Climats
a schunk company

EXCAL² -7723-HA

CREATOR
OF EXTREME

CONTENTS

WHY CHOOSE EXCAL²

Excal has been the subject of an in-depth re-design in order to create a **new generation of climatic chambers** that combines environmental challenges and the most advanced test requirements.

The new eco-responsible Climats production is compliant with (EU) regulation N° 517/2014 "F Gas" regulations.

Excal² inherits the know-how and experience of its past 20 years of production.

Careful production combining strength and ergonomics

- 304L grade stainless steel cabinet / Steel structure antistatic epoxy paint / High density double layer insulation.
- Rollers / Stabiliser cylinders / Wall pass through/ Glazed door / Trays.

The expertise of the Spirale control and regulation system

- Test recording;
- Programme editor;
- Communication, remote control;
- Safety and test monitoring;
- Open and upgradable programming script.

The tailored performance line

- The choice between the temperature and/or humidity functions;
- Minimum temperature of -10°C/ -40°C / -90°C;
- Standard maximum temperature of +200°C (as an option);
- Temperature rise or drop speed depending on needs.

Recognised reliability measured by an optimum availability rate

- Hour counters for each compressor operating time and for the machine use rate.
- Real time measurement of electricity consumption.
- Optimised running mode using the Energy Saving mode.

Keeping the device in working order is simplified by real time analysis of embedded tools

- Constant recording of pressure, temperature and actuator intensity values.
- Embedded troubleshooting tools: autotest.
- Monitoring of initial performances over time: Testcharge.
- Library of solutions to apply in the event of a failure.

Metrology requirements beyond basic compliance

- A calibration table providing calibration at 7 temperature points and 11 temperature & humidity points which is COFRAC traceable.
- Double flow ventilation to optimise homogeneity and exchanges on the product.
- A mobile PT100 "Product" sensor capable of measuring AND regulating depending on requirements.

Excal² includes many innovations that are essential to upgrade climatic tests.

F -Gas Ready

- Excal² now uses R449 A gas of which the GWP (global warming potential) is below the threshold of 2,500 (the GWP for R449A is 1,397)
- By its new design, the cooling unit reduces the quantity of gas needed: only one yearly leak-tightness test is needed (or even no checks for single stage devices).
- Eco-responsible, water consumption is qualified in real time, input / output temperatures are measured and acquisition of a flow sensor is provided.

New ergonomics

- The 140 l and 220 l versions are designed for standard door clearances (< 800 mm).
- The user interaction zones are visually identified.
- The user connection interface and the safety devices are grouped together behind the side panel.
- The electric connection is placed on top of the chamber.
- The other service connections are centralised behind the chamber.

Enhanced performances

- The innovating cabinet aeraulics significantly improves the air flow rate in order to obtain almost natural homogeneity.
- The new evaporator design makes it possible to reduce its weight by 15 % to 50 %, thereby achieving maximum air exchange.
- The cooling unit includes new upgrades making it possible to use asymmetrical cascade (reduction of electric power and electricity consumption) for equivalent performances.
- The cooling group is fitted with a desuperheater combined with a new condenser making it possible for air units to operate in environments in excess of 30°C.

Rationalised electronic architecture

- The various modules are located as close as possible to the actuators and are interconnected using an internal network.
- The functions are clearly isolated and specific, thereby significantly simplifying maintenance.
- The system is designed to simply add options or future upgrades.

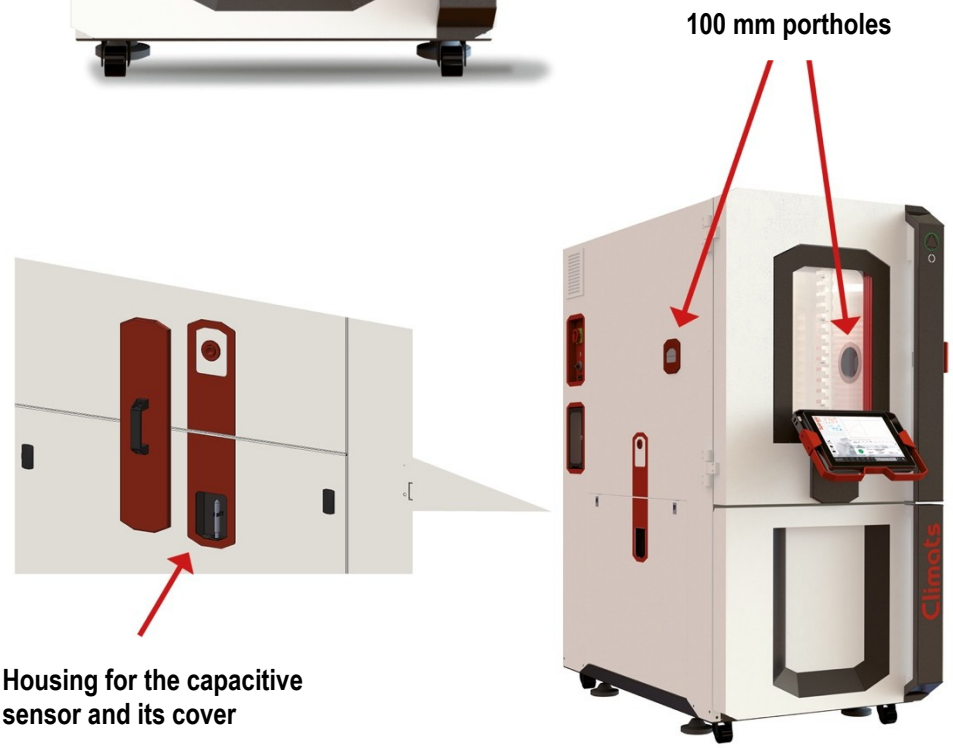
Design adapted to the most complex standards

- The redesigned test cabinet improves the drainage of condensates to avoid any risk of pollution during tests.
- The humidity generator is designed to carry out complex tests of the IEC 60068-2-30 and IEC 600-68-2-38 type.
- The direct humidity measurement and regulation are combined with the use of a capacitive sensor.

