

EXCAL

ENVIRONMENTAL **TEST CHAMBER**

ENVIRONMENTAL SIMULATION



Climats

A STEP FURTHER®



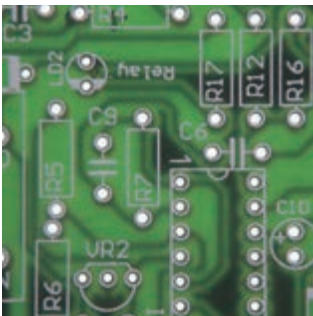
Aeronautics



Automotive



Testing laboratories



Onboard electronics



Renewable energies

EXCAL

ENVIRONMENTAL TEST CHAMBER

Climats's entire expertise in 8 EXCAL standard test volumes

Climats has been a specialist in environmental tests for almost 40 years, and designs and manufactures chambers that can simulate extreme and reproducible environments.

Present in sectors as diverse as automotive, aeronautics, space, defence and telecommunications, Climats helps guarantee the best level of performance, reliability and safety for your products.

Our "Research and Development" department, focusing entirely on quality and innovation, works towards improving the efficiency, adaptability and ergonomics of the EXCAL range. Our environmental test chambers are continuously changing to meet the latest testing standards.

cold	dry heat	temperature variation	humid heat	climatic cycles	frost	ice
NF EN 60068-2-1 NF EN 60068-2-50 GAM EG 13 fasc 01 MIL STD 810/502-2	NF EN 60068-2-2 NF EN 60068-2-51 GAM EG 13 fasc 02 MIL STD 810/502-2	NF EN 60068-2-14 GAM EG 13 RTCA DO160 SECS5	NF EN 60068-2-30 NF EN 60068-2-38 NF EN 60068-2-78 GAM EG 13 fasc 03 MIL STD 810/507 RTCA DO160 SEC6 NF C 20-703	GAM EG13 fasc 08	FREEZE/THAW	

Examples of managed test references

An entirely French design

Every year, over 700 environmental test chambers are designed, manufactured and assembled in our Bordeaux production unit. Today, we are pleased and proud to introduce a completely new generation of EXCAL environmental test chambers, which is the result of Climats's experience and expertise.



We design environmental test chambers helping you to push the boundaries further every day...

YOU ARE RIGHT TO CHOOSE AN EXCAL!

A customised environmental test chamber

Your applications require specific functions and capacities, which is why Climats has a wide range of comprehensive standard machines. Our volumes have been designed and engineered so that you can add any of the options enabling you to customise **your EXCAL** to your needs.

High end technology

Spirale 3 is the reference software solution for controlling over 4,000 environmental test chambers and test benches worldwide. It was developed by Climats's engineers for simple and efficient management of your machine.

Spirale 3 is a reliable and accurate system, a complete software package, adapted to testing equipment and maintenance user requirements. **Spirale 3** is also a completely open system that can be used for developing automatic functions and integrating data and additional data acquisition systems, to make **your EXCAL** a fully integrated test bench.

Energy saving

10 years of continuous research and development have culminated in the development of a revolutionary feature for protecting the environment.

Unique on the market, the **Energy Saving** control mode, in **Spirale 3**, scrupulously controls your energy consumption. A saving of at least 40% can be made on the electrical consumption of your typical cycles.

You can monitor the instant electrical consumption of the chamber during the test or check the total consumption for the whole test.

Reduced water consumption for the cooling system also constitutes a new environmental breakthrough.

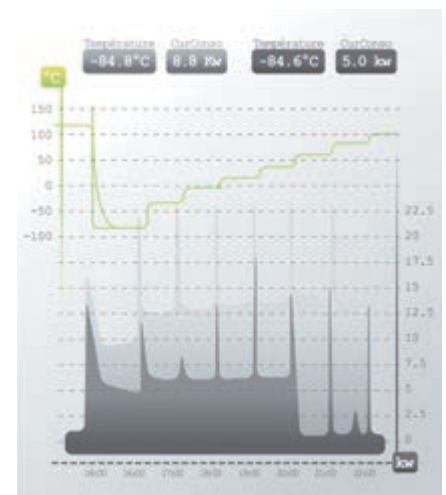
Even more reliable

A new regulation system has been developed, incorporating feedback from our customers and our research on ecological advances. So, the Energy Saving mode helps to significantly reduce the load on the various components involved in refrigeration (solenoid valves, compressors and fans). **Spirale 3** autonomously and optimally manages the production of cold and heat.



