

TESTMAK CLIMATIC CHAMBERS



TESTMAK CLIMATIC CHAMBERS VOLUME RANGE OF 120 TO 18.000 LITERS

TESTMAK CLIMATIC CHAMBERS

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1. GENERAL DESCRIPTION

1.1 Handling of the operating instructions

These operating instructions are to be permanently available on the installation.

These operating instructions are to be read and applied by any person working on/with the installation, i.e.

- Operating, including equipping, care or trouble-shooting
- Service and maintenance
- Transport

These operating instructions aim at facilitating the knowledge about the machine and the machine handling.

These operating instructions include important remarks for a secure, correct and economic installation operation.

They contribute to avoid dangers, to prevent repair costs and to reduce the failure times as well as to increase the reliability and the serviceable life of the installation.

These operating instructions contain instructions and information concerning the TMT-9220 range of climate test cabinets. They describe the assembly, starting up and function of the installation. They also include details in the case of failures and for maintenance works. The code TMT-9220 is used in these operating instructions as a designation for Testmak brand climatic test chamber.

The type designation of the TMT-9220 range of cabinets consists of;

Temperature Range : -10°C / 60 °C

Humidity Range : 20% to 95%

Capacity : 500 Liters

We reserve the right to make technical modifications, compared with representations and information given in these operating instructions, aiming at an improvement of the installation, as long as they are not in contradiction with security aspects,.

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2. SAFETY DEVICE AND SAFETY REGULATIONS

2.1 Safety Device

Please read and follow the procedure below. If These are not read and applied, There may be injuries, performance decrease of the machine or financial damage. In such a case, every guarantee and reliability undertakings will be invalid.

- ✎ The machine is designed such that it must be used in the laboratory conditions. Do not set it in a dusty, humid or hot medium.
- ✎ Set the machine correctly, use it as described manner and do maintenance regularly.
- ✎ Contact with the technical service department in case the power cable or electrical cable is broken down.
- ✎ Some problems may caused by electrical equipment of the building. So the machine must be set into an electrically suitable medium. It is very important to ground the machine and that the earth of the electrical supply is in good condition. In the case of inefficent and non existent earth, there is a potential danger to operator, machine and the working performance of the Control Unit.
- ✎ Make sure the water inlet is connected to the device. Do not operate the appliance without water.
- ✎ No independent conversions or alterations may be made to the climate chamber. No parts may be added which have not been approved by the manufacturer.
- ✎ While the power cable is plugged into the mains or while the machine is running, do not remove any parts of the machine.
- ✎ Only qualified person should perform operation.
- ✎ Do not change the calibration settings of the machine.
- ✎ If the instructions given in troubleshooting can not help to solve your problem, plug out the power cable and call TESTMAK technical service.
- ✎ The machine must only be used with samples and apparatus given in the instruction manual. Do not use samples which has inappropriate specifications for the of the machine.

2.2 Safety Regulations

2.2.1 EC Directives and National Legislation

- EC Directive for machines 98/37/EC
- EC Directive on Low Voltage 73/23/EEC in the version 93/68/EEC
- Directive on EMC 89/336/EEC in the versions 92/31/EEC and 93/68/EEC
- Device safety law in the version of 28-09-95
- Directive for pressure devices 97/23 EC

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2.2.2 Mechanical Norms

- EN 292-1,2 (issue T1 11/1991 ; T2 06/1995)
- EN 294 (issue 08/1992)
- EN 378-1,2,3,4 (issue 06/2000)
- EN 563 (issue 01/2000)
- EN 61310-1,2 (issue 09/1996)
- DIN 8901 (issue 12/1995)

2.2.3 Electrical Norms

- EN 50081 (issue 03/1994)
- EN 61000-6-2 (issue 12/2001)
- EN 61010-1 (issue 03/1994)
- DIN 12880 (issue 11/1978)
- DIN VDE 0100-410 (issue 01/1997)
- BGV A2 (issue 1998)

2.3 Safety Remarks

2.3.1 Safety Words

The following signal words are used in these operating instructions

DANGER: An immediate threatening danger. If nothing is done to avoid it, death or very severe injuries will follow.

WARNING: A possibly dangerous situation. If nothing is done to avoid it, death or very severe injuries may follow.

CAUTION: A possibly dangerous situation. If nothing is done to avoid it, light injuries may follow.

ATTENTION: A possibly damaging situation. If nothing is done to avoid it, the product or something in its environment may be damaged.

REMARK: indicates application recommendations and other particularly useful situations

2.3.2 Warranty and Liability Attention:

It is absolutely necessary to read these operating instructions before starting-up the installation in order to prevent damages and failures due to wrong handling.

The operation of the installation as well as its maintenance must be performed by instructed and authorised personnel.

We decline any responsibility and any warranty in the case of handling malpractice against these operating instructions.

The installation has been checked before its delivery with respect to its perfect function and safety. Any modification of the installation requires the agreement of Testmak.

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2.3.3 Application in Accordance with the Purpose / Misuse :

The installation is designed, constructed and manufactured for the sole application consisting in trials for temperature and climate tests. The installation cannot be used for tests on explosive, corrosive, toxic or easy inflammable materials nor with specimens generating or releasing such materials.

DANGER:

No living being is allowed to stay in the test chamber. There is danger to life.

DANGER:

The preparation of any food with the installation is prohibited. The observance of the operating instructions and of the maintenance prerequisites as described, belong to the scope of applications in accordance with the purpose.

The installation is to be used only in a technically perfect condition, as well as in accordance with its purpose, under observance of safety rules and dangers, and following these operating instructions. Malfunctions must be eliminated immediately. The installation is built according to the to-date technical knowledge and recognised safety-related rules. Its application can however cause risks to the life of the user or to the life of third persons or prejudices to the installation or to other material property.

WARNING:

The owner must compile operating instructions for the operators of this installation regarding the security measures with regard to the handling of a refrigerating installation with the applied refrigerating agents.

2.3.4 Limits of the Machine:

Refer to the drawing of the devices (page 14) for the limits of the machine. The operation takes place from the door side.

2.3.5 Warning Against Remaining Dangers:

CAUTION :

Depending upon the test temperature set, there is a risk of injuries inside the test chamber, if you touch hot surfaces !

This is also valid after the test run

CAUTION :

Depending upon the test temperature set, there is a risk of injuries inside the test chamber, if you touch cold surfaces !

This is also valid after the test run.

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2.4 Safety devices / Protection Caps

The installation is equipped with the following safety devices:

- Maximum pressure governor in the refrigeration circuit
- Temperature limiter in the test space
- Specimen protection device (option)

If a safety equipment is actuated the installation remains switched off. A restart is only possible after the elimination of the trouble.

The installation is equipped with the following protection caps:

- Protection against accidental contact in the test chamber, for the elements in the air processing system.
- Protection cover for the electric section
- Protection covers for the machine section
- Protection against accidental contact with the fan on the condenser.

Warning:

Never remove the protection caps. The user has to check before any start whether all protection caps are correctly mounted. .

2.5 Behaviour in Case of Emergency in Relation with Refrigerating Agents

The installation is equipped with the following safety devices:

The safety data sheets for the applied refrigerating agents are to be observed!

Refer to the safety data sheets for the respectively necessary personal protection equipment.

CAUTION :

If missing of refrigerants, the chamber has to be switched off and service of Testmak has to be called. The security remarks in the safety data sheets in appendix has to be observed.

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3. TESTMAK CLIMATIC CHAMBER MODELS

Testmak is a company specialized in designing, developing, manufacturing and servicing of high quality material testing equipments.

Since 2008 we have been perfecting ways to create and control temperature, humidity and many other environmental conditions that respond to the needs of customers all around the world.

Only the highest quality components are used to manufacture our chambers so customers can have the best equipment for their research and testing purposes.



