TIR100
by INGLAS GmbH & Co. KG

TIR100-2
OPERATIONS MANUAL

Version 2.3

SERIAL NUMBERS AND FACTORY SETTINGS

**This is only valid with the included original Two-in-One standard. Any new, refurbished or re-calibrated standards may differ.*

TABLE OF CONTENTS

1. INTRODUCTION

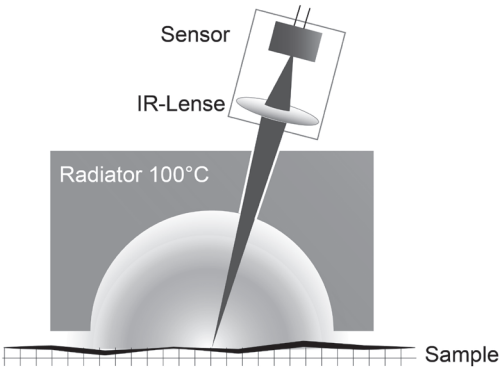
Thank you for purchasing a TIR100-2 from INGLAS GmbH & Co KG.

Included are:

- TIR100-2 instrument
- Two-in-One certified calibration standard (with certificate of calibration)
- Hard, portable and lockable aluminium storage case with keys included
- USB-B cable
- Manual
- Microfiber cleaning cloth
- Optional: sample holder

> Should you have any questions or enquiries regarding your product, please do not hesitate to contact us:
>
> www.inglas.org/contact-us
> info@tir100.com

The TIR100-2 is a compact hand-held analytical instrument, which employs a non-destructive technique that measures thermal emissivity of surfaces within seconds. “Emissivity” refers to the energy that is released through thermal radiation from a body.



The TIR100-2 measures the emissivity by directly subjecting the surface to infrared thermal energy of 100°C. The reflected infrared radiation is observed and converted into a numeric value between 0 and 1. The black body half-sphere radiator is used to capsulate the sample to ensure homogenous illumination.

For more detailed information on the TIR100-2 and the principal behind measurement, please refer to our webpage www.tir100.com

2. ICONS

This symbol indicates information that, if ignored, could result in personal injury and physical damages to property and/or instrument due to incorrect handling.

This symbol indicates vital information for the operation of the TIR100-2.

3. INTENDED USE

The TIR100-2 should only be used for its intended purpose and should not at any time be used outside the scope that is outlined in this manual. Any use of the instrument other than specified in this manual may lead to damage of the instrument or be hazardous to the operator. The instrument must not be altered in any way.

The TIR100-2 is an electronic device with the sole purpose of measuring the emissivity of different material/mediums/samples.

The TIR100-2 is a portable, hand-held instrument that can be used in laboratories or production lines as a desk top equipment or alternatively as a hand-held instrument on-site; (following the guidelines for hand-held use stated in section 13.1 of this manual). The TIR100-2 is designed for indoor-use.

The operating instructions should be followed and carried out by authorised personnel only. The device should only be operated if the authorised personnel have read and fully understood the operating instructions and are also familiar with applicable occupational safety and accident prevention regulations of the corresponding country.

4. SAFETY INSTRUCTIONS

IMPORTANT
Please study this manual carefully before operating the TIR100-2. Any warranty given shall be void due to non-compliance of this operations manual. INGLAS will not assume any liability for consequential damages or cost resulting from misuse.

This operations manual provides the information required for the use and safe operation of the TIR100-2. Operating instructions must always be available to all users of the device.

This device was constructed in accordance to the European Safety standard DIN EN 61010-1 VDE 0411-1 and has left our facilities in proper safety operational conditions. The device should only be connected and operated at 230 VAC (optional 115 VAC) voltage with a protective earthing connection.

Care must be taken, that the protective conductor (yellow/green coated wire) be kept intact throughout the device, through the power cord and into the power socket. Any interruptions/damages in the protective conductor or its insulating cover can cause high voltage electric shock.

The thermostat in the device is fitted with a electric overheating protection mechanism and has a secondary safety switch that triggerrs at 125°C. This device must not be used near combustible materials, flammable liquids or explosives.

WARNING
Operator should not open the TIR100-2 at any time. Risk of electric shock!

Commercial entities must submit the device for risk assessment for in-house use. They must adhere to any regulations associated to the country of use, regarding electrical appliances.

