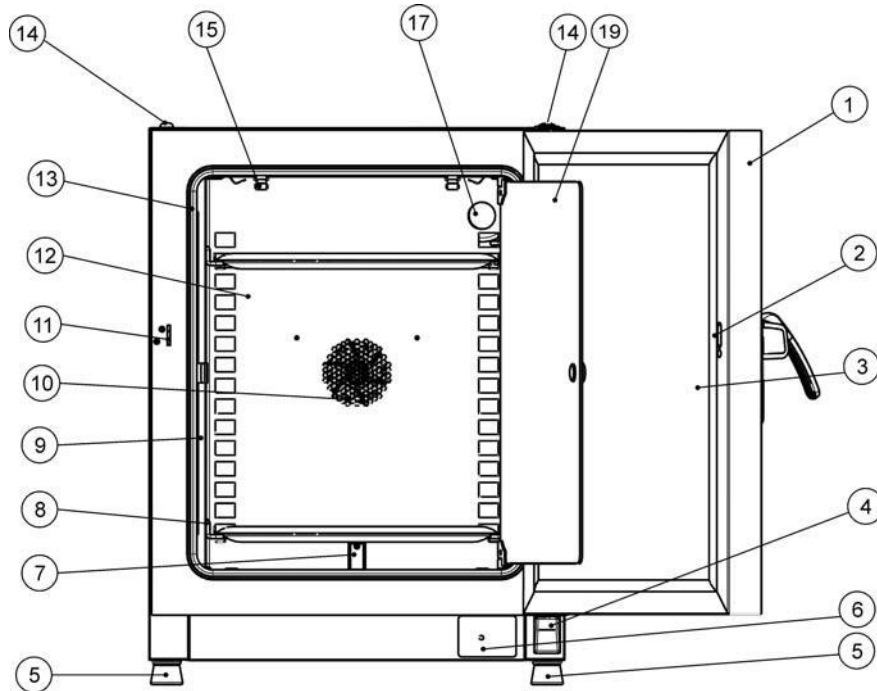
IMH-S Series advanced protocol security microbiological mechanical convection incubators come equipped with the features also found in IMH Series devices, including:

- high-precision work space temperature control, adjustable in steps of one-tenth of a degree up to 105°C (221°F)
- a variable-speed work space fan, adjustable on the control panel
- countdown, fixed-time, and weekly timers for timed process control
- two perforated-sheet shelves for sample containers
- an access port for tubing, sensor leads, etc.

Additionally, IMH-S Series incubators offer the following extra functionality:

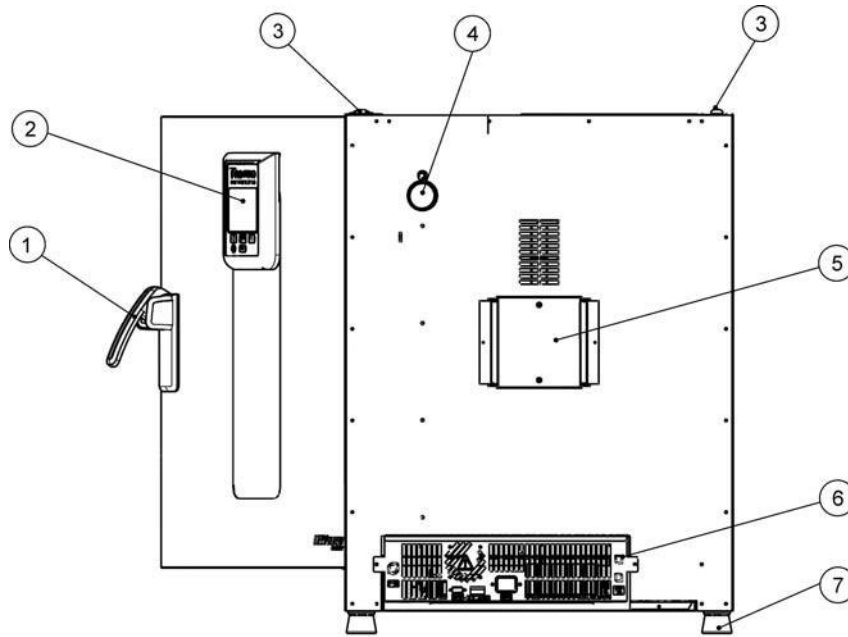
- Monitoring of lower temperature
- Connection for Acceptable temperature sensor (accessory, must be ordered separately)
- a lockable door to secure a running process against unauthorized access
- a door switch and indicator on the control panel to indicate that the door is open
- a built-in, fully automatic decontamination routine

The individual features of IMH-S Series incubators are shown in [Figure 4-3](#) and [Figure 4-4](#) below.



**Figure 4-3 IMH-S Series Front View**

- [1] Outer door
- [2] Door switch
- [3] Door latch and handle, with lock
- [4] Door hinge, lower
- [5] Levelling foot
- [6] Nameplate
- [7] Temperature sensor
- [8] Support rail for perforated-sheet shelf
- [9] Shelf rack
- [10] Air baffle
- [11] Door hook catch
- [12] Door seal
- [13] Stacking pad
- [14] Access port



**Figure 4-4 IMH-S Series Rear View**

- [1] Door latch and handle (with door switch)
- [2] Control panel
- [3] Stacking pad
- [4] Access port
- [5] Fan
- [6] Electronics compartment
- [7] Levelling foot

## Safety Devices

The incubators are equipped with the following safety features:

- a sample protection feature that safeguards the samples against destruction through overheating in case of controller failure;
- an overheat protection cut-out feature that shuts down the incubators IMH-S completely when excessive temperatures occur in the workspace;
- an alarm relay that is energized, along with audible and visual alarms, to indicate errors encountered during operation;
- dual fuses rated at 16 amperes.

## Work Space Atmosphere

To ensure undisturbed operation, the ambient temperature in the operating room must be at least 18 °C (64.4 °F).

The heating system uses this temperature threshold to control the ambient temperature plus 5°C up to the maximum of 105°C (221°F).

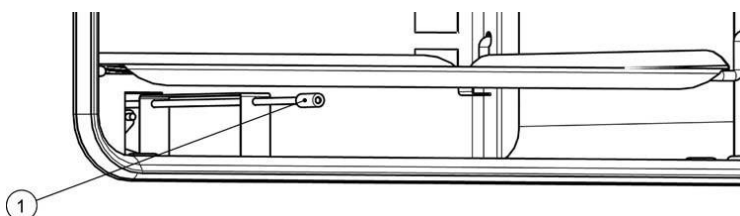
## Door Switch

IMH 60/100/180 S incubators come with a door switch [1] integrated into the latch mechanism. If the door switch is activated by opening the door, heating operations in the work space are suspended and an icon is illuminated in the display window (see D4 in [Figure 7-1 on page 7-1](#)).

If the door remains open for more than 30 seconds, a short audible alarm is sounded in addition to the icon in the display window. If the door is left open for more than 10 minutes, an audible alarm is sounded, a “door open” (E001) alarm message appears in the display and is issued through the RS-232 interface, and the alarm relay is energized.

## Sensing and Control System

The PT 100-type sensor for the control of the work space temperature and for the thermal protection [1] is mounted in the bottom.



**Figure 4-5 Sensor System**

The work space temperature sensor provides the inputs to the incubator's built-in controller, which continuously compares the measured values to the user-specified set value and adjusts the heaters according to the result.

The unit features a thermal protection function that is factory-preprogrammed and not adjustable. It protects the cultures in the work space from overheating: Thermal protection kicks in on a brief violation of the upper limit, based on the defined set point temperature, at between 2 and 3 °C, automatically reducing the work space temperature to the user-specified set value and allowing the incubation process to be continued even in case of a controller malfunction. If the thermal protection is activated, the error message (E111) "Temperature too high" appears in the display window and an audible alarm is sounded.

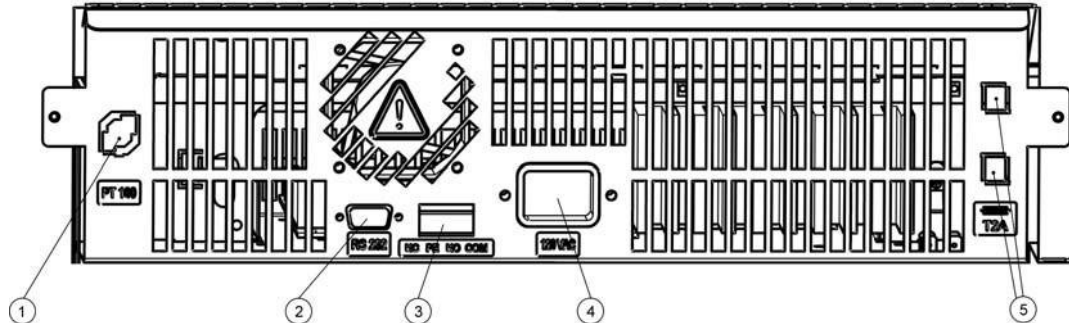
When the user acknowledges the error message, the red alarm icon (D4 in [Figure 7-1](#) on [page 7-1](#)) is illuminated and the Temperature Set Value icon (see [Table 7-3](#) on [page 7-4](#)) is highlighted by a red border to indicate that thermal protection has kicked in.

## Data Communications & Alarm Interface

All signal connections are installed in the electrical interface panel at the rear of the incubator.

### RS-232 Interface

The RS-232 interface (left in [Figure 4-6](#) below) may be used to connect incubators to the serial interface port of a computer to allow for the computer-aided acquisition and documentation of major operating parameters (temperature, error codes, etc.).



- [1] Sample /ECO Sensor
- [2] RS 232 interface
- [3] Alarm contact
- [4] Power socket
- [5] Socket lids

**Figure 4-6 Signal Interfaces and Power Socket**

## Alarm Contact

The incubator can be connected to an on-site, external alarm system (such as a private branch telephone exchange, a facility monitoring system, visual or audible alarm indicators). For this purpose, the devices come with a pre-wired potential-free alarm contact (middle item in [Figure 4-6](#) below). The alarm contact is energized whenever an error occurs in an internal control loop or the incubator's electrical circuits or hardware.

## AC Power Socket

The incubator is connected to the AC supply mains via the socket at right in [Figure 4-6](#) above, which accepts a power cord with an IEC standard plug [9].

## Fuses

Two 16 A slow-blow fuses mounted on the incubator's main electronic circuit board protect internal circuitry from the impact of excessive power consumption.

	<div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;"><b>NOTE</b></div>	<p><b>Fuse replacement</b></p> <p>The device fuses are not user-serviceable. When the incubator exhibits the typical signs of a blown fuse (no response to pressing the On/Off button, control panel remains extinguished, no heating operation), call Electron Microscopy Sciences to have the fuses replaced.</p>
--	--	---

## Work Space Components

### Inner Chamber

All components of the work space are made of corrosion-resistant stainless steel and have an absolutely smooth and easy-to-clean surface. Any embossings have a large radius.

### Connecting Nozzles for Fresh-air Filters (Accessory Items)

Observe the following note for IMH Series incubators with connecting nozzles for fresh-air filters (accessory item).

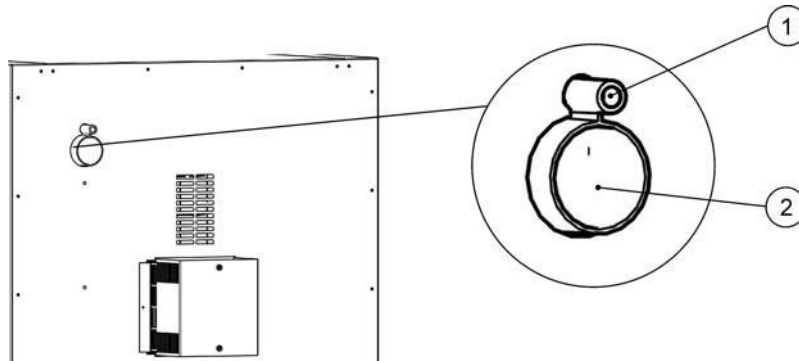
	<div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;"><b>NOTE</b></div>	<p><b>Connecting nozzle for fresh-air filters</b></p> <p>The connecting nozzle for the fresh-air filter (accessory item) may neither be extended with nor be diverted through other tubing.</p>
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A fresh-air filter can be attached to the connecting nozzle. After puncturing the plastic cap the fresh-air filter can be screwed onto the nozzle.

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The connecting nozzle can be closed off using the 1/8" closure plug delivered with the unit after opening the plastic cap.

The connecting nozzle for the IMH 60/100/180 incubators has a G 1/8" threaded fitting.



