



Flate Plate IR Calibrator (Black Body)

Temperature Range: -20°C to 100°C

EDIR-20X Instruction Manual



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PREFACE

Congratulation on purchase of “Tunix” make Flate plate/ Black Body Temperature Calibrator model EDIR-20 This instruments is one of the best available in its class.

We have taken enough care in designing and manufacturing to give you trouble free performance

STANDARED ACCESSORIES

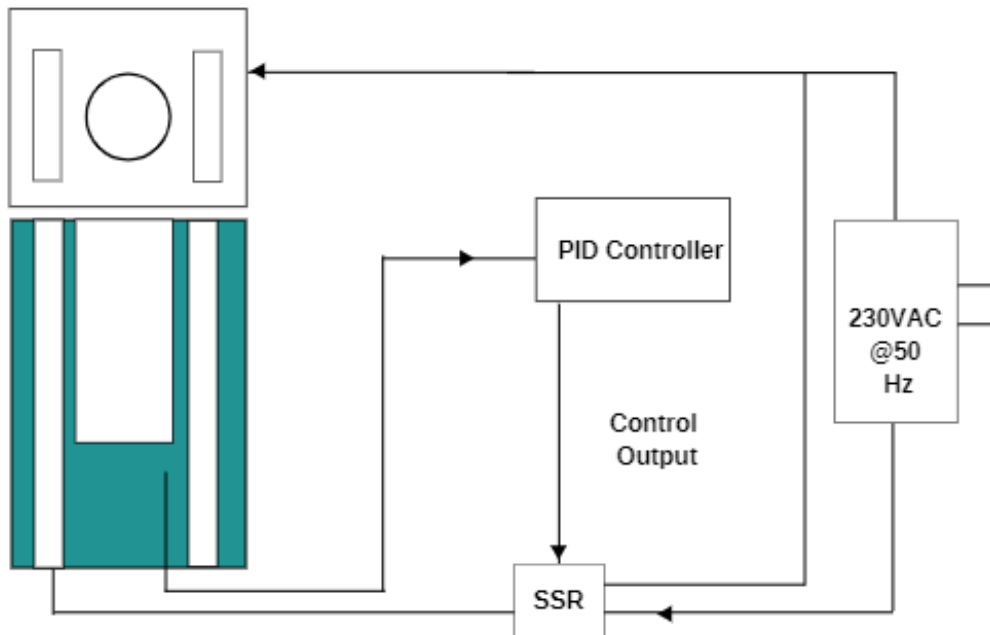
Please check for following Standard accessories/Observation upto receipt of the product

- 1) Product is not physically damaged.
- 2) Operating manual With Warranty certificate
- 3) Power Chord.
- 4) Carrying Bag(optional if orderd)
- 5) General Calibration Certificate.(Not accredited to 17025)
- 6) 17025 accredited calibration certificate(optional if orderd).
- 7) RTD PT100 accuracy class A for referance temperature measurement (optional if orderd).

TECHNICAL SPECIFICATION

- 1) Temperature Range: -20°C. to 100 °C.
- 2) Display resolution 0.1 °C
- 3) Control accuracy: better than ± 0.1 °C
- 4) Thermal Non uniformity(Radial) : ± 0.15 °C (Applicable for 40 mm dia)
- 5) Thermal stability
 ± 0.1 °C at -20 °C (calculated after stabilization time of 10 minutes).
 ± 0.25 °C at 100 °C (calculated after stabilization time of 10 minutes).
- 6) Power supply: 230 VAC @50-60 Hz.
- 7) Time to reach -20° C (20 Minutes).
Time to reach 100° C (15 Minutes).
- 8) Stabilization Time/settling time: 10 minutes after set point is achieved
- 9) Emissivity: 0.95
- 10) Power Consumption: single phase , 1200 Watt maximum.
- 11) Current : 3A
- 12) Sound: 45 dB Maximum.
- 13) Enclosure Metal(MS) Powder coated.
- 14) Weight: 10.14 kg without bag.
- 15) Dimensions: D: 265mm, H: 300, W: 225mm.

