

# Blackbody Radiator SW40 / SW40NT



## Instruction Manual

EN

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## **Legal Notice**

### **Instruction Manual English Blackbody Radiator SW40 / SW40NT**

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**DATA SHEET**

**Blackbody Radiator SW40 / SW40NT**

Serial number (radiator)

.....

Installed immersion circulator

Serial number immersion circulator

.....

.....

**Setting of immersion circulator**

Set point min

Set point max

.....

.....

**Options**

.....  
.....  
.....

**Accessories**

.....  
.....  
.....

**Miscellaneous**

.....  
.....

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Hereby it is confirmed, that the above specified instrument conforms to the data, indicated in the specifications.

**Tester:**

**Wiesbaden,**

## CE – Declaration of conformity

<b>Erklärung über die Konformität</b> DECLARATION OF CONFORMITY		
Diese Erklärung gilt für folgende Erzeugnisse: This declaration is valid for the following products:		
<b>Geräteart:</b> Type of instrument:	<b>Schwarzer Strahler</b> Blackbody Calibration Source	
<b>Typenbezeichnung:</b> Designation of model:	<b>SW40 / SW40NT</b> SW40 / SW40NT	
Diese Erklärung wird abgegeben durch This declaration is issued by		
<b>HEITRONICS</b> Infrarot Messtechnik GmbH Kreuzberger Ring 40 65205 Wiesbaden, Germany		
Hiermit wird bestätigt, dass die Produkte den Anforderungen der Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedsstaaten über die elektromagnetische Verträglichkeit (2014/30/EU) sowie über Maschinen (2006/42/EG) entsprechen: In accordance with the European Directive of Electromagnetic Compatibility (2014/30/EU) and machinery (2006/42/EC) the manufacturer declares, that the device described above conforms to the essential requirements of the EU-Directives:		
Angewandte harmonisierte Normen: Applied harmonized standards:		
EMV Anforderungen / <i>EMC General Requirements</i> EN 61326-1:2013 (Allgemeine Anforderungen / <i>General requirements</i> )		
Gerätesicherheit von Messgeräten / <i>Safety of measurement devices:</i> EN ISO 12100:2020 (Allgemeine Gestaltungsleitsätze / <i>General principles for design</i> ) EN 61010-1:2010 (Allgemeine Anforderungen / <i>General requirements</i> ) EN 61010-2-010:2014 (Besondere Anforderungen für Laborgeräte für das Erhitzen von Stoffen / <i>Particular requirements for laboratory equipment for the heating of materials</i> )		
Die hier aufgelisteten Produkte erfüllen die Vorschriften der Richtlinie 2011/65/EU (RoHS) des Europäischen Parlaments und des Rates vom 8. Juni 2011 und deren Änderung 2020/366/EU vom 5. März 2020 zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten. The listed products are in conformity with Directive 2011/65/EU (RoHS) of the European Parliament and of the Council of June 8, 2011 and the amending 2015/863/EU of June 4, 2015 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.		
		Wiesbaden, 21. Juli 2021 Wiesbaden, July 21, 2021
 Hans-Jürgen Bargenda Geschäftsführer / General Manager	 Jürgen Webler Geschäftsführer / General Manager	

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### Instruction Manual Immersion Circulator (DYNEO DD)

# 1 General Safety Instructions

## READING NOTE



### Please read the instruction manual

The instructions enable you to prevent hazards and to use the instrument in its guaranteed functions.

- ✓ Please keep the instruction manual for future reference.

## Target Group

This manual is addressed to qualified experts who are competent in setting up measuring and control systems.

HEITRONICS measuring instruments are characterized by accurate temperature measurement. This is only possible if the instruments are installed, operated and maintained properly. Handling by insufficiently trained personnel may cause incorrect measured temperature values which are misinterpreted and which provoke defects within the production process.

A person, who is not able to operate or integrate the instrument into the production line due to inexperience or lack of knowledge or physical, mental or sensory properties, should not use the instrument without a supervisor or instructions by an experienced person.

## Hazards

### WARNING



### Fire hazard due to flammable bath fluid of the blackbody radiator

The blackbody radiator can be operated with flammable bath fluids. If flammable bath fluids come into contact with hot parts of the unit, they may ignite or catch fire.

- ✓ Perform installation, operation and maintenance activities only with the radiator cooled down.

## WARNING



### Hazard due to electric shock

The blackbody radiator is operated with electricity.

- ✓ Operate the radiator only in dry environments.
- ✓ Operate the radiator only with a power source protected by GFCI (ground fault circuit interrupter).

## WARNING



### Fire hazard due to ignition of materials

The radiator can be operated up to 150 °C.

If materials come into contact with the hot surface of the radiator, they may ignite.

- ✓ Do not place flammable materials on the radiator.
- ✓ Ensure sufficient distance between the radiator and flammable materials.
- ✓ Do not leave a hot radiator unattended.

## WARNING



### Hazard of scalding from bath fluid

The bath fluid can reach a temperature of 150 °C.

If the radiator is switched off, the high temperatures of the bath fluid will persist for a long time. Hot bath fluid can leak out. If parts of the body touch hot bath fluid, they may be injured.

- ✓ Carry only an empty radiator.
- ✓ Carry only a cooled radiator.
- ✓ Align the radiator horizontally.

## CAUTION



### Hazard of burns on hot cylinder surface

The cylinder surface can reach a temperature above 110 °C.

If parts of the body touch the hot cylinder surface, they may be injured.

- ✓ Carry only a cooled radiator.
- ✓ Set up a protection against contact of the radiator when operating the radiator above 110 °C.
  - « The protection must not cover the radiator aperture.
  - « The protection must not interfere with the sight path of the instrument to be calibrated.

## NOTICE



### **Risk of damage to the blackbody radiator due to tilted position**

If the position of the radiator is tilted, bath fluid may flow over the edge of the cylinder and damage the black coating of the radiator tube.

- ✓ Align the radiator horizontally.

---

## NOTICE



### **Risk of damage to the blackbody radiator due to condensation**

If the surface temperature of the cylinder is below the dew point, moisture can condense. The black coating of the radiator tube may be damaged.

- ✓ Do not switch off the cooled down radiator.
- ✓ Heat up the radiator to a temperature above the dew point.
- ✓ Switch off the radiator afterwards.

---

## NOTICE



### **Hazard of chemical reactions of the bath fluid of the blackbody radiator**

Bath fluids may cause chemical reactions.

- ✓ Observe the safety data sheet of the bath fluid used.







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If you have any questions about how to use the radiator without any risk and in accordance with its function, please contact HEITRONICS Infrarot Messtechnik GmbH. Our employees will be available to support you!



## 2 Identification of symbols and terms

Important information which supports a safe and correct operation of the blackbody radiator SW40 / SW40NT:

SYMBOL	KEYWORD	HAZARDOUS SITUATION
<b>WARNING</b>		
		Hazards marked in this way may lead to serious injury or even death if they occur.
<b>CAUTION</b>		
		Hazards marked in this way may lead to minor or moderate injuries if they occur.
<b>NOTICE</b>		
		Hazards marked in this way may lead to property damage if they occur.
		Warning of a general danger.
		Information marked in this way should be given special attention.
SYMBOL	DESCRIPTION	
1. 2. ...	Action steps are numbered with arabic numerals	
«	Indicates a prerequisite or a condition for an action step	
»	Indicates a result or interim result of an action step	
✓	Indicates action steps to avoid hazards	
*	Indicates variants or alternatives	
	Refers to a separate document	

### 3 Intended use

Due to its high emissivity ( $\epsilon \geq 0,995$ ) which is independent of wavelength in the infrared range, SW40 / SW40NT is suitable for calibrating infrared radiation thermometers, LineScanner and thermal imaging cameras. The device to be calibrated is positioned in front of the radiator aperture. The radiated temperature is determined either with a reference radiation thermometer or with a contact probe (e.g. with a 3 mm Pt100). The materials of the radiator are designed for temperatures from -20 to 150 °C. You must set up a protection against contact above temperatures of 110 °C.