120 LITERS CLIMATIC CHAMBERS

Model	Capacity	Temperature Range	Humidity Range
TMT-9200	120 Liter	-10°C to +60°C	20% to 95% RH
TMT-9202	120 Liter	-20°C to +70°C	20% to 95% RH
TMT-9204	120 Liter	-40°C to +80°C	20% to 95% RH
TMT-9206	120 Liter	-50°C to +100°C	20% to 95% RH
TMT-9208	120 Liter	-60°C to +150°C	20% to 95% RH

250 LITERS CLIMATIC CHAMBERS

Model	Capacity	Temperature Range	Humidity Range
TMT-9210	250 Liter	-10°C to +60°C	20% to 95% RH
TMT-9212	250 Liter	-20°C to +70°C	20% to 95% RH
TMT-9214	250 Liter	-40°C to +80°C	20% to 95% RH
TMT-9216	250 Liter	-50°C to +100°C	20% to 95% RH
TMT-9218	250 Liter	-60°C to +150°C	20% to 95% RH

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500 LITERS CLIMATIC CHAMBERS

Model	Capacity	Temperature Range	Humidity Range
TMT-9220	500 Liter	-10°C to +60°C	20% to 95% RH
TMT-9222	500 Liter	-20°C to +70°C	20% to 95% RH
TMT-9224	500 Liter	-40°C to +80°C	20% to 95% RH
TMT-9226	500 Liter	-50°C to +100°C	20% to 95% RH
TMT-9228	500 Liter	-60°C to +150°C	20% to 95% RH

750 LITERS CLIMATIC CHAMBERS

Model	Capacity	Temperature Range	Humidity Range
TMT-9230	750 Liter	-10°C to +60°C	20% to 95% RH
TMT-9232	750 Liter	-20°C to +70°C	20% to 95% RH
TMT-9234	750 Liter	-40°C to +80°C	20% to 95% RH
TMT-9236	750 Liter	-50°C to +100°C	20% to 95% RH
TMT-9238	750 Liter	-60°C to +150°C	20% to 95% RH

1000 LITERS CLIMATIC CHAMBERS

Model	Capacity	Temperature Range	Humidity Range
TMT-9240	1000 Liter	-10°C to +60°C	20% to 95% RH
TMT-9242	1000 Liter	-20°C to +70°C	20% to 95% RH
TMT-9244	1000 Liter	-40°C to +80°C	20% to 95% RH
TMT-9246	1000 Liter	-50°C to +100°C	20% to 95% RH
TMT-9248	1000 Liter	-60°C to +150°C	20% to 95% RH

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1500 LITERS CLIMATIC CHAMBERS

Model	Capacity	Temperature Range	Humidity Range
TMT-9250	1500 Liter	-10°C to +60°C	20% to 95% RH
TMT-9252	1500 Liter	-20°C to +70°C	20% to 95% RH
TMT-9254	1500 Liter	-40°C to +80°C	20% to 95% RH
TMT-9256	1500 Liter	-50°C to +100°C	20% to 95% RH
TMT-9258	1500 Liter	-60°C to +150°C	20% to 95% RH

8000 LITERS CLIMATIC CHAMBERS

Model	Capacity	Temperature Range	Humidity Range
TMT-9260	8000 Liter	-10°C to +60°C	20% to 95% RH
TMT-9262	8000 Liter	-20°C to +70°C	20% to 95% RH
TMT-9264	8000 Liter	-40°C to +80°C	20% to 95% RH

12000 LITERS CLIMATIC CHAMBERS

Model	Capacity	Temperature Range	Humidity Range
TMT-9270	12000 Liter	-20°C to +70°C	20% to 95% RH
TMT-9272	12000 Liter	-40°C to +80°C	20% to 95% RH

18000 LITERS CLIMATIC CHAMBERS

Model	Capacity	Temperature Range	Humidity Range
TMT-9280	18000 Liter	-20°C to +70°C	20% to 95% RH
TMT-9282	18000 Liter	-40°C to +80°C	20% to 95% RH

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4. TECHNICAL & PHYSICAL PROPERTIES

TECHNICAL SPECIFICATIONS

Temperature Ranges	-10°C to +60°C -20°C to +70°C -40°C to +80°C -50°C to +100°C -60°C to +150°C
Precision	± 0,1 °C
Fluctuation	± 2,0 °C
Uniformity	± 2,0 °C
Humidity Range	20% to 95% RH
Precision	± 0,1 % RH
Fluctuation	± 5 % RH
Uniformity	± 5 % RH
Heating and Cooling speeds	Adjusted according to customer requirements

Physical Properties for TMT-9220

Power	220-240 V 50/60 Hz
Size(WxDxH)	950x1050x1850 mm
Weight (Approx)	210 kg

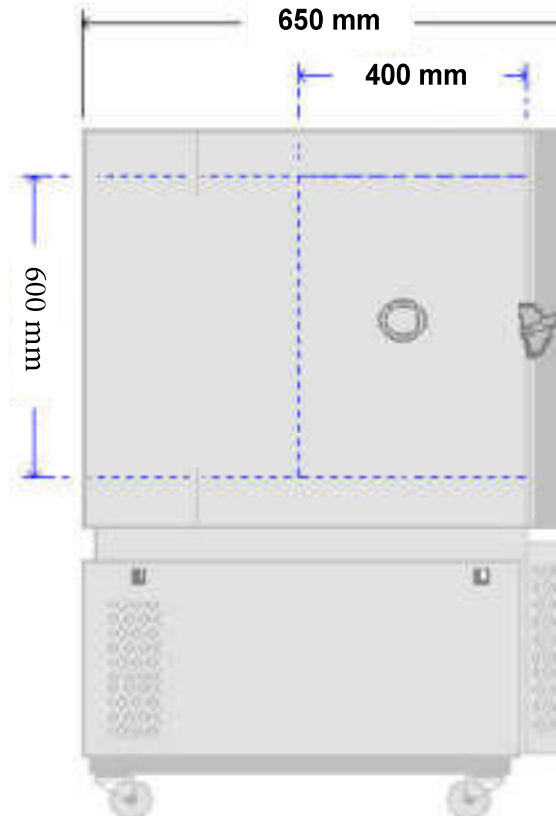
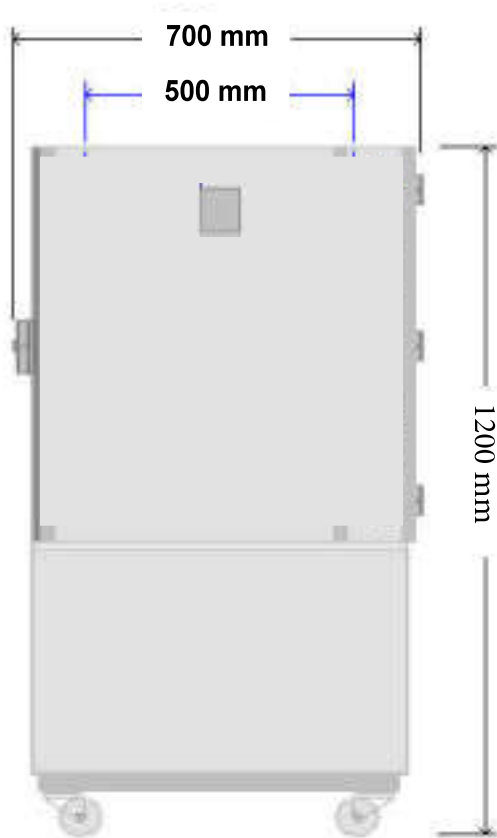
NOTE

Please inform to Testmak about specific cooling / heating requirements so we can provide with the most adequate solution. Standards systems can be upgraded to comply with more demanding cooling / heating speed requirements.

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120 LITERS CLIMATIC CHAMBERS

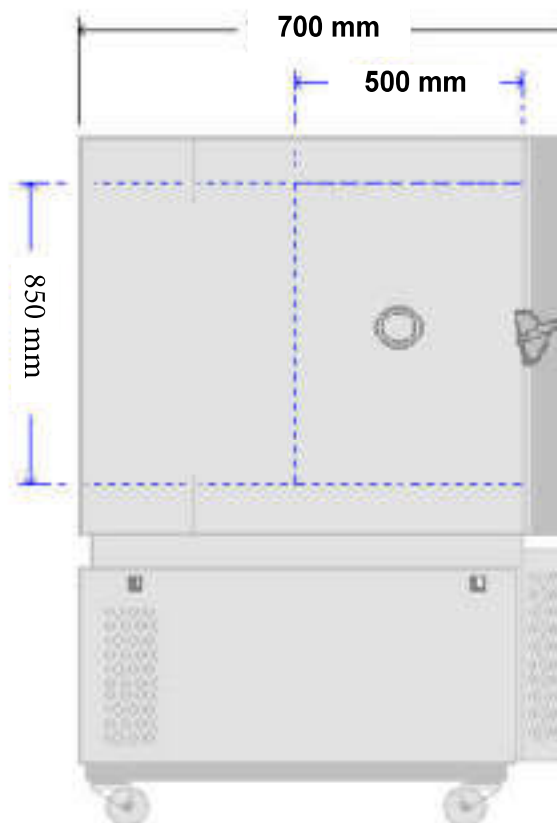
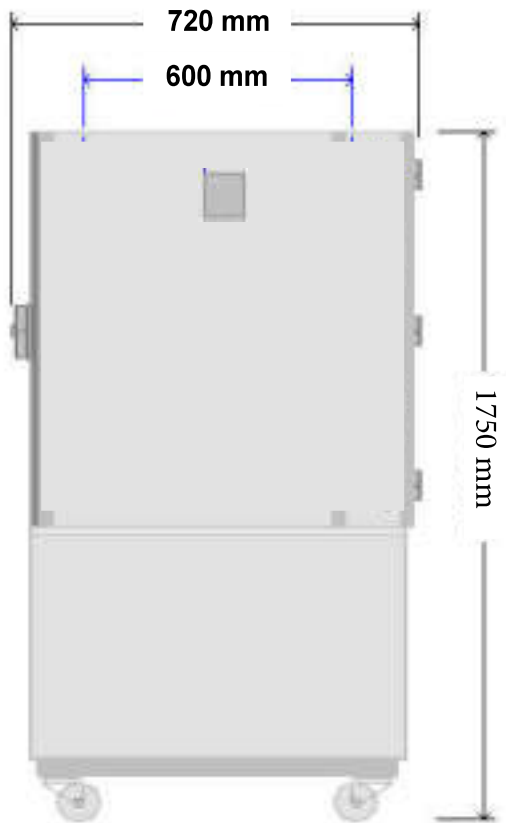
Dimensions	Height	Width	Depth
Internal	600 mm	500 mm	400 mm
External	1200 mm	700 mm	650 mm