All of our environmental test chambers are controlled by the software solution

Spirale 3



This standard test cycle clearly shows the energy saved with the "Energy saving" cycle (dark grey curve) compared with a cycle without this mode (light grey curve). Electrical consumptions are displayed instantly.

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Innovation

Enhance your test laboratory thanks to the modern design, and pure and elegant lines of the new EXCAL.

The most advanced technology

EXCAL is equipped with a 15 inch capacitive multitouch Panel PC, an SSD memory, Windows 7 and 2 USB ports. It therefore includes all of the latest technological advances.

Even greater connectivity: you have the possibility of networking your equipment, developing automatic functions, and having a completely upgradeable machine. Your connections are now completely centralised on the User Interface Panel (UIP).

A vast range: choose the foot print suitable for your work space.

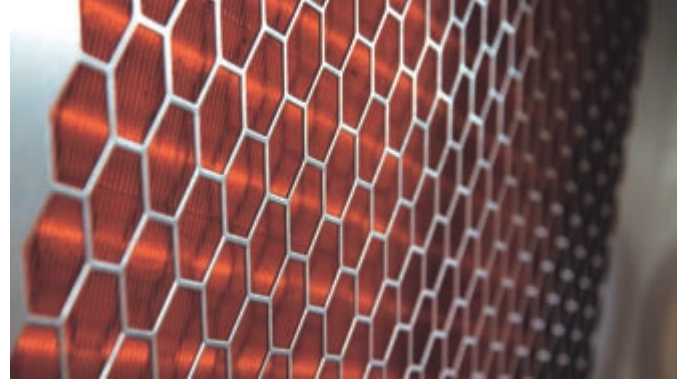


Choose your cooling mode

Your chamber can be **equipped with a water or air-cooled condenser.**

Improved sound insulation and more stable performances, regardless of the ambient temperature of your test room.

Installing an EXCAL environmental test chamber equipped with an air-cooled condenser in your work space couldn't be easier, all you need is an electrical connection.



Ergonomy

8 standard solutions:

140 l, 220 l, 400 l, 540 l, 770 l, 1000 l, 1400 l, 1800 l.



For **ideal positioning of your products in the chamber**, shelves are arranged throughout the entire height of the test volume. You can optimise your tests using several shelves for the same test.

Totally adaptable test spaces. Depending on your requirements, we can integrate fastener inserts, specific mechanical and electrical fittings or make specific penetrations (air extractor, gas injection, sampling).



The new design door **can be opened fully and provides easy access** for introducing your test products into the chamber. The door can be closed with one hand thanks to the solid and robust handle.

Keep in touch with your tested products using the Ø 80 mm portholes on each side, as standard.

Depending on the connectors and positions indicated in the specification, optional diameter (Ø 100 mm, 150 mm, 200 mm) or any other shape portholes are available.

During testing, a large anti-condensation window offers **maximum visibility of the materials being tested.**

The materials constituting the test space (304L stainless steel) are resistant and scratch-proof. Treatment against chemical hazards (316L stainless steel) is offered as an option. The condensates flow directly on to the inclined base for **rapid cleaning.**

Performances

Homogeneity: +/- 0.5 °C to +/- 1.8 °C

Temperature regulation stability:
+/- 0.1 °C to +/- 0.3 °C

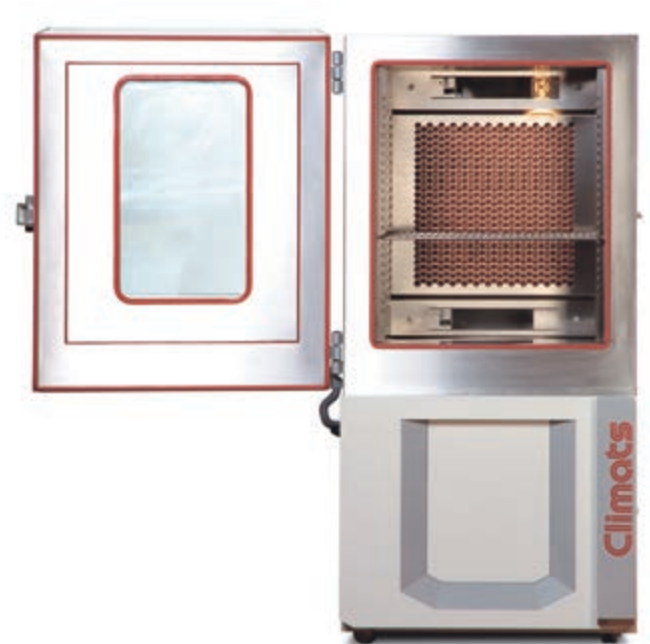
Humidity regulation stability:
+/- 1% to +/- 3%