4.1 GENERAL SAFETY

When setting up the instrument for use:

- Place the instrument on a hard, level surface, and never in a closed-in wall unit, or on a sofa or rug. Avoid placing loose papers underneath the device.
- Do not stack the instrument or place equipment so close together that it is subject to recirculated or preheated air.
- Keep the device away from radiators and heat sources.
- Keep the instrument away from extremely hot or cold temperatures. Ensure that it is used within the specified operating range.
- Do not push any objects into the openings of the instrument. Doing so can cause fire or electric shock by shorting out interior components.
- Ensure that nothing rests on the instrument's cables and that the cables are not located where they can be stepped on or tripped over.

When operating the instrument:

- Do not use the instrument in a wet environment, for example, outside in wet conditions, near a bath tub, sink, or swimming pool, or in a wet basement.
- Do not use instrument during an electrical storm.
- Do not spill food or liquids on the instrument.
- Before cleaning the instrument, disconnect it from the electrical outlet.

- Clean the device according to manual instructions (please refer to section *11. STORAGE AND MAINTANANCE* for information on cleaning). Do not use liquids or aerosol cleaners, which may contain flammable substances.

- Long-term exposure to moisture can damage the display. Do not use a commercial window cleaner to clean your display.

WARNING
Do not operate the instrument with any cover(s).

If the instrument does not operate normally- for instance, if there are any unusual sounds or smells coming from the unit - do not use and unplug immediately from power source. Contact supplier or INGLAS for assistance.

WARNING
To prevent fires and spread thereof, keep open flame sources as well as easily combustible materials, flammable liquids or explosives away from this instrument at all times.

4.2 GENERAL POWER SAFETY

Observe the following guidelines when connecting the instrument to a power source:

- Check the voltage setting before connecting the instrument to an electrical outlet to ensure that the required voltage and frequency match the available power source.

- Do not plug the instrument power cables into an electrical outlet if the power cable is damaged.

- To prevent electric shock, plug the equipment power cables into properly grounded electrical outlets.

- If an extension power cable is employed, ensure that the total current rating of the instrument plugged in to the extension power cable does not exceed the current rating of the extension cable.

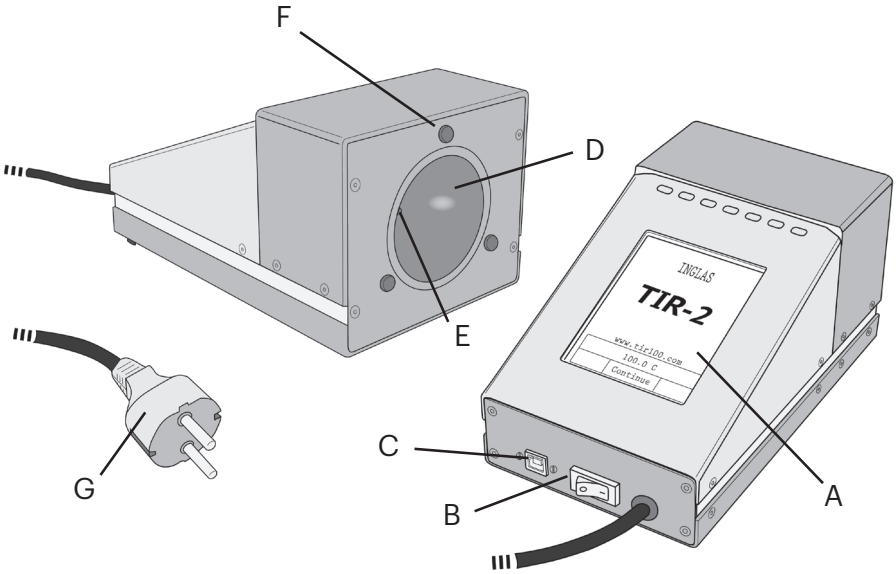
- When using an extension cable or power strip, ensure the extension cable or power strip is connected to a wall power outlet and not to another extension cable or power strip. The extension cable or power strip must be designed for grounded plugs and plugged into a grounded wall outlet.

- If using a multiple-outlet power strip, use caution when plugging the power cable into the power strip. Some power strips may allow to insert a plug incorrectly. Incorrect insertion of the power plug could result in permanent damage to the instrument, as well as risk of electric shock and/or fire. Ensure that the ground prong of the power plug is inserted into the mating ground contact of the power strip.

- Be sure to grasp the plug, not the cable, when disconnecting equipment from an electric socket.