Spirale Vision revolutionises test analysis and monitoring

- Proof in images: the photo sequences are included and combined with the test recorder (as an option).
- The tested product is linked to the test using its bar code or a QR code (as an option).
- The human / machine interface can be customised and has a new upgradable architecture (as an option).

Excal² chamber
on wheels, with a viewing window as a standard

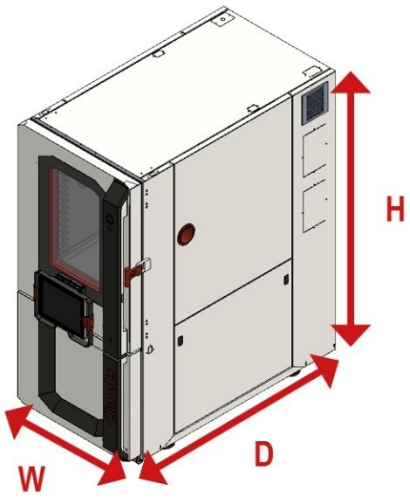


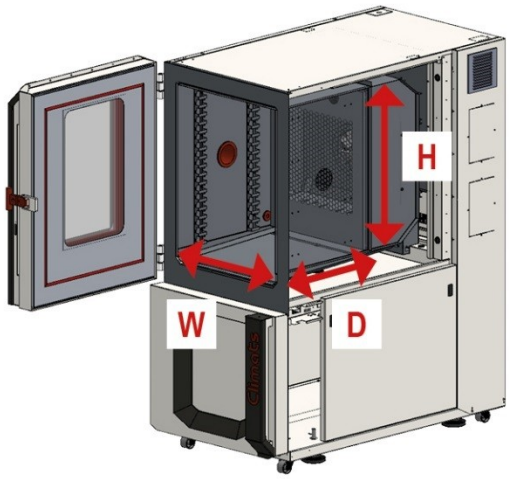
PERFORMANCES AND SPECIFICATIONS OF YOUR EXCAL² CHAMBER

REF: EXCAL²-7723-HA

DIMENSIONS	WIDTH	DEPTH	HEIGHT
Interior dimensions (mm)	900	950	900
Exterior dimensions (mm)	1185	2120	2060

Test volume (l) : 770





H: height
W: width
D: depth

Exterior dimensions

Interior dimensions

THERMAL TEST SPECIFICATIONS	
Temperature range (°C)	- 65 to +180
Temperature rise speed variation (°C/min) according to IEC 60068-3-5 standard. On the temperature range, measured from – 65 °C to +180°C on the blowing air flow sensor	5
Temperature drop speed variation (°C/min) according to IEC 60068-3-5 standard. On the temperature range, measured from +180 °C to -65°C on the blowing air flow sensor	3.5
Temperature regulation stability (°C)	±0.1 to ± 0.3
Temperature homogeneity in space, up to +180°C (°C) Not including measurement uncertainties	±0.4°C to ± 1.5°C
Allowable dissipation[1] (W)	3 000
Set point calibration values[2] as standard (°C)	7 set points for single stage 8 set points for cascade Values, see § “metrology” on page 22

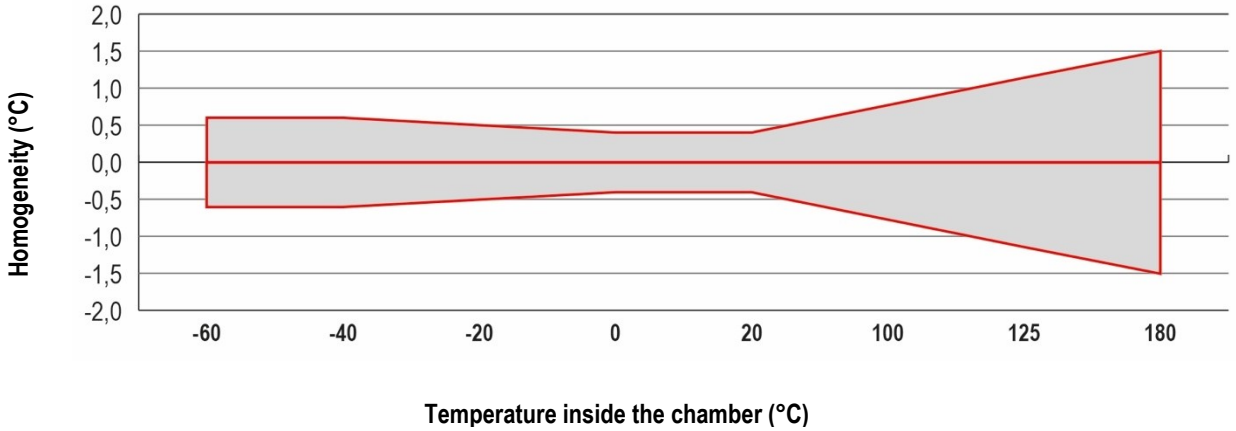
[1]. At +20°C for temperature tests.