✓ Set up a protection against contact when operating the radiator above 110 °C.

### 4 Description of SW40 / SW40NT

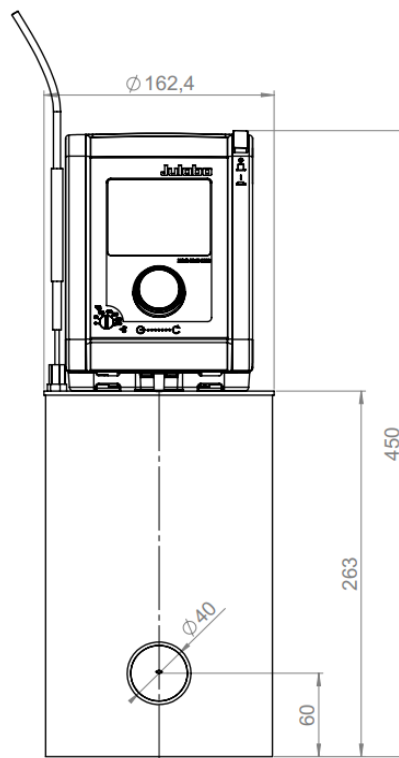


Figure 1: Dimensions (Unit: mm)

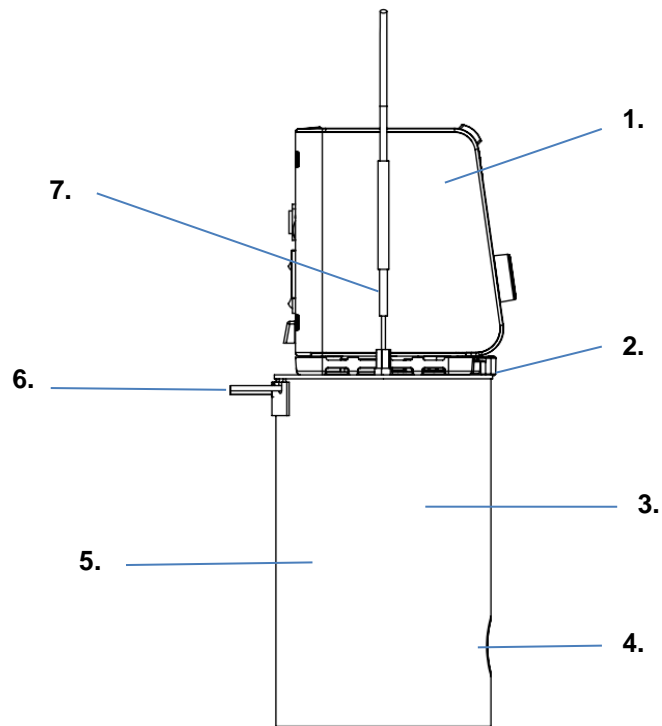


Figure 2: Component parts

**1. Immersion circulator**

The immersion circulator regulates the temperature of the bath fluid (5.) in the cylinder (3.). In this way, the radiator tube (4.) is homogeneously tempered. Set point temperature is adjusted at the immersion circulator.

**2. Cover**

**3. Cylinder (with radiator aperture)**

**4. Radiator aperture (followed by radiator tube)**

Radiator tube dimensions: 40 mm (diameter) x 150 mm (depth)

**5. Bath fluid**

Water, water-glykol or silicone oil

**6. Connection for water cooling and nitrogen purge tubing (SW40NT only)**

Cooling coils inside the SW40NT cool the bath fluid below room temperature. Nitrogen purge tubing (alternatively: dry, oil-free air) may prevent icing inside the radiator tube

**7. Contact probe option (d = 3 mm)**

Contact probe option for measuring the actual temperature of the radiator, independent of the setting and temperature indication of the immersion circulator. The choice and quality of the contact probe determines the thermodynamic temperature accuracy of the radiator.