5. OVERVIEW

5.1 DIAGRAM 1: TIR100-2

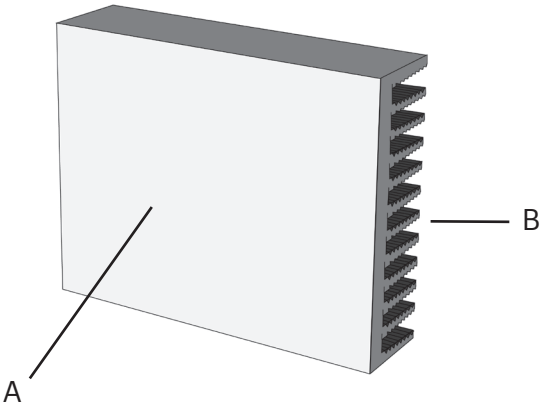


Description

A	Touch screen
B	On / Off power switch
C	USB -B Connector
D	Black body half sphere (100°C when in use)
E	Measuring probe
F	2mm Spacer (3) around the black body half sphere
G	Power plug (may vary depending on your country)

WARNING
Black body half sphere reaches high temperatures during operation. Caution must be taken to avoid burns.

5.2 DIAGRAM 2: TWO-IN-ONE CALIBRATION STANDARD



Description

A	High precision milled aluminium (smooth surface) Low emissivity side
B	Black light trap (textured surface) High emissivity side

All calibration standards are calibrated against a certified reference material from the Physikalisch-Technische Bundesanstalt (PTB) in Berlin, Germany

All calibration standards come with certification that is valid for 2 years (please see your certificate of calibration) when used and stored correctly (please refer to section *11. STORAGE AND MAINTANANCE* for information on storage). It is strongly recommended, once this time has elapsed or if damages have occurred, that the Standard is sent back to the manufacturer for re-certification/ refurbishing. Please contact INGLAS for details.

6. TECHNICAL DATA

Serial numbers	See page 3 of this manual for the serial number of the TIR100-2 and the Two-in-One calibration standard
Mains supply	220-240VAC 50/60Hz 130W or 100-130VAC 50/60Hz 260W For actual setting of your device see page 3 of this manual
Measuring range	As calibration standard
Measure uncertainty	+- 0,005 (lowE) ... +-0,01 (hiE)
Spectral range	2,5 µm - 40 µm
λ max of radiant energy	7,8 µm
Radiator temperature	100°C
Measuring duration	approx. 5 sec.
Measuring spot	approx. 5mm
Interface	USB-B
Dimension	230mm x 140mm x 120mm
Weight	TIR100-2: approx. 2,0kg Total weight with calibration standard and storage case: approx. 9,0kg
Power cord length	1,5m
Ambient conditions	Operating: 15°C - 30°C r.H. <70% Transport & storage: -10°C - 60°C r.H. <85%

The TIR100-2 is made in Germany

Note: Please check the voltage setting of your instrument before use. This is displayed on a label on the underside of the TIR100-2 and also on page 3 of this manual. Please contact your supplier or INGLAS if the TIR100-2 voltage setting differs from the local mains power supply.

7. OPERATING INSTRUCTIONS

7.1 START INSTRUMENT

1. Plug power cord (G) into power socket

2. Turn on the device using the power switch (B) on the back of the instrument.

3. The instrument will start heating up automatically to reach a radiator temperature of 100°C and an inside temperature of approx. 45°C. During this process, “heating up...” will be displayed on the screen. Please note, this may take over an hour due to external factors. Please be patient.

4. When both temperatures are reached and are stable, a “Continue” button will be displayed. This signals that the instrument is ready for operation. Press “Continue” to proceed to the Calibration mode.

   If both final temperatures are not reached or are unstable, may result in inaccurate measurements.

WARNING
Black body half sphere may cause burns when instrument is on, due to high temperatures.

7.2 CALIBRATION MODE

A robust calibration routine will reduce any external bias and greatly increase the reliability of measured results.

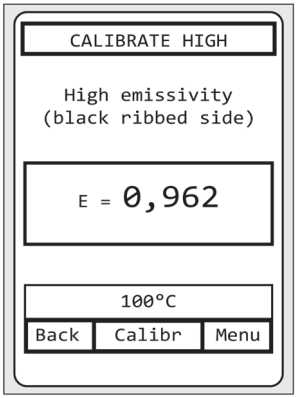
Calibration is usually conducted with the Two-in-One calibration standard included. For convenience, the High and Low values of the calibration standard have been pre-programmed into the TIR100-2 instrument. To check the set values in the TIR100-2,

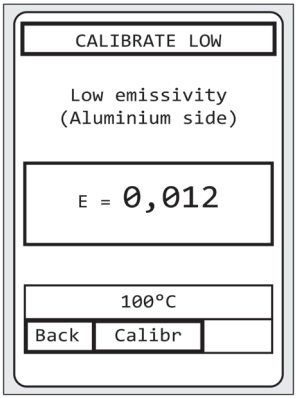
please go into the Menu mode. Confirm these values to the current calibration standards before every use (when using the supplied INGLAS calibration standards, these can be found on the label of your calibration standards and/or certificate).