**Figure 4-7 Connecting Nozzle for Fresh-air Filters (Accessory Item)**

## Access Port

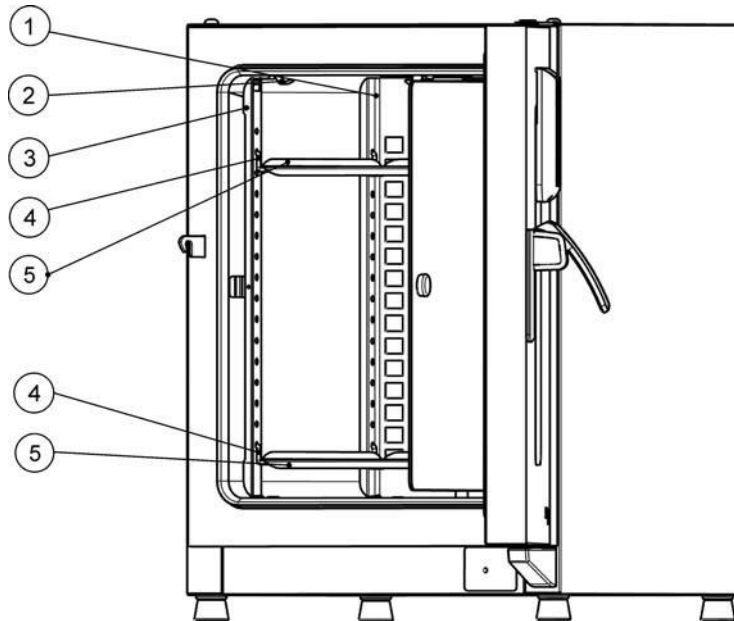
A re-sealable, capped access port (can be closed off using the plugs delivered with the unit) (IMH 60/100/180 only) allows cables, hoses or additional sensor leads to be routed into the work space of the incubator.

The access port [3] in IMH 60/100/180 incubators has a diameter of 42mm.

	<div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;"><b>NOTE</b></div>	<p><b>Operating conditions</b></p> <p>When accessories are to be operated in the work space of the incubator, the ambient condition requirements must be observed (see table below). The energy introduced into the work space has an impact on the lower end of the temperature control range. When additional heating sources are introduced into the work space, temperature control may be adversely affected.</p>
--	--	--

## Shelf System

The incubator is supplied with two perforated sheets. The shelf support rails [1] have an alternating pattern of oblong and round perforations spaced evenly at 30 mm, allowing the shelf supports [8] to be inserted without any room for error, yet in a very flexible way to accommodate any required height of sample container. The shelves [2] have an integrated tilt protection and pull-out stop. For details on using the shelf system, see “Start-up” on page 5-1.



- [1] Air Baffles
- [2] Retaining Springs
- [3] Support Rails
- [4] Shelf Supports
- [1] Shelves

**Figure 4-8 Shelf System**



## Start-up

### Installing the Shelf System

The installation of the shelf system does not require any tools. The support rails are secured in place by spring action. Once the shelf supports have been inserted into the rails, the perforated sheets can be simply pushed onto their support hooks to complete the installation.

### Initial installation

1. Peel off the protective foil from the support rails.
2. Push the retaining spring [1] into the guide on the support rail [2], making sure that the locking nub [3] on the retaining spring safely engages with the matching hole in the support rail.

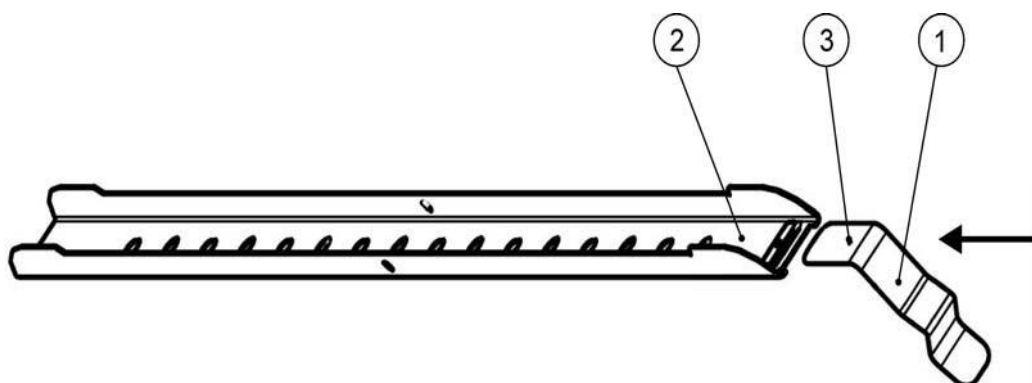
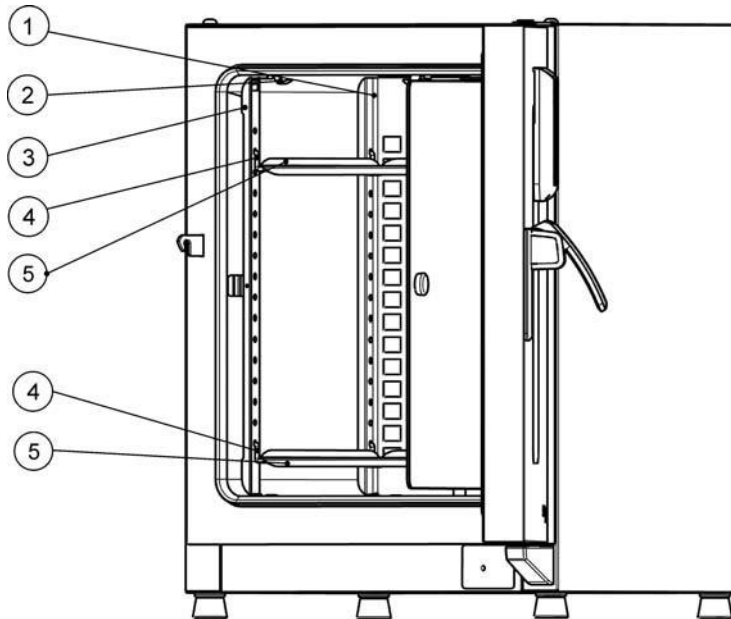


Figure 5-1 Sliding the Retaining Spring into the Support Rail

## Installing the Perforated Sheet Shelves

The illustration below shows the placement of the shelf system elements.



- [1] Air Baffles
- [2] Retaining Springs
- [3] Support Rails
- [4] Shelf Supports
- [5] Shelves

**Figure 5-2 Installing the Shelving**

## Preparing the Work Space

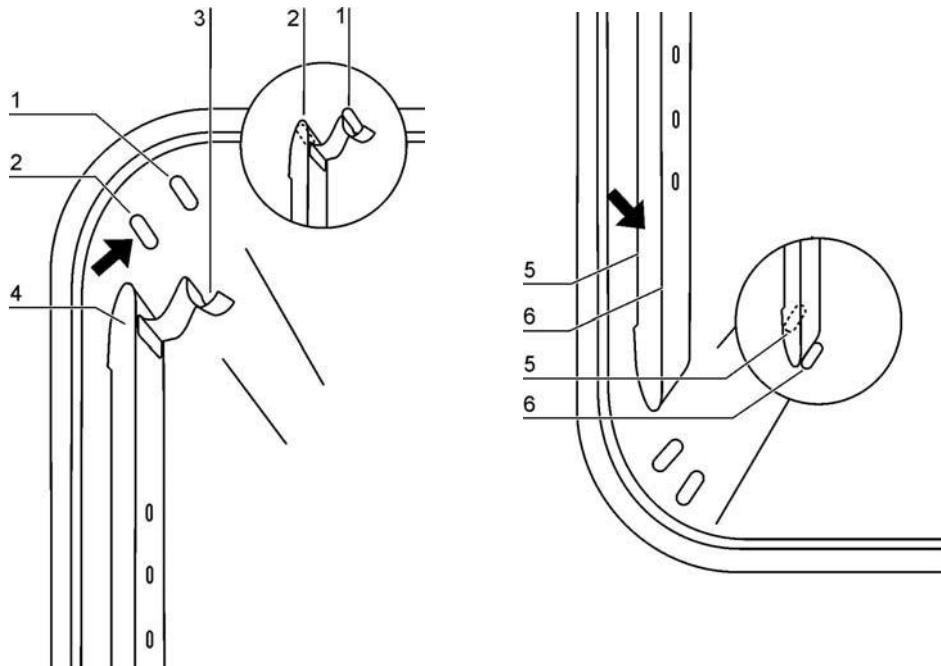
Upon delivery, incubators are not in a sterile state. Before the initial start-up, the incubator must be decontaminated.

The following work space components should be checked for cleanliness and disinfected prior to use:

- support rails,
- shelf supports,
- perforated sheets,
- work space surfaces,
- work space seals and gaskets,
- glass door

<div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;"><b>NOTE</b></div>	<p><b>Disinfection</b></p> <p>For details about the cleaning and disinfection of the incubator, please refer to <b>“Cleaning”</b> on page 9-1.</p>
--	--

## Installation or Removal of the Support Rails



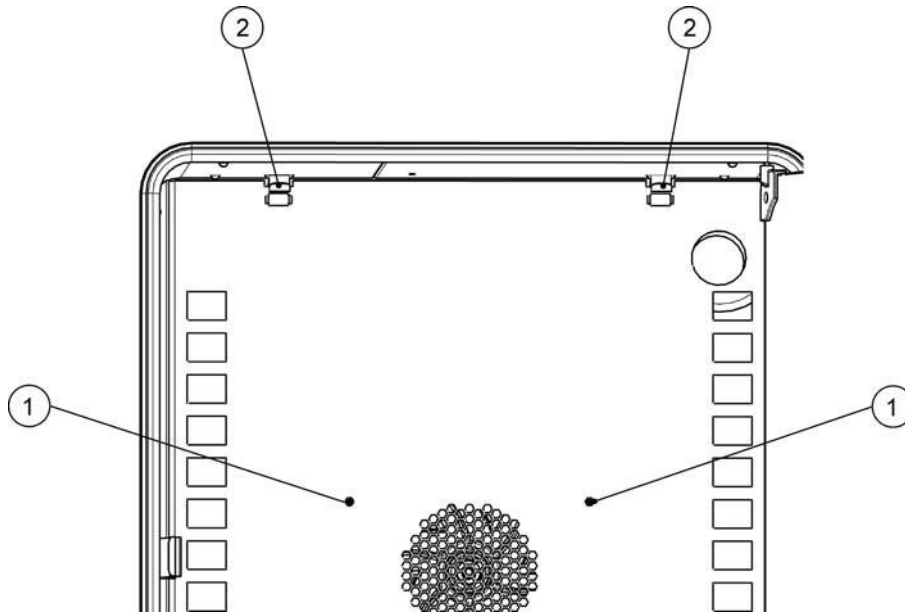
**Figure 5-3 Support Rail Installation**

The embossings at [2] and [5] act as lateral guides for the support rails, while the embossings at [1] and [6] secure the support rails in place. For the support rails to install correctly the retaining spring [3] must be facing upwards.

1. Place the support rail [4] on the lower embossing [6] and tilt it upwards against the work space side wall so that the rail is positioned over the two embossings at [5] and [2].
2. Clamp the retaining spring [3] behind the upper embossing [1].
3. To remove the support rails, pull the retaining spring tab down out of the embossing and remove the support rail assembly.

## Installing and Uninstalling the Air Baffle

IMH and IMH-S Series incubators are shipped from the factory with the air baffle readily pre-installed. Before the air baffle can be removed from the back wall, the support rails need to be uninstalled.

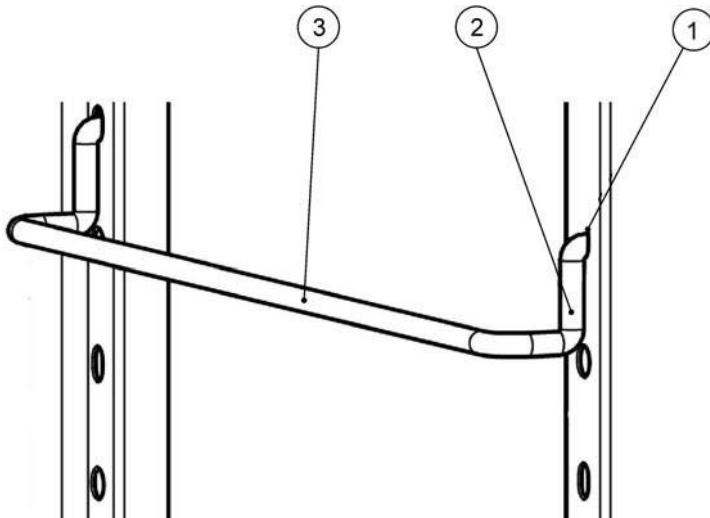


**Figure 5-4 Removing the Air Baffle**

1. Loosen the two screws [1] that hold the air baffle to the interior container back wall.
2. Grab the two retaining springs [2] at their tabs and pull them downwards out of the embossings, then take off the air baffle from the back wall.
3. For the air baffle to install correctly, the retaining springs must be facing upwards. Place the air baffle on the lower embossings and tilt it upwards against the back wall of the work space.
4. Clamp the two retaining springs [2] into the upper embossings.
5. Secure the air baffle against the interior container back wall by fastening the two screws at [1].