Temperature range: -40 °C +180 °C/-90 °C +180 °C
Optional: Extension +200 °C and up to -100 °C

Transition speed: From 2 °C to 20 °C/min
18 refrigerating configurations

Humidity range: Stable and reproducible between 10% and 98%
Optional: Direct measurement/Saturation/Dry rate

Heat compensation: From 1000 W to over 10 kW



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Useful technology

Ergonomic control panel

The new hardware system includes the latest industrial innovations with the 15 inch capacitive multitouch Panel PC with SSD memory and Windows 7.

This solid and robust Panel PC is conveniently positioned so you can incline it as required.

Connect your USB stick directly to the screen or use the network connection to archive your tests.



User Interface Panel (UIP): centralised connections

Ever attentive to user comfort and driven by our desire to continuously improve our products, we have created a **space entirely dedicated to your connections**. A panel positioned on the side of the chamber is provided for this purpose.

As standard, you have a safety socket, a thermal fuse, status indicators and 4 dry contacts that can be configured in Spirale 3.

Other innovations: 2 mobile sensors for closer regulation of your products, an RS232 connector, 4 logical inputs/outputs, 4 analogical inputs/outputs that can be configured in Spirale 3 and an **Ethernet connection** to control your chamber remotely.





Efficiency, safety, control... a step further with Spirale 3

Control system integrating the reference M.M.I. (Man-Machine Interface)

Your control panel and all of the components (test manager, program editor, etc.) benefit from remarkable ergonomics: a new user interface, instantaneous multilingual switch, ease of use, attention to detail and optimised design for use of the touch screen.

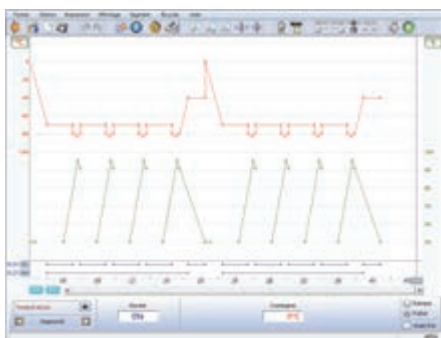


Control panel with 3 user levels

You choose the most suitable interface: production, laboratory, advanced tests.

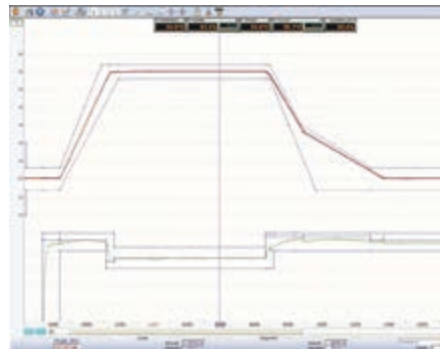
Numerous configuration options

Access to these options and to the equipment commands can be controlled by nine password levels.



In this new version of Spirale 3, our program editor has a number of improvements, a modernised user interface and includes a touch screen: you can now draw your profiles with your finger or a stylus.

Spirale 3 includes a user-friendly and complete test manager for accurate and easy traceability. Editing statistics, exporting data and analysing information (rates, stability) is quick and easy.



Example of an IEC 60068-2-30 test

User Script

This tool combines power and simplicity with its integrated help tool. You can create your own developments or submit them to us: automatic functions or specific safety functions, transform your EXCAL into a fully integrated test bench.

Network/Internet

A Spirale 3 exclusive feature, EXCAL remote control is as easy as creating a shortcut on Windows desktop and you don't need to install any software on your desktop PC. A built-in web server checks your equipment's status using any Internet browser. If the equipment alarm is activated or at the end of a test, Spirale automatically tells you by sending a message.

Supervision

This solution quite simply lets you manage all of your equipment, new and old, from a single workstation. Monitoring tools, profile creation, test report printing and email or SMS alarm setting functions are therefore available for all of your testing equipment.