OPERATING PRINCIPLE



Block Diagram

For temperature calibration you require a stable known temperature source. The certainty of the calibration depends on

- 1) Stability of the source temperature.
- 2) Uniformity to which the stable temperature is known.
- 3) Emissivity of the black body.

Designed diagram of EDIR-20X is given below.

IMPORTANT INSTRUCTION FOR OPTIMUM PERFORMANCE

- 1) Use 5 Amp glass fuse as supplied with instrument.
- 2) 3 Pin Plug and Power cable used should have minimum 10 Amp capacity.
- 3) Cooling fan is on and the top air vent is open. This is required to cool the electronics.
Ensure the air passage is not blocked
- 4) Dry gas to be used as indicated to avoid frosting on the calibrator flate plate surface.
Kindly consult the factory for the detailed use shows in Fig. B. Dry gas to be connected sapatly.

OPERATING PRINCIPLE

Fix the finger in the cavity indicated and pull it gently to remove the top cover.

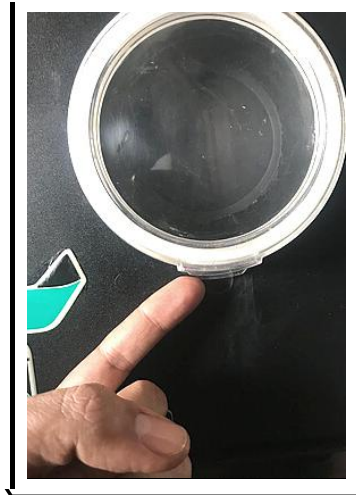


Fig A(1)

PID Controller



Fig A(2)

SAFETY MEASURES & PRECAUTIONS

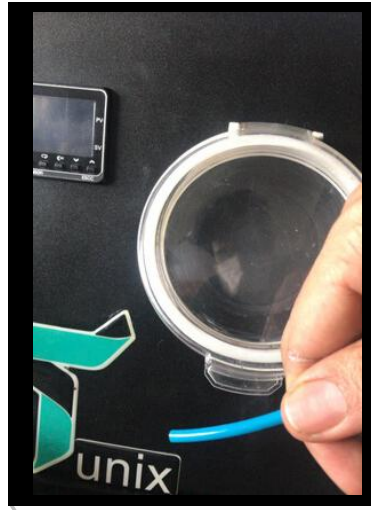


Fig B

Dry gas to be used as indicated to avoid frausting on the calibrator flate plate surface.
Kindly consult the factory for the detailed use shows in Fig. B. Dry gas to be connected sapatly.

A 5 Amp Glass fuse is used in the supply line to prevent any problem due to failure of heating element

- In case of fuse being damaged frequently kindly consult factory.

In the event of SSR failure temperature gets run away above set value. If it cross the set point by more

- than 20°C. Switch off the power immediately and consult factory.

Do not temper wiring as it may be safety hazard.

- Do not transport/ ship/ move the product when it is hot.

Do not bring IR thermometers too close(within range of 20mm) from the black body

While installing the product always keep air passage open at the back side of instrument fo proper heat

ventilation.

- Never touch the black flat screen by bare hands, wet cloth, sharp pointed tools, any scretch/mark would permanently change the emissivity of the black body.
- Always clean the black body and its front screen by clean air blower.

TROUBLE SHOOTING

- 1) Calibrator is not reaching set value.
Check mains for full voltage.

- 2) Calibrator temperature is running over.
Check terminal 1 &2 of SSR for getting short If it is short replace it/ Consult factory.
Check for correct polarity in your mains plug. Phase should go through SSR as per design.
If phase is not routed through SSR It may not control the temperature.

- 3) Calibrator is not not getting on.
Check mains.
Check fuse.
Check tightness of all terminals on controller & main terminal strip.