[2]. Temperature and humidity calculations are carried out on the mean of the 9 sensors, as per leaflet FD X 15-140 with COFRAC connected measuring equipment. As standard, each machine is characterised on site and is the subject of a certificate issued by the factory.

Each machine is calibrated for all these set points, to which are added the extreme temperature range points (depending on the chamber version).

These set points can be modified on request (option).

Homogeneity diagram

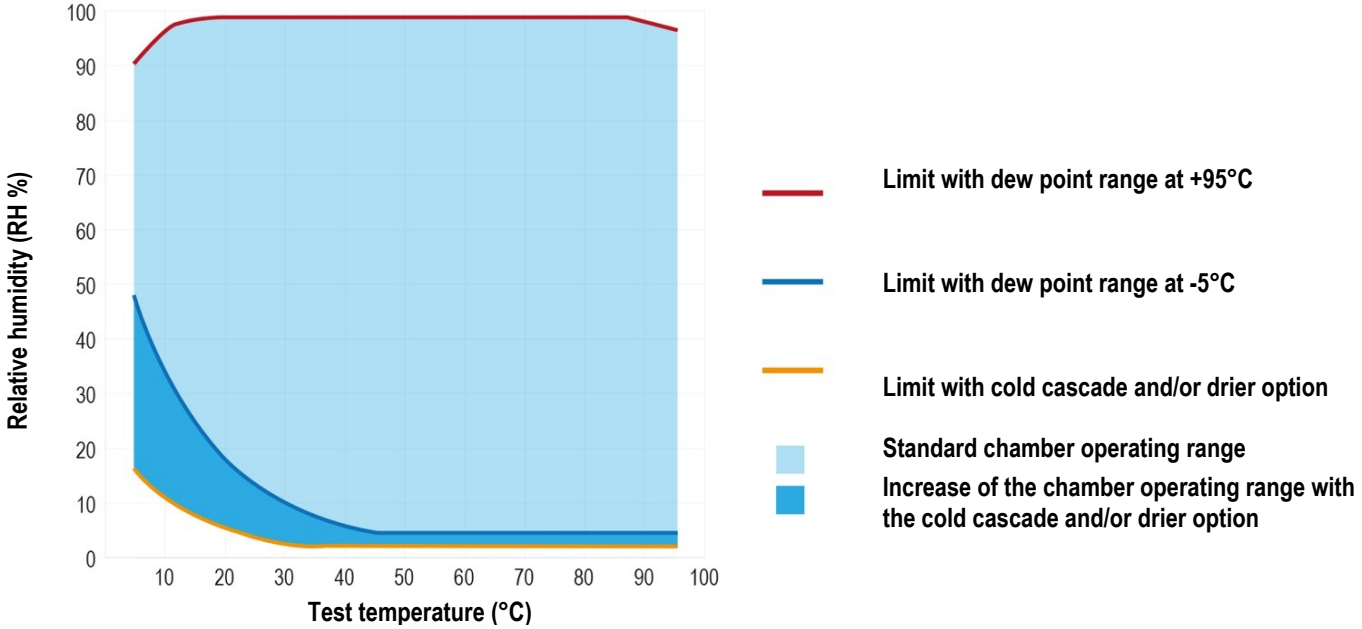


CLIMATIC TEST SPECIFICATIONS	
Temperature range (°C)	+10 to +95
Dew point temperature range (°C)	-5 to +95
Relative humidity range for a temperature from +10°C to +95°C (%RH)	5 to 98
Relative humidity regulation stability (%RH)	±2
Maximum humidification water consumption (l/h)	<2
Standard calibration values[1] (°C/%RH)	11 pairs Values, see § “metrology” on page 22

[1]. temperature and humidity calibrations are carried out on the mean of the 9 sensors, as per leaflet FD X 15-140, using COFRAC connected measuring instruments. As standard, each machine is characterised on site and is the subject of a certificate issued by the factory.
Each machine is calibrated for all these set points, to which are added the extreme temperature range points (depending on the chamber version).
These set points can be modified on request (option).

Note:
The performance specifications given above are based on a surrounding temperature of +25°C and cooling water at +18°C, power supply voltage of 400 V / 50 Hz without additional equipment and without thermal dissipation.
The equipment is designed to be installed in a dry and ventilated location with a maximum pollution level of “2” as defined by the EN 50178 standard. The allowable surrounding temperature to operate the chamber must be included between +10°C and +35°C (if there is an air condenser). The relative humidity must be included between 20%RH and 75%RH.
Climats reserves the right to make technical changes.

Humidity diagram



To durably reach dry levels, the chamber must be dried and must not contain any water in liquid form.

SUPPLLIES	
Electric supplies	
Maximum power consumption[1] (kW)	14.6
Rated current (A)	21
Power supply voltage Provide for a cut-off switch with ground fault protection upstream of the equipment	Three-phased 400 V + Earth
Equipment electric protection (A)	25 A / to be provided by the customer
Plug and power supply cable	to be provided by the customer
Energy supplies to cool the refrigerating circuit	
Air condenser	Ambient air for full performance = +28°C Ambient air Max with reduced performance = +35°C
Demineralised water supplies to produce humidity	
Humidity generator connection	Input: ¼ male Output: ⅜" male
Other information	
Sound level (dBA)	65 ± 3
Maximum thermal dissipation in the installation premises (kW)	12
Net Weight (kg)	705
Number of shelves	1 as standard Up to 13 for the 140 and 220 l; 18 for the 400, 540, 770 l; 23 for the 1,000, 1,400 and 1,800 l
Maximum load on shelf supports (kg)	90
Maximum load on each shelf[2] (kg)	30

