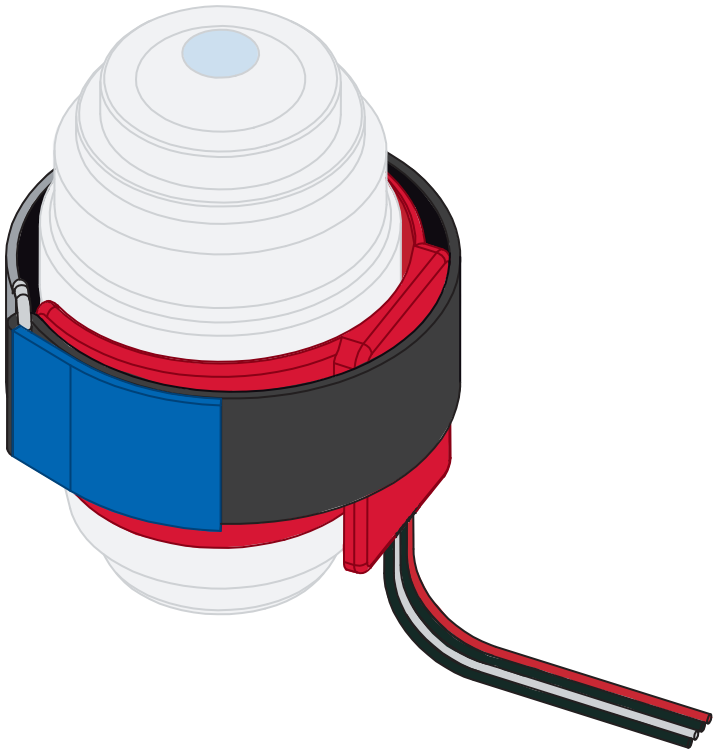
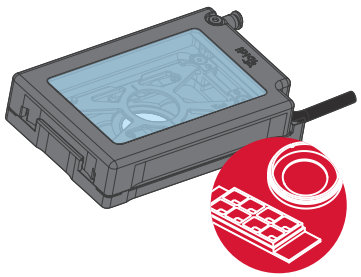
cells in focus ibidi®

Instruction Manual

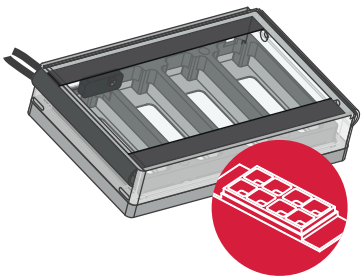
Objective Heater Universal – Silver Line

for use with ibidi Heating System Slide/Dish – Silver Line
and ibidi Heating System 4 Slides – Silver Line





12110, 12720,
12722, 12111



12130, 12131

12170 Objective Heater Universal – Silver Line

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1 Preamble

1.1 Introduction

1.2 Introduction

This manual is your guide to using the Objective Heater Universal – Silver Line for cell culture experiments on an optical microscope. It instructs first-time users on how to use the instrument, and serves as a reference for experienced users.

Before using the Objective Heater Universal – Silver Line, please read this instruction manual carefully and make sure that the contents are fully understood. This manual should be easily accessible to the operator at all times during instrument operation. If this manual gets lost, see the online version on ibidi.com or request a replacement via techsupport@ibidi.com.

To ensure safe operation, the Objective Heater Universal – Silver Line must only be operated with the supplied components and according to the instruction manual.

For Research Use Only! Not for use in diagnostic procedures.

The Objective Heater Universal – Silver Line (#12170) can be used with the Heating System Slide/Dish – Silver Line (product numbers 12110, 12720, 12722, 12111) and the Heating System 4 Slides – Silver Line (product numbers 12130, 12131).

1.3 Safety Symbols

Note that the signal words **WARNING**, **CAUTION** and **NOTE** have specific meanings in this manual. Do not proceed beyond a signal word until you have performed the indicated actions. Warning messages in the text are displayed in a gray shaded box. Please see section **??** for general safety considerations.

WARNING – A potentially hazardous situation which, if not avoided, could result in serious injury or even death.

CAUTION – A potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It is also used to alert against damaging the equipment or the instrument.

NOTE – Additional information to help achieve optimal instrument and assay performance.

