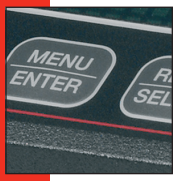
AMETEK®
TEST & CALIBRATION INSTRUMENTS

User manual

Temperature Calibrator

JOFRA ITC-155/320/650 A





User manual
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FIG. 1

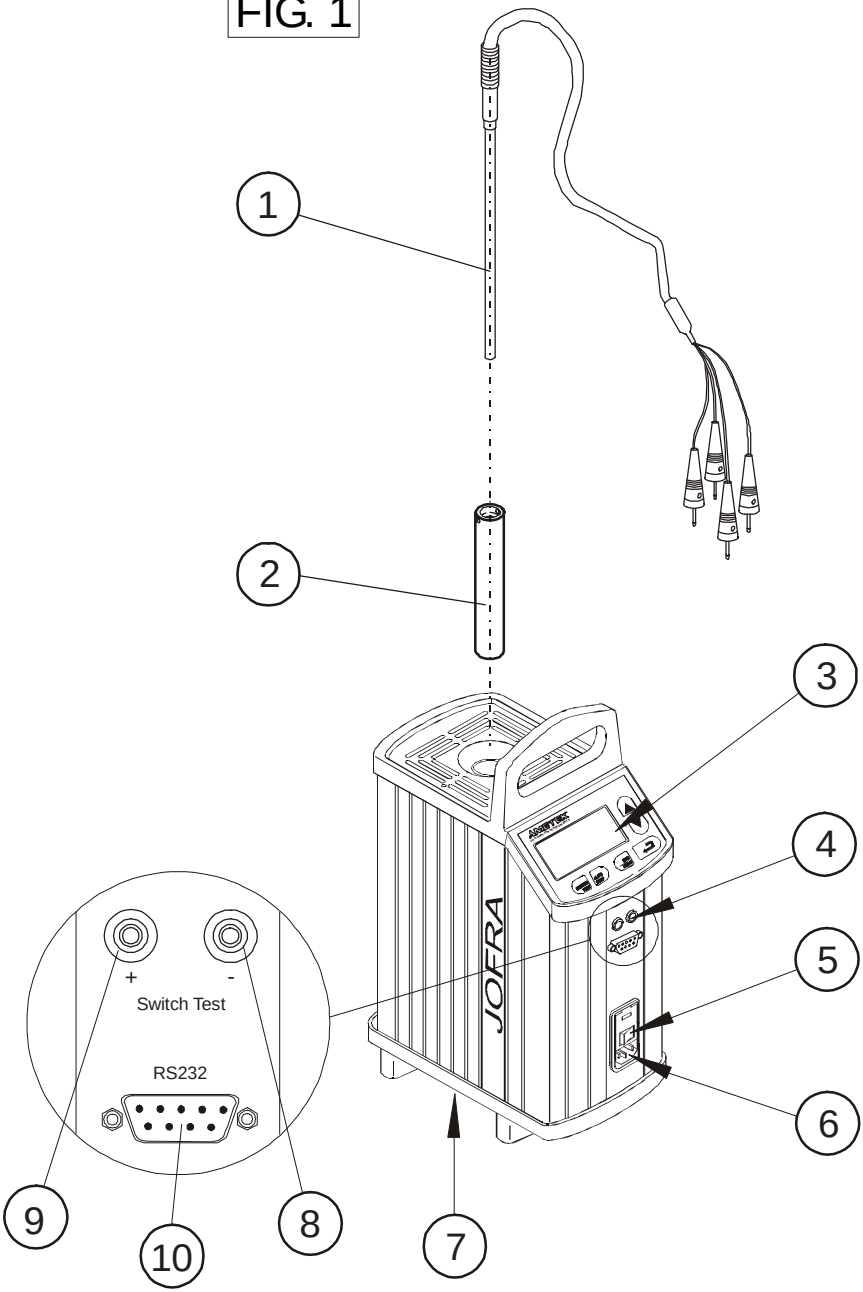
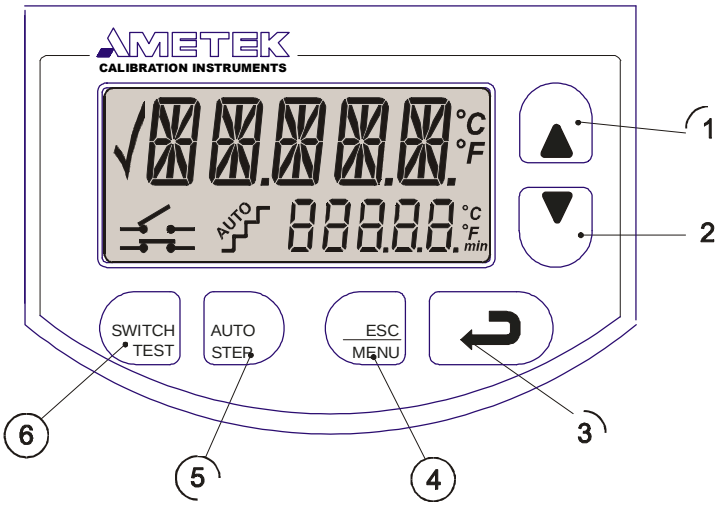