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250 LITERS CLIMATIC CHAMBERS

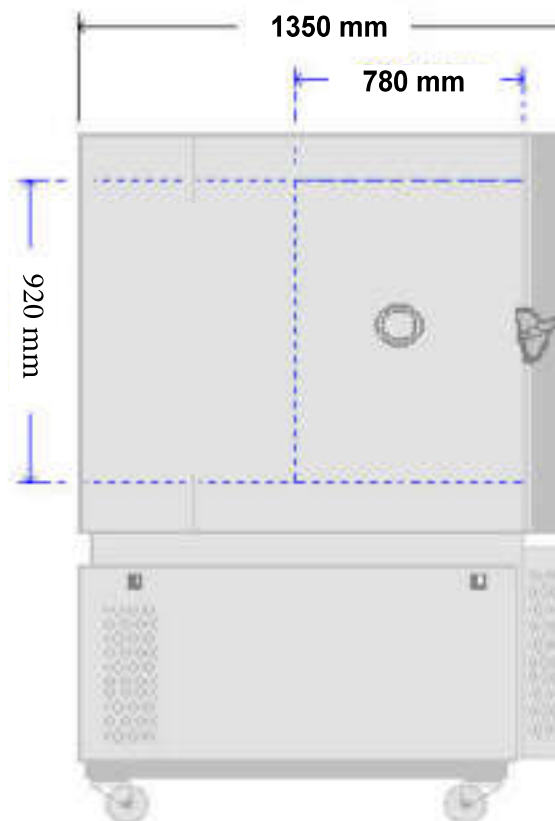
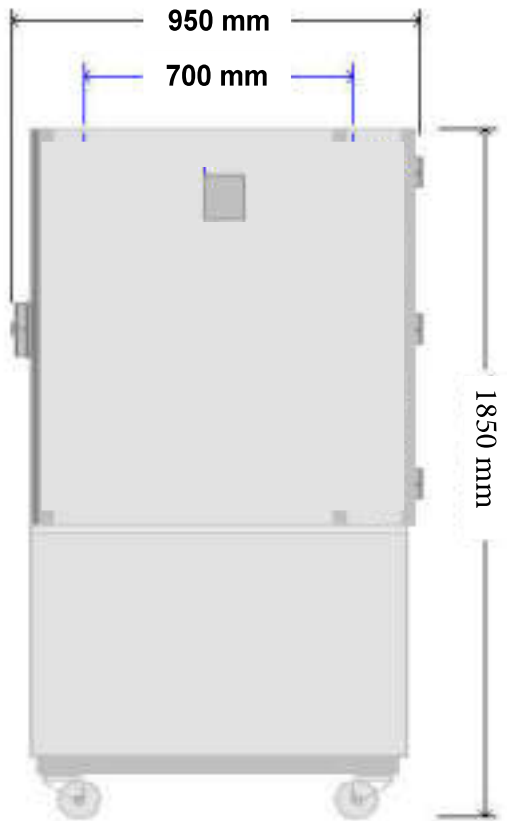
Dimensions	Height	Width	Depth
Internal	850 mm	600 mm	500 mm
External	1750 mm	720 mm	700 mm



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500 LITERS CLIMATIC CHAMBERS

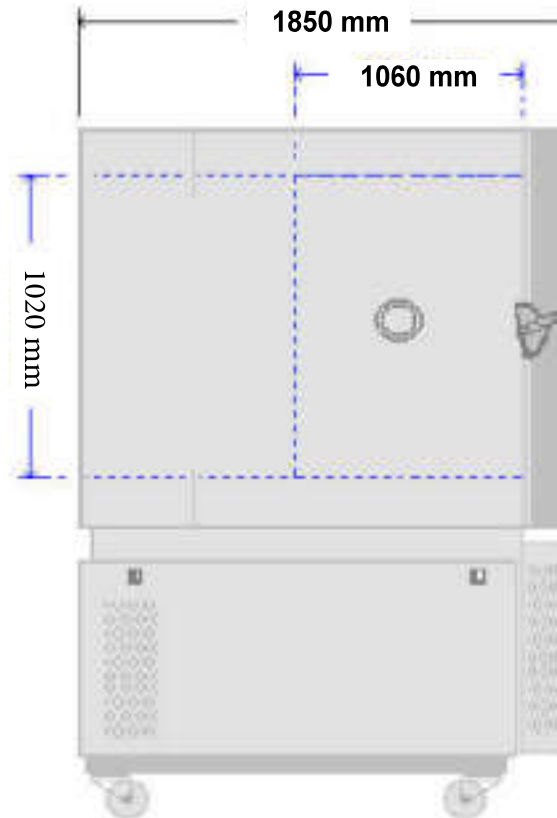
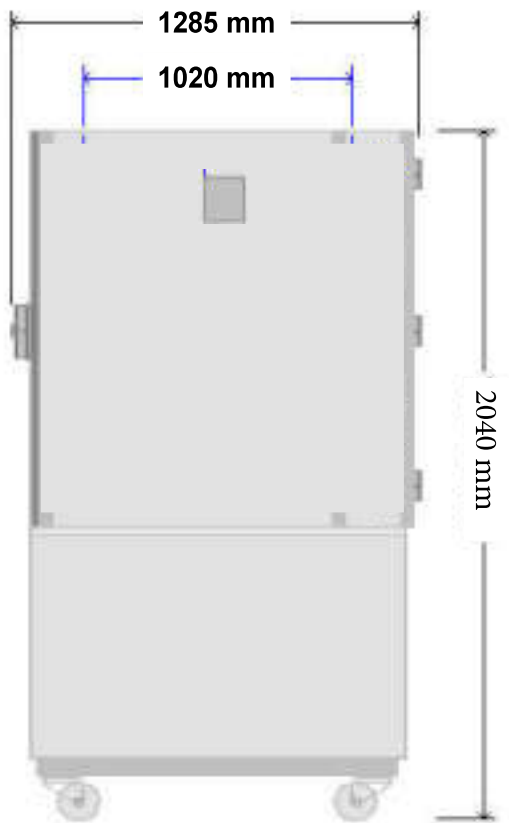
Dimensions	Height	Width	Depth
Internal	920 mm	700 mm	780 mm
External	1850 mm	950 mm	1350 mm



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1.000 LITERS CLIMATIC CHAMBERS