Tracking alarm

Temperature Tracking Alarm

Tracking alarm allow a temperature regulation monitoring during your tests.

Enable tracking alarm control

Details Full speed arrivals.

Lower and higher limits are calculated according the figure below :

1 Stabilization duration: 10 minutes

2 Arrival maximum limit: ± 10.0°C

3 Stabilized maximum limit: ± 3.0°C

Set the alarm if temperature is outside the limit above during: 120 seconds

In "stabilized" mode (details, ramps) the maximum difference is given per the value of (3).

Transitions control

Temperature variation is periodically controlled: temperature must approach its setpoint each time.

Control temperature variation every: 5 minutes

Alarm Management

Only highlight the tracking alarm indicator in the control panel.

Generate a failure and interrupt the test.

Close

AutoTest

EXCAL offers you this exclusive feature: check/test refrigerating unit components, compressor performances, gas load status, etc. This autotest is possible thanks to the technology of Spirale 3 and the numerous sensors installed on the unit.



Reliability

Simplified thanks to Spirale 3, our refrigerating circuits contain less parts subject to wear (solenoid valves), which is an excellent advantage for ensuring longer life span for your EXCAL equipment.

Preventive maintenance

Every component is individually monitored (solenoid valves, compressors) by action or duration counters. A global synthesis table helps you to plan preventive maintenance operations.



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A perfectly dimensioned range

- **Extreme temperatures** (model T): from -90 °C to +200 °C
- **Humidity tests** (model H): RH from 10% to 98% (for temperatures from +10 °C to +90 °C)
- **An unparalleled high performance panel:** from 2 °C/min to 20 °C/min

Aeraulics

Air circulation is optimised thanks to the double flow ventilation. This solution has a number of advantages:

- **Products are temperature treated simultaneously on all sides.**
- **Homogeneity on load is excellent regardless of the volume of your load.**
- **EXCAL chambers are equipped with adjustable air flow flaps.**

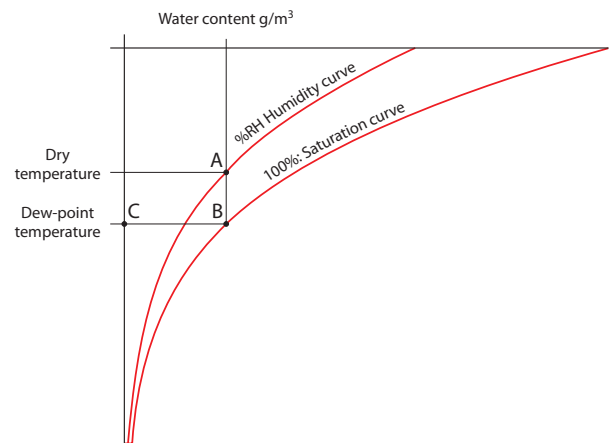


Circulated by a high-temperature fan, air is drawn in and conditioned in the technical compartment, then sent back into the entire test volume.

Humidity production

Climats uses dew point bath humidity production, the system that is the most stable and closest to natural phenomena, which requires no maintenance. Easy to operate, it is completely reliable.

Spirale 3 provides accurate regulation to the 1/10% RH, with the standard humidity range from 10 to 98% for temperatures between +10 °C and +90 °C, limited by a minimum dew point of 4 to 8 °C.



Temperature and humidity calibration

The Spirale 3 double entry calibration table can be filled in manually or automatically using a standard communicating with Spirale 3.

Measurement accuracy ensures a regulation stability between +/- 0.1 °C and +/- 0.3 °C.

Work space homogeneity, according to the standard IEC EN 60068-3-5, is between +/- 0.5 °C and +/- 1.8 °C.

Hygrometry: Produced by a maintenance-free water bath regulated at dew point temperature. Reliability, accuracy and regulation stability between +/- 1% and +/- 3%.

Relative humidity range between 10% and 98% and temperature range between +10 °C and +90 °C.

Nominal test conditions: Empty chamber without option. Water condensing type, clean cooling water supply at +18 °C with a flow and pressure rate (2.5 bar minimum) matching the technical specifications of the chamber.

400 V three-phase 50 Hz/60 Hz mains power supply

Useful dimensions do not include the thickness of the rack for the shelves (25 mm on each side).

* Cabinet depth reduced by 10 mm

** Cabinet depth reduced by 20 mm

INTERIOR DIMENSIONS (mm)	EXTERIOR DIMENSIONS (mm)	MINIMUM TEMP.	COOLING DOWN RATE	RATES GIVEN FROM +180 °C TO THE VALUE INDICATED IN THIS COLUMN AND VICE-VERSA	HEATING UP RATE	ADMISSIBLE DISSIPATION AT +20°C	CONDENSER TYPE A (AIR) W (WATER)	MAXIMUM POWER CONSUMED	NET WEIGHT
		(°C)	ACCORDING TO IEC 60068-3-5 (K/min)		(K/min)	(kW)		(kW)	(kg)

EXCAL 140		138 litres	Mobile									
EXCAL 1421-T/H			W: 550	W: 820	-70	5	-70	7	1.5	A/W	6.6	420
Rapid Temperature Change			D: 500	D: 1375	-40	6	-40	7	1.5	A/W	5.1	370
EXCAL 1411-T/H			H: 500	H: 1730	-45	10	-40	17	2.5	A/W	8.4	410
EXCAL 1413-T/H*					-80	10	-70	17	2.5	A/W	10.5	470

EXCAL 220		206 litres	Compact									
EXCAL 2211-T/H					-30	5	-30	6	1.5	A/W	5.1	430
EXCAL 2221-T/H			W: 550	W: 820	-70	5	-70	6	1.5	A/W	6.6	470
Rapid Temperature Change			D: 500	D: 1375	-45	9	-40	15	2.5	A/W	8.4	460
EXCAL 2213-T/H			H: 750	H: 1880	-50	13	-40	15	3	W	9.4	530
EXCAL 2214-T/H*					-80	10	-70	15	2.5	A/W	10.5	520
EXCAL 2223-T/H					-80	15	-70	12	4	W	11.9	660

EXCAL 400		400 litres	Optimum									
EXCAL 4011-T/H					-30	4	-30	10	1.5	A/W	8.1	490
EXCAL 4021-T/H					-70	3,5	-70	10	1.5	A/W	9.5	540
Rapid Temperature Change			W: 660	W: 930	-43	6	-40	10	2.5	A/W	8.4	520
EXCAL 4013-T/H			D: 800	D: 1790	-50	10	-40	12	3.5	A/W	12.5	600
EXCAL 4015-T/H			H: 750	H: 1880	-50	15	-40	20	5	W	15.8	670
EXCAL 4023-T/H					-75	7	-70	10	2.5	A/W	10.4	670
EXCAL 4024-T/H					-80	10	-70	12	4.5	A/W	14.9	730
EXCAL 4025-T/H*					-85	15	-70	20	6.5	W	19.2	860

EXCAL 540		540 litres	Multipurpose									
EXCAL 5411-T/H					-30	3	-30	10	1.5	A/W	8.1	540
EXCAL 5421-T/H					-65	2,5	-60	10	1.5	A/W	9.5	590
EXCAL 5423-T/H					-75	5	-70	10	3	A/W	10.4	640
Rapid Temperature Change			W: 750	W: 1020	-42	6	-40	10	3	A/W	8.4	580
EXCAL 5413-T/H			D: 800	D: 1700	-50	10	-40	12	4	A/W	12.5	650
EXCAL 5414-T/H			H: 900	H: 2002	-50	15	-40	18	6	W	15.8	720
EXCAL 5415-T/H					-55	16	-40	18	7	W	19.2	790
EXCAL 5417-T/H					-80	8	-70	12	5	A/W	14.9	780
EXCAL 5424-T/H					-85	15	-70	20	7	W	19.2	910

EXCAL 770		770 litres	High Performance									
EXCAL 7713-T/H					-40	4	-40	6	2.5	A/W	8.4	670
EXCAL 7723-T/H					-70	4	-70	6	3	A/W	10.5	730
Rapid Temperature Change			W: 900	W: 1170	-45	8	-40	8	4	A/W	12.5	740
EXCAL 7714-T/H			D: 950	D: 2000	-50	10	-40	15	6	W	15.8	810
EXCAL 7715-T/H			H: 900	H: 2002	-50	14	-40	15	7	W	17.9	880
EXCAL 7717-T/H					-50	17	-40	20	10	W	25.7	900
EXCAL 7718-T/H					-75	7	-70	8	5	A/W	14.9	870
EXCAL 7724-T/H					-80	13	-70	15	7	W	19.2	1000
EXCAL 7725-T/H					-85	14	-70	15	8	W	20.8	1120
EXCAL 7727-T/H					-90	18	-70	20	10	W	34.1	1150