## 5 Installation

How to prepare the radiator for operation is described in the following chapters:

### 5.1 Set up the radiator

#### CAUTION



##### Hazard of burns on hot cylinder surface

If parts of the body touch the hot cylinder surface at temperatures above 110 °C, they may be injured.

- ✓ Set up a protection against contact of the radiator.
- « The protection must not cover the radiator aperture.
- « The protection must not interfere with the sight path of the instrument to be calibrated.

#### NOTICE



##### Risk of damage to the blackbody radiator due to tilted position

If the position of the radiator is tilted, bath fluid may flow over the edge of the cylinder and damage the black coating of the radiator tube.

- ✓ Align the radiator horizontally.


1. Place the radiator at a location that ensures sufficient distance from other combustible materials.
  2. Choose a ground that is firm and level.
    - » This prevents the radiator from tipping over during operation.
  3. Align the radiator horizontally.
    - » This prevents bath fluid from flowing over the edge of the cylinder.
- » The radiator is securely set up.

## 5.2 Fill the radiator

You may fill the radiator with the following liquids:

- Silicone oil (recommended)
- Water in the temperature range up to 95 °C or
- Water-glycol-mixture (1:1) in the temperature range from -20 to +95 °C

### Korasilon M10 (silicone oil)

<b>Temperature range</b>	-20 ... 150 °C
<b>Change bath fluid:</b>	after approx. 2 years, independent of the operating time after approx. 2000 operating hours
<b>Rinsing</b>	2x with acetone
<b>Disposal:</b>	 Safety data sheet

## WARNING



### Hazard of scalding from bath fluid

If parts of the body touch hot bath fluid, they may be injured.

- ✓ Only fill a radiator that has cooled down.

## NOTICE



### Risk of damage to the blackbody radiator due to bath fluid

If bath fluid gets into the radiator aperture, the black coating of the radiator tube may be damaged.

- ✓ Avoid contact of the bath fluid with the radiator aperture.



Observe the data sheet of the bath fluid used.



When using glycols containing additives (such as coolants for cars), make sure that the water-glycol-mixture is compatible with the materials of the radiator. The interior of the SW40NT is made of stainless steel and copper.

- « The radiator is cooled down.
  1. Select the bath fluid.
  2. Remove the cover of the immersion circulator.
  3. Carefully fill the bath fluid into the cylinder up to 5 cm below the upper edge.
- » The radiator is filled.
- » The radiator is ready for operation.

## 6 Operation



The instruction manual of the immersion circulator explains how to

- prepare and
- operate the circulator
- operate display elements and
- determine set point temperatures

### 6.1 Determine temperature

- « The radiator is ready for operation.
  1. Switch on the immersion circulator.
  2. Determine the set point temperature on the immersion circulator.
  3. Wait until the radiator has reached the set point temperature and has stabilized sufficiently for measurement.
- » The temperature of the radiator is set.
- » The radiator is ready for the calibration of your device.

### 6.2 Calibrate your device (usual procedure)

- « Set point temperature is determined.
  1. Place the device to be calibrated in the field of view distance.
  2. Align the field of view of the device to be calibrated centered to the radiator aperture.
  3. Document the indication of the device to be calibrated.
  4. Determine the actual temperature of the radiator:
    - \* with a contact probe and emissivity adjustment or
    - \* with a reference radiation thermometer (steps 1. to 3.).
  5. Document the actual temperature of the radiator.
- » The calibration has been performed successfully.

## 6.3 Operate SW40NT below room temperatures

### 6.3.1 Install cooling unit

Below room temperature you must connect a cooling unit to the SW40NT.

#### WARNING



#### Fire hazard due to ignition of cooling fluid

If the immersion circulator is operated incorrectly, flammable cooling fluids may ignite in the external cooling unit.