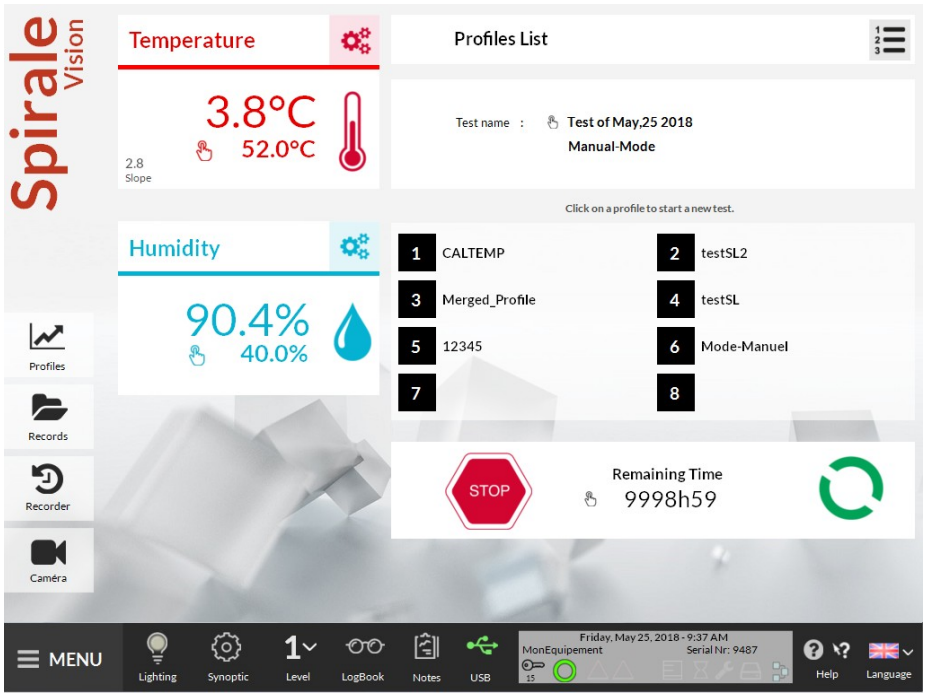
[1] Maximum power consumption when the chamber is running at full power.

[2]. To be distributed on the shelf.

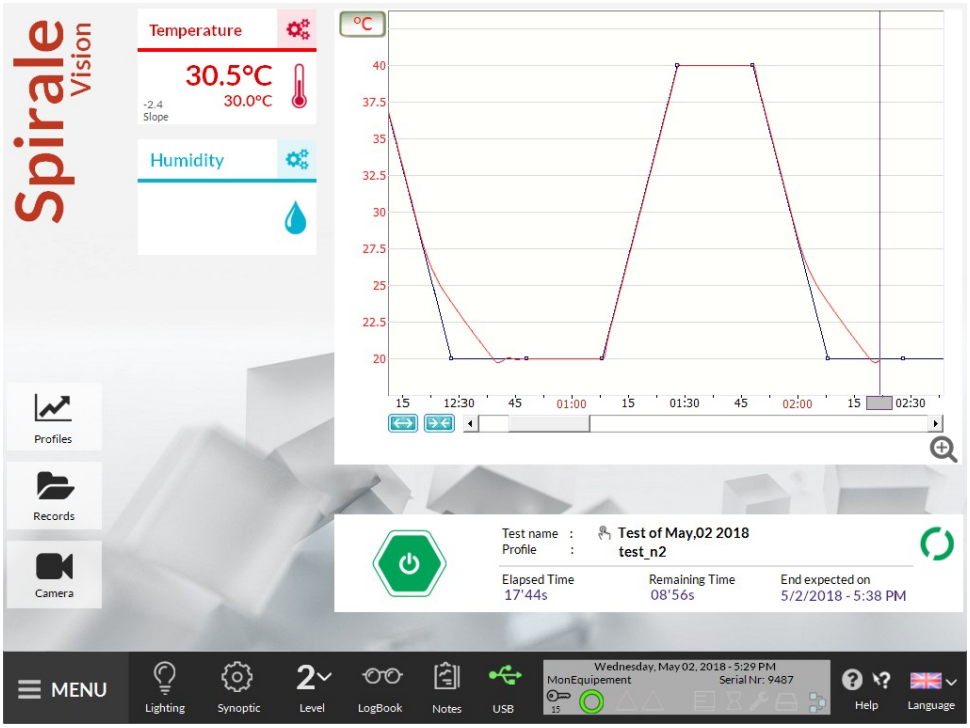
COMPLETE EQUIPMENT

Spirale Vision

SPECIFICATIONS	
Control system	Manual or profile mode
	Delayed start function
	Logbook
	Test integrity indicator
	Alarm indicator
	Emails sent on alarms or on test stops
	9 password-protected access levels
	Interface customisation (logo/screen background)
	Remote control via network
	External communications protocol (Ethernet/USB/RS232)
	Display with context help
	Multi-language selection

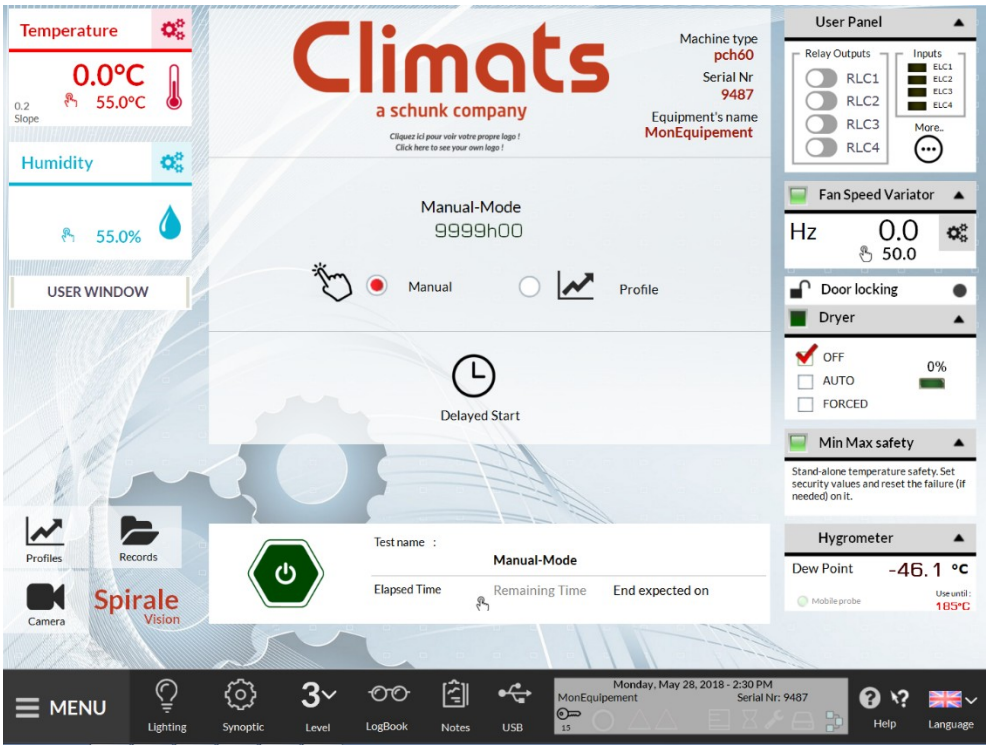


<u>Level 1</u>: Production mode
A single key to start and archive your tests.
You limit use to previously defined programmes.



Level 2: Laboratory mode

Freely select a programme and monitor its running using the CycleWin recorder.

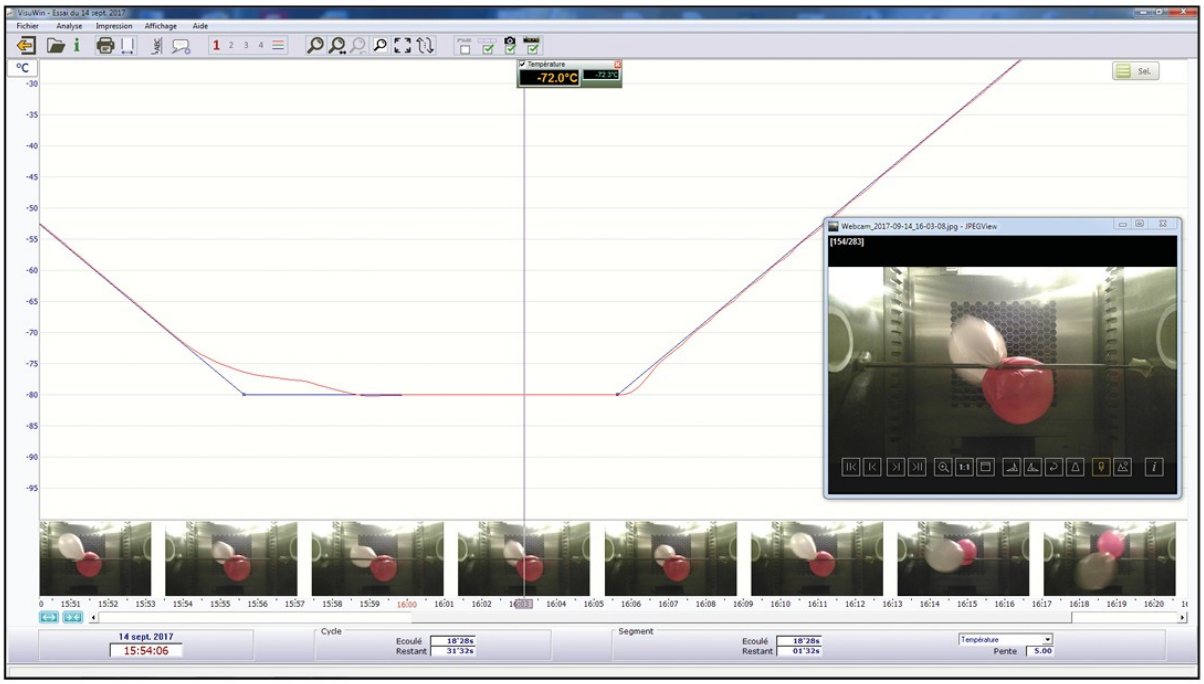


Level 3: Advanced mode

The most detailed and in-depth mode grouping together the level 2 functions and adding extensions such as additional measurements and complex automation.