EXCAL 1000		1000 litres	Universal									
EXCAL 10013-T/H					-35	3	-30	4,5	2.5	A/W	9.9	810
EXCAL 10023-T/H					-70	2	-70	4,5	3	A/W	11.9	870
EXCAL 10024-T/H					-75	4,5	-70	6	5	A/W	16.4	1010
Rapid Temperature Change			W: 1000	W: 1270	-45	6	-40	6	4	A/W	14	880
EXCAL 10014-T/H			D: 1000	D: 2140	-45	8	-40	10,5	6	W	17.3	950
EXCAL 10015-T/H			H: 1000	H: 2095	-50	10,5	-40	11	7	W	19.4	1020
EXCAL 10017-T/H					-50	13,5	-40	15	10	W	27.2	1050
EXCAL 10018-T/H					-55	15	-40	15	10	W	43	1200
EXCAL 10019-T					-75	7	-70	10,5	7	W	20.7	1150
EXCAL 10025-T/H					-85	8	-70	11	8	W	26.6	1260
EXCAL 10027-T/H					-85	12	-70	15	10	W	35.6	1290
EXCAL 10028-T/H					-85	15	-70	15	10	W	45.1	1600

EXCAL 1400		1416 litres	Powerful									
EXCAL 14013-T/H					-35	2	-30	3	2.5	A/W	9.9	920
EXCAL 14014-T/H					-45	4	-40	4	4	A/W	14	990
EXCAL 14023-T/H					-70	2	-70	3	2.5	A/W	11.9	990
EXCAL 14024-T/H					-75	4	-70	4	4	A/W	16.4	1120
Rapid Temperature Change			W: 1150	W: 1470	-45	6	-40	6	6	W	17.3	1060
EXCAL 14015-T/H			D: 1100	D: 2220	-50	7	-40	7	7	W	19.4	1130
EXCAL 14017-T/H			H: 1120	H: 2200	-50	10	-40	10	10	W	27.2	1160
EXCAL 14018-T/H					-55	13	-40	15	10	W	43	1340
EXCAL 14019-T/H					-75	6	-70	6	7	W	20.7	1260
EXCAL 14025-T/H					-85	7	-70	7	8	W	26.6	1370
EXCAL 14027-T/H					-85	10	-70	10	10	W	35.6	1400
EXCAL 14028-T/H					-85	12	-70	15	10	W	45.1	1740

EXCAL 1800		1932 litres	Industrial									
EXCAL 18014-T/H					-45	3	-40	3	4	A/W	14	1280
EXCAL 18015-T/H					-45	4	-40	4	6	W	17.3	1350
EXCAL 18017-T/H					-50	5	-40	5	7	W	19.4	1420
EXCAL 18023-T/H					-70	1,5	-70	1,5	2,5	A/W	11.9	1270
EXCAL 18024-T/H			W: 1150	W: 1470	-75	3	-70	3	4	A/W	16.4	1410
EXCAL 18025-T/H			D: 1500	D: 2620	-75	4	-70	4	7	W	20.7	1550
EXCAL 18027-T/H			H: 1120	H: 2200	-85	5	-70	5	8	W	26.6	1660
Rapid Temperature Change					-50	8	-40	8	10	W	27.2	1450
EXCAL 18018-T/H					-55	10	-40	10	10	W	43	1630
EXCAL 18019-T/H					-85	8	-70	8	10	W	35.6	1720
EXCAL 18028-T/H					-85	10	-70	10	10	W	45.1	1960

EXCAL

ENVIRONMENTAL TEST CHAMBER

To organise the structure of your chamber

■ Integration of additional portholes on the sides, ceiling, door and even in the window (diameters between 80 and 200 mm).



RGB4 portholes

■ Integration of specific customer windows, connectors or sensors adapted to your requirements.



Example of 9 connectors and 12 humidity sensors

■ Integration of notched cabinet portholes for connecting products before inserting them into the cabinet.



Notched portholes

■ Increased loading capacity for each level using reinforced shelves.

■ Increased loading capacity placed on the base of the test space.

■ Reversible door opening.

■ Integration of inserts for precise mechanical assemblies.

■ 316L stainless steel cabinet and nickel-plated evaporator to protect the test volume from chemical hazards.