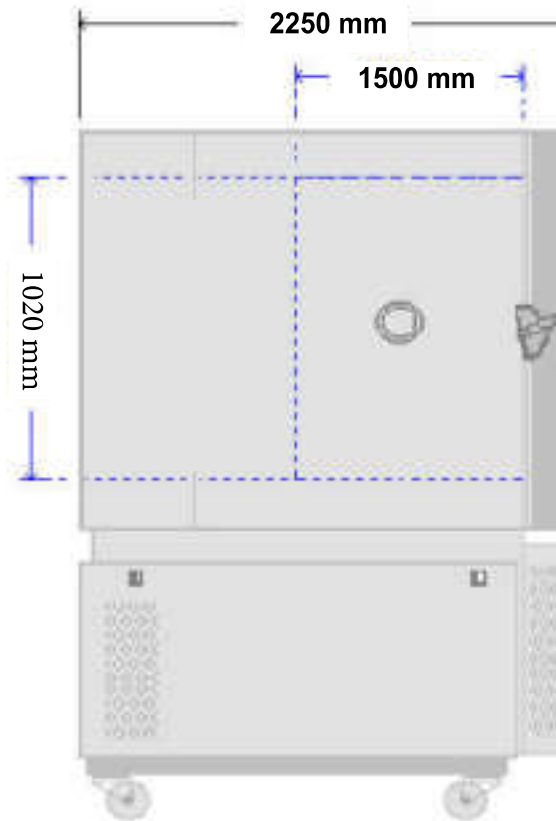
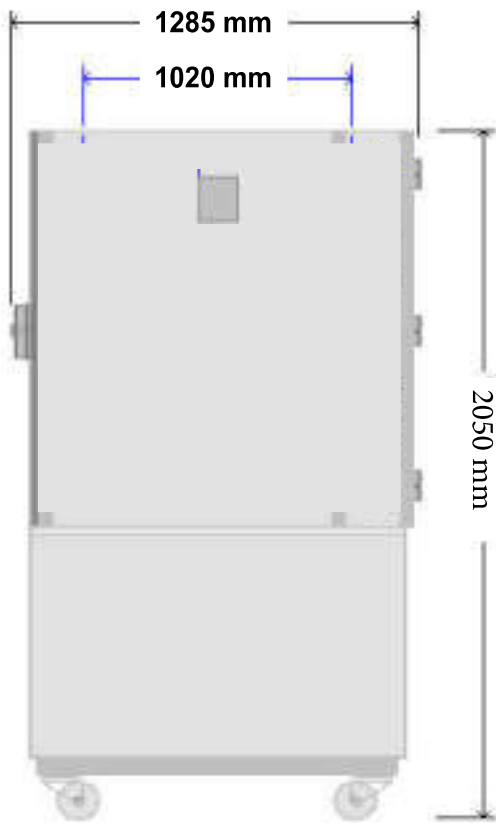
Dimensions	Height	Width	Depth
Internal	1020 mm	1020 mm	1060 mm
External	2040 mm	1285 mm	1830 mm



TESTMAK CLIMATIC CHAMBERS

1.500 LITERS CLIMATIC CHAMBERS

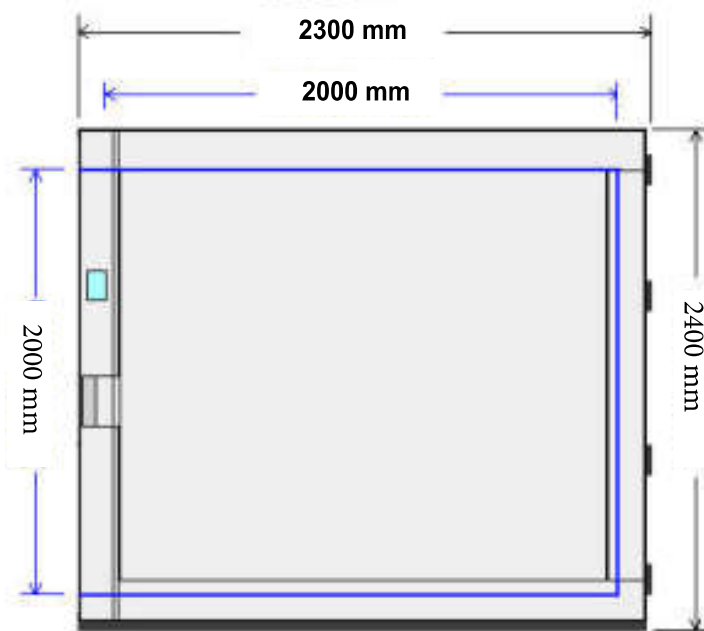
Dimensions	Height	Width	Depth
Internal	1020 mm	1020 mm	1500 mm
External	2050 mm	1285 mm	2250 mm



TESTMAK CLIMATIC CHAMBERS

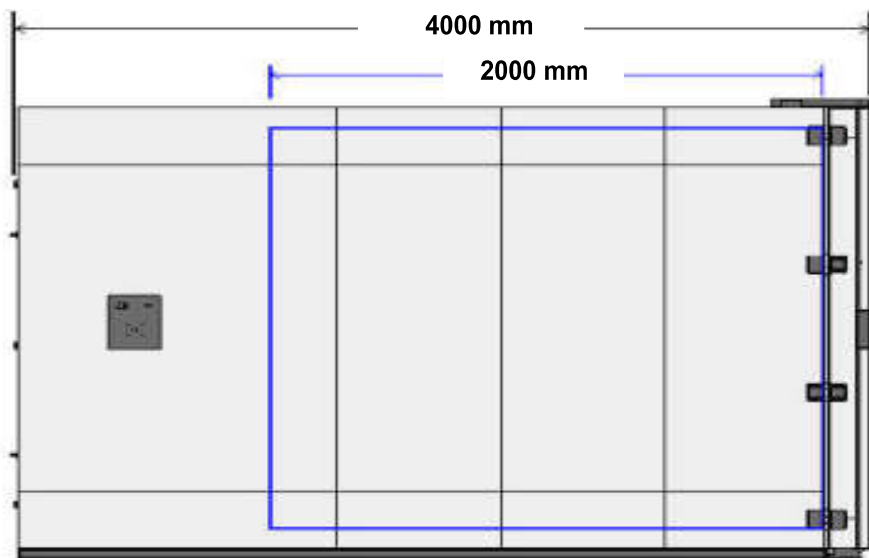
8.000 LITERS CLIMATIC CHAMBERS

Dimensions	Height	Width	Depth
Internal	2000 mm	2000 mm	2000 mm
External	2400 mm	2300 mm	4000 mm



NOTE

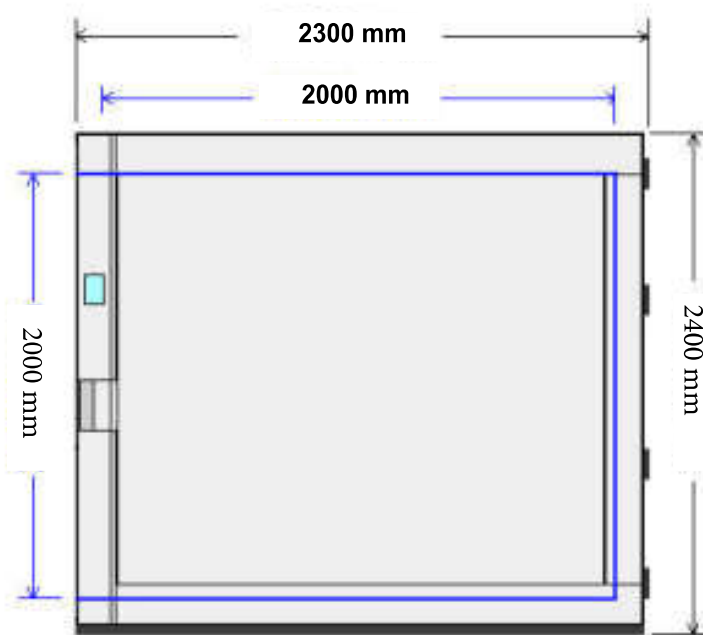
For quality and performance purposes the range chambers (8.000, 12.000 and 18.000 liters internal volume) require an additional external compressor group with approximately 2000mm(H)x2500mm(W)x1000mm(D).



TESTMAK CLIMATIC CHAMBERS

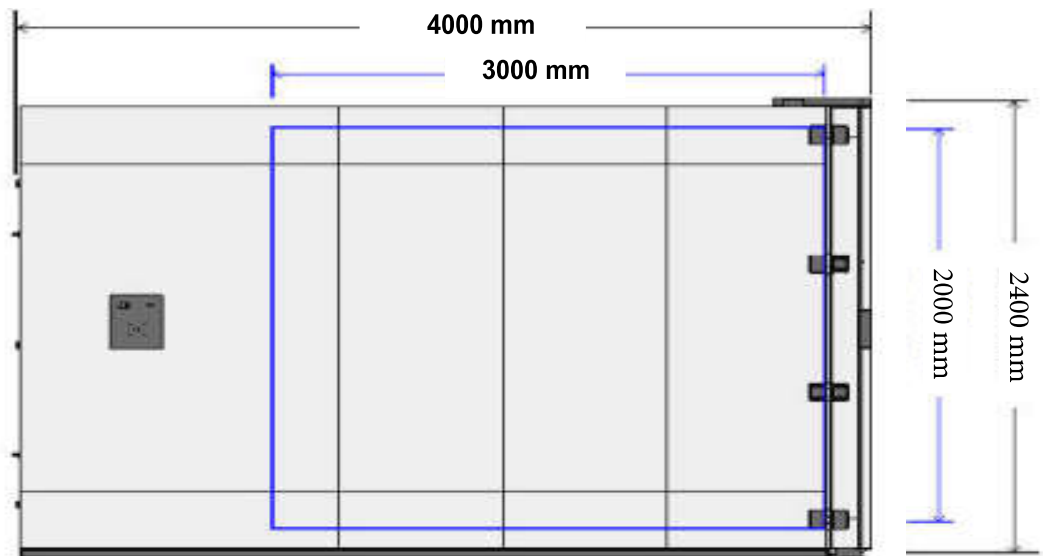
12.000 LITERS CLIMATIC CHAMBERS

Dimensions	Height	Width	Depth
Internal	2000 mm	2000 mm	3000 mm
External	2400 mm	2300 mm	4000 mm