- 4) Calibrator temperature not getting stable.
Check fan at the back cover it should be running.
Need turning off/On controller.

EMISSIVITY CHART

Definition :Emissivity is defined as the ratio of the energy radiated from a material's surface to that radiated from a perfect emitter, known as a blackbody, at the same temperature and wavelength and under the same viewing conditions. It is a dimensionless number between 0 (for a perfect reflector) and 1 (for a perfect emitter).

The emissivity of a surface depends not only on the material but also on the nature of the surface. For example, a clean and polished metal surface will have a low emissivity, whereas a roughened and oxidised metal surface will have a high emissivity. The emissivity also depends on the temperature of the surface as well as wavelength and angle.

Knowledge of surface emissivity is important both for accurate non-contact temperature measurement and for heat transfer calculations. Radiation thermometers detect the thermal radiation emitted by a surface. They are generally calibrated using blackbody reference sources that have an emissivity as close to 1 as makes no practical difference.

When viewing 'real', more reflective surfaces, with a lower emissivity, less radiation will be received by the thermometer than from a blackbody at the same temperature and so the surface will appear colder than it is unless the thermometer reading is adjusted to take into account the material surface emissivity.

There are some emissivities indicated below , Note : Indicated emissivities may vary based on viewing angle , temperature , material , Wavelength etc

Material	Emissivity
Alumel (Unoxidized)	0.10 - 0.25
Alumel (Oxidized)	0.6
Aluminum (Polished)	0.10 - 0.05
Aluminum (Oxidized)	0.10 - 0.40
Aluminum (Rough)	0.10 - 0.30
Aluminum (Anodized)	0.60 - 0.95
Aluminum Oxide	0.4
Asbestos	0.95
Asphalt	0.90 - 1.00

EMISSIVITY CHART

Basalt	0.7
Bismuth	0.5
Brass (Polished)	0.05
Brass (Oxidized)	0.50 - 0.60
Brass (Burnished)	0.3
Carbon (Unoxidized)	0.40 - 0.90
Carbon (Filament)	0.5
Carbon (Soot)	0.50 - 0.95
Carbon (Coke)	0.95 - 1.00
Carbon (Graphite)	0.70 - 0.80
Carborundum	0.80 - 0.90
Ceramic	0.90 - 0.95
Clay (Fired)	0.95
Concrete	0.95
Chrome (Oxidized)	0.60 - 0.85
Chromium	0.1
Cobalt	0.2
Columbium (Polished)	0.2
Columbium (Oxidized)	0.7
Copper (Polished)	0.1
Copper (Oxidized)	0.20 - 0.80
Electrical terminal blocks	0.6
Enamel	0.9
Foods	0.85 - 1.00
Formica	0.95
Glass (Convex D)	0.8
Glass (Nonex)	0.8
Glass (Plate)	0.90 - 0.95
Glass (Fused quartz)	0.75

EMISSIVITY CHART

Glass (Pyrex, lead and soda)	0.95
Gold:	0.05
Granite (Polished)	0.85
Granite (Rough)	0.9
Granite (Natural)	0.95
Gravel	0.90 - 0.95
Gypsum	0.85 - 0.95
Haynes Alloy	0.30 - 0.80
Human Skin	0.99
Inconel (Polished)	0.15
Inconel (Oxidized)	0.70 - 0.95
Inconel (Sandblasted)	0.30 - 0.66
Iron (Oxidized)	0.50 - 0.95
Iron (Rusted)	0.50 - 0.70
Iron (Wrought, dull)	0.9
Iron Oxide	0.85
Lacquer (Colored on Al)	0.75 - 0.90
Lacquer (Colored)	0.95
Lacquer (Clear on Al)	0.1
Lacquer (Clear on Cu)	0.65
Lead (Polished)	0.05 - 0.10
Lead (Oxidized)	0.30 - 0.65
Lead (Rough)	0.4
Limestone	0.95 - 1.00
Magnesium Oxide	0.55
Molybdenum (Polished)	0.05
Molybdenum (Oxidized)	0.20 - 0.80
Monel (Oxidized)	0.45 - 0.85
Mullite	0.80 - 0.85