✓ Adjust cut-off setting of the immersion circulator.

 Instruction Manual Immersion Circulator (DYNEO DD)



Observe the safety data sheet of the cooling fluid.  
If possible, use water-glycol as coolant for -20 to 85 °C.

1. Choose the cooling hoses as short as possible.
  2. Connect the cooling unit to the connection for water cooling on the rear side of the radiator.
  3. Set a temperature on the cooling unit which is between 3 and 10 °C below the set point temperature, depending on local conditions (ambient temperature and length of cooling hoses).
- » The radiator can be operated below room temperature.

### 6.3.2 Connect nitrogen purge

When operating below the dew point, ice forms at the entrance of the radiator aperture. You can prevent icing inside the radiator tube with nitrogen:

1. Connect the nitrogen hose to the nitrogen purge tubing on the rear side of the radiator.
2. Set a volume flow of approx. 100 l/h.
  - » The gas cools down to the temperature of the bath fluid as the nitrogen is passed through the bath fluid in a long tube.
  - » The nitrogen tube ends at the end of the radiator tube.
  - » Icing inside the radiator tube is largely suppressed.



Icing inside the radiator tube may be suppressed alternatively with dry, clean and oil-free air.

## 7 Upkeep and maintenance

### 7.1 Empty the radiator

#### WARNING



#### Hazard of burns and scalding from bath fluid

If parts of the body touch hot bath fluid, they may be injured.

✓ Only empty a radiator that has cooled down.

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#### NOTICE



#### Risk of damage to the blackbody radiator due to bath fluid

If bath fluid gets into the radiator aperture, the black coating of the radiator tube may be damaged.

✓ Avoid contact of the bath fluid with the radiator aperture.

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Observe the data sheet of the bath fluid used.

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- « The radiator is cooled down.
  1. Remove the cover of the immersion circulator.
  2. Carefully pour out the bath fluid.
  3. If you use silicone oil and it drips, remove the silicone oil from the ground immediately.
- » The radiator is emptied.



## 7.2 Rinse the radiator

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Observe the data sheet of the cleansing agent used.

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- « The bath fluid is emptied.
  1. Remove coarse impurities with a cloth.
  2. Fill 1 l of acetone into the cylinder.
  3. Slew out the cylinder.
  4. Carefully pour out the acetone.
- » The radiator is rinsed.

## 7.3 Change bath fluid

### NOTICE



#### **Risk of contamination of the silicone oil due to water-glycol residues**

If you replace water-glycol with silicone oil and glycol residues remain in the cylinder, the silicone oil becomes unusable.

- ✓ Remove glycol residues.
- 

### NOTICE



#### **Risk of damage to the blackbody radiator due to residual moisture**

Existing residual moisture can cause the silicone oil to evaporate and the radiator to boil over when operating over 100 °C.

- ✓ Operate the blackbody radiator at 95 °C for one hour so that any residual moisture can evaporate.
- 

- « The radiator is filled.
  1. Empty the radiator.
  2. Rinse the radiator.
  3. Fill the radiator with the bath fluid.
- » The bath fluid has been changed.



## Garantiebedingungen

Die HEITRONICS Infrarot Messtechnik GmbH (nachfolgend HEITRONICS genannt) haftet unter Ausschluss weitergehender Ansprüche für Mängel an den von ihr gelieferten Strahlungsthermometern und deren Zubehör, und zwar für die Dauer von 24 Monaten nach Maßgabe folgender Bedingungen:

1. Die Mängelhaftung erstreckt sich ausschließlich auf kostenlosen Ersatz fehlerhafter Teile im Hause HEITRONICS.

Die Mängelhaftung bezieht sich insbesondere nicht auf natürliche Abnutzung und nicht auf Schäden, die auf unsachgemäßer Bedienung oder Beanspruchung oder sonstigen von HEITRONICS nicht verschuldeten Umständen beruhen. Die Mängelhaftung gilt nicht für Batterien.