NOTE

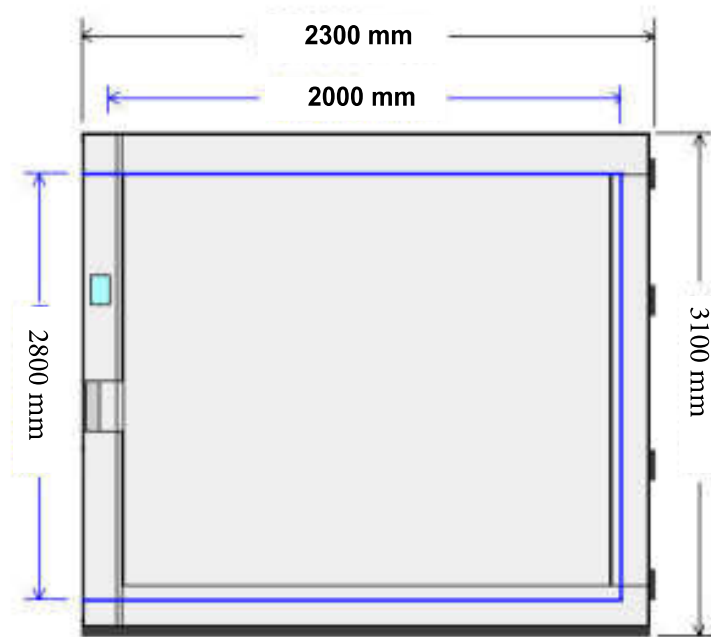
For quality and performance purposes the range chambers (8.000, 12.000 and 18.000 liters internal volume) require an additional external compressor group with approximately 2000mm(H)x2500mm(W)x1000mm(D).



TESTMAK CLIMATIC CHAMBERS

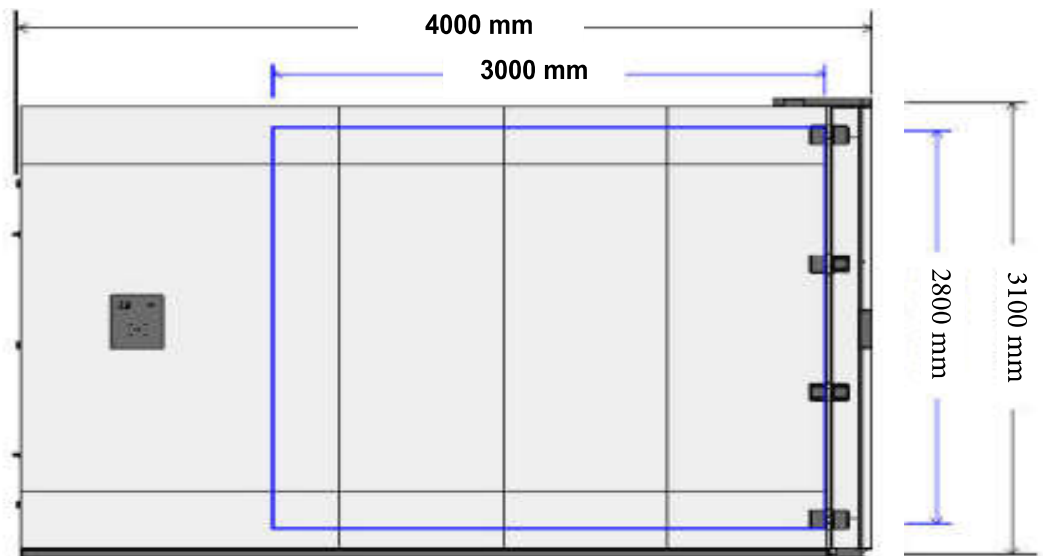
18.000 LITERS CLIMATIC CHAMBERS

Dimensions	Height	Width	Depth
Internal	2800 mm	2000 mm	3000 mm
External	3100 mm	2300 mm	4000 mm



NOTE

For quality and performance purposes the range chambers (8.000,12.000 and 18.000 liters internal volume) require an additional external compressor group with approximately 2000mm(H)x2500mm(W)x1000mm(D).

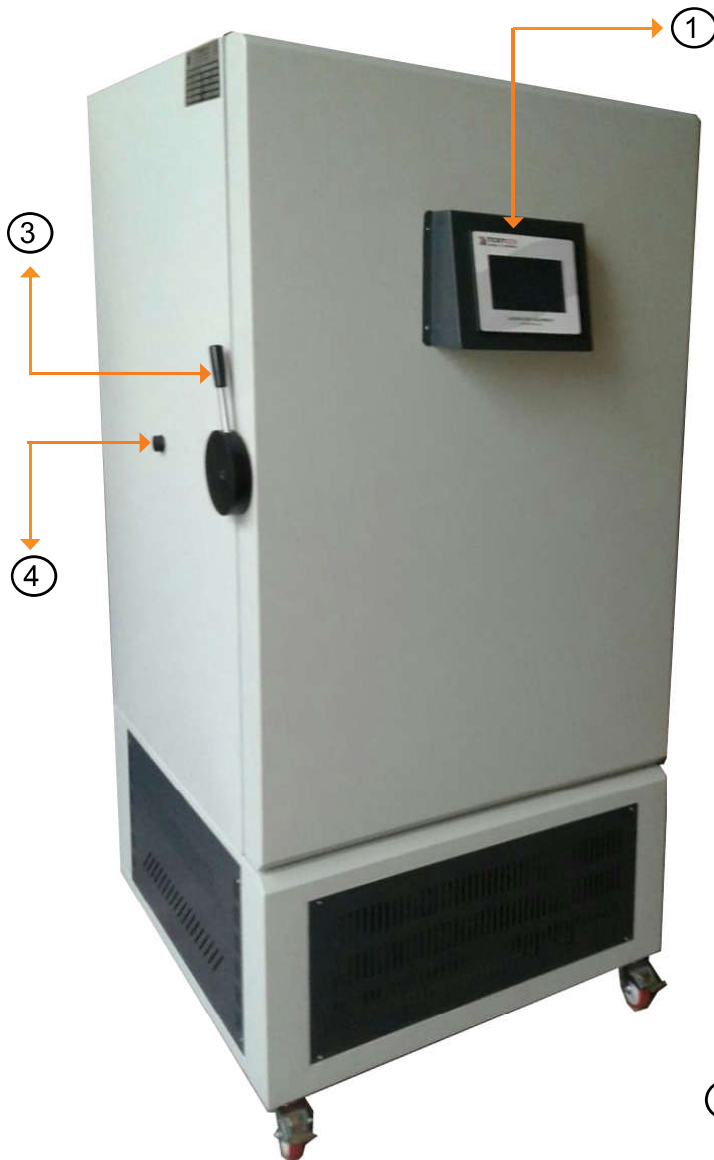


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5. CLIMATIC CABINET

5.1 Test Chamber

The test chamber consists of a stainless steel container and is welded vapour tight. The test chamber is easy to clean thanks to special welding. The rear test chamber wall incorporates a recirculated air duct with built in humidification/dehumidification system, built in heat exchanger, electric heaters and a recirculated air fan. The special air flow via baffle plates in the test chamber floor and ceiling produces optimum ambient air and temperature distribution. Test space illumination is provided.



1. Control Panel for Device
2. On / Off Button
3. Device Cover Opening-Closing Lever
4. Calibration Area
5. Water connect
6. Water connect apparat
7. Main switch
8. Excess water drain hose

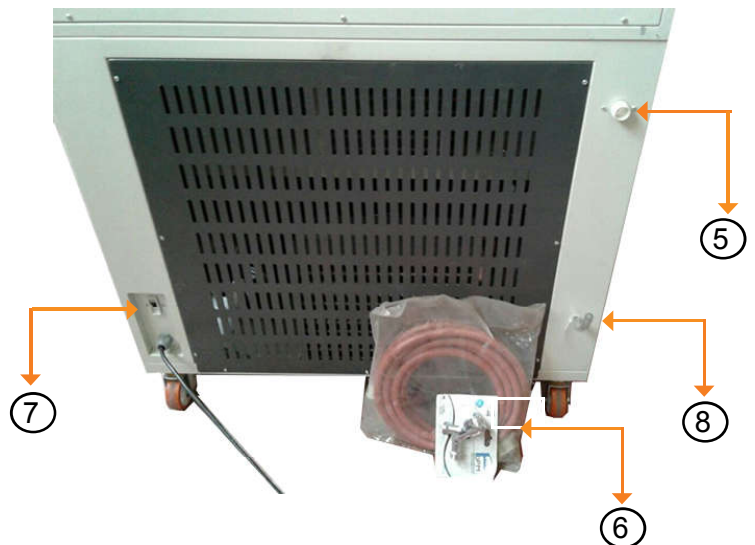


Figure 1: Climatic Cabinet

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Temperature

Control of temperature is done by the Delta PLC Touch Screen, high tech PID temperature and humidity control, developed by Testmak.