■ Air extractor for renewing the air inside the test volume.

■ Customisation of the colour of your chamber.

To make your tests safe

■ Sensor-controlled door opening status indicator.



Safety switch

■ MINI/MAX electronic temperature safety unit on separate PT100 sensor.

■ Pre-installation of an emergency stop to be interfaced with your test benches.

■ Integration of dedicated thermal fuses.

■ Variator to select the fan speed.



Speed variator

■ Securing of your high power cables via the 10/16A safety socket.

■ Air dryer for preventing the formation of humidity by sweeping with dry air or nitrogen.



Air dryer

To improve the chamber's environment

■ Integration of an audible warning device on event or alarm.

■ 3-colour tower light.

■ Integration of a demineralised water tank for use during humidity tests.

■ Reinforced machinery soundproofing.

■ Installation of a demineralised water generator for long-term humidity tests.



Bottles of demineralised water

■ Installation of water filter cartridges for short-term humidity tests.



U2 cartridge

■ Replacement of the water cooling system with a remote air-cooled condenser solution.



Remote air-cooled condenser

■ Installation of an additional chiller to ensure cooling of the installation.



Chiller



Optimise your environmental test chamber by combining standard accessories and measuring devices

To develop your tests

You have a multitude of input and output units for your customised adaptations and applications.

- Relative humidity sensor for measuring or regulating.



Humidity sensor

- PT100 data acquisition card or thermocouple.



ET-7018 thermocouple module

- Additional data acquisition units.



Data acquisition unit

- Specific operating mode development : regulation on the average of several sensors, incoming regulation information on dry contact, START & STOP for regulation and ventilation when taking measurements.

- Specific digital communication such as IEEE 488, and 0/10v analogue control.

- Remote Panel PC for controlling your peripherals remotely.

- Supports MODBUS communication protocol accessories.

- Module with 6 relay outputs/6 logical inputs.



Input/output extension unit

Please contact us, we are continuously enhancing these features!



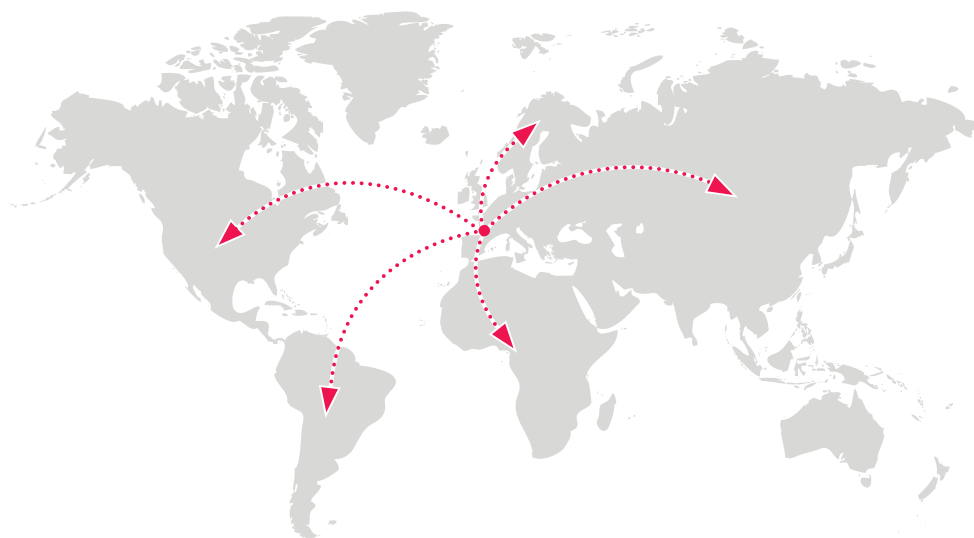
Swivelling Panel PC

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AN INTERNATIONAL PRESENCE



- EUROPE** As the key development strategy for, Export relies on a large network of worldwide distributors.
- ASIA**
- AMERICA** Our partners market and service **Climats** equipment all over the world ; they are fully skilled in our technology and fully committed to a long-term relationship.
- AFRICA**

Your distributor:

Climats

Zone du Bedat - CS 50067 - 33652 Saint Médard d'Eyrans Cedex - France
Tel. **+33 (0)5 56 20 25 25** - Fax **+33 (0)5 56 78 43 97**
e-mail: sales@climats-tec.com



www.climats-tec.com