When using own standard/ INGLAS re-calibrated standards or if values differ, please refer to section *12.1 PROGRAMMING OF CALIBRATION STANDARD VALUES* for instructions.

> **IMPORTANT** In order to ensure accurate measurements, the temperature of the calibration standards **must be the same** as that of the measured sample! Therefore it is strongly recommended that the calibration standard and the sample to be measured are allowed to come to ambient temperature together. This process usually takes 20 to 40 minutes prior to measurement. During a measurement session, the calibration standards must be allowed to cool back down to ambient temperature before next measurement/calibration.
> INGLAS has designed the calibration standard from a single aluminium block to help with the dispersion of heat after measurement.

Calibration Mode consists of two calibration steps/displays. First, the “Calibrate High” which refers to the black ribbed surface and second is the “Calibrate Low” which refers to the polished aluminium side.





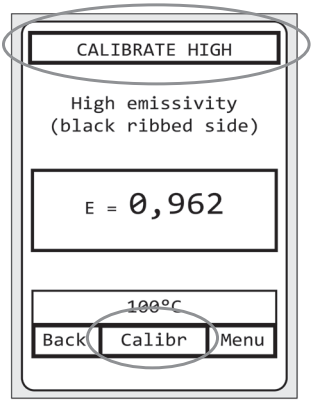
Please ensure, that the values in the “Calibrate High” and “Calibrate Low”

display are the current values of your calibration standard, which is stated on the label.

7.2.1 Start calibration:

1. When “Calibrate High” is displayed, place the black ribbed side of the calibration standard in front of the instrument so that the standard is touching the spacers (F). Use the standard so that the ribs are horizontally positioned.

2. Start the calibration by touching either **“CALIBRATE HIGH”** or **“Calibr”**. A correct calibration is followed by a short beep. Remove standard from the hot radiator to avoid build-up of heat.



3. When “Calibrate Low” is displayed, place the polished aluminium side of the Calibration Standard in front of the instrument so that the Standard is touching the spacers (F). Start the calibration by touching either **“CALIBRATE LOW”** or **“Calibr”**. A correct calibration is followed by a short beep. Remove standard from the hot radiator to avoid heating.

4. After calibrating has been successfully performed, the TIR100 will proceed into Measurement mode.

Note: In case of significant deviations from the expected standard values (found in Menu mode), the calibration procedures should be repeated.

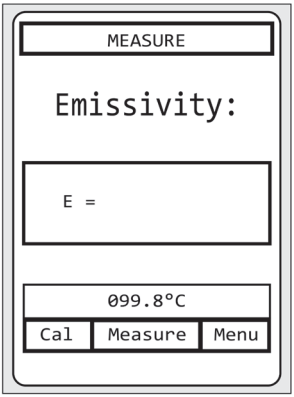
WARNING
Do not leave the calibration standard in front of the 100°C radiator for an extended period of time. Prolonged heat at 100°C may cause oxidation to occur on the polished aluminium side.

To compensate for thermal drift from the environment, we strongly suggest to periodically re-calibrate the TIR100-2 every 10 minutes. This will ensure high precision in the results in a session.

IMPORTANT The calibration standard is fragile. Both sides are susceptible to scratches and dents, if used and stored improperly. This may cause false readings and reduced accuracy and precision. Please refer to section *11. STORAGE AND MAINTANANCE*.

7.3 MEASUREMENT MODE

Once a calibration has successfully been performed, the TIR100-2 will automatically enter Measurement mode. In this mode, the TIR100-2 will have the following display:

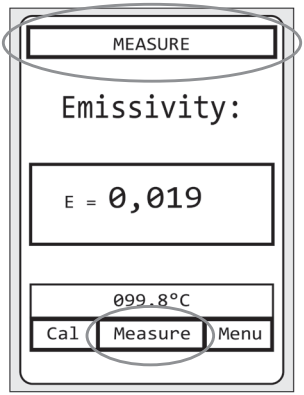


Within this display, there are two “Measure” buttons. One at the top and one bottom centred.
There is also a “Cal” button bottom left to return back to Calibration mode and a “Menu” button bottom right to enter Menu mode.