Temperature Precision (in the interior of the chamber, at 5 cm from walls, floor and top)

In Time : $\leq \pm 0,5^{\circ} \text{C}$

In Space: $\leq \pm 1,0^{\circ} \text{C}$

Temperature Sensors

One (1) PT 100 Class A, located in air treatment tunnel

Two (2) PT 100 Class A, movable sensors for flexible placing inside chamber (for 1.500 to 18.000 Liters)



Heating

By tubular stainless steel electric heaters located in the air treatment tunnel

Cooling

By airtight mechanical compressor group Secop brand (low noise, high efficiency) with enforced ventilation and without use of CFC's.

As an option the system can be cooled by an air / water condenser. Air is used by default and only in need of greater power is water used, thus increasing efficiency.

For -60°C models this option is required.



Thermal Security

Safety thermostat with High/Low temperature configuration, with automatic stop of all thermic systems.

High/Low temperature alarms programmed in the controller, with mute function. This function won't stop the chamber and it's only used to record the occurrence and to call the attention of the users with an audible alarm.

Humidity (chambers)

Control of humidity levels is done by Delta PLC Touch Screen, high tech PID temperature and humidity control, and developed by Testmak.

Humidity Precision (in the interior of the chamber, at 5 cm from walls, floor and top)

In Time $\leq \pm 1,0\% \text{ RH}$

In Space $\leq \pm 2,0\% \text{ RH}$

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Humidity Sensors (HTC11 Model)

To measure and control humidity, Testmak has different probing technologies: Psychometric, Capacitive, or both simultaneously. Consult Testmak for technical support on the appropriate selection.



Humidity / Drying

Humidity: Through thermostatic bath with dew point control.

Drying: Through thermostatic bath with dew point control and additional dry coil

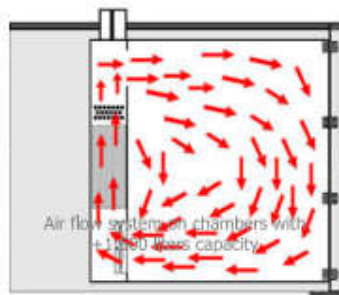
Security

Automatic stop function in case of water failure, with indication on the controller; High / Low Temperature alarms; High / Low humidity alarms;

Air Flow / Ventilation

Air Flow: Forced through 1 ventilators mounted at the top of the chamber.

Air Renovation: By lateral port, also for compensating pressure.



Construction

Construction Interior: AISI 304 hermetical welded, vapor tight, stainless steel

Exterior: Zinc mild steel with epoxy coating finish (color RAL 7035)

Insulation: Isolation foam

Interior illumination: Halogen lamp 12V (only available with optional window)

Door: Double silicone joints and anti-condensation heating frames. Automatic electric locks with emergency opening from the inside.

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Cut-off panel, Security and Communications

Mounted on left lateral and rear panel of the chamber and equipped with:

High / Low safety thermostat

Main Power switch

Audible alarms

USB Output

Optional Accessories

Software

Observational anti condensation windows in multi layered glass (for 8.000 to 18.000 Liters)

Water demineralizer (for Testmak Chambers)

Water conductivity monitor (for Testmak Chambers)

Additional entry ports with different diameters

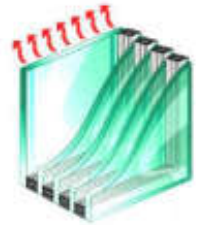
Calibration certificate from accredited laboratory

Casters with adjustable height

Rack system for solar panel support inside the chamber (for 8.000 to 18.000 Liters)

Window Option

The observation window is composed of a multilayered glass with optimum levels of thermal insulation. The interior and exterior glasses have a heating system that is activated in cold cycles and damp heat to prevent condensation at the surface. (for 8.000 to 18.000 Liters)



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Installation Requirements

To assure a correct functioning of the equipment, the following installation conditions are required:

Installation site

The place should be easily accessible, according to equipment dimensions and weight. It should have good air circulation and a room temperature between 10° and 26°C. The floor should be leveled and a minimum distance of 50 cm from the walls of other equipment must be kept.

Electrical supply

All Testmak 120 to 500 Liters climatic chambers are: 220-240 V 50/60Hz.

All Testmak 750 to 18.000 Liters climatic chambers are: 380 V % 50Hz.

Nominal current will vary from 16 Amp up to 150 Amp per phase, depending on model and required performance.

Humidification circuit and demineralized water (for Clima models)

The humidification circuit works exclusively with distilled or demineralized water. For this circuit, a water admission pressure of 1 to 6 bares and conductivity of $\leq 5\mu$ Siemens is required

Water circuit for cooling condenser (optional for -45°C and standard for -10°C)

A cold water circuit is required for the cold system condenser. Technical characteristics:

Water flow: 0,5 to 3 liters/hour maximum

Intake pressure: 3 to 6 bares

Water entry and exit pipe: 1"

Differential pressure between entry and exit: $> 2,5$ bares

Maximum temperature of water entry: 26°C

Adequate temperature of water entry: 18°C.

Drain

At floor level and near the equipment. The draining of the humidification and cooling systems water is done by gravity. For a correct draining there should be a minimum inclination of 10° in a descending trajectory from the chambers draining pipe until the sewage system.

TESTMAK CLIMATIC CHAMBERS

Humidity Diagram

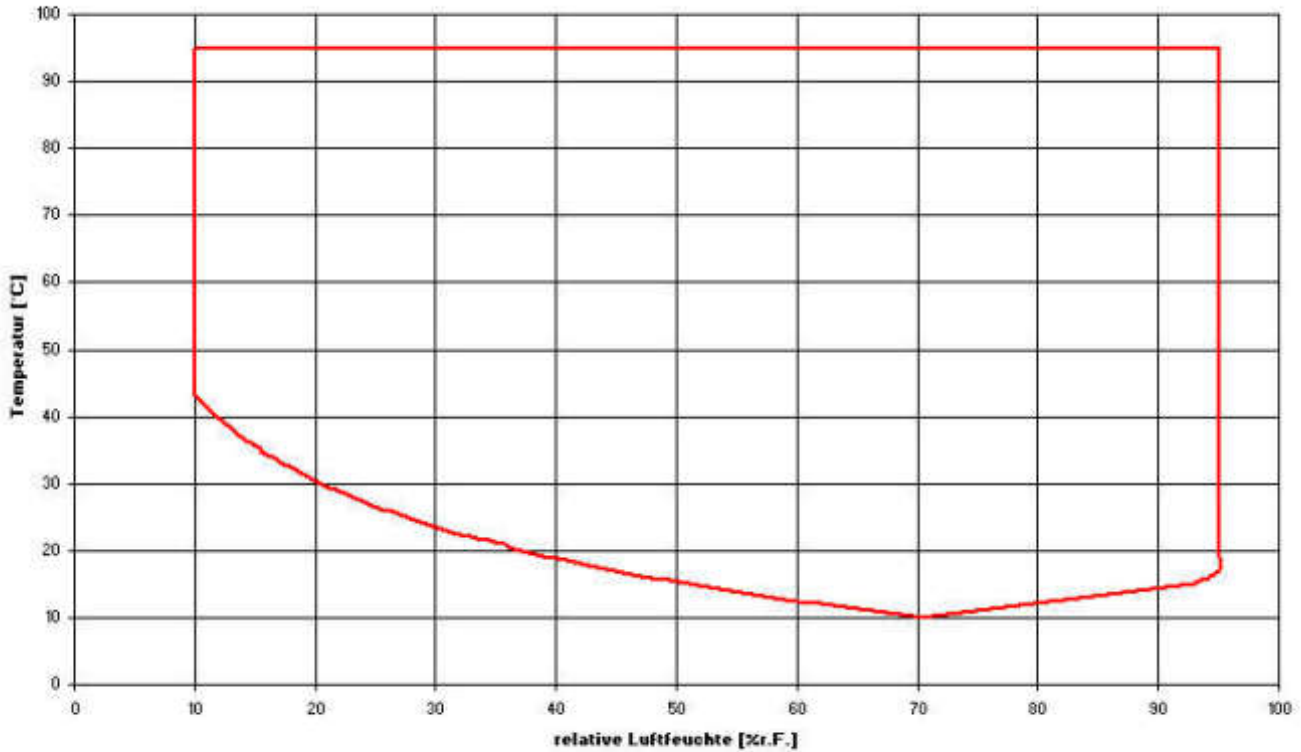


Figure 3: Humidity Diagram

TESTMAK CLIMATIC CHAMBERS

6. OPERATION WITH DELTA



- Touchpad screen
- Real time and date
- High performance temperature and humidity control with value correction possibility in all ranges
- Capability for creating 10 programs of 10 segments each
- Non-volatile memory
- Automatic restart of tests due to power failure, without losing data and restarting test where it was interrupted
- Real-time monitoring of all functions and control of equipment.
- Send all control settings and system software via USB to plant.
- Possibility of programming a delay of the beginning of test
- Monitoring and recording of all alarms
- Possibility of performing events by external commands USB output for computer connecting
- Alarms management Graphic representation of the tests ran
- Graphical visualization of the test in the controller.
- Possibility of running computer test programs and export them to the controller

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6.1 Delta Menus

Main Menu



Figure 4: Control Panel

LANGUAGE SELECTION

1. Turkish Language

2. English Language

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After selecting the language, the following menu is opened.

Select Program Menu



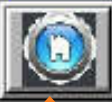
Figure 5: Select Program Menu

- 1- Up Button:** It provides movement in the upward direction to go to the test to be selected.
- 2- Down Button:** It provides movement in the downward direction to go to the test to be selected.
- 3- Setting Button:** This button is used to enter the factory setting page.
- 4- Recording Period Button:** It is used to determine for how many minutes intervals the records will be save.
- 5- Send Data to USB Button:** You can get the data as excel by completing registration when requested.
- 6- Select Program Button:** Used to select the desired saved program.
- 7- Program Step Button:** Used to sets the desired step program with this button. Can be entered ten steps.

TESTMAK CLIMATIC CHAMBERS

Program Step Menu

Step No		Cabin Temp.	Work Time		Cabin Humidity		Step	
			Hour	Minute			Hour	Minute
1	STEP ON	26.0 °C	2	0	HUMIDITY ON	95.0	☐	0 0
2	STEP ON	26.0 °C	2	0	HUMIDITY ON	85.0	☐	0 0
3	STEP ON	26.0 °C	2	0	HUMIDITY ON	75.0	☐	0 0
4	STEP ON	26.0 °C	2	0	HUMIDITY ON	65.0	☐	0 0
5	STEP ON	26.0 °C	2	0	HUMIDITY ON	55.0	☐	0 0
6	STEP ON	26.0 °C	2	0	HUMIDITY ON	45.0	☐	0 0
7	STEP ON	26.0 °C	2	0	HUMIDITY ON	35.0	☐	0 0
8	STEP ON	-10.0 °C	2	0	HUMIDITY OFF	# # , #%	☐	0 0
9	STEP OFF	0.0 °C	0	0	HUMIDITY OFF	# # , #%	☐	0 0
10	STEP OFF	0.0 °C	0	0	HUMIDITY OFF	# # , #%	☐	0 0



1

Program Name

TESTMAK

2

Repeat Time

5

3

Figure6: Program Step Menu

1- Home Button: Goes to the home screen menu.

2- Program Name: The desired program name is written.

3- Repeat Time: If it is desired to how much repeat the written program, the number of repet is entered in this section.

TESTMAK CLIMATIC CHAMBERS

Run Step Program Menu

dd/mm/yy

HH:MM:SS

Program No	Program Name	Number of Step	Repeat Step
1	TESTMAK	10 / 1	12 / 1

Step Set Values	Cabin Temp.	Cabin Humidity	Working Time		Ramp Time	
			Hour	Minute	Hour	Minute
	26.0 °C	51.8 %	123	12	12	12

Sample Temperature	Cabin Temperature	Cabin Humidity	Steam Temp.	Operating Time			Ramp Time		
				h	min.	sec.	h	min.	sec.
26.0 °C	26.0 °C	51.8 %	97.8 °C	123	12	12	123	12	12











1 ← 2 → 3

Figure7: Run Step Program Menu

- 1- **Home Button:** Goes to the home screen menu.
- 2- **Record Button:** Used to finish or start data record..
- 3- **START Button:** Used to run program.

TESTMAK CLIMATIC CHAMBERS

7. STARTING-UP: PREPARATION and EXECUTION

7.1 Requirements for the Place of Installation

Please take the quantity of refrigerant from the type plate of the chamber, the circuit with max. refrigerant filling will be considerable. The owner or the operator must take into account this conditions!

The admissible ambient temperature lies between +10 and +26°C, and the admissible ambient humidity between 20 and 75 % rel. humidity. The place must be well ventilated and dry. The floor must be plane.

7.2 Installation and Preparation of the Test Cabinet

ATTENTION:

Transport the test cabinet only with the supplied pallet! Refer to the technical specifications, page 11 for the weight.

Install the test cabinet as follows:

- 1- Unpack the test cabinet and check the extent of supply.
- 2- Remove the accessories from the test space or from the supplied boxes.
- 3- Adjust the test cabinet on the workshop floor using a spirit level and turning the adjustable footing.

ATTENTION: Never use the test cabinet without its adjustable footing or rollers!

- 4- If equipped with rollers, use the roll stop apparatus.
- 5- Discharge from test cabinet and condensate into gully hole to be arranged by the user.
- 6- Connect cooling water supply and runback pipes. Refer to page 20 for the position of the supply connections.

ATTENTION:

Absolutely keep following cooling water parameters:

- Supply temperature min.: 18°C
- Supply temperature max.: 26°C
- Water pressure: 3 - 6 bar
- Pressure lost: >2,5 bar
- Water consumption at $\Delta t_w = 10K$: approx. 0,5 liter/hour
- Particle-free water with pH-value ab. 7

7- Filling up of the reservoir canister of the climatic system positioned behind the front cover of the substructure.

TESTMAK CLIMATIC CHAMBERS

ATTENTION:

Repeatedly switching on the humidity system without water in the reservoir canister leads to a destruction of the backfeeding pump.

ATTENTION:

Absolutely keep the following parameters for the moistening water:

demineralized water with max. conductivity $\leq 5\mu$

pH-value 6 to 7

free of algae

ATTENTION:

Keep following parameters for the deionized water network!

Supply temperature max. 26°C

Pressure: 3 to 6 bar

No water hammers nor pressure variations within the system

ATTENTION:

A run-off hose connected by the user must be directed into the gully hole without any superelevation.

Minimum hose size R 1", maximum hose length 1.5m!

CAUTION:

The waste water can be very hot!

8- If Should you use a deionization device, connect it to the installation with the set of hoses belonging to the scope of supply. Connection at the bottom on the reverse side of the installation. The deionization device is connected by the user to an electric power supply (230V , 50 Hz) and to a service water network (R 1").

CAUTION:

Keep following water network parameters!

Supply temperature max. 26°C

Pressure: 3 to 6 bar

No water hammers nor pressure variations within the system

CAUTION:

For the connection of the deionization device, observe by all means the assembly and operating instructions, particularly the short instructions for beading gaskets and washers into the set of hoses.

CAUTION:

It is necessary to bleed at least 20 liter water when setting a deionization cartridge into operation in order to achieve the admissible conductivity. Only after that, the cartridge can be connected to the climatic test cabinet.

TESTMAK CLIMATIC CHAMBERS

CAUTION:

Control the display of the deionization device weekly.

9- Connect the compressed-air supply to a compressed-air ductwork system from the user.

REMARK:

If you put in wires or pipes, the entry port must be closed with plastic sealing. The sealing material must be appropriate for the range of temperatures.

10- Before connecting the electric power supply, check the tension, the frequency and the mains fuse at the user's workshop.

11- If the everything is correct, connect the test cabinet to the electric power supply.

ATTENTION:

Switch on the test cabinet only after it has reached the admissible ambient temperature of +10°C to +26°C!

TESTMAK CLIMATIC CHAMBERS

7.3 Starting-Up

- 1- Check whether all jobs described under 2.1 (Safety Regulations) or whether due maintenance jobs have been carried out
 - 2- Power on the device with the On / Off switch. Should see the On / Off switch lamp is on..
 - 3- Place a suitable specimen into the test space.
 - 4- After selecting the language, the menu1 (figure 5) is opened.
 - 5- Press the program step button on the **Select Program Menu** (figure 5).
 - 6- And will open **Program Step Menu**. (figure 6).
 - 7- The step will be active with pressing the step on button. (Will be green color.) (figure 6).
 - 8- Enter the will do test temperature value from cabin tempreature area. (figure 6).
 - 9- When the desired temperature is reached, enter the operating time with this temperature from work time area. (figure 6).
 - 10- If want to work with humidty, The Humudity will be active with pressing the on humidity button. (Will be green color.) (figure 6).
 - 11- There are 10 steps in the device. If you want to work several steps, those steps can be entered.
 - 12- Enter the will do test humidity value from cabin humidity area. (figure 6).
 - 13- If the desired to temperature want reached within a certain period of time, this time is entered from step area. (figure 6).
 - 14- The desired program name is written from program name area. (figure 6).
 - 15- If it is desired to how much repeat the written program, the number of repeat is entered from repeat time section. (figure 6).
- The device will automatically work between the values you enter.
- 16- Your device is ready for operation.
 - 17- Go to the main menu by pressing the main menu button. (figure 6).
 - 18- Go to the program name with the up and down arrow keys.
 - 19- The desired work program is selected with select program button.
 - 20- Press the start button for begin test.
 - 21- Press the record button for the save test result.
 - 22- When you want to get test results in excel format, press "home" button to go to "select program menu".
 - 23- Press "Send data to USB" button to transfer the records. Test results will be transferred in exel format.
 - 24- Turn off your device from the On / Off switch after the test is finished.
 - 25- When you want to start the test again, turn on the device with the On / Off switch.