FIG. 2


AMETEK
CALIBRATION INSTRUMENTS
°C
°F
AUTO
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min
SWITCH
TEST
AUTO
STEP
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MENU
1
2
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6

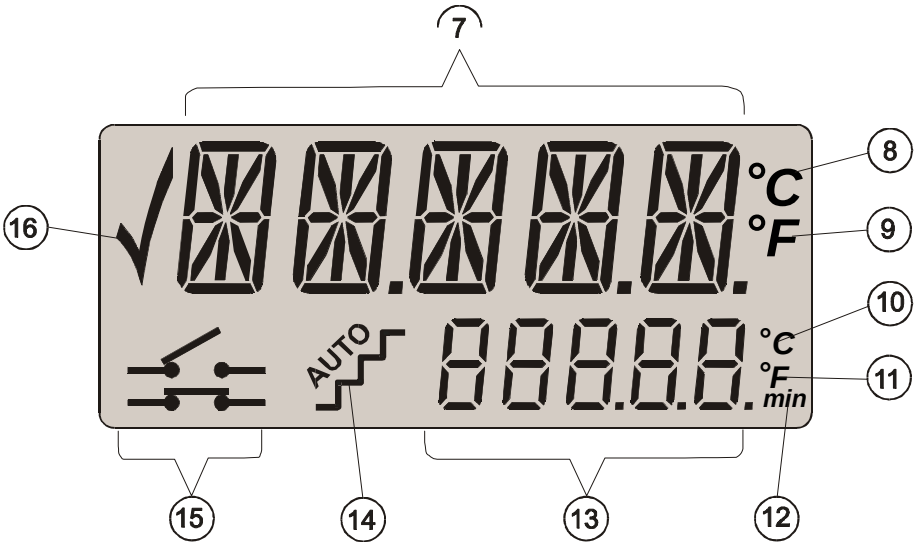
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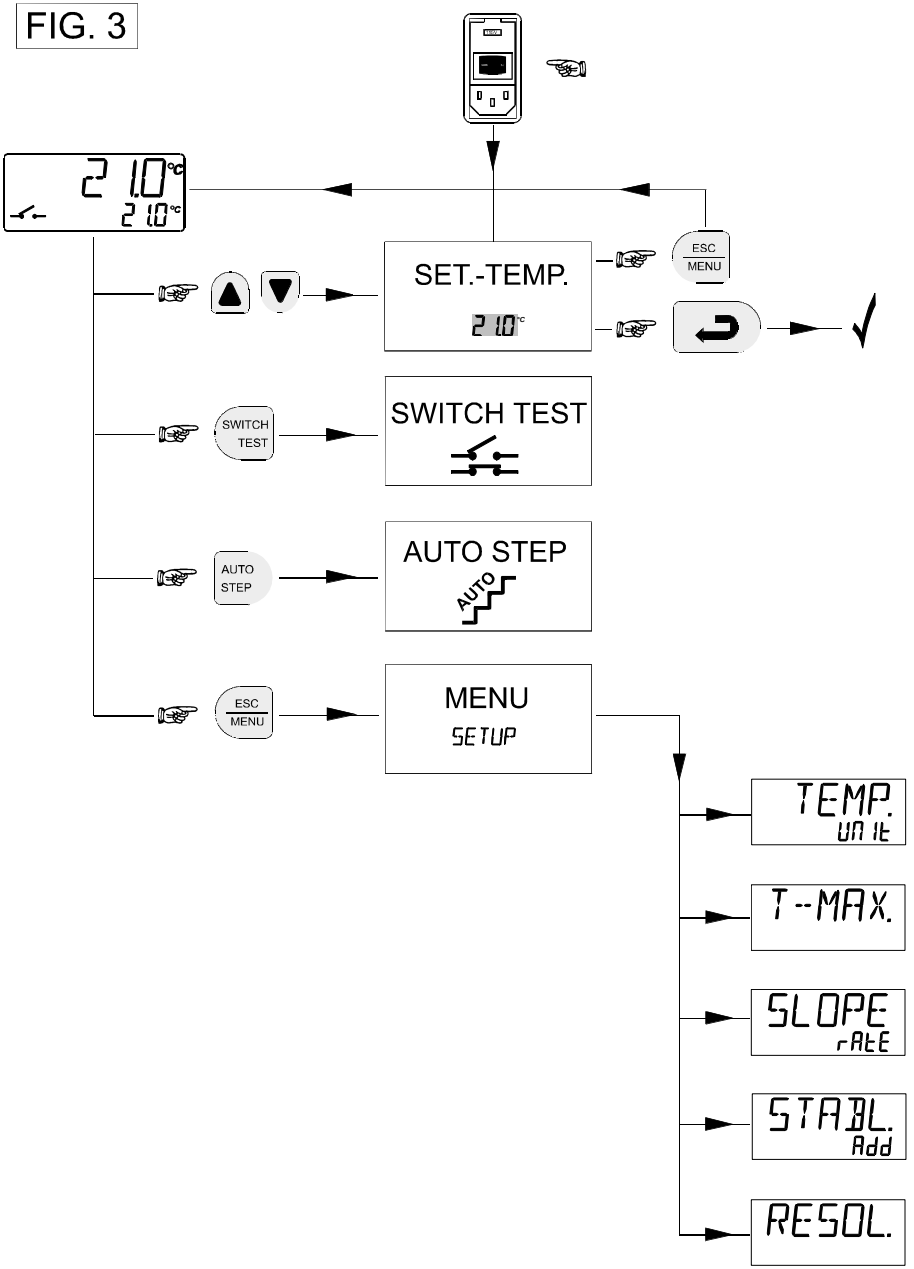
FIG. 3


21.0°C
21.0°C
SET.-TEMP.
21.0°C
ESC
MENU
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TEST
SWITCH TEST
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AUTO STEP
AUTO
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MENU
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TEMP.
UNIT
T-MAX.
SLOPE
rAtE
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Add
RESOL.

FIG. 4

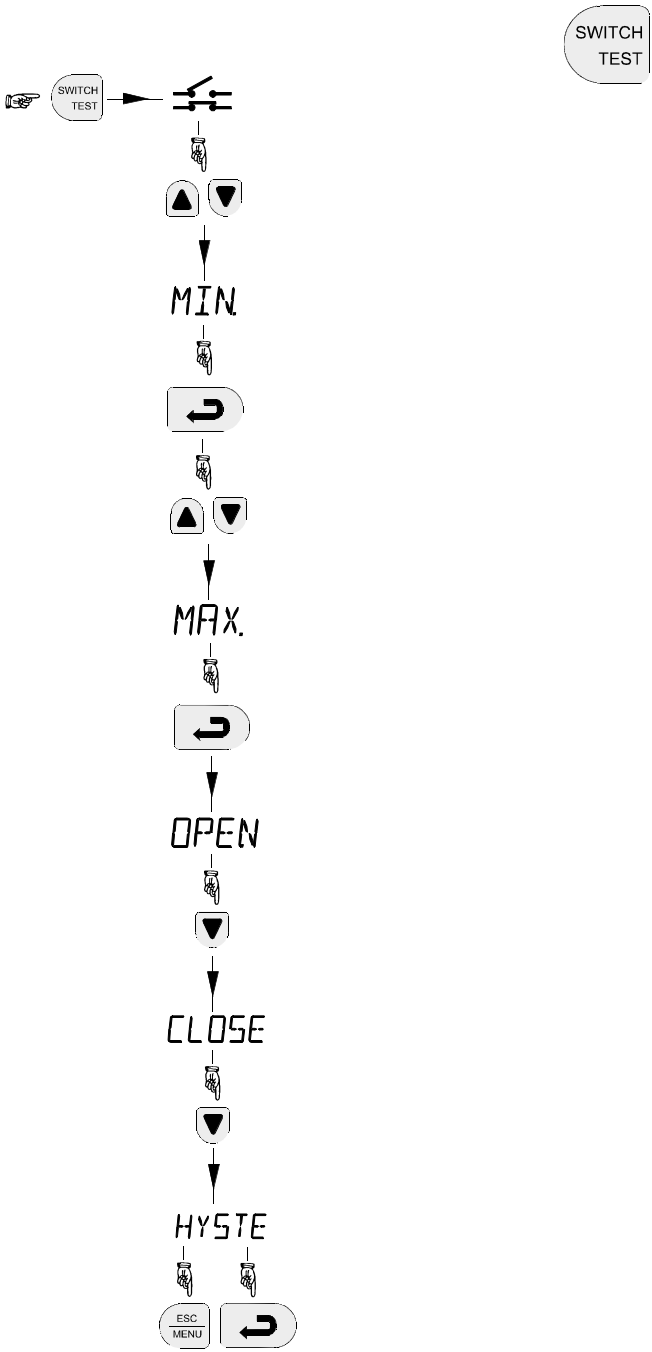


FIG. 5

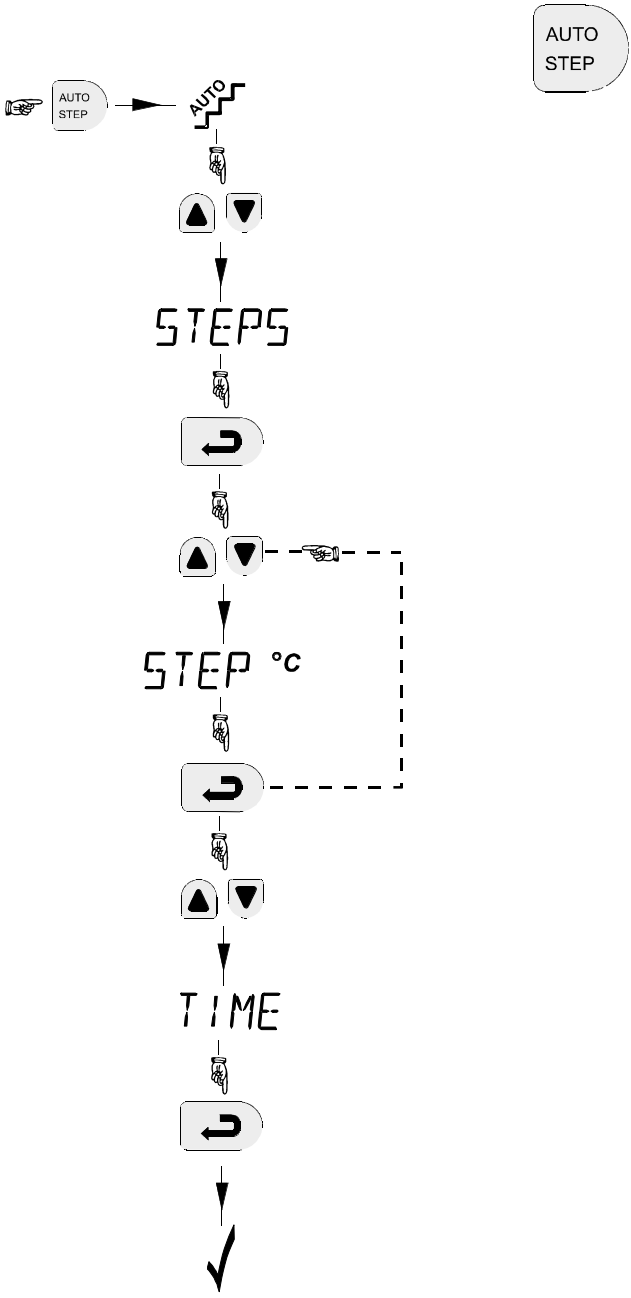
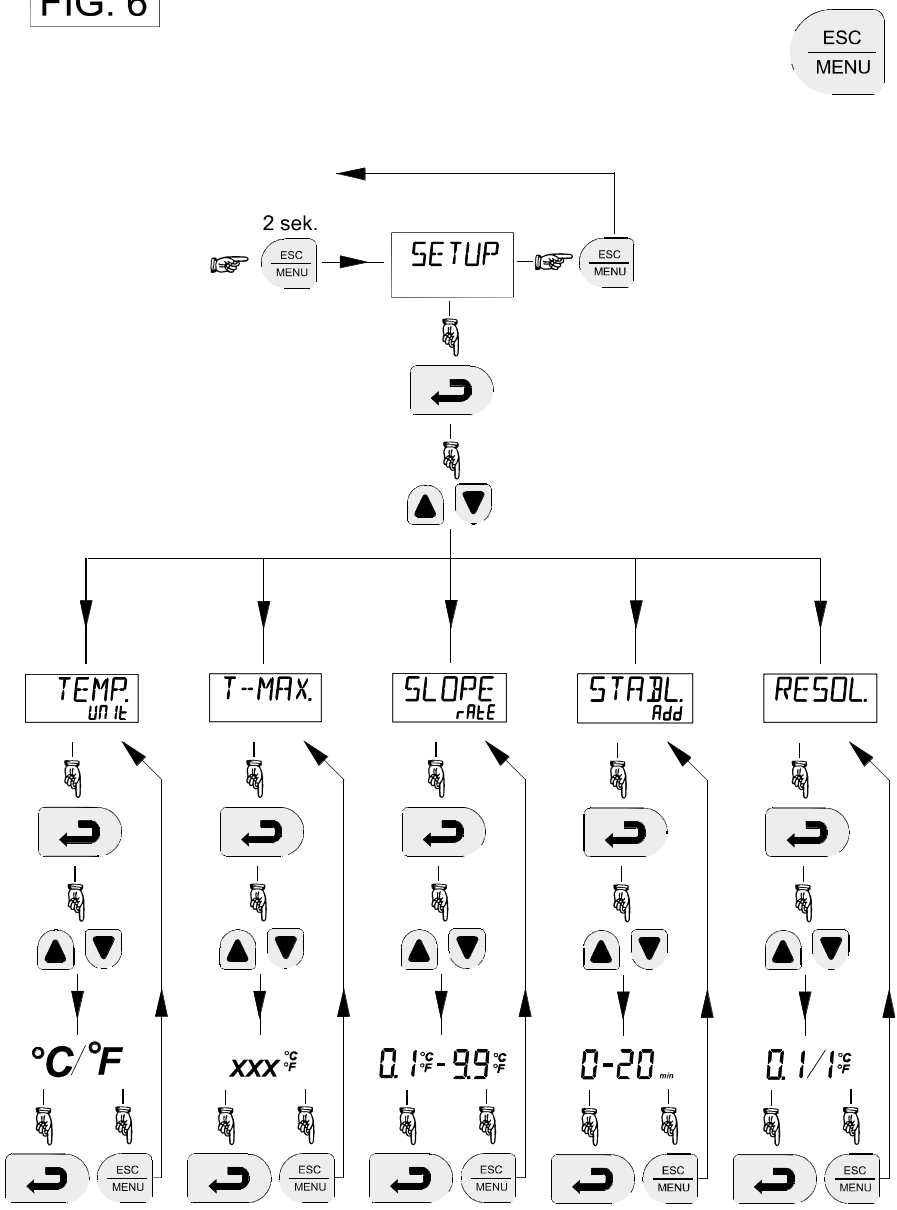


FIG. 6


ESC
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TEMP.
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SLOPE
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STABL.
Add
RESOL.
°C/°F
xxx °C °F
0.1 °C °F - 9.9 °C °F
0-20 min
0.1/1 °C °F

List of contents

1.0 Introduction

ITC-calibrators are temperature calibrators designed to calibrate temperature sensors and temperature switches.

Read this manual carefully before using the instrument and make sure that all safety instructions and warnings are observed.

1.1 List of equipment received

When you receive the instrument, the following should be enclosed:

- 1 calibrator
- 1 mains cable
- 1 set of test cables (1 black, 1 red)
- 1 insertion tube
- 1 tool for insertion tube
- 1 traceable certificate
- 1 reference manual
- 1 user manual
- RS232 serial cable
- 1 CD-ROM containing software package “JOFRACAL” (The adjustment software “AmeTrim” is **not** applicable to the ITC-calibrators)

2.0 Safety instructions

Read this manual carefully before using the instrument!

In order to avoid any personal injuries and/or damage to the instrument all safety instructions and warnings must be observed.

Disposal – WEEE Directive

These calibrators contain Electrical and Electronic circuits and must be recycled or disposed of properly (in accordance with the WEEE Directive 2002/96/EC).

Warning

About the use:

- The calibrator **must not** be used for any purposes other than those described in this manual, as it might cause a hazard.
- The calibrator has been designed for **indoor use only** and is not to be used in wet locations.
- The calibrator is **not to be used in hazardous areas**, where vapour or gas leaks, etc. may constitute a danger of explosion.
- The calibrator is **not** designed for operation in altitudes above 2000 meters.
- The calibrator is a CLASS I product and must be connected to a mains outlet with a protective earth connection. Ensure the ground connection of the calibrator is properly connected to the protective earth before switching on the calibrator. Always use a mains power cable with a mains plug that connects to the protective earth.

- To ensure the connection to protective earth any extension cord used **must** also have a protective earth conductor.
- Only use a mains power cord with a current rating as specified by the calibrator and which is approved for the voltage and plug configuration in your area.
- Before switching on the calibrator make sure that it is set to the voltage of the mains electricity supply.
- **Always** position the calibrator to enable easy and quick disconnection of the power source (mains inlet socket).
- The calibrator **must** be kept clear within an area of 20 cm on all sides and 1 metre above the calibrator due to fire hazard.
- **Never** use heat transfer fluids such as silicone, oil, paste, etc. in the dry-block calibrators. These fluids may penetrate the calibrator and cause electrical hazard, damage or create poisonous fumes.
- The calibrator **must** be switched off before any attempt to service the instrument is made. There are no user serviceable parts inside the calibrator.
- When cleaning the well or insertion tube, **REMEMBER** to wear goggles when using compressed air!

About the front panel:

- The connections used to test thermostats must **NEVER** be connected to a voltage source.
- Thermostats must **not** be connected to any other voltage source during a test.

About the insertion tubes, insulation plug, well and sensor:

- **Never** leave hot insertion tubes which have been removed from the calibrator unsupervised – they may constitute a fire hazard or personal injury.

  If you intend to store the calibrator in the optional carrying case after use, you **must** ensure that the instrument has cooled down to a temperature **below 100°C/212°F** before placing it in the carrying case.

- **Never** place a hot insertion tube in the optional carrying case.
- Use only insulation plugs supplied by AMETEK Denmark A/S.

About the fuses:

- The fuse box must not be removed from the power control switch until the mains cable has been disconnected.
- The two main fuses must have the specified current and voltage rating and be of the specified type. The use of makeshift fuses and the short-circuiting of fuse holders are prohibited and may cause a hazard.

Caution – Hot surface

This symbol is engraved in the grid plate. 

- **Do not touch** the grid plate, the well or the insertion tube when the calibrator is heating up – they may be very hot and cause burns.
- **Do not touch** the tip of the sensor when it is removed from the insertion tube/well – it may be very hot and cause burns.
- **Do not touch** the handle of the calibrator during use – it may be very hot and cause burns.
- **Over 50°C/122°F**

  If the calibrator has been heated up to temperatures above 50°C/122°F, you must wait until the instrument reaches a temperature **below 50°C/122°F** before you switch it off.
- **Do not** remove the insert from the calibrator before the insert has cooled down to less than 50°C/122°F.

Caution – Cold surface

Below 0°C/32°F (applies only to the ITC-155 A models)

- **Do not** touch the well or insertion tube when these are below 0°C/32°F - they might create frostbite.
- If the calibrator has reached a temperature below 0°C/32°F, ice crystals may form on the insertion tube and the well. This, in turn, may cause the material surfaces to oxidize
  To prevent this from happening, simply heat up the calibrator to 100°C/212°F until all water left has evaporated.
  Remove the insulation plug while heating up.

  It is very important that humidity in the well and insertion tube is removed to prevent corrosion and frost expansion damages.

Caution…

About the use:

- **Do not** use the instrument if the fan is out of order.
- Before cleaning the calibrator, you **must** switch it off, allow it to cool down and remove all cables.

About the well, insertion tube and grid plate:

- The well and the insertion tube **must** be clean before use.
- **Do not** pour any form of liquids into the well. It might damage the well or cause a hazard.
- Scratches and other damage to the insertion tubes should be avoided by storing the insertion tubes carefully when not in use.
- The insertion tube must **never** be forced into the well. The well could be damaged as a result, and the insertion tube may get stuck.
- The insertion tube must **always** be removed from the

calibrator after use.
The humidity in the air may cause corrosion oxidation on the insertion tube inside the instrument. There is a risk that the insertion tube may be stuck if this is allowed to happen.

- If the calibrator is to be transported, the insertion tube **must** be removed from the well to avoid damage to the instrument.

Note…

The product liability **only** applies if the instrument is subject to a manufacturing defect. This liability becomes void if the user fails to follow the instructions set out in this manual or uses unauthorised spare parts.

3.0 Operating the calibrator

3.1 Before use

Warning

- The calibrator **must not** be used for any purposes other than those described in this manual, as it might cause a hazard.
- The calibrator has been designed for **indoor use only** and is not to be used in wet locations.
- The calibrator is **not to be used in hazardous areas**, where vapour or gas leaks, etc. may constitute a danger of explosion.
- The calibrator is **not** designed for operation in altitudes above 2000 meters.
- The calibrator is a CLASS I product and must be connected to a mains outlet with a protective earth connection. Ensure the ground connection of the calibrator is properly connected to the protective earth before switching on the calibrator. Always use a mains power cable with a mains plug that connects to the protective earth.
- To ensure the connection to protective earth any extension cord used **must** also have a protective earth conductor.
- Only use a mains power cord with a current rating as specified by the calibrator and which is approved for the voltage and plug configuration in your area.
- Before switching on the calibrator make sure that it is set to the voltage of the mains electricity supply.
- **Always** position the calibrator to enable easy and quick disconnection of the power source (mains inlet socket).
- The connections used to test thermostats (fig. 1 pos. 8 and 9) must **NEVER** be connected to a voltage source.
- Thermostats must **not** be connected to any other voltage source during a test.

- **Never** use heat transfer fluids such as silicone, oil, paste, etc. in the dry-block calibrators. These fluids may penetrate the calibrator and cause electrical hazard, damage or create poisonous fumes.
- The calibrator **must** be kept clear within an area of 20 cm on all sides and 1 metre above the calibrator due to fire hazard.
- Use only insulation plugs supplied by AMETEK Denmark A/S.

Caution – Hot surface

This symbol is engraved in the grid plate. 

- **Do not touch** the grid plate, the well or the insertion tube when the calibrator is heating up – they may be very hot and cause burns.
- **Do not touch** the handle of the calibrator during use – it may be very hot and cause burns.

Follow the instructions below before using the calibrator (cf. Fig. 1):

1. Place the calibrator on an even horizontal surface away from all draughts.

Caution…

Do not use the instrument if the fan is out of order. Ensure a free supply of air to the fan located at the bottom of the instrument (pos. 7).

2. Check that the voltage shown on the power control switch (pos. 5) is identical to the mains voltage.
3. Plug in the cable below the power control switch (pos. 6) and check that the earth connection is present.
4. Select an insertion tube (pos. 2) with a well diameter that matches the sensor (pos. 1) to be calibrated. Insert the insertion tube in the well of the calibrator

Caution…

- The well and the insertion tube **must** be clean before use.
- The insertion tube must **never** be forced into the well. The well could be damaged as a result, and the insertion tube may get stuck.
- **Do not** pour any form of liquids into the well. It might damage the well or cause a hazard.

5. Place the sensor (pos. 1) in the insertion tube (pos. 2) as shown in Fig. 1.
6. In order to spare the sensor and its connections it is recommended to use a heat protection shield (104216) at high temperatures.

3.2 Keyboard

The keys on the keyboard activate the following functions (cf. Fig. 2):

POS	Description
①	**UP ARROW** button used to adjust temperature values (value increases) and to select menu options.
②	**DOWN ARROW** button used to adjust temperature values (value decreases) and to select menu options.
③	**ENTER** button used to accept chosen options.
④	**ESC/MENU** button used to escape or to activate the menu system (hold button down for min. 2 seconds).
⑤	**AUTO STEP** button used to activate AUTO STEP. The function is used to switch between a series of set-temperatures automatically.
⑥	**SWITCH TEST** button used to activate SWITCH TEST. The function automatically detects the opening/closing temperatures for thermostats.

3.3 Display

The various segments of the display are used to indicate the following (cf. Fig. 2):

POS	Description
⑦	Used to display Read-temperature and parameters in the menu system.
⑧	Celsius temperature unit for top display.
⑨	Fahrenheit temperature unit for top display.
⑩	Celsius temperature unit for bottom display.
11	Fahrenheit temperature unit for bottom display.
12	Minute time unit for bottom display.

⑬ Used to display set-temperature, time-until-stable and parameter values in the menu system.

⑭ AUTO STEP symbol used to indicate that the function is active (symbol flashes repeatedly).

⑮ SWITCH TEST input closed.

SWITCH TEST input open.

⑯ Check mark displayed when the calibrator is stable.

3.4 Connections

The instrument is designed for the following connections (cf. Fig. 1):

POS	Description
⑧	Connection of black test cable -
⑨	Connection of red test cable +
⑩	Connection of RS232 cable **Note** that all PC-equipment, which are connected to the calibrator must observe the directive IEC950.

3.5 Calibrator functions - overview

The instrument's functions are divided into hierarchical groups. See the key diagram in Fig. 3.

3.6 Selecting the set-temperature

☞ Press ▲ or ▼. The current set-temperature flashes (the starting point is the last chosen set-temperature even if the instrument has been switched off).

☞ Press ▲ or ▼ to select the required temperature.

☞ Press ↵ to accept the change or ESC/MENU to cancel and return to the previous value.

The calibrator will now work towards the new set-temperature.

3.7 SWITCH TEST

The SWITCH TEST function (cf. Fig. 4) automatically locates the opening/closing temperatures of a thermostat. You must enter a T_{min} - and a T_{max} -temperature which define the range within which the opening/closing temperatures are expected to be found.

☞ Press SWITCH TEST. The last chosen T_{min} -temperature value will flash.

☞ Press ▲ or ▼ to set the required T_{min} -temperature.

☞ Press ↵ to accept your selection.

☞ Press ▲ or ▼ to set the required T_{max} -temperature.

☞ Press ↵ to accept your selection. The function is activated.

Once the opening/closing temperatures have been located, the instrument will display the values as CLOSE (the closing temperature), OPEN (the opening temperature) and HYSTE. (the difference between the opening/closing temperatures) respectively. If a temperature has not been found, the instrument will display Error.

☞ To display the three temperatures, press ▲ or ▼.

☞ Press ↵ to end the test or ESC MENU to leave the function at any time.

3.8 AUTO STEP

The AUTO STEP function (cf. Fig. 5) is used to step automatically between a range of different set-temperatures.

☞ Press AUTO STEP. The instrument displays the number of set-temperature STEPS.

☞ Press ▲ or ▼ to select the required number of steps.

☞ Press ↵ to accept your selection. The first set-temperature will flash.

☞ Press ▲ or ▼ to select the required temperature.

☞ Press ↵ to accept your selection. The next set-temperature will flash. This process will be repeated until the last value has been accepted. The extra TIME for which you wish the calibrator to remain at every step will flash.

☞ Press ▲ or ▼ to set the required number of minutes.

☞ Press ↵ to accept your selection. The function will be activated.

☞ Press ↵ after the last set-temperature to end the function or ESC MENU to leave the function at any time.

3.9 MENU

The MENU function (cf. Fig. 6) is used to modify the SETUP parameters.

☞ Hold down ESC/MENU for approx. 2 seconds. The word SETUP will appear on the display.

☞ Press ↵. The first SETUP parameter will be displayed.

☞ Press ▲ or ▼ to toggle between the SETUP parameters:

TEMP. UNIT:	Temperature unit °C or °F.
T-MAX.:	The highest permissible temperature for the calibrator.
SLOPE rATE:	Temperature change per minute used in connection with SWITCH TEST.
STABL. Add:	Extra time which must elapse once the well is stable before the check mark symbol is displayed.
RESOL.:	Temperature resolution of 0 or 1 decimal.

☞ Press ↵ to select the SETUP parameter you wish to change. The current value will flash.

☞ Press ▲ or ▼ to select the required value.

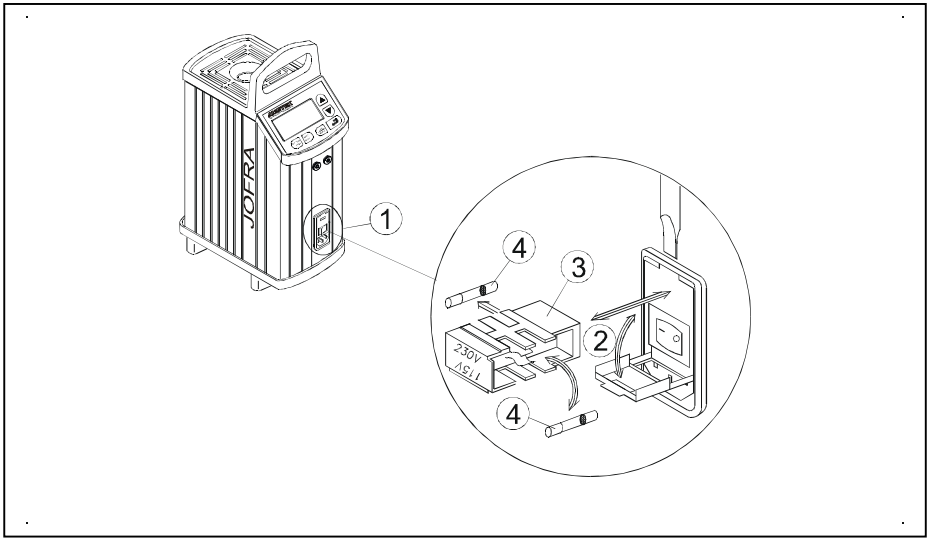
☞ Press ↵ to accept your selection or ESC/MENU to cancel and return to the previous value.

☞ Once you have changed all SETUP parameters as required, cancel the function by pressing ESC/MENU twice.

4.0 Setting the main voltage and replacing the fuses

Warning

- The fuse box must not be removed from the power control switch until the mains cable has been disconnected.
- The two main fuses must have the specified current and voltage rating and be of the specified type. The use of makeshift fuses and the short-circuiting of fuse holders are prohibited and may cause a hazard.



① Locate the main fuses in the fuse box in the power control switch and check the voltage of the power control switch (on/off switch (230V/115V)). If the voltage of the power control switch differs from the line voltage, you must adjust the voltage of the power control switch.

② Open the lid of the fuse box using a screwdriver.

③ Remove the fuse box.

④ Remove both fuses and insert two new fuses. These must be identical and should correspond to the line voltage.

- **ITC-155:** 115V, 2AT = 105014 / 230V, 1AT = 105007
- **ITC-320/650:** 115V, 10AF = 60B302 / 230V, 5AF = 60B301

If the fuses blow immediately after you have replaced them, the calibrator should be returned to the manufacturer for service.

Slide the fuse box into place with the correct voltage turning upwards.

5.0 After use

Warning

Never leave hot insertion tubes which have been removed from the calibrator unsupervised – they may constitute a fire hazard or personal injury.

If you intend to store the calibrator in the optional carrying case after use, you **must** ensure that the instrument has cooled to a temperature **below 100°C/212°F** before placing it in the carrying case.

Caution…

- The insertion tube must **always** be removed from the calibrator after use.

  The humidity in the air may cause corrosion oxidation on the insertion tube inside the instrument. There is a risk that the insertion tube may get stuck if this is allowed to happen.
- If the calibrator is to be transported, the insertion tube **must** be removed from the well to avoid damage to the instrument.
- Scratches and other damage to the insertion tubes should be avoided by storing the insertion tubes carefully when not in use.

Caution – Hot surface

- **Do not touch** the grid plate, the well or the insertion tube - they may be very hot and cause burns.
- **Do not touch** the tip of the sensor when it is removed from the insertion tube/well – it may be very hot and cause burns.
- **Do not** remove the insert from the calibrator before the insert has cooled down to less than 50°C/122°F.

5.1 Switching off the calibrator

The following routine must be observed before the insertion tube is removed and the instrument switched off (cf. Fig. 1):

1. If the calibrator has been heated up to temperatures above 50°C/122°F, you must wait until the instrument reaches a temperature **below 50°C/122°F** before you switch it off.
2. If the calibrator has reached a temperature below 0°C/32°F, it should be heated momentarily to a temperature of 100°C/212°F.
3. Switch off the calibrator using the power control switch (pos. 5).
4. Remove the insertion tube from the calibrator using the tool supplied with the instrument.
5. **Optional:** Store the calibrator in the carrying case.

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