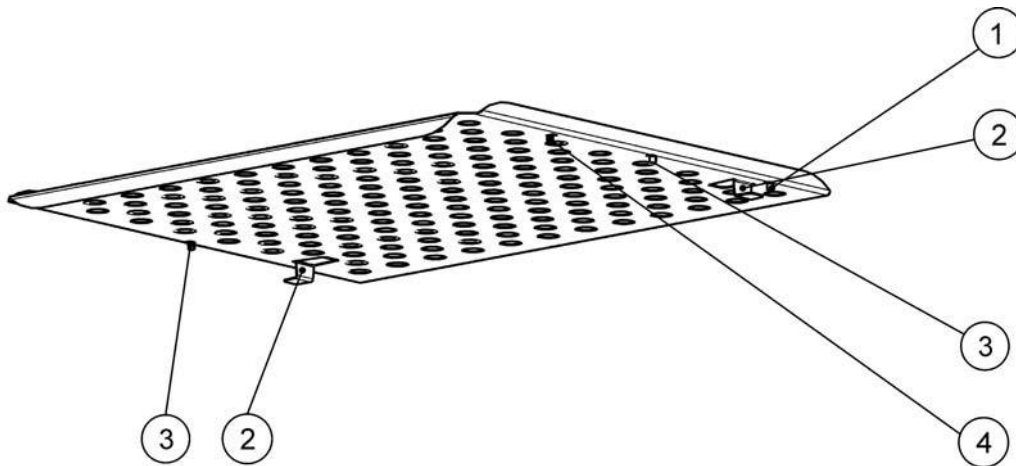
## Installing the Shelf Supports

1. Insert the shelf support [3] into the perforations [1] of the support rail and air baffle and tilt them downwards.
2. Make sure that the two vertical elements [2] of the shelf support are flush with the support rail and air baffle.



**Figure 5-5 Shelf Support Installation**

## Installing the Perforated Sheet Shelves



- [1] 1 Rear Pull-out Stop
- [2] 2 Tilt Protection Device
- [3] 3 Front Pull-out Stop
- [4] 4 Shelf Guide

**Figure 5-6 Perforated Sheet Shelf**



1. Push the shelf [4] onto the shelf supports with the tilt protection devices [2] facing the rear panel of the incubator.
2. Slightly raise the perforated sheet shelf so that the pull-out stops [1] and [3] can slide over the shelf supports.
3. Make sure that the shelves and both of their tilt protection devices are free to move over the shelf supports.

## Levelling the Incubator

1. Position a bubble level onto the center shelf.

2. Manually adjust the levelling feet until the shelf is horizontally aligned in all directions. Perform the adjustment of the levelling feet from left to right and from rear to front.

## Connecting Power

	<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> <p><b>Electric shock</b></p> <p><b>Contact with live electrical components may cause a lethal electric shock. Before connecting the incubator to the power supply, check the power cord and the plug for damage. Do not use damaged cables for connecting the incubator to the power supply!</b></p> </div> </div>
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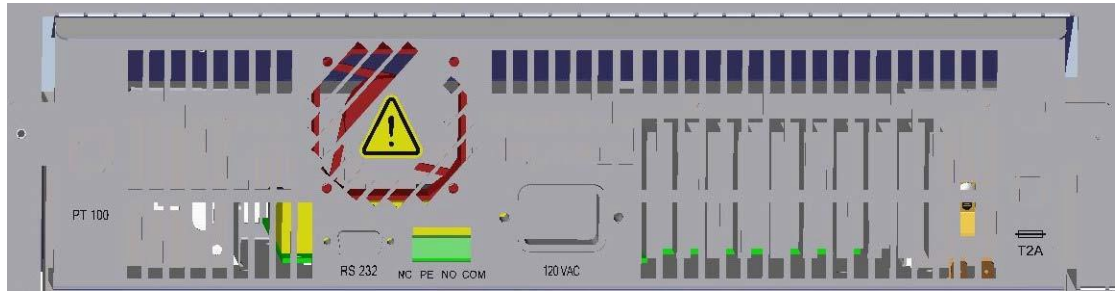
The incubator has a class I, protection-earthed enclosure. To minimize the risk of electrical shock, use the AC power cord supplied to connect the incubator to a correctly installed and protection-earthed power supply source, with the following features in place for each incubator:

- T 16 A slow-blow fusing
- B 16 circuit breaker


### Connecting to the Power Supply Source

1. Before connecting the incubator to the power source, check to see if the power supply voltage corresponds with the specifications on the nameplate on the front of the incubator. If the voltage (V) and current (A) ratings given are not as required, do not connect the incubator to the powersource!
2. Make sure the alarm contact remains disconnected at this time. If connected, disconnect it now to avoid a false alarm on the receiving end. You will get back to the alarm contact later on as you work your way through this start-up procedure.
3. Connect the IEC connector to the socket at the rear of the incubator.
4. Route the power cord along a path that does not cross exhaust air piping or passageways and aisles.  
With stacked devices, keep the power cord away from hot spots on the other incubator in the stack.
5. Connect the protection-earthed plug of the power cord to a correctly protection-earthed and earth leakage circuit breaker fused powersocket.
6. Make sure the power cord is not subjected to tensile or compressive force.

	<p><b>Keep the power outlet accessible!</b></p> <p>To allow a rapid disconnection of power in case of an emergency, make sure that power outlets remain freely accessible at all times!</p>
---	---




**Figure 5-7 AC Power Supply Socket**

		<p><b>Condensation</b></p> <p>When taking the incubator into operation for the first time allow some time before switching on for stabilization to avoid condensation forming on live parts.</p>
--	---	--

## Connecting the RS-232 Interface

The RS-232 data communication interface supports the querying of status information and temperature data from the incubator by entering basic commands in a standard terminal window provided by your computer's operating system. The interconnection requires a standard RS-232 cable with 9-pin connectors and a straight "1:1" pinout without any crossed wires, which is not supplied with the incubator.

Users may employ the RS-232 command inventory listed in [Table 5-1](#) below for automating process data logging - for example, by embedding these commands in scripts that run on a remote computer.

		<p><b>RS-232 interface compatibility</b></p> <p>To avoid overloading and damaging the RS-232 interface check the interfacing parameters against the pin-out description given above and make sure that computer's interface port works with a signal level of +/- 5V DC.</p>
--	---	--

### Interconnecting the Incubator with a Computer

1. Turn the computer off.
2. Route the serial interface cable along a path that does not cross hot exhaust air piping, tables, aisles or passageways.  
With stacked devices, keep the serial interface cable away from hot spots on the other incubator in the stack.

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3. Connect one connector of the serial interface cable (cable length, 5 to max. 10 m, not supplied as a standard item) to the socket labeled **RS 223** in the computer and alarm interface section at the rear of the incubator (see “**Signal Interfaces and Power Socket**” on page 4-7).
4. Connect the second connector to an unused COM 1 /COM 2 or other serial port on the computer.
5. Boot the computer.
6. Launch your standard terminal program and set up the connection with the following parameters:
  - 9600 bits per second
  - 8 data bits
  - 1 stop bit
  - No Parity
7. Once your terminal indicates that serial communication has been established successfully, enter any of the commands listed in **Table 5-1** below, depending on what type of information you want to query.
8. Use the following generic command syntax:

**?:aaaa:00:Cn** , where:

- **?**: identifies the command line as a query;
- **aaaa**: is the parameter address;
- **:Cn** specifies the type of data to be queried (see the examples in **Table 5-1** for reference)
- **:00** is a response field (retained in the query for technical reasons) that must be left at “00”;
- **<CR>** is for carriage return.

You will receive a response of the following general format:


**!:aaaa:bb:XXXXX:cc<CR>** , where:

- **!**: identifies the line as a response to a query;
- **aaaa**: is the parameter address entered with the query;
- **bb**: is the number of payload bytes in hexadecimal code— for example, **1F** for the decimal value **31**;
- **XXXXXX**: is the significant status information queried;
- **cc**: is a check sum (technically an inverted XOR of all bytes returned, excluding the check sum bytes and the **<CR>** character);
- **<CR>** is for carriage return.

Table 5-1 Terminal Commands for Querying Data


Command Syntax	Response Example
<b>Combined Date and Time</b>	
?:0010:00::c1	!:0010:11: <b>31.07.10</b> ; <b>01:02:23</b> :e2 Date Time
<b>Date only</b>	
?:0011:00::c0	!:0011:08: <b>31.07.10</b> :d2 Date
<b>Time only</b>	
?:0012:00::c3	!:0012:08: <b>01:02:23</b> :dc Time
<b>Temperature Set Value (T1); Current Work Space Temperature (T2); Reference Temperature (T3); Sample Sensor Temperature (T4)</b>	
?:3010:00::c2	!:3010:1f:+125.00;+124.96;+000.000;+000.00:b0 T1 T2 T3 T4

## Wiring the Alarm Contact

		<p><b>Skilled work</b></p> <p>Electron Microscopy Sciences warrants the operational safety and the operativeness of the incubator only if installation and repairs are performed by skilled personnel.</p> <p>The connection of the incubator to an external alarm system must only be carried out by adequately trained and authorized electrical engineering or telecommunications expert personnel!</p>
--	---	--

### Functional Description

When system errors and failures occur in the temperature control circuits, an alarm message is issued to the connected alarm monitoring system. The potential-free contact (single changeover-type contact) has been designed for the circuit configuration specified below.

		<p><b>Switching behavior</b></p> <p>The alarm relay is energized by all error conditions reported by internal control loops.</p>
--	---	--

## Alarm Relay Specifications

Circuit	Voltage	External fusing
Circuits with system voltage	max. 250 V ~	max. 2 A
SELV circuits (cf. VDE 0100, Part 410)	25 V ~	max. 2 A
	60 V =	max. 1 A
SELV-E circuits (cf. VDE 0100, Part 410)	50 V ~	max. 1 A
	120 V =	max. 0.5 A



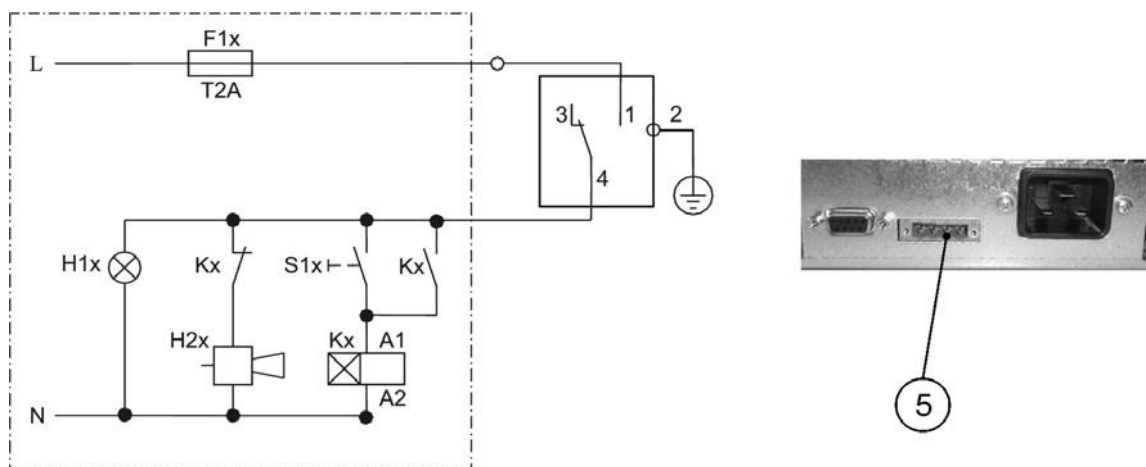
### Alarm contact electrical compatibility considerations

To avoid overloading and damaging the alarm contact, check the electrical interfacing parameters of the alarm-receiving system for compatibility with the alarm relay specifications given above.

## Connection Example

The connector [5] for the interface cable is supplied with the incubator as a standard item. Specifications for the operating voltage and the fusing of external alarm circuitry are given in the table above.

1. Wire the individual conductors [1] through [4] of the interface cable as shown in the wiring diagram.
2. Route the alarm cable along a path that does not cross hot exhaust air piping, tables, aisles or passageways.  
With stacked devices, keep the alarm cable away from hot spots on the other incubator in the stack.
3. Plug the alarm system interface cable connector into the interface port [5] in the rear panel of the incubator.

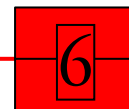


## Figure 5-8 Alarm Contact Connection Example

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The circuit diagram shown above represents the undisturbed condition of operation. In case of an error condition—including a power outage—contact closure occurs on the path between contacts 1-4.

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# Operation

## Preparing the Incubator

The incubator must not be released for operation before all major start-up activities have been completed (see [Chapter 5, “Start-up.”](#)).

### Device Check



Prior to starting operation, the following incubator components must be checked for their correct function:

- The door seal in the front frame must not be damaged.
- The glass door must not be damaged.
- The shelving components must be installed safely.
- Disinfecting the Incubator’s Work Space




Run the decontamination routine (IMH 60/100/180 S devices only; see section [“Decontamination”](#) on [page 7-16](#)) or disinfect the work space according to the operator-specified hygiene guidelines.

## Starting Operation

1. Turn the incubator on using the control panel.
2. Adjust the temperature set value on the control panel.
3. Launch decontamination (optional with IMH 60/100/180 S devices only; see [“Decontamination”](#) on [page 7-16](#)).
4. The temperature controller starts adjusting the work space to the user-specified temperature set value now.

	<div style="display: flex; align-items: center;">  <div> <p><b>To avoid any risk of explosion or fire</b></p> <ul style="list-style-type: none"> <li>• refrain from loading the incubator with any of the substances listed in the section <a href="#">“Incorrect Use”</a> on <a href="#">page 1-6</a></li> <li>• make sure that the ambient air is free of any solvents</li> <li>• do not operate the incubator in areas with an explosion hazard</li> </ul> </div> </div>
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5. Load the work space with samples.

	<div data-bbox="539 271 903 365" style="border: 1px solid black; background-color: #FFD700; padding: 5px; display: inline-block;">  <b>WARNING</b> </div> <div data-bbox="927 293 1110 324" style="margin-left: 10px;"><b>Hot surfaces</b></div> <p data-bbox="520 387 1430 521">The screen of the glass door, the interior panel of the outer door as well as the surfaces of the shelving and the work space become extremely hot while the incubator is running through its heating cycles and need some time to cool down.</p> <p data-bbox="520 546 1430 647">When removing samples from a running or recently completed heating cycle, always wear safety gloves and other appropriate personal protection equipment to avoid burns on hot surfaces!</p>
	<div data-bbox="539 741 895 835" style="border: 1px solid black; background-color: #FFD700; padding: 5px; display: inline-block;">  <b>CAUTION</b> </div> <div data-bbox="927 734 1201 766" style="margin-left: 10px;"><b>Risk of overloading</b></div> <p data-bbox="520 840 1430 1010"><b>Overloading may damage the shelves or cause the shelves and/or the incubator to tilt when the shelves are being drawn out, ultimately destroying the samples. To avoid overloading the incubator or its shelving be sure to observe the sample weight limits specified in <b>Chapter 13, "Technical Data."</b></b></p>
	<div data-bbox="512 1070 871 1164" style="border: 1px solid black; background-color: #0070C0; color: white; padding: 5px; display: inline-block; font-size: 1.2em;"><b>NOTE</b></div> <div data-bbox="922 1099 1129 1131" style="margin-left: 10px;"><b>Proper loading</b></div> <p data-bbox="520 1189 1430 1319">To ensure sufficient air circulation and uniform heating of the samples, do not use more than 70% of the maximum surface area of the work space. Bulky objects in the work space that dissipate heat may impair heat distribution.</p>



## Handling and Control

IMH Series and IMH-S Series incubators come with a front panel mounted control unit consisting of a multifunctional display, four control buttons, and an on/off button. The four control buttons interact with the display window to let users access all of the user control functions and adjustments of the incubator, including - for example, the temperature set value, timer, energizing/de-energizing the AC outlet in the work space, as well as a variety of other functions.

Under normal operating conditions the display presents user with the work space temperature. The display returns to its default mode upon completion of the adjustments or whenever no entries have been made for a period of 30seconds.






The graphic below shows the IMH 60/100/180 and IMH 60/100/180 S control panel with all of its visualization elements and controls.

**Figure 7-1 Control Panel for IMH Series and IMH-S Series Incubators.**



The table below contains brief descriptions of the buttons on the control panel (items K1 through K5 in [Figure 7-1](#)).

Table 7-1 Control Buttons

Icon	Item	Function
	K1	<p><b>Menu/Enter button</b></p> <p><b>First key press:</b> Activates the menu, highlighting the first menu item with a red border (see D3).</p> <p><b>Second key press:</b> Selects the currently activated menu item (as highlighted by the red border). depending on the currently selected function, pressing this button enables entries with item D2, D5 or D6.</p> <p><b>Third key press (once a setting has been changed):</b> Confirms a previous entry or selection.</p>
	K2	<p><b>Left button</b></p> <p><b>After the first press of the Menu/Enter button:</b></p> <ul style="list-style-type: none"> <li>- Moves the selection in the menu (see item D3) to the next icon on the left.</li> </ul> <p><b>Once a menu item has been selected:</b></p> <ul style="list-style-type: none"> <li>- Decreases an adjustable parameter value - for example, the temperature set value in D5 or the fan speed level at D6. Holding this button depressed for a few seconds changes the selected value in quick run mode.</li> <li>- Moves the selection in the multifunctional display pane in D2 in the currently activated menu item to the next option on the left - for example, from the <b>Off</b> state of the timer to <b>On</b>.</li> </ul>
	K3	<p><b>On/Off Button</b></p> <p>Holding this button depressed for 2 seconds switches the incubator off. The display window goes out, except for the readiness indicator icon in the status display area at item D4.</p> <p>The temperature display field D1 provides a dimmed readout of the work space temperature, provided that the temperature exceeds 50 °C (122 °F).</p>
	K4	<p><b>Right button</b></p> <p><b>After the first press of Menu/Enter button:</b></p> <ul style="list-style-type: none"> <li>- Moves the selection in the menu (see item D3) to the next icon on the right.</li> </ul> <p><b>Once a menu item has been selected:</b></p> <ul style="list-style-type: none"> <li>- Increases an adjustable parameter value - for example, the temperature set value in D5 or the fan speed level at D6. Holding this button depressed for a few seconds changes the selected value in quick run mode.</li> <li>- Moves the selection in the multifunctional display pane in D2 in the currently activated menu item to the next option on the left - for example, from the Off state of the timer to On.</li> </ul>
	K5	<p><b>Escape button</b></p> <p>Returns to the previous level of the menu or standard display. Upon exiting from the current menu item the user may be prompted to save any previously made settings.</p>

The table below contains brief descriptions of the display features of the control panel (items D1 through D6 in [Figure 7-1](#); the identifiers K1 through K4 refer to the buttons shown in that figure).

Table 7-2 Display Features








Feature	Item	Function
	D1	Display field showing a permanent readout of the actual temperature in the work space either in °C or °F (depending on the user's preferences, see <a href="#">“Temperature Display Unit” on page 7-27</a> ). At temperatures below 105°C or 221 °F the temperature readout has one digit after the decimal point, while temperatures beyond are shown without any decimal places. Alternatively, a flashing time entry prompt of the general format <b>hh:mm</b> (hours:minutes, both with two digits) appears in this place while the user is setting the incubator's built-in clock.
	D2	Four-line multifunctional display pane with fields for date and time, a display area for the specific options of the selected menu item, detailed alarm messages with alarm codes, progress indicators for continuous processes (for example, program-controlled temperature ramping), etc.
	D3	Menu bar with iconized representations of adjustable parameters. A red border is used to highlight the current menu item, as selected using the <b>Menu</b> (K1) and arrow buttons <b>Left</b> (K2) and <b>Right</b> (K4). Brief descriptions of the individual menu items are given in <a href="#">Table 7-3</a> below. <b>Note</b> If a menu item cannot be selected, then the function it represents is not part of the equipment configuration of your unit.
	D4	Status display area with three icons representing specific statuses of the incubator (from left to right): - The <b>Door Open</b> icon appears when the front door of the incubator is open or has not been closed correctly (see <a href="#">“Door Switch” on page 4-6</a> ). <b>Note</b> The <b>Door Open</b> icon is only functional with IMH-S Series devices. - Upon occurrence of an error condition, the red alarm icon will be illuminated. At the same time the current error code will flash in the display field at D2. The alarm may be acknowledged by pressing the  button. - The readiness indicator icon appears when the incubator has been switched off using the <b>On/Off</b> button (item K3 in <a href="#">Figure 7-1</a> ).
	D5	Settings pane labeled <b>Set</b> for temperature set value in either °C or °F (depending on the user's preferences; see <a href="#">“Temperature Display Unit” on page 7-27</a> ). At temperatures below 105 °C or 221 °F the temperature readout has one digit after the decimal point, while temperatures beyond are shown without any decimal places.

Table 7-2 Display Features

Feature	Item	Function
	D6	<p>The left one of the two vertical bar graphs belongs to the <b>Fan</b> icon directly beneath it and displays the current fan speed level. Bar graph for fan speed setting (in 6 steps: 0 – 5)</p> <ul style="list-style-type: none"> <li>- 0% (all chevrons extinguished)</li> <li>- 20% (chevron 1 illuminated)</li> <li>- 40% (chevrons 1 and 2 illuminated)</li> <li>- 60% (chevrons 1 through 3 illuminated)</li> <li>- 80% (chevrons 1 through 4 illuminated)</li> <li>- 100% (chevrons 1 through 5 illuminated)</li> </ul>

The table below contains brief descriptions of the menu bar icons (item D3 in [Figure 7-1](#)).

Table 7-3 Menu Bar Icons







Icon	Function
	<p><b>Temperature Set Value</b> Allows for changing the temperature set value (factory-preset to 37 °C/99 °F) within the permissible temperature range. The set value can be changed by pressing the <b>Left</b> and <b>Right</b> (item K2 or K4) and you can, after confirming your changes with the <b>Menu/Enter</b> button (item K1), track the impact on the actual temperature in the temperature display field at D1. <b>Instructions:</b> <a href="#">“Temperature Set Value” on page 7-7.</a></p>
	<p><b>Timer</b> Allows for having the incubator turn on or off upon expiry of a user-specified countdown period or at a fixed on or off time, or having it operate on a complete weekly schedule of daily on and off times. When the user enables an “on timer” the display goes out. A rotating hand in the <b>Timer</b> icon and the illuminated readiness indicator icon in the status display area indicates that the timer is running. <b>Instructions:</b> <a href="#">“Timer” on page 7-8.</a></p>
	<p><b>Power Outlet (IMH Series only)</b> Toggles the AC outlet in the work space of the incubator on and off. <b>Instructions:</b> <a href="#">“Power Outlet” on page 7-15.</a></p>
	<p><b>Decontamination (IMH-S Series only)</b> Activates the built-in decontamination routine. <b>Instructions:</b> <a href="#">“Decontamination” on page 7-16.</a></p>
	<p><b>Fan</b> Turns the fan on and allows for choosing the fan speed levels described under D6. The current setting is shown by the bar graph located directly above the icon and spelled out as a numeric value in the display pane at D2. <b>Instructions:</b> <a href="#">“Fan” on page 7-19.</a></p>

Table 7-3 Menu Bar Icons

Icon	Function
	<p><b>Settings</b></p> <p>Invokes a submenu with the following functions:</p> <ul style="list-style-type: none"> <li>- Read access to error log</li> <li>- Calibrating the incubator</li> <li>- Setting date and time</li> <li>- Toggling the temperature display unit between °C and °F</li> <li>- Selecting the timer mode of operation (countdown / fixed time of day / weekday timer)</li> <li>- Entering a configuration control code</li> </ul> <p><b>(Instructions: “Settings” on page 7-21)</b></p>

## Powering Up

1. Plug the power plug of the incubator into a suitable protection-earthed AC power outlet.



In the display window on the front panel the readiness indicator icon (rightmost icon in the status display area at D4 in [Figure 7-1 on page 7-1](#)) is illuminated.



2. Keep the **On/Off** button depressed for twoseconds.

An initialization routine will be run after the has been powered up. On completion of the initialization, the display will light up and the current work space temperature will appear in the temperature display field (item **D1** in [Figure 7-1 on page 7-1](#)). The incubator is ready for use now.

## Switching the Incubator Off / Powering Down



1. Keep the **On/Off** button depressed for twoseconds.

The display window goes out, except for the readiness indicator icon (rightmost icon in the status display area at D4 in [Figure 7-1 on page 7-1](#)) and a residual heat temperature readout in case the work space temperature is still higher than 50 °C (122 °F). The incubator is switched off now.



2. If required, unplug the AC power plug to power down the incubator completely.



## Temperature Set Value

These incubators allow for setting the desired work space temperature directly using only a few button presses. After confirming the new temperature set value in the settings pane **Set** (item D5 in [Figure 7-1 on page 7-1](#)), the user may trace the resulting temperature change in the temperature display field (item D1 in [Figure 7-1 on page 7-1](#)).

**Table 7-4 Adjusting the Temperature Set Value**

	<p>Press  to activate the menu bar, then use  to select the <b>Temperature</b> icon and press  to confirm.</p>
	<p>In the flashing settings pane <b>Set</b>, press  or  to adjust a new temperature set value, then press  to confirm your settings.</p>
	<p>The display returns to its default mode. The actual temperature measured in the work space and shown in the temperature display area starts to change until it reaches the newly adjusted set value.</p>



## Timer

The **Timer** feature from the menu bar enables the user to turn the incubator on and off at scheduled times. The timer supports three different modes of operation, depending on the user's preferences:

- **Countdown-type on or off timer:** Turns the incubator on or off after a user-specified period of time. Instructions on setting the preferences for this option are given in [Table 7-5](#), while its use as an off timer and on timer are described in [Table 7-6 on page 7-9](#) and [Table 7-7 on page 7-9](#), respectively.
- **Fixed-time on or off timer:** Turns the incubator on or off at a scheduled time. Instructions on setting the preferences for this option are given in [Table 7-8 on page 7-10](#), while its use as an off timer and on timer are described in [Table 7-9 on page 7-10](#) and [Table 7-10 on page 7-10](#), respectively.
- **Weekly timer:** Turns the incubator on or off at scheduled times on specific days of the week. The process for setting the preferences for this option is described in [Table 7-11 on page 7-11](#), while instructions for programming the daily turn-on and turn-off times are given in [Table 7-12 on page 7-11](#).

Programming a turn-on time causes the incubator to switch off until it is scheduled to restart, while a turn-off time keeps the device running before it shuts down at the user-specified time. The timer starts running immediately as soon as the user confirms his or her entries.

The decontamination routine (see "[Decontamination](#)" on page 7-16) overrides timer schedules, that is, a pre-programmed timer will not start before decontamination is finished.

**Table 7-5 Presetting the Countdown Timer Mode of Operation**










	Press  to activate the menu bar, then use  to select the <b>Settings</b> icon and press  to confirm.
	Press  to switch to the <b>Timer</b> menu item and confirm the selection with  .
<div style="background-color: black; color: white; padding: 5px;"> <p>2010-04-12 10:14PM</p> <p style="text-align: center;">Count Down</p> </div>	Press  or  to select the <b>Count Down</b> timer mode of operation, then use  to confirm the selection.
	The display returns to its default mode.



Table 7-6 Setting a Countdown-type Off Timer






























	<p>Press  to activate the menu bar, then use  to select the <b>Timer</b> icon and press  to confirm.</p>
<p>2010-03-29 12:59PM</p> <p>On Off</p>	<p>Press  to select the off timer option <b>Off</b>.</p>
<p>2010-03-29 1:05PM</p> <p>Off-Timer 00:00</p>	<p>Set the hours and minutes until the incubator is supposed to shut down by pressing  or , then press  to confirm.</p>
	<p>The display returns to its default mode. In the menu bar, the Timer icon is illuminated and a hand is rotating on the icon's face.</p>

Table 7-7 Setting a Countdown-type On Timer










	<p>Press  to activate the menu bar, then use  to select the <b>Timer</b> icon and press  to confirm.</p>
<p>2010-03-29 12:59PM</p> <p>On Off</p>	<p>Press  to select the on timer option <b>On</b>, then  to confirm.</p>
<p>2010-03-29 1:05PM</p> <p>On-Timer 00:00</p>	<p>Set the hours and minutes until the incubator is supposed to turn on by pressing  or , then press  to confirm.</p>
 	<p>The incubator switches off. The display goes out, the Timer icon is illuminated in the menu bar with a rotating hand on its face. Additionally, the readiness indicator icon is illuminated.</p>

## Setting a Fixed-time On or Off Timer

**Table 7-8 Presetting the “Fixed-time” Timer Mode of Operation**

	Press  to activate the menu bar, then use  to select the <b>Settings</b> icon and press  to confirm.
	Press  to switch to the <b>Timer</b> menu item and confirm the selection with  .
<p>2010-04-12 10:14PM</p> <p>Timer Absolute</p>	Press  or  to select the <b>Absolute</b> fixed-time timer mode of operation, then  to confirm the selection.
	The display returns to its default mode.

**Table 7-9 Setting a Fixed-time Off Timer**

	Press  to activate the menu bar, then use  to select the <b>Timer</b> icon and press  to confirm.
<p>2010-03-29 12:59PM</p> <p>On Off</p>	Press  to select the off timer option <b>Off</b> .
<p>2010-03-29 1:05PM</p> <p>Off-Timer</p> <p>2010-03-29 1:05PM</p>	Set year, month, day, hours and minutes using  or  , followed by  to confirm.
	In the menu bar, the Timer icon is illuminated and a hand is rotating on the icon's face.

**Table 7-10 Setting a Fixed-time On Timer**












	Press  to activate the menu bar, then use  to select the <b>Timer</b> icon and press  to confirm.
<p>2010-03-29 12:59PM</p> <p>On Off</p>	Press  to select the on timer option <b>On</b> , then  to confirm.

Table 7-10 Setting a Fixed-time On Timer

<p>2010-03-29 1:05PM On-Timer 2010-03-29 1:05PM</p>	<p>Set year, month, day, hours and minutes using  or , followed by  to confirm.</p>
  	<p>The incubator switches off. The display goes out, the Timer icon is illuminated in the menu bar with a rotating hand on its face, and the readiness indicator icon is illuminated additionally.</p>

## Setting a Weekly Timer

Table 7-11 Presetting the Weekly Timer Mode of Operation










	<p>Press  to activate the menu bar, then use  to select the <b>Settings</b> icon and press  to confirm.</p>
	<p>Press  to switch to the <b>Timer</b> menu item and confirm the selection with .</p>
<p>2010-04-12 10:14PM Timer Weekly</p>	<p>Press  or  to select the <b>Weekly</b> timer mode of operation, then  to confirm the selection.</p>
	<p>The display returns to its default mode.</p>

Table 7-12 Setting a Weekly Timer







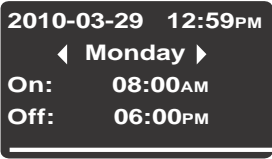









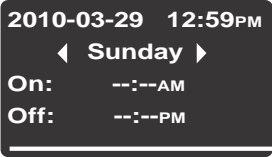




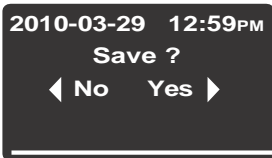

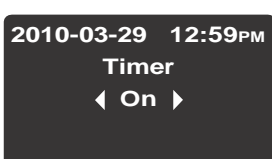











	<p>Press  to activate the menu bar, then use  to select the <b>Timer</b> icon and press  to confirm.</p>
<p>2010-03-29 12:59PM Timer On</p>	<p>In the selection screen shown at left, press  to switch from the default <b>On</b> to the <b>Edit</b> option.</p>
<p>2010-03-29 12:59PM Timer Edit</p>	<p>Select the <b>Edit</b> option by pressing .</p>

Table 7-12 Setting a Weekly Timer


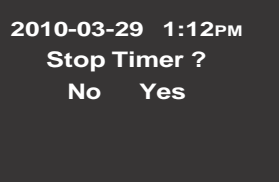


	<p>Press  to select the turn-on time for Monday, which should start flashing when selected (or continue to the desired weekday by pressing , which will cause the turn-on time of that day to start flashing).</p> <p>Press  or  to set the hours, then continue to minutes by pressing .</p> <p>Use  or  to set the minutes, then continue to the turn-off time by pressing .</p> <p>Set the turn-off time as explained above, then press  to continue to Tuesday or any other desired weekday.</p> <p>To prevent the incubator from turning on and back off on a specific day, set both hours and minutes to --:--.</p>
	<p>Set the scheduled turn-on and turn-off times for each single day of the week all the way to Sunday and press . (The turn-on and turn-off times for Saturday and Sunday are disabled by default.)</p> <p>If there is no need to set the turn-on and/or turn-off times for a specific weekday, press  and  or  to go back and forth to the previous and next day, respectively.</p>
	<p>When prompted to save your changes, press  to confirm.</p> <p><b>Note</b> This prompt for saving also appears when you press the <b>Esc</b> button while working on the weekly timer's settings.</p>
	<p>To enable the weekly timer press .</p> <p>Alternatively, press  and  to select the <b>Off</b> option if the weekly timer you have just saved should be activated at a later date.</p>
	<p>In the menu bar, the Timer icon is illuminated and a hand is rotating on the icon's face.</p>

## Stopping a Timer





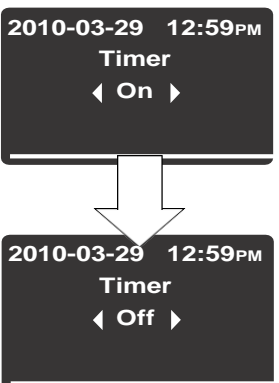


**Table 7-13 Stopping an Off Timer Before It Expires**

	<p>Press  to activate the menu bar, then use  to select the <b>Timer</b> icon and press  to confirm.</p>
	<p>Press  to confirm the <b>Yes</b> default selection.</p>
	<p>In the menu bar, the Timer icon  will go out.</p>


**Table 7-14 Stopping an On Timer**

	<p>To cancel a pre-programmed on timer while the incubator is switched off, hold the On/Off button depressed for a few seconds.</p>
	<p>In the <b>Stop Timer?</b> prompt that appears, confirm the default selection <b>Yes</b> by pressing .</p>
	<p>The display will return to the selection between off timer (<b>Off, flashing</b>) and on timer (<b>On</b>) explained previously in <a href="#">Table 7-6 on page 7-9</a>. In the menu bar, the Timer icon will go out.</p>

**Table 7-15 Stopping a Weekly Timer Before It Expires**

	<p>Press  to activate the menu bar, then use  to select the <b>Timer</b> icon and press  to confirm.</p>
	<p>The flashing word <b>On</b> appears in the multifunctional display pane. Press  to switch to <b>Off</b> state, then press  to confirm.</p>

**Table 7-15 Stopping a Weekly Timer Before It Expires**

<p>2010-03-29 4:05PM Timer stopped!</p>	<p>The message <b>Timer stopped!</b> appears as a confirmation.</p>
	<p>In the menu bar, the Timer icon will go out. The display returns to the entry screen for the current type of timer.</p>



## Power Outlet

This menu item (IMH Series only) toggles the built-in AC outlet in the work space of the incubator on and off. While the outlet is in live state the **Power Outlet** icon is illuminated in the menu bar.

**Table 7-16 Turning the AC Outlet On**

	<p>Press  to activate the menu bar, then use  to select the <b>Power Outlet</b> icon and press  to confirm.</p>
	<p>In the selection screen that appears, press  or  to switch to the <b>On</b> option and confirm the selected On option by pressing .</p>
	<p>The selected option <b>On</b> remains in the display pane for a few seconds to let you track your action.</p>
	<p>The display returns to its default mode. The <b>AC Outlet</b> icon in the menu bar is illuminated to indicate that the outlet is live.</p>

**Table 7-17 Turning the AC outlet off**

	<p>Press  to activate the menu bar, then use  to select the <b>Power Outlet</b> icon and press  to confirm.</p>
	<p>In the selection screen that appears, press  or  to switch to the <b>OFF</b> option and confirm the selected Off option by pressing .</p>
	<p>The selected option <b>Off</b> remains in the display pane for a few seconds to let you track your action.</p>
	<p>The display returns to its default mode. The <b>AC Outlet</b> icon in the menu bar is extinguished to indicate that the outlet is switched off.</p>



## Decontamination

This menu item (available on IMH-S Series devices only) launches the built-in decontamination routine of the incubator. The decontamination routine consists of a factory-preprogrammed, multi-phase workflow (heating, holding, cooling). It works with a temperature set value of 140°C (284°F), which is held over a period of six hours. The overall duration of the process depends on the set temperature that is in place before decontamination is started, on the initial temperature of the work space and miscellaneous other factors. The incubator will be unavailable during that period of time.

**Table 7-18 Launching Decontamination**





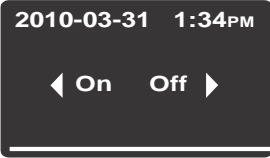




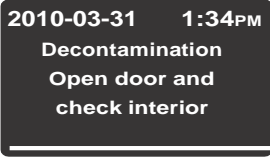



	<p>Press  to activate the menu bar, then use  to select the <b>Decontamination</b> icon and press  to confirm.</p>
	<p>In the selection screen that appears, press  or  to switch to the <b>On</b> option and confirm the selected On option by pressing .</p>
	<p><b>If a Stop Timer prompt appears while decontamination is launching:</b></p> <p>If a timer is running, an additional <b>Stop Timer</b> prompt appears at this point (see “Stopping an On Timer” on page 7-13). When you answer that prompt with <b>Yes</b>, the timer will be aborted and decontamination be launched instead. Choosing <b>No</b> allows the timer to continue. However, if decontamination and a timer overlap, decontamination has priority over the timer, that is, the timer will be put on hold and start later after the decontamination routine has finished.</p>
	<p>After pressing  to launch decontamination, you will be prompted to open the door and perform a safety check to make sure that all cultures or other temperature-sensitive items have been removed from the work space. Perform the check as requested, close the door and finally launch decontamination by pressing .</p>
	<p>A progress bar and a residual time readout for the decontamination process appear in the multifunctional display pane.</p>



Table 7-18 Launching Decontamination










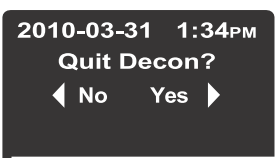



	<b>Opening the door while decontamination is running</b>
	<p>Opening the front door during the heating and holding phases causes the decontamination routine to stop and wait for the door to be closed. As soon as the door is closed, decontamination starts over with the heating phase, repeating all of the remaining phases of the process. This may extend the overall duration of the decontamination routine substantially.</p>
	<b><u>Put up bio-hazard warning signs!</u></b>
	<p><b><u>Under specific circumstances, there is a risk that bacteria, viruses, fungi, prions, and other biological substances survive when the decontamination routine is aborted due to a power outage. Normally, the incubator starts over with the decontamination cycle without any need for user intervention upon return of power. Users who fail to notice the power outage, may open the door and/or load the incubator with samples, thus exposing themselves or their samples to bio-hazards without being aware of that risk.</u></b></p>
	<p>The <b>Decontamination</b> icon in the menu bar is illuminated to indicate that the decontamination process is running.</p>
<p>2010-03-31 4:13PM Decontamination finished!</p>	<p>When decontamination is completed, the message <b>Decontamination finished!</b> appears in the multifunctional display pane. Press the  button to acknowledge that message.</p>
	<p>The <b>Decontamination</b> icon in the menu bar will go out. The settings that were in place before the decontamination routine was started—for example, fan speed, will be restored.</p>

Table 7-19 Stopping Decontamination Prematurely

	<p>Press  to activate the menu bar, then use  to select the <b>Decontamination</b> icon and press  to confirm.</p>
---	---

**Table 7-19 Stopping Decontamination Prematurely**

	<p>In the selection screen that appears, press  to switch to <b>Yes</b> and confirm the selection with .</p>
	<p>The display returns to its default mode. The <b>Decontamination</b> icon in the menu bar will go out. The settings that were in place before the decontamination routine was started—for example, fan speed, will be restored.</p>



## Fan

This menu item allows for turning on the fan that ventilates the work space and gradually adjusting its speed in one go. The current status of the fan will be indicated by the illuminated **Fan** icon in the menu bar and the five-level bar graph (see item D6 in [Figure 7-1 on page 7-1](#)) for the fan speed setting, located directly above the icon. The fan can be adjusted in 6 levels:







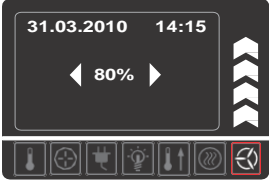








- 0% (all chevrons extinguished)
- 20% (1 chevron illuminated)
- 40% (2 chevrons illuminated)
- 60% (3 chevrons illuminated)
- 80% (4 chevrons illuminated)
- 100% (5 chevrons illuminated)

**Table 7-20 Turning on the Fan**

	<p>Press  to activate the menu bar, then use  to select the  <b>Fan</b> icon and press  to confirm.</p>
	<p>The settings dialog shown at left appears in the multifunctional display pane, with the value 0% flashing.</p>
	<p>Press  as often as needed to reach the desired fan speed level, then confirm with .</p> <p>The multifunctional display pane will show the current fan speed level as a percentage (20%, 40%, 60%, 80% or 100%). Additionally, the matching number of chevrons will be illuminated in the bar graph to the right.</p>
	<p>The display returns to its default mode. The Fan icon in the menu bar is illuminated to indicate that the fan is running.</p>

## Handling and Control Fan

**Table 7-21 Adjusting Fan Speed or Turning the Fan Off**

	<p>Press  to activate the menu bar, then use  or  to select the <b>Fan</b> icon and press  to confirm.</p>
	<p>The settings dialog shown at left appears in the multifunctional display pane, with the current fan speed setting flashing.</p>
 	<p>Change the fan speed with  or , then press  to confirm.</p> <p>To turn off the fan, use  to reset its speed to 0%, then press  to confirm.</p>
 / 	<p>The display returns to its default mode.</p> <p>If you have just changed the fan speed level, the <b>Fan</b> will remain illuminated in the menu bar.</p> <p>If you choose to turn off the fan altogether, the <b>Fan</b> icon in the menu bar will be extinguished.</p>



## Settings

The **Settings** menu item opens a submenu populated with various commands for viewing general status information on the Heratherm unit and setting for the operation of the incubator or its display window:

- Read access to error log
- Calibrating the incubator
- Setting date and time
- Toggling the temperature display unit between °C and °F
- Entering a configuration controlcode

Instructions for using these features are given in the following. Also supported is an option for presetting the timer mode of operation, as explained previously in the section “**Timer**” on page 7-8.

## Error Log





Users calling customer service for support may be asked by Electron Microscopy Sciences to supply information from the error log of the incubator. This internal memory may be accessed by choosing the **Settings** -> **Error** menu item. It enables the user to browse through the most recent 22 alarm messages that were caused by hardware or control loop errors. Each error is displayed with the date and time of its occurrence, a brief clear text description and an internal error code.

Error codes and instructions for clearing alarm conditions appear in the section “**Error Codes**” on page 12-1.

**Table 7-22 Reading the Error Log**

	Press  to activate the menu bar, then use  or  to select the <b>Settings</b> icon and press  to confirm.
2010-04-06 1:33PM <b>Error</b>	Press  to select the <b>Error</b> item from the <b>Settings</b> submenu.
2010-04-06 1:36PM <b>Error 0</b> 2010-04-06 1:31PM <b>Fan Error (E009)</b>	The first entry of the error log is displayed, named “ <b>Error 0.</b> ”

Table 7-22 Reading the Error Log

<p>2010-04-06 1:37PM Error 1 2010-04-06 1:34PM Heat Relay (E109)</p>	<p>Press  to go to the next entry (or  to go back to the previous one).</p> <p>After the entry numbered <b>21</b> the display wraps and returns to the beginning of the error log, displaying <b>Error 0</b> again.</p>
	<p>To exit from the error log and return to normal display mode press  twice.</p> <p>The <b>Settings</b> icon in the menu bar will go out.</p>






## Calibration

The **Settings** -> **Calibration** menu item enables the user to initiate a temperature calibration process (see “[Temperature Calibration Procedure](#)” on [page 10-3](#)) for the built-in temperature sensors and choose whether calibration should be accomplished manually or automatically:

- The **Manual** option allows for entering an absolute temperature directly, as measured—for example, using an external reference sensor.
- The **Sample** option allows for calibrating the incubator’s temperature control by directly entering the absolute temperature obtained from an external sample sensor (option to be ordered separately) and reference measuring device.

	<div style="border: 1px solid black; padding: 5px;"> <div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;"><b>NOTE</b></div> <div style="margin-left: 10px;"> <p><b>Calibration Prerequisites</b></p> <p><b>Maintain the ambient conditions within the specified limits of the incubator before launching calibration.</b></p> <p><b>Varying ambient conditions may impact the result of the calibration routine, which may lead to misadjustment of the controller and unreliable temperature control operation.</b></p> </div> </div>
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Table 7-23 Entering the Calibration Reference Temperature Manually






	<p>Press  to activate the menu bar, then use  or  to select the <b>Settings</b> icon and press  to confirm.</p>
<p>2010-04-06 1:33PM Error</p>	<p>The <b>Error</b> menu item from the <b>Settings</b> submenu appears in the multifunctional display pane.</p>

2010-04-06 1:33PM








Calibration

Press            to switch to the **Calibration** menu item and  
confirm the selection with            .

**Table 7-23 Entering the Calibration Reference Temperature Manually**

<p>2010-04-06 1:33PM</p> <p>Calibration Manual</p>	<p>In the <b>Calibration</b> selection screen, press  to choose the preselected option <b>Manual</b>.</p>
<p>2010-04-06 1:33PM</p> <p>Calibration 36.9°C</p>	<p>In the settings dialog that appears, set the temperature measured with the external reference sensor by using  or  and confirm the settings with .</p>
	<p>The newly entered value will be stored and used to calibrate the internal temperature sensors with the value measured by the reference sensor.</p> <p>The display returns to its default mode.</p> <p>The <b>Settings</b> icon in the menu bar will go out.</p>

**Tabelle 7-24 Entering the Calibration Reference Temperature for the Sample Sensor Manually**

	<p>Place the sample sensor in the sample to be dried. Route the sensor lead through the tube access port to an external temperature measuring device.</p>
	<p>Power up the measuring device and wait until the sample sensor has stabilized and provides a constant temperature reading.</p>
	<p>Press  to activate the menu bar, then use  or  to select the <b>Settings</b> icon and press  to confirm.</p>
<p>2010-04-06 1:33PM</p> <p>Error</p>	<p>The <b>Error</b> menu item from the <b>Settings</b> submenu appears in the multifunctional display pane.</p>
<p>2010-04-06 1:33PM</p> <p>Calibration</p>	<p>Press  to switch to the <b>Calibration</b> menu item and confirm the selection with .</p>

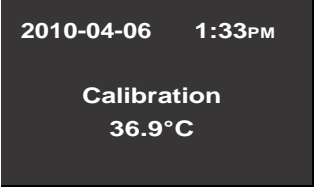






2010-04-06 1:33PM

Calibration  
Sample

In the **Calibration** selection screen, press      to  
choose the **Sample** option.

**Tabelle 7-24 Entering the Calibration Reference Temperature for the Sample Sensor Manually**

	<p>In the settings dialog that appears, set the temperature measured with the external reference sensor by using  or  and confirm the settings with .</p>
	<p>The newly entered value will be stored and used to calibrate the built-in controller to the absolute value measured by the sample sensor. The display returns to its default mode. The <b>Settings</b> icon in the menu bar will go out.</p>

## Date and Time

The **Settings** -> **Time / Date** option allows for switching between the international time and date display formats and for setting the time and date of the internal clock. There are two display formats to choose from:

- European date format *DD.MM.YYYY* and 24-hours time format. Example: *07.04.2010* and *15:05*.
- US standard date format *YYYY-MM-DD* and 12-hour time format with *AM/PM* suffix. Example: *2010-04-07* and *3:05 PM*.

**Table 7-25 Setting the Date Format**






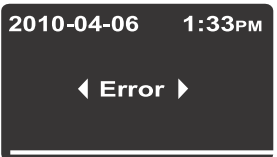
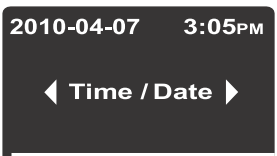


	<p>Press  to activate the menu bar, then use  or  to select the <b>Settings</b> icon and press  to confirm.</p>
	<p>The <b>Error</b> menu item from the <b>Settings</b> submenu appears in the multifunctional display pane.</p>
	<p>Press  to switch to the <b>Time / Date</b> menu item and confirm the selection with .</p>

Table 7-25 Setting the Date Format

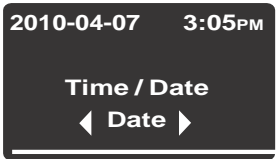

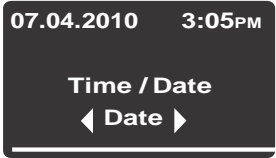




	<p>The <b>Format Date</b> menu item is flashing in the multifunctional display pane.</p> <p>Choose the preselected option <b>Format Date</b> by pressing .</p> <p>The date field will start flashing in the upper left corner of the multifunctional display pane.</p>
	<p>Press  or  to switch to the desired date format <b>DD.MM.YYYY</b> or <b>YYYY-MM-DD</b> and confirm the selection with .</p> <p>The date field in the upper left corner will change its appearance according to your selection (and stop flashing).</p>
	<p>The display returns to its default mode.</p> <p>The <b>Settings</b> icon in the menu bar will go out.</p>

Table 7-26 Setting the Time Format






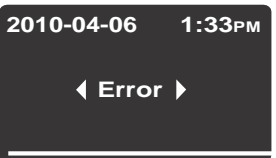
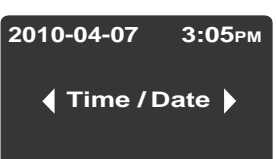


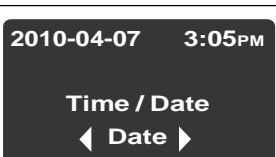
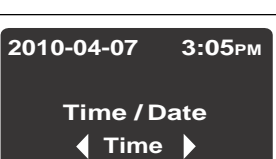


	<p>Press  to activate the menu bar, then use  or  to select the <b>Settings</b> icon and press  to confirm.</p>
	<p>The <b>Error</b> menu item from the <b>Settings</b> submenu appears in the multifunctional display pane.</p>
	<p>Press  to switch to the <b>Time / Date</b> menu item and confirm the selection with .</p>
	<p>The <b>Format Date</b> menu item is flashing in the multifunctional display pane.</p>
	<p>In the flashing <b>Format Date</b> menu item, press  to switch to the <b>Format Time</b> option and confirm the selection with .</p> <p>The <b>Format Date</b> menu item is flashing in the multifunctional display pane, along with the time field in the upper right corner.</p>

Table 7-26 Setting the Time Format

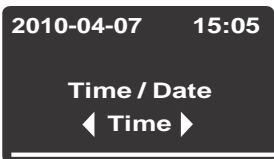









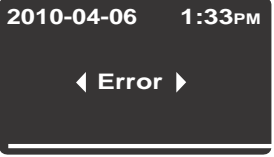
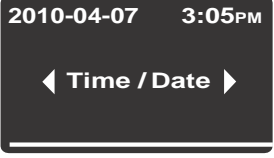


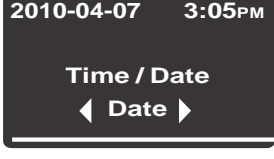
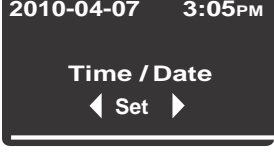










	<p>Press  or  to switch to the desired time format <b>hh:mm</b> or <b>hh:mm AM/PM</b> and confirm the selection with .</p> <p>The time field in the upper right corner will change its appearance according to your selection (and stop flashing).</p>
	<p>The display returns to its default mode. The <b>Settings</b> icon in the menu bar will go out.</p>

Table 7-27 Setting Date and Time

	<p>Press  to activate the menu bar, then use  or  to select the <b>Settings</b> icon and press  to confirm.</p>
	<p>The <b>Error</b> menu item from the <b>Settings</b> submenu appears in the multifunctional display pane.</p>
	<p>Press  to switch to the <b>Time / Date</b> menu item and confirm the selection with .</p>
	<p>The <b>Format Date</b> menu item is flashing in the multifunctional display pane.</p>
	<p>From the flashing <b>Format Date</b> menu item, press  to switch to the <b>Adjust</b> option and confirm the selection with . The <b>Adjust</b> menu item is flashing in the multifunctional display pane now, along with the day or year section (depending on the selected date format) of the date field in the upper left corner.</p>

**Table 7-27 Setting Date and Time**










	<p>Press  or  to set the year and confirm your settings with .</p> <p>The flashing selection moves on to the month section of the date field.</p> <p>Set months, days (or years), hours and minutes using  or  and confirm each setting with .</p>
	<p>When you confirm with the  button after setting the minutes, the date and time field in the upper right corner will be updated according to your settings (and stop flashing). The display returns to its default mode.</p> <p>The <b>Settings</b> icon in the menu bar will go out.</p>

## Temperature Display Unit

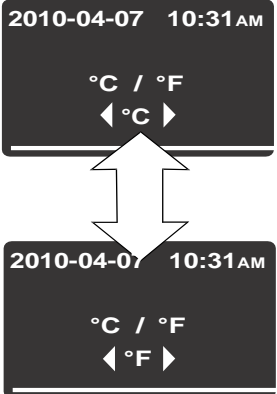




The **Settings** -> °C / °F menu item allows for toggling the incubator used for displaying temperatures between degrees Centigrade and Fahrenheit.