EMISSIVITY CHART

Nichrome (Clean)	0.65
Nichrome (Oxidized)	0.60 - 0.85
Nickel (Polished)	0.1
Nickel (Oxidized)	0.20 - 0.95
Nickel Oxide	0.6
Oil (Animal/vegetable)	0.95 - 1.00
Oil (Mineral)	0.90 - 1.00
Oil (0.001" thick)	0.25
Oil (0.002" thick)	0.46
Oil (0.005" thick)	0.7
Paint (Aluminum paint)	0.5
Paint (Bronze paint)	0.8
Paint (on metal)	0.60 - 0.90
Paint (on plastic or wood)	0.80 - 0.95
Paint (Gold enamel)	0.4
Paint (Clear silicone)	0.65 - 0.80
Paper	0.85 - 1.00
Plaster	0.9
Plastic	0.95 - 1.00
Platinum	0.05
Polyester	0.75 - 0.85
Polyethylene	0.1
Quartz	0.9
Roofing Paper	0.9
Rubber (Hard glossy)	0.95
Rubber (Soft rough)	0.85
Sand	0.80 - 0.90
Sandstone	0.7
Shale	0.7

EMISSIVITY CHART

Silica (Powder)	0.35 - 0.60
Silica (Glazed)	0.85
Silica (Unglazed)	0.75
Silicone Carbide	0.80 - 0.95
Silver	0.05
Soil (Dry)	0.90 - 0.95
Soil (Wet)	0.95 - 1.00
Slate	0.70 - 0.80
Stainless Steel (Polished)	0.10 - 0.15
Stainless Steel (Oxidized)	0.45 - 0.95
Steel (Unoxidized)	0.1
Steel (Oxidized)	0.70 - 0.95
Steel (Cold Rolled)	0.70 - 0.90
Steel (Ground sheet)	0.40 - 0.60
Steel (Rough surface)	0.95
Tantalum (Unoxidized)	0.2
Tantalum (Oxidized)	0.6
Textiles (Carpet)	0.85 - 1.00
Textiles (Carpet)	0.85 - 1.00
Textiles (Close weave)	0.70 - 0.95
Textiles (Cotton)	0.8
Textiles (Leather)	0.95 - 1.00
Textiles (Silk)	0.8
Textiles (Died black)	0.98
Tin (Unoxidized)	0.05 - 0.10
Tungsten (Unoxidized)	0.05
Tungsten (Filament)	0.3
Water (Liquid)	0.90 - 0.95
Water (Ice)	0.95 - 1.00
Water (Snow)	0.80 - 1.00
Wood (Planed)	0.80 - 0.95
Wood (Sawdust)	0.75

EMISSIVITY CHART

Zinc (Polished)	0.05
Zinc (Oxidized)	0.1
Zinc (Galvanized)	0.20 - 0.30

WARRANTY CERTIFICATE

This is to certify that, Infrard flat plate/Black body temperature Calibrator Model EDIR-20X having Sr. No. _____ Date _____ is properly Tested for workmanship.

We Certify our Calibrator for satisfactory performance for the period of one year from the date of supply against any manufacturing defect.

Name:

Date:

Signature

CHECK LIST

- 1) Is Instrument working properly(Yes/No)
- 2) Is power chord available?(Yes/No)
- 3) Is Carry bag available(Optional)if ordered saparetly ? ..(Yes/No)
- 4) Is all factory setting parameters of Instrument locked?(Yes/No)

Name:

Date:

Signature

CALIBRATION CERTIFICATE

Certificate No. : _____

Date : _____

Model No. : _____

Temperature Range : _____

Reading On Calibrator	Reading on Master

Calibrated By

Name:

Date:

Signature: