

PRESYS®



Dry Block Temperature Calibration TG-25N

Technical Manual



WARNING!

Avoid electric shock risk on touching the equipment:

- Use only suitable power cable with earth connection;
- Never power the equipment to the mains socket with no earth connection.



WARNING!

High voltage is present inside these equipments. It can cause great damages and injuries.

Do not make any repair service inside the equipment without removing the plug from the supply.



WARNING!

Much electromagnetic noise can cause instability to the equipment.

The equipment is provided with electromagnetic interference filters that protect not only the mains but also the equipment itself against noise. These filters have no function if the unit is not earthed properly.



WARNING!

High temperatures are achieved in these equipments.

Risk of fire and explosion are present in case safety measures are not taken. Sign by means of warnings the hazardous areas at high temperatures.

Do not place the dry-block on inflammable surfaces or even on materials that can be deformed due to high temperatures.

Do not obstruct any air-vent to avoid risk of fire in the equipment.



WARNING!

The instruments described in this technical manual are equipment for use in specialized technical area.

The user is responsible for configuration and selection of values of the parameters of the instruments.

The manufacturer warns against the risk of incidents with injuries to both persons and property, resulting from the incorrect use of the instrument.



WARNING!

Never remove the insert from the dry-block or the thermo-elements from the insert, while they are in temperatures far from the ambient. Wait until they reach the ambient temperature so that the heterogeneous cooling of the parts do not jam each other. If, by chance, it happens a jamming situation, refer to item 6.2 - *Instructions for Insert Jamming* to proceed properly.

Disposal calibrator:



NO HOUSEHOLD WASTE!

The calibrator of the series TG Calibrator consist of various different materials. It must not be disposed of with household waste.

Warranty conditions are available on our website:

www.presys.com.br/warranty/

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1 - Introduction

1.1 - General



The TG-25N Dry Block Temperature Calibration Furnace is a dry-block furnace designed to generate temperatures between -25 and 140 °C for the calibration of temperature sensors (thermocouples, RTDs, thermal systems, etc.). The front panel features a microprocessor-based digital controller that controls the temperature through a precision Pt-100 sensor installed internally in the thermal block. The temperature and setpoint are indicated by two four-digit displays with a resolution of 0.1 °C.

The thermal block is equipped with an insert system (test blocks), consisting of interchangeable blocks with holes for the calibration of a wide dimensional range of standard or special temperature sensors (upon request). Independent of the main temperature control, there is a high-temperature protection and safety system that automatically disables the heating operation.

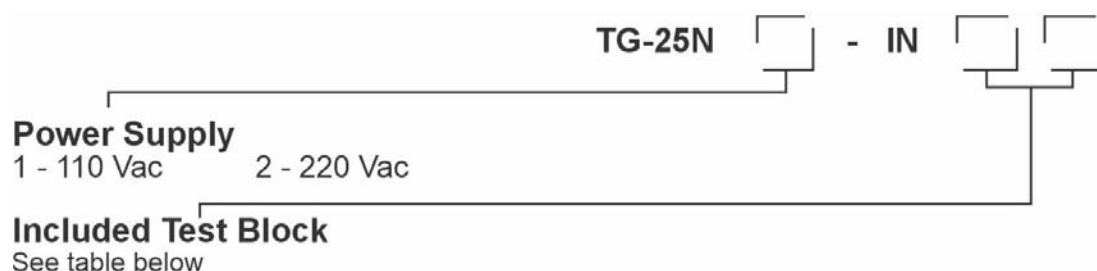
The furnace generates temperature with the stability required for the calibration of thermocouples and RTDs, by comparison with an external sensor when connected to a measuring instrument. Accuracy depends on the correct use of the equipment, and the temperature sensor must fit tightly into the test block; otherwise, considerable errors may occur. Careful reading of this manual is also strongly recommended.

It features RS-232 communication with microcomputers, allowing temperature monitoring.

1.2 - Technical Specifications

TG-25N	
Operating Range Ambient temperature: up to 23 °C	-25 °C to +155 °C
Display Accuracy	$\pm (0.1 \text{ °C} + 0.1 \% \text{ of reading})$
Resolution	0.1 °C
Stability	$\pm 0.06 \text{ °C}$
Axial Uniformity (40 mm)	$\pm 0.05 \text{ °C}$
Radial Uniformity	$\pm 0.01 \text{ °C}$
Heating Time	10 minutes (25 °C to 140 °C)
Cooling Time	11 minutes (25 °C to -20 °C)
Calibration Volume	Ø 25.4 mm (diameter) 125 mm (well depth)
Temperature Unit / Scale	°C
Dimensions (H × W × D)	340 x 200 x 320 mm
Weight	8.3 kg
Electrical Power	200 W
Operating Ambient Conditions	0 to 50 °C / 0 to 90 % UR
Power Supply	110 Vac or 220 Vac 50/60 Hz, according to the ordering code.
Warranty	1 year, except for Peltier effect elements

1.3 - Ordering Code



1.4 - Accessories

- **Test Blocks (Inserts):**

Description	Holes	Ordering Code
IN01	1 x 3/4"	06.04.0011-00
IN02	1 x 1/2"	06.04.0012-00
IN03	1 x 6,0 mm e 3 x 1/4"	06.04.0013-00
IN04	3 x 6,0 mm e 1 x 1/4"	06.04.0014-00
IN05	4 x 6,0 mm	06.04.0015-00
IN06	2 x 6,0 mm e 2 x 1/4"	06.04.0016-00
IN07	1 x 6,0 mm, 1 x 8,0 mm e 1 x 3/8"	06.04.0017-00
IN08	1 x 6,0 mm, 1 x 3,0 mm e 2 x 1/4"	06.04.0018-00
IN09	No hole, to be machined by the customer.	06.04.0019-00
IN10	Others, upon request.	06.04.0020-00
IN1P	1 x 3,0 mm, 1 x 6,0 mm, 1 x 8,0 mm e 1 x 1/4"	06.04.0121-00
IN1A	1 x 1/8", 1 x 3/16", 2 x 1/4" e 1 x 3/8"	06.04.0122-00
IN1E	1 x 4,0 mm, 1 x 6,0 mm, 1 x 8,0 mm, 1 x 10,0 mm e 1 x 1/4"	06.04.0123-00
INCL	Cup-Type Insert (supplied with metallic spheres)	06.04.0086-00

- **Included with the Calibrator:**

Insert selected by the customer

Insert Extractor (borehole according to the chosen model)

Power Cable (code 01.14.0086-00)

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- **Optional Accessories:**

Cup-Type Insert (code 06.04.0086-00),

Metallic spheres (code 03.03.0144-00),

Carrying Bag (code 06.01.1052-00).

2 - Operation

The TG-25N furnace uses a controller to monitor and control the temperature of the thermal block (displayed on the upper display) and to set the desired temperature value (setpoint shown on the lower display). Both values correspond to temperatures in degrees Celsius with one decimal place.

The setpoint value is changed directly using the UP and DOWN keys within the range of 25.0 °C to 140.0 °C. This value is stored in the controller memory so that, when powered on, the thermal furnace resumes controlling the setpoint that was in use before it was last switched off.

Figure 1 below shows the front panel of the controller.

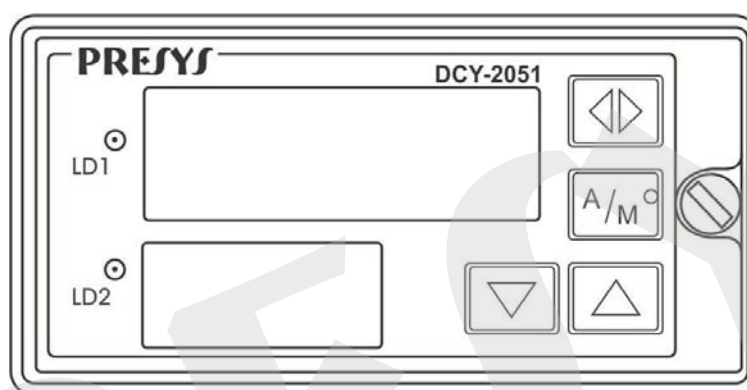


Fig. 1 - Controller Front Panel

The **ENTER** and **A/M** keys are not used during furnace operation.

No additional parameter configuration is required besides the setpoint selected by the user.

3 - Recommendations for Measurement Accuracy

PRESYS dry-block temperature calibrators are high-accuracy instruments, requiring that the procedures described in this section be followed in order to ensure the conditions necessary to achieve the specified accuracy levels during calibration.

- Special attention should be given to keeping the inserts clean. Whenever necessary, they should be washed with soap and water, thoroughly rinsed, and dried. Oil, grease, and solid particles may impair heat transfer to the insert and cause the insert to seize inside the thermal block.
- The sensor to be calibrated must fit tightly into the appropriate insert hole. Any clearance may significantly compromise measurement accuracy. The concept of clearance between the sensor and the corresponding hole should be interpreted subjectively, where good judgment is essential. Therefore, the sensor should fit snugly into the insert hole (both being perfectly clean). Once inserted, it should neither move nor wobble; however, it should not be forced into place, as this may cause it to seize.

- In the specific case of generating negative temperatures, calibrations should be performed following a sequence of decreasing temperature values. This procedure is necessary due to the formation of ice at negative temperatures on the surface of the insert and between the insert and the temperature sensor being calibrated. This moisture alters the thermal coupling between the parts and results in calibration errors. After using the insert below 0 °C, the temperature should be raised to positive values, the insert and the sensor should be removed from the thermal block, and all parts should be thoroughly dried before continuing the calibration. This procedure ensures an accuracy of approximately ± 0.2 °C. If this level of accuracy is not required, that is, if values greater than ± 0.3 °C are acceptable, these precautions may be disregarded.

3.1 - Achieving Maximum Furnace Accuracy

Temperature control is based on the temperature measurement provided by an internal sensor embedded in the thermal block.

This control sensor, together with the controller, is factory-adjusted using a high-accuracy reference thermometer. During manufacturing, the accuracy of the reference thermometer is transferred to the indication of the thermal block calibrator. This transfer is only effective when there is perfect temperature equalization (thermal equilibrium) between the internal control sensor and the reference thermometer. Therefore, there must be no clearance between the insert and the thermal block or between the probe and the insert. The internal sensor and the probe must also be positioned at the same insertion depth.

The user will obtain the maximum furnace accuracy specified in the technical manual if the same calibration conditions used at the factory are reproduced, that is, the same insert used during factory calibration, with no clearances, the same insertion depth, etc.

The key to achieving maximum accuracy with a dry-block temperature calibrator is to reproduce the same process used by the factory to calibrate the furnace itself.

Whenever accuracy greater than that specified in the technical manual is required, an external thermometer may be used as a reference or standard for comparison with the temperature sensor being calibrated. Since its stability is better than its accuracy, the user can take advantage of this characteristic by using a two-hole insert to compare the temperature indicated by the reference thermometer with that of the temperature sensor being calibrated..

4 - Safety Instructions

- Do not leave the area where the calibrator is operating without proper identification and warning signs.
- Before switching off the calibrator, return the thermal block temperature to a value close to ambient temperature.
- Never remove the insert from the thermal block, nor remove the temperature sensors from the insert, while they are at high temperatures. Wait until they have reached ambient temperature. Otherwise, uneven cooling of the parts may cause mechanical seizure between them.

5 - Maintenance

5.1 - Hardware Maintenance Instructions

There are no parts or components inside the temperature calibrator that can be serviced by the user. Only the 5 A power supply fuse, located next to the power inlet, may be replaced by the user.

A blown fuse may be caused by a power surge from the mains or by the failure of a calibrator component. Replace the fuse once. If a second fuse blows, the failure has been caused by an internal component of the calibrator. Return the calibrator to the factory for repair.

5.2 - Instructions for Insert Seizure

If, for any reason, the insert becomes seized inside the thermal block or a sensor becomes stuck inside the insert well, proceed as follows:

- 1 - Apply lubricating oil between the mating surfaces;
- 2 - Apply a cooling fluid inside the insert holes so that the insert contracts;
- 3 - Try again to remove the insert.

If the insert becomes seized, after removing it from the block, polish the affected surfaces with wet sandpaper, then polish them using a suitable polishing compound, and finally clean all parts thoroughly using alcohol or a suitable solvent.

6 - Steel Microspheres, Recommendations for Use and Safety Instructions

The furnaces may be supplied, as an optional accessory, with a plastic container holding small steel spheres. This accessory is exclusive to PRESYS furnaces, which also offers the insert called the "cup-type insert", a model with the largest available hole diameter (3/4"), specifically designed to be filled with the spheres.

Using the cup-type insert together with the steel spheres, it is possible to calibrate temperature sensors having irregular stem shapes or dimensions that do not match the available inserts. The sensor to be calibrated should be placed inside the insert, and the remaining volume should be filled with the steel spheres.

It is important to note that this type of calibration results in reduced accuracy because the furnace is always factory-calibrated using an insert whose hole perfectly fits the reference sensor used during calibration. Therefore, the accuracy specifications provided in this manual are no longer valid. In general, an increase of up to five times in the error values may be expected.

To use the steel spheres while maintaining highly accurate measurements, an external reference sensor should be placed together with the sensor being calibrated, with both immersed in the spheres. The sensors may be secured together by wrapping rigid copper wire several times around them, starting from their ends.

Safety Precautions:

Extreme care must be taken when using the cup-type insert and the steel spheres. Only insert or remove the spheres or the sensors when they are at ambient temperature. Operate the furnace in a suitable location where it cannot fall or tip over, preventing the hot steel spheres from spilling out and causing burns or other damage.

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