**Note** This setting does not have any impact on data logging via the RS-232 interface. Any temperature data that is logged to a computer for operational parameter documentation purposes is handed over in °C.

**Table 7-28 Toggling the Temperature Display Unit**

	<p>Press  to activate the menu bar, then use  or  to select the <b>Settings</b> icon and press  to confirm.</p>
	<p>The <b>Error</b> menu item from the <b>Settings</b> submenu appears in the multifunctional display pane.</p>
	<p>Press  to switch to the °C / °F menu item and confirm the selection with .</p>



**Table 7-28 Toggling the Temperature Display Unit**

	<p>The multifunctional display pane changes to the following selection screen, with the currently selected temperature display unit (factory setting is °C) flashing.</p> <p>Press  or  to switch to the desired temperature unit and confirm the selection with .</p>
	<p>The temperatures in the display field (item D1 in <a href="#">Figure 7-1</a> on <a href="#">page 7-1</a>) and settings pane <b>Set</b> (item D5 in the same figure) will be displayed with the newly selected unit.</p> <p>The display returns to its default mode.</p> <p>The <b>Settings</b> icon in the menu bar will go out.</p>

# Shut-down

## Shutting the Incubator Down

This chapter provides instructions for shutting the incubator down for prolonged periods of time, that is, at least for several days in a row.

	 <b>WARNING</b>	<b>Contamination hazard</b>
<p><b>If the work space surfaces are contaminated, harmful biological material may spread to the environment of the incubator.</b></p>		
<p><b>To rule out any risk for subsequent users, perform a full cleaning, disinfection and decontamination cycle to the standards set out in the section “<a href="#">Cleaning and Disinfection</a>” on <a href="#">page 9-1</a> if you suspect (or if you are positive) that harmful biological material has been processed with the incubator.</b></p>		




1. Remove the containers with the cultures, all accessories, and other objects from the work space.
2. Clean and disinfect the work space, as explained in the section “Cleaning and Disinfection” on page 9-1 or—if the above warning note applies—run the dry decontamination routine at 140 °C / 284 °F (see “[Decontamination](#)” on [page 7-16](#)).
- 3.
4. When cleaning and disinfection and/or decontamination are done, turn the incubator off using the control panel.
5. Unplug the power cord and secure it against accidental reconnection.
6. Until the incubator is shut down, the work space must be continuously ventilated. Leave the glass door and the outer door open and secure them against accidental closure.

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# Cleaning and Disinfection

## Cleaning

		<b>Incompatible cleaners</b>
	<p>Some incubator components are made of plastics. Solvents may attack plastics. Strong acids or alkaline solutions may cause embrittlement of plastics.</p>	
		<b>Moisture-sensitive components</b>
	<p>Do not spray cleaning agent onto the control panel and the interfaces at the rear of the incubator. When wiping the incubator clean, always make sure that no moisture enters into these components.</p>	
	<p>Wipe the display window down with a slightly dampened cloth, then wipe dry with a rag made of 100% microfiber.</p>	

### Cleaning Exterior Surfaces

Remove dirt residues and depositions thoroughly using a solution of lukewarm water and commercial detergent.





Wipe the surfaces clean using a clean cloth and clear water.

Then, wipe the surfaces dry using a clean cloth.





## Wipe / Spray Disinfection

The manual wipe and spray disinfection is a three-stage process:

- predisinfection,
- cleaning,
- final disinfection.


		<b>Alcoholic disinfectants!</b>
		<p>Disinfectants having an alcohol content of more than 10% may form, in combination with air, easily combustible and explosive gas mixtures.</p>
		<p>When using such disinfectants, avoid open flames or exposure to excessive heat during the entire disinfection process!</p>
		<p>Use such disinfectants only in adequately ventilated rooms.</p>
		<p>After the disinfectant has been allowed to react, wipe the cleaned incubator components thoroughly dry.</p>
		<p>Observe safety regulations to avoid fire and/or explosion hazard caused by alcohol-containing disinfectants.</p>
		<b>Chloride-containing disinfectants!</b>
		<p>Chloride-containing disinfectants can corrode stainless steel.</p>
		<p>Use only disinfectants that do not affect stainless steel!</p>

## Preparing the Manual Wipe/Spray Disinfection

		<b>Health hazard</b>
		<p>The surfaces of the work space may be contaminated. Contact with contaminated cleaning liquids may cause infections. Disinfectants may contain harmful substances.</p>
		<p>When cleaning and disinfecting, always observe the safety instructions and hygiene guidelines!</p>
		<ul style="list-style-type: none"> <li>• Wear safety gloves.</li> <li>• Wear safety goggles.</li> <li>• Wear mouth and respiratory system protection gear to protect your mucous membranes.</li> <li>• Observe the safety instructions of the disinfectant's manufacturer and the hygiene supervisor.</li> </ul>

## Predisinfection

1. Remove all samples from the work space and store them in a safe place.
2. Spray disinfectant onto the surfaces of the work space and of the accessories or wipe the surfaces clean using disinfectant.

		<p>Risk of injury caused by breaking of glass panel</p> <p>The glass panel may only be removed by properly trained and authorized specialists.</p> <p>The glass panel must be held by two persons.</p>
--	---	--

3. Allow time for the disinfectant to act as specified by the manufacturer.

		<p>Disinfecting hard-to-reach components</p> <p>Spray the sensor and other hard-to-reach components with disinfectant!</p>
--	---	--

## Cleaning


1. Remove all internals from the specimen chamber.
2. Wipe off the specimen chamber surfaces and the internals that have been removed from the chamber using lukewarm water mixed with standard rinsing agents. Completely remove any tenacious impurities using rinsing agent and warm water.
3. Re-rinse the cleansed surfaces 3 to 5 times with autoclaved water to completely remove and cleaning agent residues.
4. After this, wipe the cleansed surfaces and internals dry with a soft, sterile cloth.

## Final Disinfection

1. Spray the specimen chamber surfaces and the internals removed from this chamber again with disinfectant, or wipe them down.
2. Let the disinfectant work on the surfaces/internals as detailed in the manufacturer's instructions.
3. Re-install the internals in the specimen chamber.

## Starting the Decontamination Routine

For detailed instructions, please refer to “Decontamination” on page 7-16.

	<div data-bbox="534 322 892 414" style="background-color: #0070C0; color: white; padding: 5px; text-align: center; font-weight: bold; font-size: 1.2em;">NOTE</div> <p data-bbox="922 367 1230 439"><b>Recommendations for decontamination</b></p> <p data-bbox="520 499 1430 667">The user should be familiar with the internationally recognized “Laboratory Biosafety Manual” (from the World Health Organization (WHO)) and with national, pertinent recommendations. These manuals/recommendations provide information about decontaminants, their use, dilution, properties and possible applications.</p>
	<div data-bbox="534 714 898 806" style="background-color: #0070C0; color: white; padding: 5px; text-align: center; font-weight: bold; font-size: 1.2em;">NOTE</div> <p data-bbox="922 761 1318 833"><b>Opening the door during the decontamination routine</b></p> <p data-bbox="520 860 1430 954">If the door will be opened and closed again whilst decontamination is running, the routine returns to a phase which will ensure a continuation without faults.</p>
	<p data-bbox="927 1032 1078 1061" style="text-align: center;"><b>Bio-hazard</b></p> <p data-bbox="520 1124 1414 1191">Be sure to determine the current operating condition of the incubator before you open the door!</p> <p data-bbox="520 1216 1453 1487">Under specific circumstances, there is a risk that bacteria, viruses, fungi, prions, and other biological substances survive when the decontamination routine is aborted due to a power outage. Normally, the incubator starts over with the decontamination cycle without any need for user intervention upon return of power. Users who fail to notice the power outage, may open the door and/or load the incubator with samples, thus exposing themselves or their samples to bio-hazards without being aware of that risk.</p> <p data-bbox="520 1525 1299 1592"><b>Decontamination must be performed immediately if any biohazardous material is spilled in or on the incubator.</b></p>

# Maintenance

Maintenance and inspection at regular intervals of the features and components listed below are mission-critical to maintain the product in a fully operative and safe condition and avoid malfunctions due to ageing and wear. Failure to perform maintenance on a regular basis may result in:

- deviations in heating performance
- damage to samples
- loss of control over temperature distribution throughout the work space

## Inspections and Checks

To ensure the operational performance and safety of the incubator and its functions, the components listed below must be checked at regular intervals.


### Regular Checks

- Check the incubator for overall cleanliness and remove any residues from previous processes.
- Check the locking screw for the glass panel
- To avoid incubator operation without an appropriate fresh air supply, check the air filter (optional) in the air inlet path for contamination.

### Semi-annual Inspection

- Check integrity and proper seating of the seal.
- Swap the fresh-air filter (accessory) in air inlet.
- Perform functional check of the control panel and of the incubator's built-in controller.
- Perform electrical safety check in accordance with the relevant national regulations.

	<div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;"><b>NOTE</b></div>	<p><b>Functional Check</b></p> <p>If safety devices were removed or disabled for inspections, the incubator must not be operated before the safety devices have been reinstalled and checked for their correct function.</p>
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	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;">  <b style="font-size: 1.2em;">WARNING</b> </div> <p><b>Spare Parts and User Modifications</b></p> <p><b>To avoid major malfunctions of the incubator and associated safety hazards that may result in death, serious injuries, or damage to the incubator and other equipment, use spare parts approved by Electron Microscopy Sciences only. Third-party spares without Electron Microscopy Sciences approval void the limited warranty.</b></p> <p><b>Do not modify the incubator in any way without obtaining the prior written authorization from Electron Microscopy Sciences. Unauthorized modifications may compromise operational safety and give rise to hazards that may result in death, serious injuries, or damage to the incubator and other equipment.</b></p>
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## Service Intervals

During running operation, the following service works must be performed:

### 3-monthly service

- Perform the comparative temperature measurement outlined in the following section.

### Annual Service

- Have the incubator inspected and services by a Electron Microscopy Sciences authorized Technical Service agent.

	<div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;"><b style="font-size: 1.5em;">NOTE</b></div> <b style="margin-left: 10px;">Service contract</b> </div> <p><b>Electron Microscopy Sciences</b> offers a product-specific service contract comprising all necessary tests and service work.</p>
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## Preparing Temperature Calibration

To determine the exact measured value of the incubator's integral temperature sensor, a temperature comparison measurement must be performed every three months. If a major temperature deviation is found during this check, temperature calibration is required. During this process, the temperature controller of the incubator is set to the value measured during the temperature comparison measurement.

Use a calibrated measuring instrument with an accuracy of  $< \pm 0,1 \text{ }^\circ\text{C}$  for this test.

To minimize temperature variations during the measurement, put the measuring sensor in an isothermal container (such as a bowl filled with glycerol) before placing it in the work space. Use the center of the work space as the reference location for the comparison measurement.

	<div data-bbox="534 293 898 387" style="background-color: #0056b3; color: white; padding: 5px; text-align: center; font-weight: bold; font-size: 1.2em;">NOTE</div> <div data-bbox="922 320 1214 349" style="font-weight: bold;">Isothermal container</div> <p data-bbox="518 412 1390 510">Do not use a container filled with water as an isothermal container because the evaporation of water will result in a lower temperature reading.</p> <div data-bbox="534 562 898 656" style="background-color: #0056b3; color: white; padding: 5px; text-align: center; font-weight: bold; font-size: 1.2em;">NOTE</div> <div data-bbox="922 584 1430 613" style="font-weight: bold;">Excessive work space temperatures</div> <p data-bbox="518 676 1353 739">Excessive work space temperatures after the calibration may be reduced by leaving the doors open for approx. 30 seconds.</p>
--	--

## Comparison Measurement Procedure

1. Turn the incubator on using the power switch.
2. Set the temperature set value and allow the incubator to stabilize. This may take several hours.
3. Place the measuring device in the center area of the work space. Alternatively, a temperature sensor may be positioned in this location. Route the connecting cable between the glass panel and the interior tank.
4. Close the doors.
5. Wait until the temperature value displayed on the measuring instrument has stabilized.
6. Use the temperature reading from the measuring device to calibrate temperature control manually, as explained “[Entering the Calibration Reference Temperature Manually](#)” on [page 7-22](#).

## Temperature Calibration Procedure

For detailed instructions on how to perform a manual temperature calibration, please refer to the instructions in the section “[Calibration](#)” on [page 7-22](#).