Symbols on the product identification label and back panel of the device:

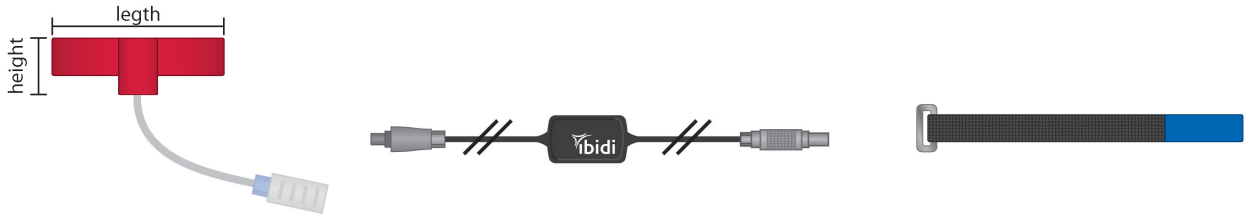
CE Marking: This symbol indicates the product's compliance with EU legislation.

This label is positioned on the back of the device and prompts you to read the manual before using the device.

Product disposal: The symbol indicates that this product must be recycled/disposed of separately from other household waste. See page 9 for details.

1.4 Nomenclature

For better readability, the Objective Heater Universal – Silver Line is hereafter abbreviated and referred to as "Objective Heater" in body text and figure captions. The Objective Heater consists of the following three components:



Flexible heating unit | Cable | Velcro® fastener

1.5 Specifications

Table 1: Specifications of the Objective Heater Universal – Silver Line

Electrical Specifications	
Overvoltage category	III
Input line voltage	DC 24 V, 2 A, 48 W

Operating Conditions	
Operating site	Indoor use only
Operating temperature	18–30°C/64–86°F (min 5°C/9°F less than set temperature)
Humidity	80% relative humidity (RH) up to 31°C/87°F 30% relative humidity (RH) up to 40°C/104°F
Operating altitude	max. 2000 m (atmospheric pressure 800–1060 hPa/ 11.6–15.4 psi)
Storage conditions	-5–50°C/23–122°F, humidity <60% relative humidity (RH)

Outer Dimensions and Characteristics	
Length of flexible heating unit	12 cm
Height of flexible heating unit	2 cm
Length of cable	232.5 cm
Weight of heating unit including cable	110 g

Fit With Microscope Objectives	
Diameter of Objectives	∼ 2.5–4.5 cm

Table 1: (continued)

Compatibility With Temperature Controllers and Temperature Control Range	
Compatibility	ibidi Temperature Controller – Silver Line
Temperature control range	Ambient temperature (min. 18°C/64°F) to 45°C/113°F
Recommended temperature settings	See Section 5.3

NOTE – The Objective Heater is only compatible with the ibidi Temperature Controller – Silver Line, hereafter abbreviated and referred to as "Temperature Controller".

1.6 Disclaimer

- ibidi shall not be held liable, either directly or indirectly, for any damage incurred as a result of product use.
- The contents of this manual are subject to change without notice for product improvement.
- This manual is considered complete and accurate at publication.
- This manual does not guarantee the validity of any patent rights or other rights.
- If an ibidi software program doesn't function properly, this may be caused by a conflict from another program operating on the computer. In this case, take corrective action by uninstalling the conflicting product(s).
- ibidi is a registered trademark of ibidi GmbH in Germany and other countries.

1.7 Safety Considerations

WARNING

- Only operate the Objective Heater with the supplied components and the Temperature Controller.
- Only use the cables and plugs delivered with the Objective Heater. The power plug of the control unit must be inserted in an outlet with a ground (earth) contact.
- Do not replace detachable power cables with inadequate specifications power cables. By violating these instructions you risk electric shock and fire.
- Do not operate the Objective Heater under conditions that pose a risk of explosion, implosion, or the release of gases.

- Do not place flammable solids, liquids, gases, or gas outlets near the Objective Heater (e.g., matches, ethanol, propane gas, solvents). Do not bring these products in contact with any other component of the system either.
- Do not operate a damaged Objective Heater. If the Objective Heater seems to be damaged, contact techsupport@ibidi.com.
- Only operate the Objective Heater properly installed to a microscope objective.
- Some accessible parts of the Objective Heater can reach temperatures up to 65°C. Avoid touching the temperature-controlled parts of the system when you have set the Temperature Controller to high temperatures.

CAUTION

- Not all objectives/lenses tolerate heat! Please check with the manufacturer of your objective if it can be heated.
- Ensure that the external power supply is easily accessible. The Objective Heater must be installed in a manner such that none of its components hinders access to the external power supply.
- Immediately replace damaged cords, plugs, or cables to avoid the risk of personal injury or damage to the instrument.
- Only ibidi technical staff and technical staff instructed by ibidi are permitted to open and service the Objective Heater.
- The Objective Heater should not come in contact with moisture. If the housing is damaged, the external power supply should not be used.
- Avoid strong magnetic fields and sources of high frequency. The Objective Heater might not function properly when located near a strong magnetic field or high frequency source.
- Avoid vibrations from vacuum pumps, centrifuges, electric motors, processing equipment, and machine tools.
- Avoid dust and corrosive gas. Do not install the Objective Heater where it could be exposed to high levels of dust or outside air or ventilation outlets.
- Install the Objective Heater in a location that enables easy access for maintenance.
- Do not place heavy objects on the Objective Heater and do not fold the Objective Heater.

1.8 Limited Warranty

Products manufactured by ibidi, unless otherwise specified, are warrantied for a period of one year from the date of shipment to be free of defects in materials and workmanship. If any defects in the product are found during this warranty period, ibidi will repair or replace the defective part(s) or product free of charge.

This warranty does not apply to defects resulting from the following:

1. Improper or inadequate installation.
2. Improper or inadequate operation, maintenance, adjustment, or calibration.
3. Unauthorized modification or misuse.
4. Use of consumables, disposables, and parts not supplied by an authorized ibidi distributor.
5. Corrosion due to the use of improper solvents, samples, or due to surrounding gases.
6. Accidents beyond ibidi's control, including natural disasters.

This warranty does not cover consumables, such as cell culture chambers and dishes, tubes, fluidic connectors, reagents, etc.

The warranty for all parts supplied and repairs provided under this warranty expires on the warranty expiration date of the original product.

1.9 Repairing the Objective Heater Universal – Silver Line

For inquiries concerning repair service contact ibidi GmbH technical support (techsupport@ibidi.com) and provide the model name and serial number of your system.

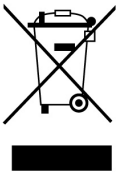
CAUTION Do not try to repair the Objective Heater by yourself. Disassembly of the Objective Heater is not allowed. Disassembly poses a risk of personal injury or damage to the devices. Contact ibidi technical support if there is a need to disassemble a device.

1.10 Waste Disposal – WEEE/RoHS Compliance Statement

The European Union (EU) has enacted two directives, the first on product recycling (Waste Electrical and Electronic Equipment, WEEE) and the second on limiting the use of certain substances (Restriction on the use of Hazardous Substances, RoHS).

1.10.1 EU Directive WEEE

The Objective Heater Universal – Silver Line must be disposed of in compliance with the WEEE Directive 2012/19/EC.



This symbol on the product is in accordance with the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive. The symbol indicates that this product must be recycled/disposed of separately from other household waste. It is the end user's responsibility to dispose of this product by taking it to a designated WEEE collection facility for the proper collection and recycling of the waste equipment. The separate collection and recycling of waste equipment will help to conserve natural resources and protect human health and the environment. For more information about recycling, please contact your local environmental office, an electrical/electronic waste disposal company or distributor where you purchased the product.

1.10.2 EU Directive RoHS

RoHS conformity is declared in the EU-conformity in Section 1.11.

1.11 Regulatory Statement

EG-Konformitätserklärung
EC Declaration of Conformity

Wir / We

ibidi GmbH
Lochhamer Schlag 11
D-82166 Gräfelfing

erklären hiermit die Übereinstimmung des genannten Produktes mit der Richtlinie 2014/35/EU - Niederspannungsrichtlinie und mit der Richtlinie 2014/30/EU über die Elektromagnetische Verträglichkeit.
Bei Änderungen am Produkt, die nicht von uns autorisiert wurden, verliert diese Erklärung ihre Gültigkeit.

We declare the compliance of the product with the requirements of the Directive 2014/35/EU - Low Voltage Directive and with the Directive 2014/30/EU about the Electromagnetic Compatibility.
Any modification to the product, not authorized by us, will invalidate this declaration.

Laborgerät / laboratory equipment:

ibidi Temperature Controller ibiTC3-XXX with ibidi accessories

Der oben beschriebene Gegenstand erfüllt die Vorschriften der Richtlinie 2011/65/EU vom 08. Juni 2011 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten.

The object of the declaration described above is in conformity with Directive 2011/65/EU of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Das Produkt entspricht den unten aufgeführten Normen:
The product meets the requirements of the following standards:

DIN EN 61010-1:2020

Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte - Teil 1: Allgemeine Anforderungen Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements

DIN EN 61326-1:2013

Elektrische Mess-, Steuer-, Regel und Laborgeräte. EMV-Anforderungen. Allgemeine Anforderungen
Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements

Das Produkt ist gekennzeichnet mit/ The product is marked with CE

Gräfelfing, den 29.07.2021 Gräfelfing, 2021-07-29	Dr. Valentin Kahl Geschäftsführer	Valentin Kahl
Ort/Datum Place/date	Name, Funktion Name, Function	Unterschrift Signature

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, ist jedoch keine Zusicherung von Eigenschaften. Die Sicherheitshinweise der Produktdokumentation sind zu beachten.

This declaration certifies the conformity to he specified directives but not includes any warranted quality of the instrument. The safety documentation of the product shall be considered in detail

2 Intended Use

The Objective Heater Universal – Silver Line is designed for use in combination with a stage top incubation system to keep cells on a microscope stage at 37°C. The Objective Heater, operated with the ibidi Temperature Controller – Silver Line, is a heating device for microscope objectives used for live cell imaging. Heating of the microscope objective with the Objective Heater prevents strong temperature gradients between the sample and the objective. This is especially important for high magnification objectives that are in close contact with the sample (e.g., water or oil immersion objectives). Using the Objective Heater improves keeping a defined and stable temperature of the sample. Please note that the Objective Heater is designed for research purposes only.

3 Principle

Microscope objectives that require close approximation to the sample (e.g., water and oil immersion objectives) might cause cooling of the sample by thermal transfer from the sample to the objective, when the objective is not heated. Adequate heating of the objective by the Objective Heater prevents cooling of the sample. The Objective Heater includes a flexible heating element that can be easily wrapped around microscope objectives and fixed by a Velcro® fastener to enable efficient heating by a large contact area between the microscope objective and the Objective Heater.

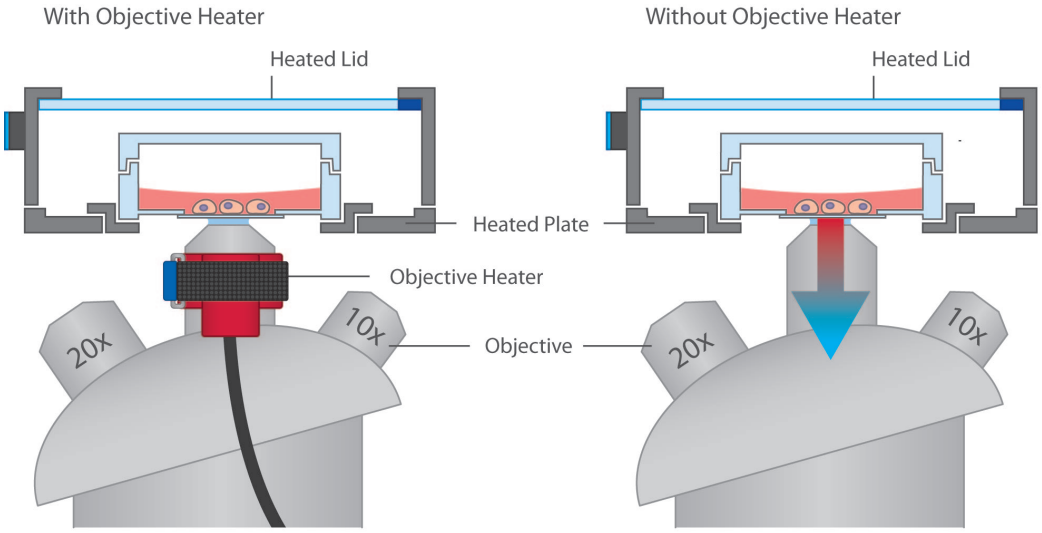
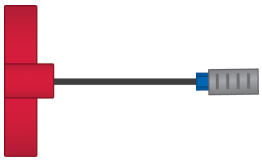


Figure 1: Schematic illustration of a live cell imaging setup with an ibidi Stage Top Incubator and the Objective Heater for optimal temperature stability of the sample.