CYCLEWIN recorder

SPECIFICATIONS	
Control system	Viewing of the test cycle in real time
	300 analogue channels and 32 logical channels
	4 configurable views
	Insertion of comments and bubbles
	Interruption and alarm marker
Innovation	**Recording of photos from an external camera and real time viewing**

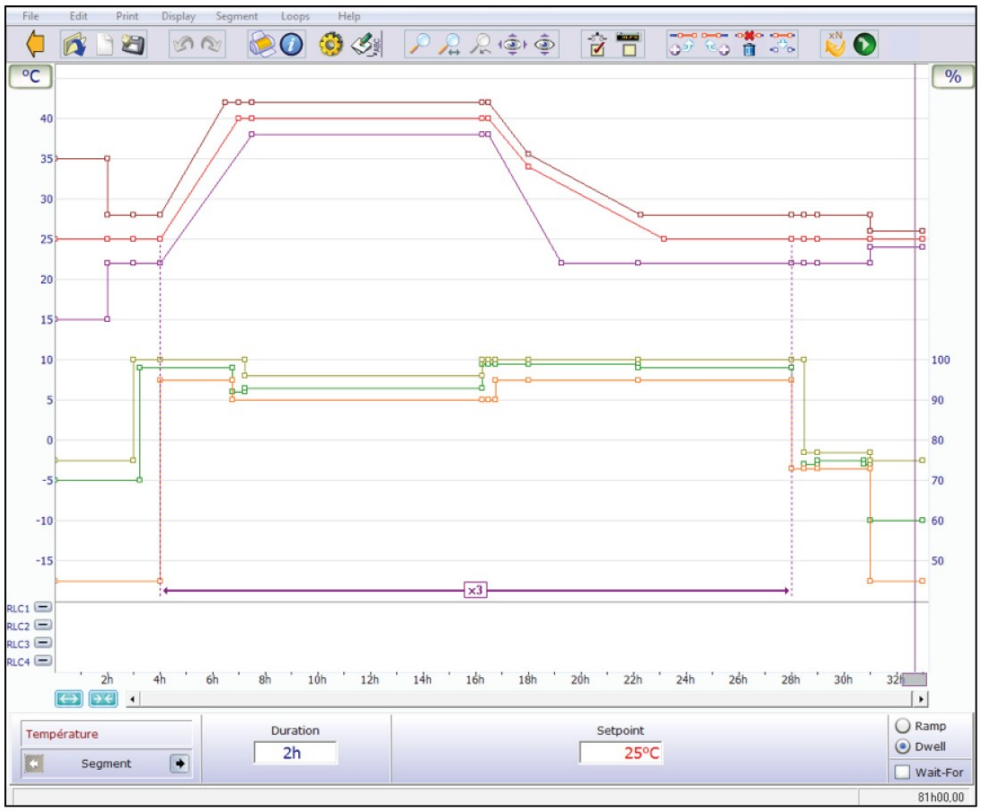


CYCLEWIN: ***Example of photo sequence recording***

The Spirale Vision **recorder** lets you access the monitoring for the ongoing test and manages running the profile. Your tests have full traceability.

PROGWIN programme editor

SPECIFICATIONS	
Control system	View of the profile in “Run” mode (loop execution)
	Asynchronous channel programming
	Programming wizard
	Organisation into profile models
	“Wait-For” function to make sure segment times are respected
	Time-based comments
	On-Off on logical outputs
	“Undo” cancellation function

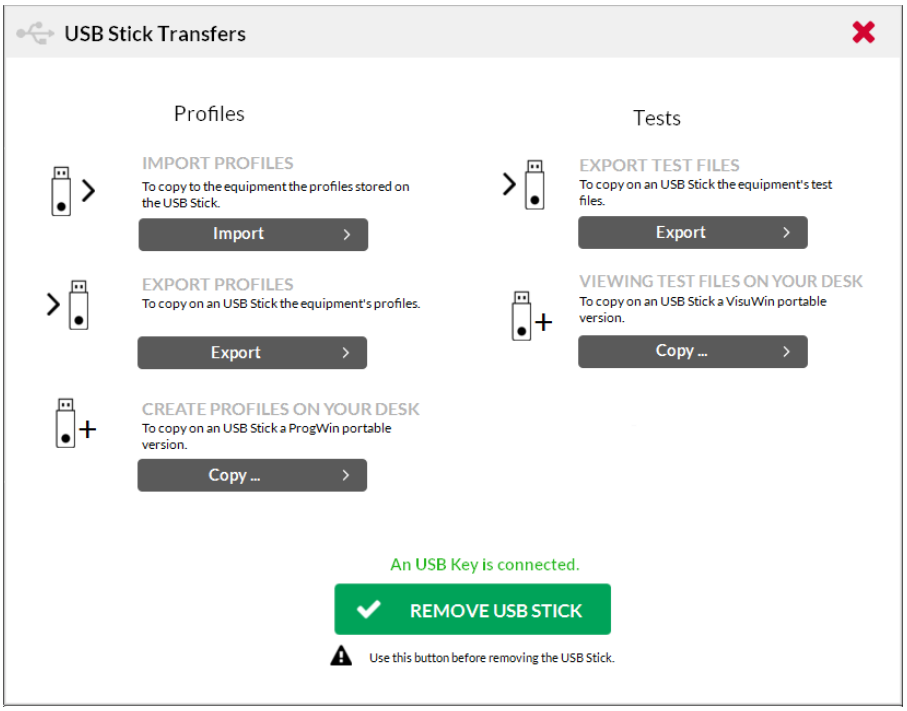


PROGWIN: ***example of programming for IEC 60068-2-30***

The Spirale Vision **programme** editor makes it very easy to programme using the touch screen.
Quick and easy test creation.

VISUWIN test manager

SPECIFICATIONS	
Control system	Use of the test photos
Innovation	**Test analyses**: variation speeds, homogeneity, min/max/mean
	Addition of comments: on the overall test, on the graph using bubbles
	Test library viewing
	Exports: native, Excel, Word, others
	Drawing up of test reports
	Use in office mode from the work station
	Transfer of programmes and tests to a thumb drive (as soon as it is inserted)



Thumb drive export wizard:
your tests can be used directly.