7.3.1 Taking measurements

1. When “Measure” is displayed, place the sample in front of the instrument so that the sample is touching the Spacers (F).

2. Start the measurement by touching either **“MEASURE”** buttons. A correct measurement is followed by a short beep. For best practise, make sure the temperature is 100°C ± 0,5°C, which is shown on the display. Remove the sample from the hot radiator to avoid build-up of heat.



3. The Emissivity value for the sample measured will be displayed in the centre denoted as E = “result”, as shown in the picture on the right. This measurement will range between 0,000 ... 1,000.

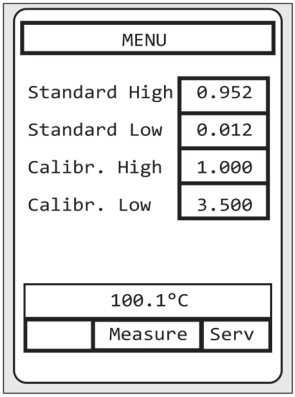
4. For measuring any additional samples, please allow approx. 30 sec to compensate for any thermal heat build-up in the black body half sphere, then repeat steps 1 through to 3.

Please note: The last measurement will be displayed until the next measurement or calibration is performed.

IMPORTANT During a measurement session, if the ambient condition changes, it is strongly recommended to allow the calibration standard and sample to once again reach room temperature and recalibrate.

Please remember!
To compensate for thermal drift from the environment, we strongly suggest to periodically re-calibrate the TIR100-2 every 10 minutes. This will ensure high precision in the results in a session.

7.4 MENU MODE



To reach Menu Mode, touch the "Menu" button in the Measurement Mode, which is displayed in the bottom right hand corner.
In the Menu Mode you will find the display as shown on the right picture.

This display shows an overview of the Calibration Standards emissivity values and the last known calibration results.

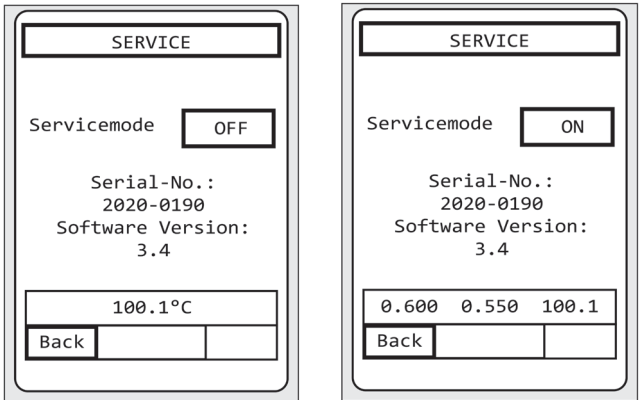
Please note: When using a calibration standard supplied by INGLAS, make sure the values found in the Menu Mode for the Standards correlate with the actual emissivity values of the supplied calibration standards, which are located on the first page of this manual and labelled on the calibration standards itself.

From the Menu Mode, the Measurement mode can be re-entered by touching the "Measure" button located bottom centre. Alternatively the Service mode can be entered by touching "Serv" on the bottom right.

8. SERVICE MODE

To reach Service Mode, touch the "Serv" button in the Menu mode, which is displayed in the bottom right hand corner. Following displays can be viewd in the Service mode (please see pictures on next page).

This mode shows the Serial number of your TIR100-2 and the software version.



Also displayed is the Service mode “OFF” / “ON” button. For routine operation with the TIR100-2, this button should remain on the “OFF” position, so that the temperature of the TIR100-2 is displayed (Refer to the left picture).
If circumstances arise and there is a problem with the TIR100-2, it may be required to switch the Service mode button to the “ON” position. The information displayed will assist our technicians in assessing and solving the issue. The “ON” position is a diagnostic tool only and has no influence on operations.

To exit the Service mode and re-enter the Menu mode, touch the “Back” button on the bottom left.

9. CONNECTING THE TIR100-2 TO A PC

The TIR100-2 has the capability to record measured results to a PC via the USB-B port.
Firstly, the PC will need a terminal program. Any terminal program should suffice, for example:

HTerm.exe >> http://www.der-hammer.info/terminal/

The following perimeters will need to be inputted into the

terminal program:

Rate of transmittance: 9600 Baud
Data length: 8 Bit
Stop bit: 1
Parity: none
Once the terminal program is open, connect the TIR100-2 with the provided USB-B cord to the PC USB bus.
Note: The first time the TIR100-2 is connected to a PC, a virtual serial port will automatically be installed.