4 Equipment

This section gives an overview of the components and their functionality and characteristics.

The components of the Objective Heater Universal – Silver Line (#12170) are listed below.

Description	Drawing
Flexible heating unit (red) with piece of cable and part (female) of the break-away connector	
Cable for connecting the Objective Heater to the Temperature Controller, with part (male) of the break-away connector, converter box and plug	
Velcro® fastener for holding the Objective Heater on the objective	

5 Operation

Before starting an experiment, check that the Objective Heater fits your microscope objectives (see Section 1.5).

CAUTION Not all objectives/lenses tolerate heat! Please check with the manufacturer of your objective if it can be heated.

NOTE – The Temperature Controller controls the temperature of the Objective Heater according to the sensor inside the heating unit of the Objective Heater. As the Objective Heater dissipates heat to the objective and the sample, the temperature of the Objective Heater is typically set higher than the target temperature of the sample. In order to adjust the temperature within the sample to a specific target temperature follow the instructions in Section 5.3.

5.1 Installation and Connection of the Objective Heater Universal – Silver Line

Objectives come in different sizes and lengths, depending on manufacturer and magnification. Hence, there are two different ways to mount the Objective Heater to a microscope objective (Figure 2).

1. Test if the heating unit creates a significant overlap when wrapped around the objective. If there is no overlap, proceed with steps 2A and 3A. If there is an overlap, which is not optimal for homogenous heating, proceed with steps 2B and 3B.

2A. Thread the blue end of the Velcro® fastener through the metal buckle and create a loose loop that can be easily placed over the objective.

3A. Bend the heating unit of the Objective Heater around the objective, the cable directing towards the revolving nosepiece (turret) of the microscope. Next, place the Velcro® fastener around the heating unit while holding it in place, and secure the Objective Heater in the desired position by closing the Velcro®.

2B. Thread the blue end of the Velcro® fastener as well as one end of the heating unit carefully through the metal buckle and create a loose loop that can be easily placed over the objective.

3B. Place the Objective Heater around the objective, the cable directing towards the revolving nosepiece (turret) of the microscope. Fasten the Velcro® fastener and heating unit around the objective so that there is enough contact between heating unit and objective. Close the Velcro®.