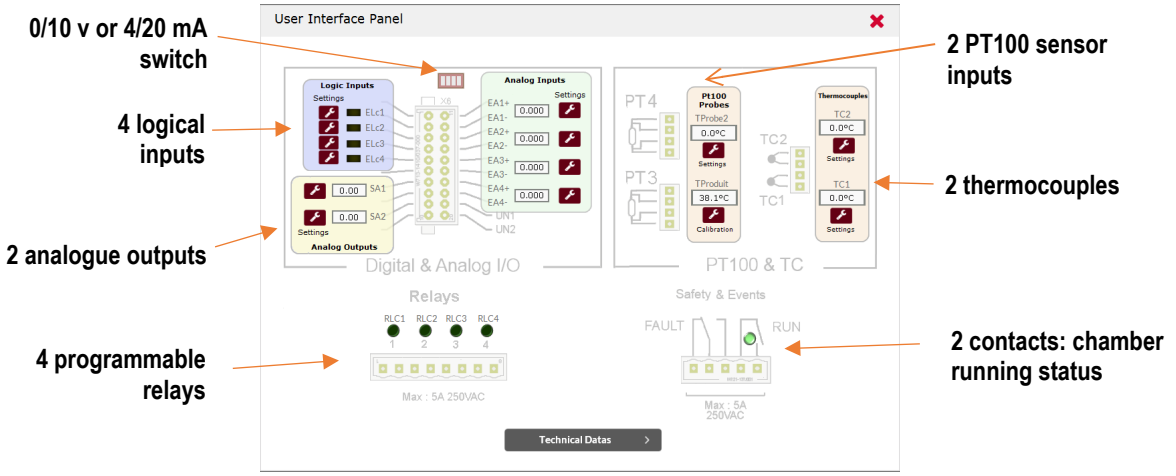
Hardware

SPECIFICATIONS		ADVANTAGES
Touch screen Panel PC, IP 66	15 inch 128 Gb SSD memory Multipoint capacitive slab Running Windows 7	Ergonomics Reliability Easy to use
2 USB drives and network connectors on the front		Ergonomics

Panel PC 15" touch screen

User panel

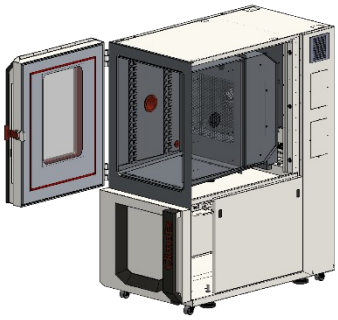
SPECIFICATIONS		
User panel interface	Contacts	Operating (machine run status)
		Fault reverser
	Sockets	RJ45 remote control / TCP/IP communication socket
		RS232 type
	Inputs	2 PT100 sensor inputs (4 wires) 1 product sensor delivered as standard
		2 thermocouple inputs (all types)
		4 -10/+10 V or 4/20 mA measurement inputs
		4 logical inputs (dry contact)
	Outputs	4 relay outputs (220 V - 5 A) programmable
		2 -10/+10 V analogue outputs



User Panel interface diagram

Mechanical design

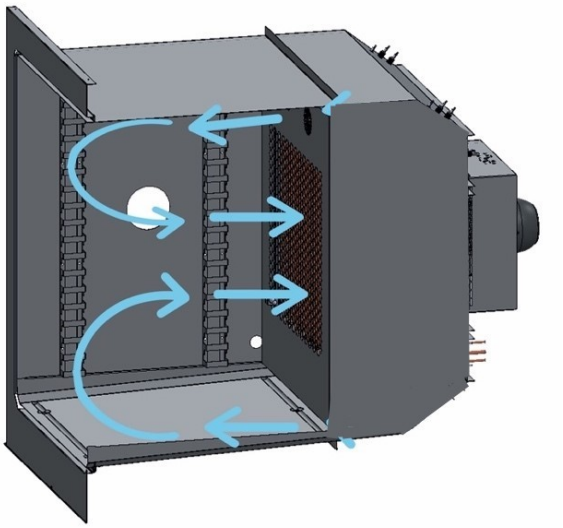
SPECIFICATIONS			ADVANTAGES
Self-supporting structure	Reinforced steel plating	Fully welded	Strength
	180°C oven-fired epoxy paint	Textured RAL 9002 colour	Antistatic
	Removable gate	On all 4 faces	Accessibility
	Rollers	Brakes (optional)	Mobility
	Stabiliser cylinders	4 pads (starting from the 540l)	Safety
The structure is thermally insulated	Rigid rock-wool panel	Thickness 40 mm	Thermal resistance
The test tank is thermally insulated	Double crossed layers of mineral wool + moisture barrier film	Thickness 60 mm	Thermal resistance
	Moisture barrier film		Anti condensation
Test cabinet	304 L grade stainless steel (316 L as an option), brushed, non-scratch	Spragged and welded	Leak tightness & corrosion protection
	Fitted on the floating system		Absorption of thermal expansion
	Sloped cabinet floor	With condensate drainage	Antipollution
	2 side portholes centred on the walls (other dimensions and positions as an option)	100 mm (1 on each side)	Test ergonomics
	1 multi-position stainless steel shelf	Load per shelf: 30 kg or 100 kg depending on the version	Test ergonomics
	Removable shelf supports	Maximum load on the supports: 90 kg to 300 kg depending on the version	13 to 23 product positioning levels
	Interior lighting	1 halogen lamp 50 W / 12 V / 850 Lm (2 for volumes ≥ 770 l)	Visibility
Door	Inside structure and coating	Stainless steel	Corrosion proof
	Thermal insulation	70 mm	Thermal resistance
	Multi-glazed viewing window	5 windows with film and double heating cord	Visibility Corrosion proof
	Double silicone seal	Cabinet / door connection	Leak tightness
	Double hinges on the left (optionally on the right)		Ergonomics
	Compression handle	Single-handed opening	Ergonomics & leak-tightness
	Power on / Running / Fault status indicator	Luminous information	Ergonomics