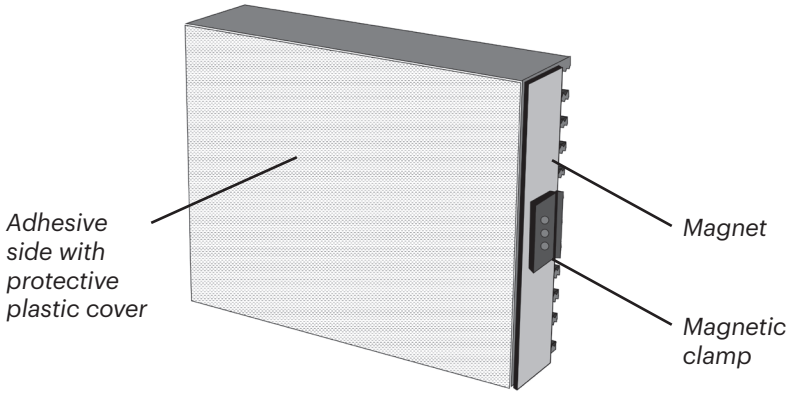
10. OPTIONAL ACCESSORY

10.1 SAMPLE HOLDER

The TIR100-2 can be used to measure the emissivity of foils, textiles, fabrics and other thin materials. To obtain an accurate result, it is necessary to have the sample as flat/smooth as possible and to prevent any interfering background noise/radiation.

The sample holder (diagram 3) is made from the same material as the black body trap of the calibration standard. This ensures no interfering backround noise/radiation and helps with the dispersion of heat after measurement.

10.1.1 Diagram 3: Sample Holder



The flat surface of the sample holder has an adhesive material that the sample can be carefully stuck to wrinkle-free. Mounted on either sides of the sample holder are two magnetic clips, which can be utilised for larger samples.

11. STORAGE AND MAINTANANCE

Following the below suggestions on maintenance and storage will contribute to the longevity of the TIR100-2 instrument and ensure that a high level of accuracy and precision are maintained.

When the TIR100-2 and its accessories are not in use or are in transit, they should be stored in the provided robust transportation case.

11.1 INSTRUMENT

Regularly check the TIR100-2 and the black body half sphere for dents, loss of black coating and other damages as these may affect measurement results.

If visible dirt or grit is detected in the black body half sphere, we recommend the use of the microfiber cloth provided or use low compressed air to remove any debris scratch-free.

After use please allow sufficient time for the TIR100-2 to reach ambient conditions before storing.

> **IMPORTANT** Do not store the instrument when black body half sphere is hot, as this may damage the interior of the transportation case.

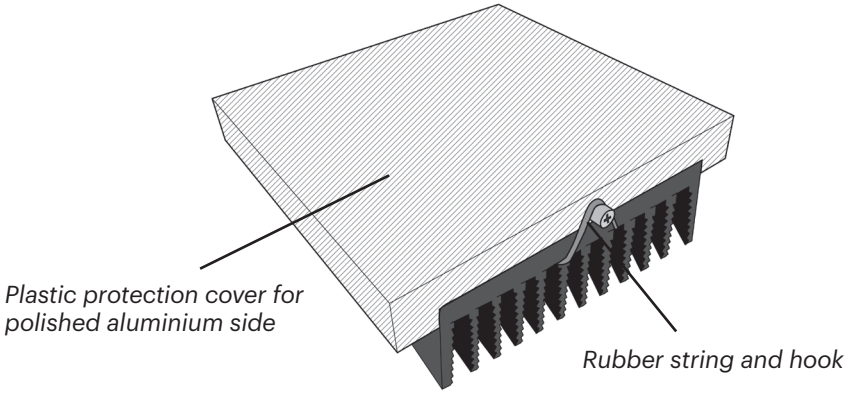
Please note:
The TIR100-2 for all purposes is a sealed unit. There are no serviceable/ interchangeable parts inside. Making any unwarranted adjustments and/or modifications to the TIR100-2 will void any warranty given. INGLAS will not assume any liability for consequential damages or cost resulting therefrom.

WARNING
Operator should not open the TIR100-2 at any time. Risk of electric shock!

11.2 TWO-IN-ONE CALIBRATION STANDARD

Always store the calibration standard with its protection cover on the polished aluminium surface as shown in diagram 4.

11.2.1 Diagram 4: Two-In-One calibration standard



Caution! The polished aluminium is an extremely delicate and scratch-prone surface. We recommend wearing cotton gloves when handling the Two-In-One calibration standard.

Before use, the polished aluminium surface should be cleaned with the use of the microfiber fabric cloth provided.
If visible dirt or grit is detected, we recommend the use of Isopropanol or deionised water as a cleaning liquid.

Never use paper or any household cleaning products!
To clean the black light trap surface of the calibration standard, it is recommended to use the microfiber cloth provided or to clean with low compressed air.

All calibration standards come with a certification that is valid for 2 years. Once this time has elapsed, as good practise it is strongly recommended to re-certify at the manufacturers. For more information please contact INGLAS.

Excessive scratches or damages to the Two-In-One calibration standard will reduce accuracy and sensitivity of measurements.

If this occurs, it is strongly recommended that the Standard is sent back to the manufacturer for refurbishing. Please contact INGLAS for details.

If the Standard has sustained severe damages it may not be possible to refurbish and thus a new Calibration Standard is required.

11.3 SAMPLE HOLDER (OPTIONAL ACCESSORY)

Over time, the adhesive side will become less adhesive. To prolong the usage of the adhesive side, make sure to recover with the plastic sheet provided after each use.

Please store the sample holder in the plastic sleeve provided after each use and store in the transportation case.

Caution: Never stack the back of the sample holder to the black light trap side of the Two-In-One calibration standard, as both sides are ribbed, which may result in interlocking and thus damage both apparatuses.

12. ADDITIONAL INFORMATION

12.1 PROGRAMMING OF CALIBRATION STANDARD VALUES

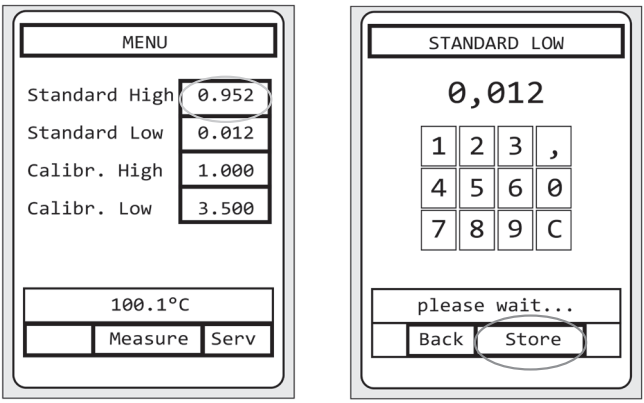
When using a new or re-calibrated Two-in-One standard provided by INGLAS, it is important that these new values are programmed into the TIR100-2 before use.

It is also possible to use different (own) standards for the TIR100-2 in place of the Two-In-One tandard that is provided.

Please note, the use of a two-point calibration standard system

(i.e. high vs. low) is required.

To manually set the values of the different calibration standards, please go into the “Menu mode” in the TIR100-2.
Touch the “Standard High” button (denoted below in the below diagram) and enter a value between 0.000 and 0.999.
The fractional digits are typed with the numeric keys and confirmed with “Store”.



Repeat the process for the “Standard Low” value.

> **IMPORTANT** After changing the reference values, calibration must be performed before use with the new corresponding standards!

Please remember the Two-In-One standard values are labelled on the standard and on the corresponding certificate of analysis.

12.2 VOLTAGE SETTINGS

Before turning on the TIR100-2, please ensure that the voltage setting of the TIR100-2 matches the power socket used for the operation of the instrument. The factory voltage setting is stated

on the underside of the TIR100-2 and on page 3 of this manual.

WARNING
Should the voltage setting differ, do not use!
Please contact your supplier or INGLAS for more information regarding voltage settings.

13. MEASURING OF DIFFERENT MEDIUMS

13.1 MEASURING OF LARGE SAMPLES

One major advantage of the TIR100-2 is its portability. When measuring oversized/ fixed samples, it is not always possible to bring the sample into a laboratory. In these cases the TIR100-2 can take measurements directly on site. Keep in mind the following guidelines:

1. The reference calibration standard must be the same temperature as the sample

2. The distance between sample and TIR100-2 must be kept constant, i.e. the sample touches the spacers (see diagram (F))

3. Between measurements avoid sudden and fast movements, as this will cause thermal instability in the black body half sphere radiator.

It is also possible to use the TIR100-2 in the vertical direction. When doing so, the calibration measurement must also be taken in the same vertical direction.

13.2 MEASURING OF SMALL SAMPLES

When measuring samples smaller than the black body radiator opening of 70 x 70mm, it is advised to use the sample holder. However, the sample should not be smaller than 20 x 20 mm and should be placed in the middle of the sample holder during measurement.

13.3 MEASURING OF TRANSPARENT SAMPLES

Avoid direct light behind transparent samples. If not possible, please insert a non-transparent backing between the sample and the light source. Any infrared radiation source transmitted through the sample and reaching the sensor will interfere with the emissivity measurements.

13.4 MEASURING OF THIN SAMPLES AND FOILS

Thin foil samples have the tendency to heat up very quickly during measurement. This can cause deviations of results. The table below shows these deviations when the sample surface temperature is higher than that of the Reference Standard.

Emissivity	Difference in Temperature (°C)	TIR Results
0,0200	+5	0,0187
0,0200	+10	0,0175
0,800	+5	0,748
0,800	+10	0,700

From this table, it can be concluded that the higher the sample temperature relative to the standard, the lower the emissivity is reported by the TIR100-2.

As absorption is directly correlated to emissivity, the higher the emissivity, the stronger the deviation in results due to the temperature difference.

To avoid heat build-up in foil samples, we recommend the use of our sample holder. It is made from one piece of aluminium block that helps with the dispersion of excess heat.

When it is not practical to use the sample holder, a foil sample can be moved slowly along the radiator at a constant speed during measurement. This will avoid any excess heat that can build up on any given spot.

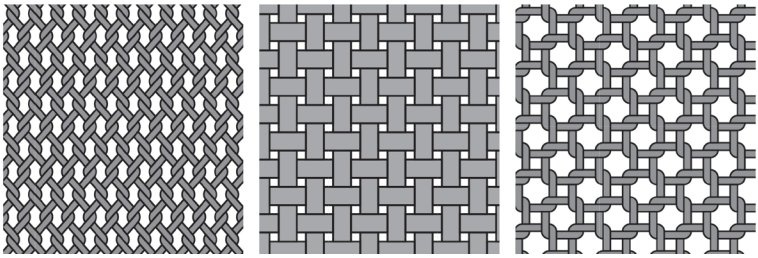
Please note:

1. The distance between sample and TIR100-2 must be kept constant, i.e. the sample touches the spacers (see diagram (F))

2. The surface of the sample must remain flat

3. Make sure when moving the foil sample it is at a slow, gentle and constant speed. This will avoid any thermal instability in the black body half sphere radiator.

13.5 MEASURING OF TEXTILES OR SAMPLES WITH OPEN PORES



A= approx. 0.6 A= approx. 0.9 A= approx. 0.4

Measuring textiles and/ or samples with open pores requires a background substrate of emissivity value close to 1.
We recommend the use of our sample holder as it is made from the same material as the black body trap of the calibration standard. This ensures that the background is as close as E=1 as possible.

This will ensure that the background will absorb all excess radiation so that only the emissivity from the sample will be measured by the TIR100-2.

The emissivity result (ε_{TIR}) is proportional to the emissivity of the textile sample (ε_{sample}) and the percentage area (A) that the textile sample covers.

$$\varepsilon_{TIR} = A \times \varepsilon_{sample}$$

13.6 MATERIALS THAT ARE TRANSPARENT IN THE INFRARED REGION

Certain materials such as thin polyethylene foils and semiconductors are transparent in the infrared region and cannot be accurately measured by the TIR100-2. This is due to loss of radiation through transmittance.

14. TROUBLESHOOTING

Should there be any issues with the TIR100-2, please visit our homepage **www.tir100.com/FAQ** for frequently asked questions and information on troubleshooting. We can also be contacted via email: **info@tir100.com** for any questions or problems that may arise.
Please check our website regularly for updates on the operations manual. They will be denoted by a different version number. The version stated on our website will replace and supersede any previous version issued.

15. DECLARATION OF CONFORMITY

For the declaration of conformity please visit to our website www.inglas.org

16. WARRANTY

All warranty claims must be made in writing.

The TIR100-2 comes with a 2-year product warranty, starting from the date of delivery. This includes the free of charge repairs and/or replacement of any faulty parts.

Incorrect handling and/or usage of the product, non-compliance of the operations manual or any damages due to unforeseeable circumstances is not covered under this warranty.

INGLAS does not assume any liability for consequential damages or cost resulting therefrom.

INGLAS will assess all written claims and will repair or replace the product at its own discretion, on the basis set out in this warranty.

17. DISPOSAL

Electrical and electronic appliances should not be disposed of as part of the household garbage.
This device must be properly disposed of in accordance with your national regulations and laws.
The device can also be sent back to the manufacturers for disposal:
INGLAS GmbH & Co KG
Muschelweg 19 - 88697 Bermatingen - GERMANY

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