Das Gerät ist in der Originalverpackung frachtfrei an HEITRONICS zu senden. Kosten für Steuern, Gebühren und Zölle trägt der Versender. Transportschäden gehen zu Lasten des Versenders.

2. Die Frist für die Mängelhaftung beginnt mit dem Tage des Geräteversandes aus dem Hause HEITRONICS.

3. Etwa auftretende Mängel sind HEITRONICS unverzüglich zu melden, um weitergehende Auswirkungen möglichst zu vermeiden.

4. Ersetzte Teile gehen in das Eigentum von HEITRONICS über. Für Ersatzteile leistet HEITRONICS bis zum Ablauf der für den ursprünglichen Liefergegenstand geltenden Frist in der vorgenannten Weise Gewähr.

5. Alleiniger Gerichtsstand für alle sich aus der Mängelhaftung ergebenden Streitigkeiten ist Wiesbaden, Deutschland.

## WARRANTY CONDITIONS

Temperature measuring equipment delivered by HEITRONICS Infrarot Messtechnik GmbH (hereinafter referred to as HEITRONICS) is warranted against defects, excluding consequential liability, notably for a period of 24 months subject to the following conditions:

1. Warranty is limited to the free replacement of defective parts at its works.

In particular, warranty does not cover normal wear and tear or damage due to improper use or overloading or other circumstances for which HEITRONICS is not responsible. Warranty does not include batteries.

The device must be returned to HEITRONICS in the original packing, carriage paid. Costs for taxes, fees and customs duties are to be paid by sender. Shipping damage is borne by the sender.

2. The warranty period starts from the date of delivery from its works.

3. Information concerning eventually encountered defects has to be forwarded to HEITRONICS immediately to preclude possible consequential damage.

4. Replaced parts or components are returned to the property of HEITRONICS. Replacements are warranted on the conditions mentioned above until the expiration of the warranty period for the originally delivered equipment.

5. Jurisdiction for any legal dispute arising from this warranty shall be limited to the Court District of Wiesbaden, Germany.

## CONDITIONS DE GARANTIE

La garantie de HEITRONICS Infrarot Messtechnik GmbH (ci-après mentionnée HEITRONICS) couvre les défauts des radiomètres et accessoires livrés par elle, à l'exclusion de toute autre réclamation, pour une durée de 24 mois dans les conditions suivantes:

1. La responsabilité de HEITRONICS est limitée au remplacement gratuit des pièces défectueuses dans les usines de HEITRONICS.

La garantie ne couvre pas le cas d'usure normale, non plus les dommages provoqués par fausse manoeuvre, par des conditions de travail trop dures ou des circonstances dont HEITRONICS n'est pas responsable. Les batteries ne sont pas sous garantie.

L'appareil doit être retourné à HEITRONICS dans son emballage d'origine, port payé. L'expéditeur paye pour les frais des impôts, des taxes et des droits de douane. Dommages de transport sont à la charge de l'expéditeur.

2. La période de garantie commence le jour d'expédition des appareils par les usines HEITRONICS.

3. Tout défaut doit être signalé à HEITRONICS de toute urgence pour éviter des conséquences plus graves.

4. Les pièces échangées deviennent propriété de HEITRONICS. Les pièces de rechange bénéficient de la garantie dans les conditions mentionnées ci avant, jusqu'à l'expiration de la période prévue pour la livraison d'origine.

5. Pour tous litiges qui pourraient naître de l'application de la garantie, la seule juridiction compétente sera celle de Wiesbaden, R.F.A.

## **Service Adress**

**HEITRONICS Infrarot Messtechnik GmbH**

**IRM SERVICE**

Lieferanschrift / Delivery address / Adresse de livraison / Dirección de entrega:

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## **Organizacion de la venta**

Información referente a nuestros regionales colaboradores de venta se encuentran en nuestra pagina web [www.heitronics.eu](http://www.heitronics.eu).