4. Connect the electrical cable of the Objective Heater to port 3 or 6 at the back of the Temperature Controller.

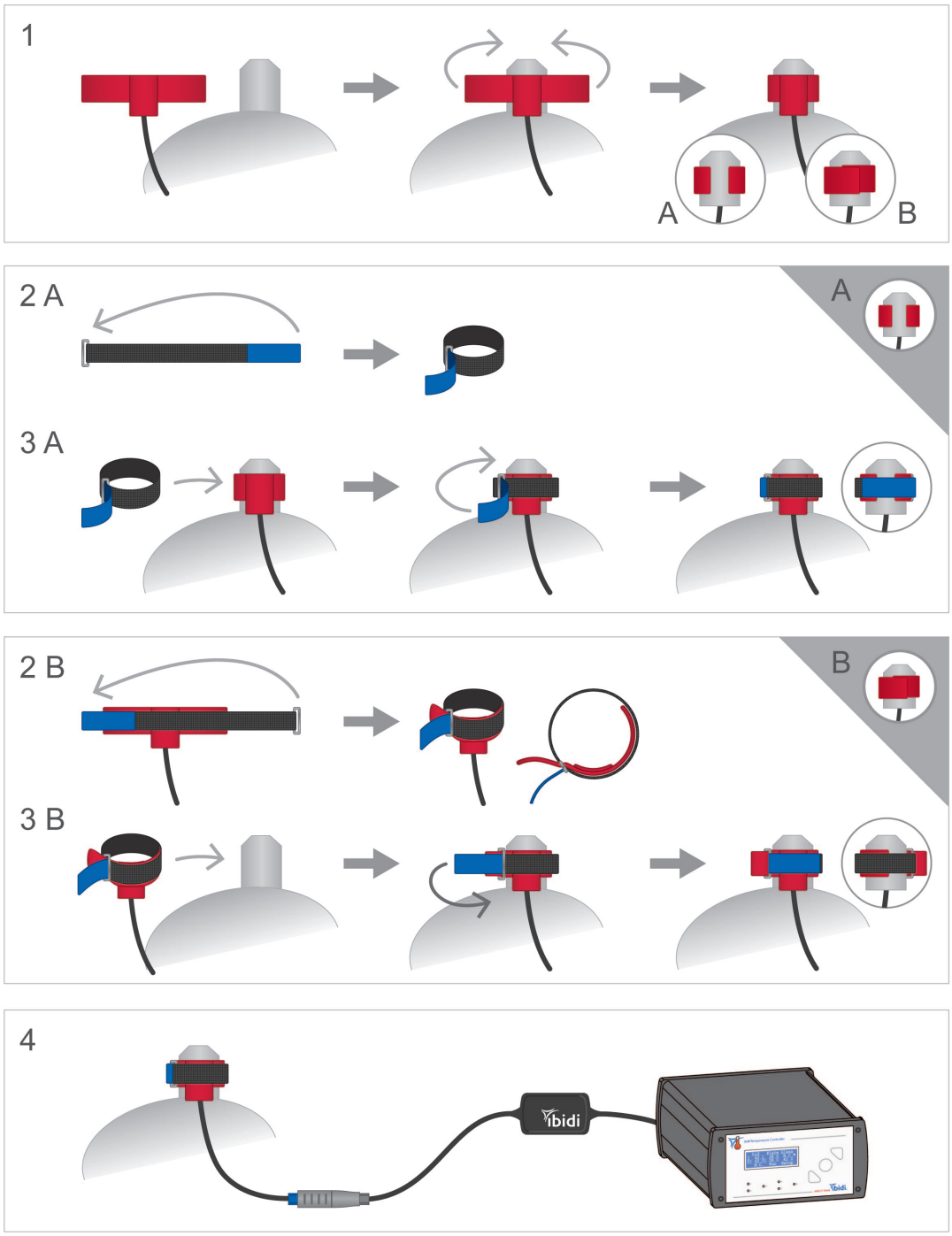


Figure 2: Mounting of the Objective Heater to an objective.

To control the temperature of the Objective Heater, please follow the instructions of the Temperature Controller (see Instructions). Optional: To setup communication with the IncuControl Software, use a USB cable to connect the Temperature Controller to the computer.

5.2 Emergency Release Mechanism

A break-away connector in the cable between the Objective Heater and the Temperature Controller allows for emergency release of the Objective Heater from the Temperature Controller (see Figure 3). If a force above about 14 N acts on the cable of the Objective Heater, the break-away connector releases open to prevent any force from being transferred to the microscope's objective.

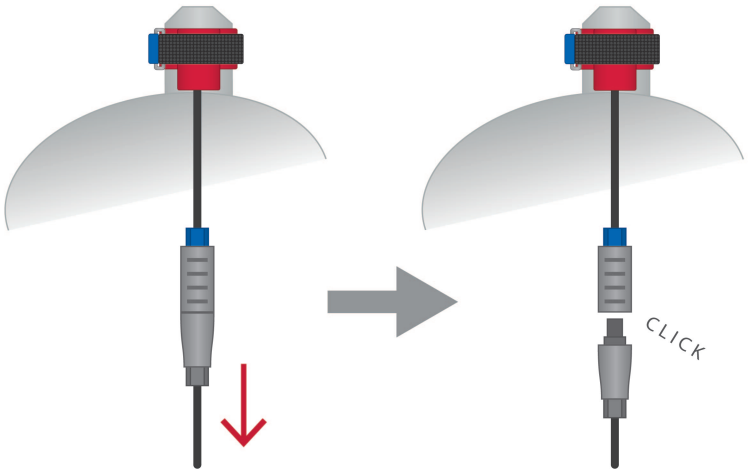


Figure 3: Principle of the emergency release mechanism by a break-away connector in the cable between the Objective Heater and the Temperature Controller.