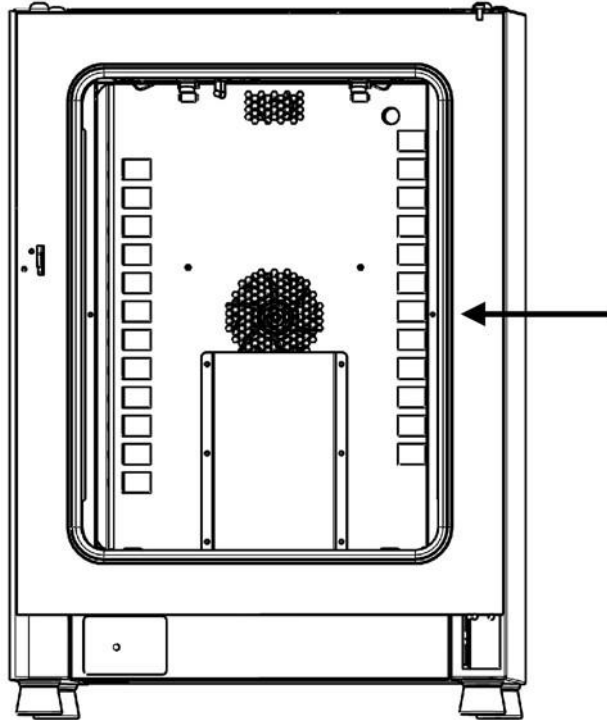
	<div data-bbox="534 1648 898 1742" style="background-color: #0056b3; color: white; padding: 5px; text-align: center; font-weight: bold; font-size: 1.2em;">NOTE</div> <div data-bbox="922 1675 1414 1704" style="font-weight: bold;">Excessive work space temperature</div> <p data-bbox="518 1776 1425 1839">Excessive work space temperatures after the calibration can be reduced by leaving the doors open for approx. 30seconds.</p>
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## Replacing the Door Seal

The door seal of the outer door is located in the retaining slot.

The door seal should be inspected for any signs embrittlement at half-yearly intervals.

No tools are required to replace theseal.



**Figure 10-1 Door Seal Replacement**

1. Pull the seal out of the guide slot.
2. Starting on the hinge side of the door, position the end of the new seal at the location indicated by the arrow in **Figure 10-1** above.
3. Gently press the seal into the slot, working around the circumference of the door. In corner areas in particular ensure that the seal lip is installed without any wrinkles and that the seal is not stretched or compressed.
4. Make sure that the seal is positioned correctly in the slot and flush with the door frame. Correct, if necessary.

## Replacing the Power Cord



If the power cord is damaged, it must be replaced by an original spare part. Using a standard power cord with a lower thermal withstand capabilities is prohibited.



## Returns for Repair



Prior to returning any materials, please contact our Customer Service Department for a "Return Materials Authorization" number (RMA).

Material returned without an RMA number will be refused.

		<p><b>Contamination hazard</b></p>
<p>The incubator may have been used for treating and processing infectious substances, which may have caused contamination of the incubator and its components. Prior to return shipment, it is therefore mandatory that all incubator components be properly decontaminated..</p> <ul style="list-style-type: none"> <li>• Clean the incubator components thoroughly, then disinfect or decontaminate them (depending on application).</li> <li>• Fill in and attach a safety declaration with details on decontamination activities performed to the items that are to be repaired.</li> </ul>		

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## Disposal

	<div style="border: 2px solid black; padding: 5px; display: inline-block; margin-bottom: 10px;">  <b>WARNING</b> </div> <p><b>Contamination hazard</b></p> <p>The incubator may have been used for treating and processing infectious substances, which may have caused contamination of the incubator and its components. Prior to disposal, it is therefore mandatory that all incubator components be properly decontaminated.</p> <p>Clean the incubator components thoroughly, then disinfect or decontaminate them (depending on application).</p> <p>Attach a declaration of decontamination with details on decontamination activities performed to the items that are to be disposed of.</p>
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## Overview of Materials Used

Component	Material
Thermal insulation components	Glass wool
Printed circuit boards	Coated electrical components contain various plastics materials. Components mounted on circuit boards containing epoxy resin bonder.
Plastic components, general	see material labelling
Exterior housing	Galvanized steel sheet, painted
Device rear panel	Galvanized steel sheet
Outer door	Galvanized steel sheet, painted, + stainless steel (optional)
Door inner panel	Stainless steel 1.430
Control panel and display window protective foil	Polyethylene
Heater	Silicone-sheathed resistance heater wires, stainless-steel-jacketed resistance heater wires with the IMH-S model

Component	Material
Work space containers, installed components and shelves	Stainless steel 1.4301
Door frame seal	Silicone
Glass screen	Sodium silicate glass
Fan wheel	Stainless steel 1.4016
Cables	Plastic-sheathed stranded copper wire
Packaging	Corrugated board, polyethylene film, and styrofoam, chemically untreated wood

## WEEE Conformity

This product is subject to the regulations of the EU Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96. It is marked by the symbol shown below.





**Electron Microscopy Sciences** has entered into agreements with recycling and disposal companies in all EU Member States for the recycling and disposal of this incubator. For information on how **Electron Microscopy Sciences** secures conformity with this directive, on recycling and disposal companies in your country and on the products of **Electron Microscopy Sciences**, which fall under the RoHS Directive (Restriction of the use of certain hazardous substances in electrical and electronic equipment).

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## Error Codes

Table 12-1 below lists the error messages that may appear in the control panel display window (see “Error Log” on page 7-21) and provides instructions for clearing such alarms.

**Table 12-1 Incubator Error Codes**

Error Message & Code	Root Cause	Alarm Response	Alarm Clearing Instructions*
Door Open Error (E001)	The door switch (IMH-S Series only) has triggered an alarm because the door has been open for more than 10 minutes.	Audible alarm activated, alarm relay energized.	Close the door.
Display Error (E002)	Display communication error. The built-in controller was unable to restore communication with the control panel.	Audible alarm activated, alarm relay energized.	Power cycle the device by unplugging, then reconnecting the power cord. If this doesn't solve the problem, call service.
Mirrored Parameter Loaded (E003)	The controller was unable to read the user-specific settings and had to resort to an emergency parameter set held in mirrored storage.	Fallback to mirrored parameter storage. Device continues to run without loss of functionality, including user-specific settings.	Check the last settings, e.g. the defined setpoint.
Factory Parameter Loaded (E004)	The controller was unable to read the mirrored parameter set and had to resort to factory-preset parameters.	Fallback to factory-preset parameters. Audible alarm activated, alarm relay energized. User-specific settings may be lost - for example, the temperature display unit preference, or user programs.	Acknowledge by pressing  .
Default Parameter Loaded (E005)	The controller was unable to read the factory-preset parameters and had to resort to default settings	Fallback to default parameters. User-specific settings will be unavailable - for example, the temperature display unit preference, or user programs. Audible alarm activated, alarm relay energized.	Power cycle the device by unplugging, then reconnecting the power cord. If this doesn't solve the problem, call service.
Disinfection Routine Error (E006)	Process error in decontamination routine. Controller, heater, or fan error, etc.	Abort decontamination. Audible alarm activated, alarm relay energized.	Acknowledge by pressing  . Relaunch decontamination. If this doesn't solve the problem, call service.

**Table 12-1 Incubator Error Codes**

Error Message & Code	Root Cause	Alarm Response	Alarm Clearing Instructions*
Power Down Error (E007)	Power has been cut off (power outage) while the device was running.	Audible alarm activated, alarm relay energized.	Check the power supply. Power up then device, then acknowledge the alarm by pressing  .
Program Error (E008)	Error in processing a user program.	Program is aborted. Audible alarm activated, alarm relay energized.	Acknowledge by pressing  .
Config Error (E012)	General device configuration error.	Audible alarm activated, alarm relay energized. No user entries accepted by control panel.	call service.
Sensor Error (E100)	Process sensor damaged. The actual measured value is out of range.	Text message on display; swap control to reference sensor. If both sensors are defective, disable all control circuits.	call service.
Temperature Too High (E101)	Actual measured value exceeds permissible range (heater circuit defective).	Activate process protection, continue control based on set value, show text message on display. (Triac defective.)	call service.
Temperature Too Low (E102)	Actual measured value falls short of permissible range (heater circuit defective). Only on devices equipped with a door switch.	Show text message on display.	call service.
Temperature Not Plausible (E103)	The difference between the control and reference sensors exceeds the maximum permissible deviation, rendering the measurement implausible.	Use the sensor that indicates the higher temperature. Show text message on display.	call service.
Calibration Value Too High (E104)	The calibration reference value calculated on the basis of the user input falls short of the upper limit for calibration references.	Fall back to previous calibration reference, show text message on display.	call service.
Calibration Value Too low (E105)	The calibration reference value calculated on the basis of the user input exceeds of the lower limit for calibration references.	Fall back to previous calibration reference, show text message on display.	call service.
Constant Sensor Signal (E106)	None of the decimal places of the A/D-converter output for the process sensor has changed over a specific time period.	Swap control to reference sensor, show text message on display. If both sensors are defective, disable all control circuits.	call service.

Constant Reference Sensor Signal (E107)	None of the decimal places of the A/D-converter output for the reference sensor has changed over a specific time period.	Continue control based on process sensor, show text message on display. If both sensors are defective, disable all control circuits.	call service.
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**Table 12-1 Heratherm Incubator Error Codes**

Error Message & Code	Root Cause	Alarm Response	Alarm Clearing Instructions*
Constant Sample Sensor Signal (E108)	None of the decimal places of the A/D-converter output for the sample sensor has changed over a specific time period.	Text message on display.	call service.
Heating Relay Error (E109)	The voltage measurement has indicated a defect in the heater circuit relay.		call service.
Heating Triac Error (E110)	The voltage measurement has indicated a defect in the triac	Buzzer alarm returns upon acknowledgement.	call service.
Temperature Too High (E111)	The actual measured value exceeds the upper limit of the permissible error range.	Turn off heater until hysteresis is recovered. Show text message on display. Note: This error does not indicate a defective triac.	call service.
Sensor Error (E112)	Reference sensor damaged. The actual measured value is out of range.	Text message on display; continue control on process sensor. If both sensors are defective, disable all control circuits.	call service.
Sensor Error (E113)	Sample sensor damaged. The actual measured value is out of range.	Text message on display.	call service.
Reserved (E114)	N/A	N/A	N/A
Watchdog error (E115)	Watchdog test failed on power-up.	Text message on display.	call service.

\*Clearing should mute the audible alarm, de-energize the alarm relay, and clear the message from the control panel display.



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# Technical Data

**Table 13-1 Technical Data - Series IMH und IMH-S**

Parameter	Unit	IMH 60	IMH 100	IMH 180	IMH-S 60	IMH-S 100	IMHS 180
<b>Process (First value is with fan running, second with fan off.)</b>							
Temperature deviation from set value at 37° C, spatial	K	±0.6/±0.3	±0.6/±0.4	±0.6/±0.3	±0.6/±0.3	±0.6/±0.4	±0.6/±0.3
Temperature deviation from set value at 37° C, over time	K	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1
Heat-up time (work space unoccupied, from 25°C to 98% of set temperature of 37° C)	min	25 / 22	35 / 42	35 / 40	25 / 22	35 / 42	35 / 40
Recovery time (work space unoccupied, door open for 30 s, to set temperature of 37° C)	min	5 / 4	6 / 4	5 / 4	5 / 4	6 / 4	5 / 4
Heat dissipation to environment (at set temperature of 37° C and room temperature of 25° C)	W	23 ±10%/ 65 ±10 %	30 ±10%/ 68 ±10%	36 ±10%/ 78 ±10%	23 ±10%/ 65 ±10 %	30 ±10%/ 68 ±10%	36 ±10%/ 78 ±10%
Loading capacity per shelf	kg/lbs	25/55			25/55		
Max. overall loading capacity per device	kg/lbs	50/110	50/110	75/165	50/110	50/110	75/165
<b>Electrical data</b>							
Power consumption	W	600	840	1020	1390	1390	1390
Maximum current	A	5.0	7.0	8.5	11.6	11.6	11.6
Earthing system (e.g. 1/N/PE)		1/N/PE	1/N/PE	1/N/PE	1/N/PE	1/N/PE	1/N/PE
Power line frequency	Hz	60			60		
Power line voltage +/- 10 %	V	120			120		
IP protection system		IP 20			IP 20		
Protection class		I			I		
Overvoltage category		II			II		

**Table 13-1 Technical Data - Series IMH und IMH-S**

Parameter	Unit	IMH 60	IMH 100	IMH 180	IMH-S 60	IMH-S 100	IMHS 180
Device fusing, building side	A	16			16		
Device fusing, on PCB	A	2 x 16			2 x 16		
<b>Environmental conditions</b>							
Min. ambient temperature	°C/°F	18/65			18/65		
Max. ambient temperature	°C/°F	32/90			32/90		
Max. humidity in service, non condensing	% r.F./ % r.H.	80, non condensing			80, non condensing		
Min. storage temperature	°C/°F	20/68			20/68		
Max. storage temperature	°C/°F	60/140			60/140		
Max. humidity in storage, non condensing	% r.F./ % r.H.	90, non condensing			90, non condensing		
Post-transport acclimation time	h	2			2		
Noise level	dB(A)	45			45		
Pollution degree		2			2		
<b>Site conditions</b>							
Maximum altitude above sea level	m/y NN	2000/2187			2000/2187		
Minimum side clearance	mm/in	50/2			50/2		
Minimum front clearance	mm/in	590 / 23.2	690 / 27.2	814 / 32	590 / 23.2	690 / 27.2	814 / 32
Minimum back wall clearance	mm/in	80/3.2			80/3.2		
Minimum bottom clearance	mm/in	200/8			200/8		
Minimum top clearance	mm/in	300/12			300/12		

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