TESTMAK CLIMATIC CHAMBERS

Main Menu

1- When the device is energized, the following menu is opened.



2- After selecting the language, the **Select Program Menu** (figure 5) is opened.

3- Press the program step button on the **Select Program Menu** (figure 5).

4- And will open **Program Step Menu**. (figure 6).

Select Program Menu (figure 5)



TESTMAK CLIMATIC CHAMBERS

Program Step Menu (figure 6)

Step No	Cabin Temp.	Work Time Hour Minute	Cabin Humidity	Step Hour Minute
1 STEP ON	26.0 °C	2 0	HUMIDITY ON 95.0	0 0
2 STEP ON	26.0 °C	2 0	HUMIDITY ON 85.0	0 0
3 STEP ON	26.0 °C	2 0	HUMIDITY ON 75.0	0 0
4 STEP ON	26.0 °C	2 0	HUMIDITY ON 65.0	0 0
5 STEP ON	26.0 °C	2 0	HUMIDITY ON 55.0	0 0
6 STEP ON	26.0 °C	2 0	HUMIDITY ON 45.0	0 0
7 STEP ON	26.0 °C	2 0	HUMIDITY ON 35.0	0 0
8 STEP ON	-10.0 °C	2 0	HUMIDITY OFF #.#.#%	0 0
9 STEP OFF	0.0 °C	0 0	HUMIDITY OFF #.#.#%	0 0
10 STEP OFF	0.0 °C	0 0	HUMIDITY OFF #.#.#%	0 0

Program Name: TESTMAK Repeat Time: 5

- 5- The step will be active with pressing the step on button. (Will be green color.) (figure 6).
- 6- Enter the will do test temperature value from cabin tempreture area. (figure 6).
- 7- When the desired temperature is reached, enter the operating time with this temperature from work time area. (figure 6).
- 8- If want to work with humdity, The Humudity will be active with pressing the on humidity button. (Will be green color.) (figure 6).
- 9- Enter the will do test humidity value from cabin humidity area. (figure 6).
- 10- If the desired to temperature want reached within a certain period of time, this time is entered from step area. (figure 6).
- 11- The desired program name is written fron program name area. (figure 6).
- 12- If it is desired to how much repeat the written program, the number of repeat is entered from repeat time section. (figure 6).
- 13- Go to the main menu by pressing the main menu button. (figure 6).

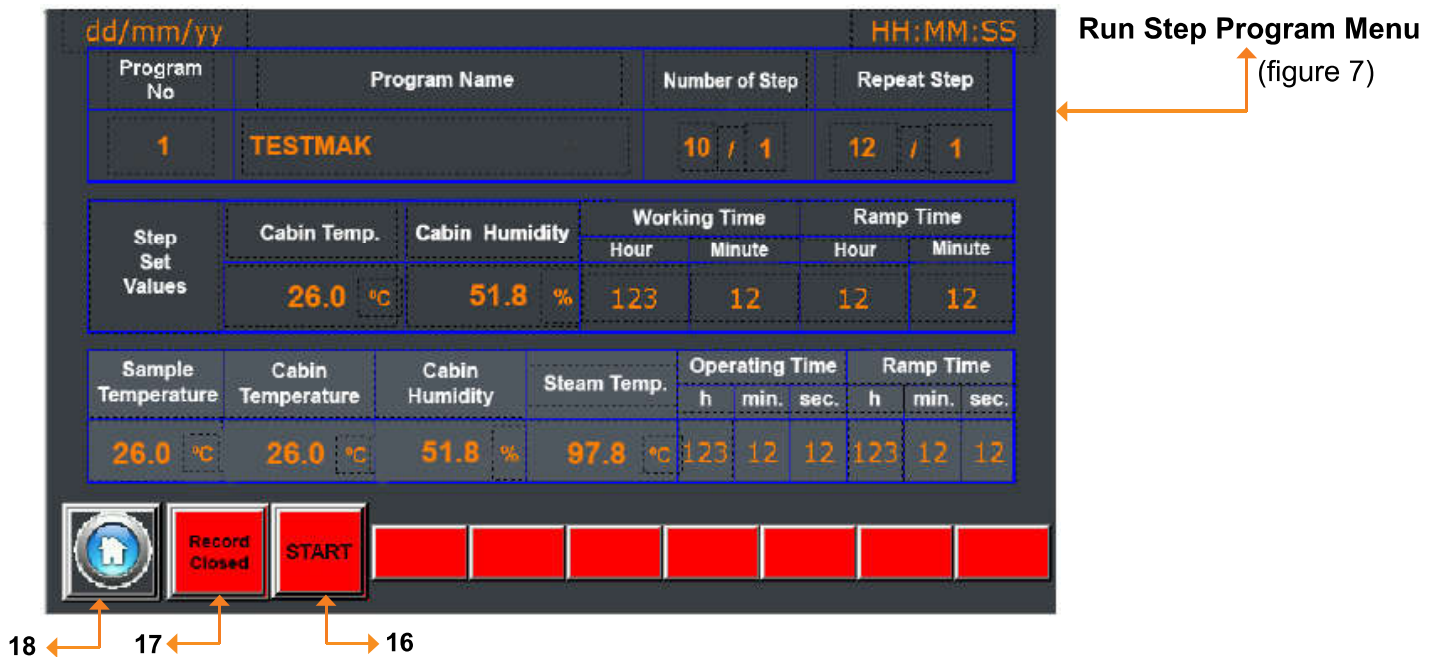
TESTMAK CLIMATIC CHAMBERS

Select Program Menu (figure 5)



14- Go to the program name with the up and down arrow keys.

15- The desired work program is selected with select program button.



16- Press the start button for begin test.

17- Press the record button for the save test result.

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- 18- When you want to get test results in excel format, press “home” button to go to “select program menu”.
 19- Press “Send data to USB” button to transfer the records. Test results will be transferred in excel format.

Select Program Menu (figure 5)



7.4 Closing Down

Before a longer standstill of the installation or in order to replace the water in the bowl-type humidifier, it is necessary to set the moisture channel first on zero. Before actuating the main switch, the installation must still run about 5 minutes with active temperature control.

The following storage conditions are to be observed for longer immobilisation periods:

Ambient temperature +10°C to + 26 °C

Dry, clean atmosphere

Even floor surface.

It is appropriate to cover the whole installation with a plastic sheet.

7.5 Shutdown, Disposal

Contact Testmak if an elimination is required after the shutdown of the installation. The owner must in particular take care that the elimination of the operating mediums (refrigerating agents, possibly heat transfer liquid and refrigerating machine oil) takes place professionally and correctly and according to the respectively valid state of the pertinent directives.

TESTMAK CLIMATIC CHAMBERS

8. MAINTENANCE

Our installations are to a large extent free of any maintenance. Regular attendance and maintenance do however contribute to a failure-free operation of your installation.

Maintenance jobs on the systems belonging to this installation are to be performed only by the manufacturer or his authorised representations.

CAUTION:

The owner or the operator must ensure that the installation is checked in a satisfying way, regularly monitored and maintained.

ATTENTION: :

Use only genuine spare parts.

WARNING: :

For any maintenance job, the main switch must be off and secured against any restart.

Some maintenance jobs which can be performed by trained personnel are listed here below.

Time	Element	Work Description
After each test	Test chamber	Clean test chamber. To prevent corrosion it is necessary to wash the sides of the test space as well as the bowl type humidifier and dehumidifier after each test with clear water. Scrapes in the test space container can be removed with an usual domestic cleanser for stainless steel.
	Test chamber door	Clean the seals with clear water. Check whether the door is really sealed all around.
	Condenser	Check dust deposits on the air-cooled condenser and clean it if necessary with a hand brush or a vacuum cleaner. For water-cooled condenser, clean the filter in the water feed.
If necessary	Humidity system	Clean the reservoir canisters with clear water.
	Inlet filter of humidity system	Replace the filter.
	Test chamber lighting	Change the bulb