5.3 Temperature Adjustment of the Objective Heater Universal – Silver Line

ibidi recommends a temperature adjustment before starting the first experiment to ensure that the sample reaches the correct temperature. The temperature in the sample is affected primarily by the temperature of the Stage Top Incubator. In addition, the temperature of the microscope objective can contribute to the sample temperature by heat transfer from the sample to the objective and vice versa. The temperature of the Objective Heater is regulated by the Temperature Controller. Please follow the instructions for temperature adjustment of the sample as described in the instructions of the Temperature Controller (see Instructions).

1. Adjust temperatures of Heated Plate and Heated Lid in a way that the target temperature for the sample is reached (e.g., 37°C), while the objective is not yet in contact with the sample.
2. As soon as the target temperature of the sample is reached, bring the cold objective in contact with the sample. The temperature of the sample will most likely drop. Wait until the temperature of the sample reaches a stable plateau.
3. In order to bring back the sample temperature to the target temperature, heat up the Objective Heater to an initial temperature between 38°C and 45°C. The optimal temperature depends on the diameter and material of your objective. Wait until the temperature is stable again.
4. Adjust the temperature of the Objective Heater, if necessary. We recommend beginning the temperature adjustment with a low temperature and to increase the temperature stepwise by 0.5–1 °C.

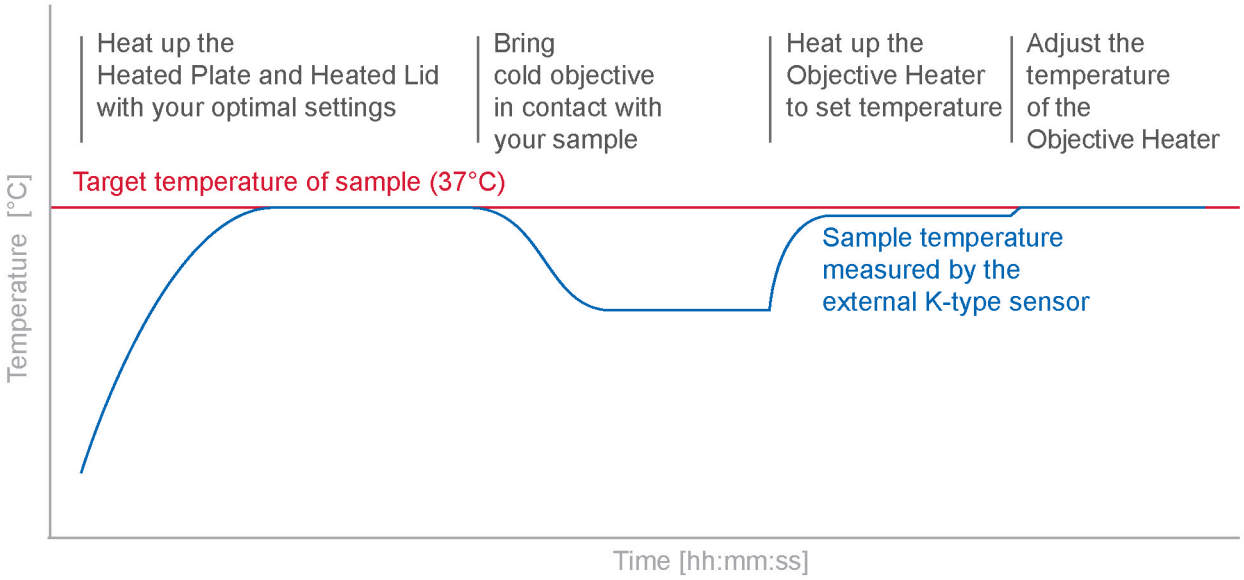


Figure 4: Temperature adjustment procedure to adjust the sample temperature to the target temperature.

The temperature adjustment must be repeated from time to time (at least once a year), especially if one of the following conditions has been changed:

- Room temperature
- Air conditioning
- Chamber type or objective lens
- Humidification and gas flow
- Use of an XL-incubator

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