Corrosion protection & visibility of your tests: door with 5 glass layer viewing window with double heating cord, stainless steel cabinet

Aeraulic design

SPECIFICATIONS			ADVANTAGES
Ventilation	Radial blade turbine	Corrects the air flow	Natural consistency
	The motorisation is outside the test tank	Long, high and low temperature resistant shaft	Reliability
Distribution circuit	Double air flow	Top and bottom horizontal blowing and horizontal sucking in the middle	Optimum thermal exchanges on the product
	Profiled technical compartment	High speed air flow	Natural homogeneity
	Air flow channelled to the product zone	Similar temperature behaviour at the blower and in the middle of the tank	Optimum thermal exchange
	Complex tests	Temperature homogeneity ≤ 2°C to +180°C	JJF 1101 standard



Principle diagram of the cabinet with double air flow ventilation

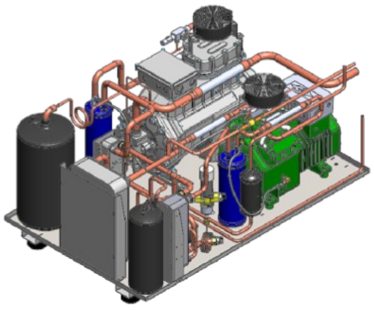
Heating design

SPECIFICATIONS			ADVANTAGES
Heating elements	Electric heating elements controlled using static relays	Stainless steel	Corrosion proof Quick heating speed
	Shielded heating elements	Connection outside the tank	Accessibility
Thermal treatment	Tested test cabinet and components	24 h degassing at 180°C	Antipollution

Cold production

SPECIFICATIONS			ADVANTAGES
Cooling unit	Mounted on a separate shock-absorbing table	Stainless steel Table mounted on silent blocks	Corrosion proof Condensate drainage and collection
	Hermetic and semi-hermetic condenser	On springs	Reduced sound level Anti-vibration
	Air and/or water condensation	Depending on the version	Flexibility
	Single stage or cascade type circuit	Min temperature -40°C (single stage) or –90°C (cascade). Depending on the models	Tailored performances
	For single stage circuit and auxiliary circuit	R449A coolant (GWP=1397)	F-Gas Ready Compliant with EU regulation n° 517/2014
	For main cascade circuit	R23 coolant	Very low temperature circuit ≤ -50°C Not subject to EU regulation n° 517/2014
	Monitored cooling circuit operation synopsis	Using a PT100 temperature sensor / intensity sensor / pressure sensor	Embedded control Assisted maintenance
	Regulation valves	on remote control box	Accessibility Simplified maintenance
	For water cooled condensers	Input and output temperature measurement and recording	Embedded control Assisted maintenance
	For air condensers	Performances maintained for a maximum surrounding temperature ≤ +28 °C Downgraded operating mode for surrounding temperatures up to +35°C	Tropicalised environment
	Double circuit, high exchange coefficient air condenser	Reduction of the power to evacuate to the auxiliary circuit using a built-in desuperheater. Asymmetrical cascade	Energy reduction
	Plate exchanger type water condenser	316 L grade stainless steel	High heat output
Evaporator	Cold battery	Fully copper	High heat output
		High exchange coefficient innovating technology	Maximum thermal exchange
	Humid trap	Integrated circuit and automatic control	Anti-condensation
Regulatory inspections	Quantity of coolant	Marking on firm plate	CE compliance
	Optimised cooling circuit	Gas charge reduced by 25% on average	Not subject to checks for single-stage units ≤ 5 HP. 1 yearly inspection for the other configurations.

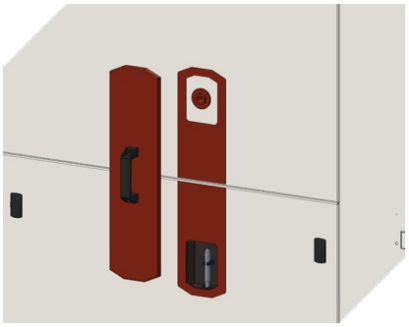
Very high thermal output: copper evaporator



Cold production system on a table. Asymmetrical assembly

Humidity production

SPECIFICATIONS			ADVANTAGES
Humidity generator	Leak-tight welded tank	In 316L grade stainless steel + passivation	Corrosion proof Simplified maintenance Low water consumption
	Extractable heating cartridge	In 316L grade stainless steel	Corrosion proof Simplified maintenance
	Low on water safety	Double level check	Reliability
	Internal water temperature check	Using a stainless steel PT100 sensor Dew point = +95°C max	Saturating humidity
	Steam production	At constant temperature	Regulation stability over time
Evaporator	Regulation pin	Built into the main evaporator Min. dew point = -5°C	Dehumidification
Regulation	Direct measurement	Extractable capacitive sensor	High regulation accuracy
	Dynamic mode regulation	Designed for complex test standards	Suitable for the 60068-2-30 standard
Upgradable	Conversion of a temperature chamber to a climatic chamber	Possible to add modules: humidity generator and regulation	Extended use



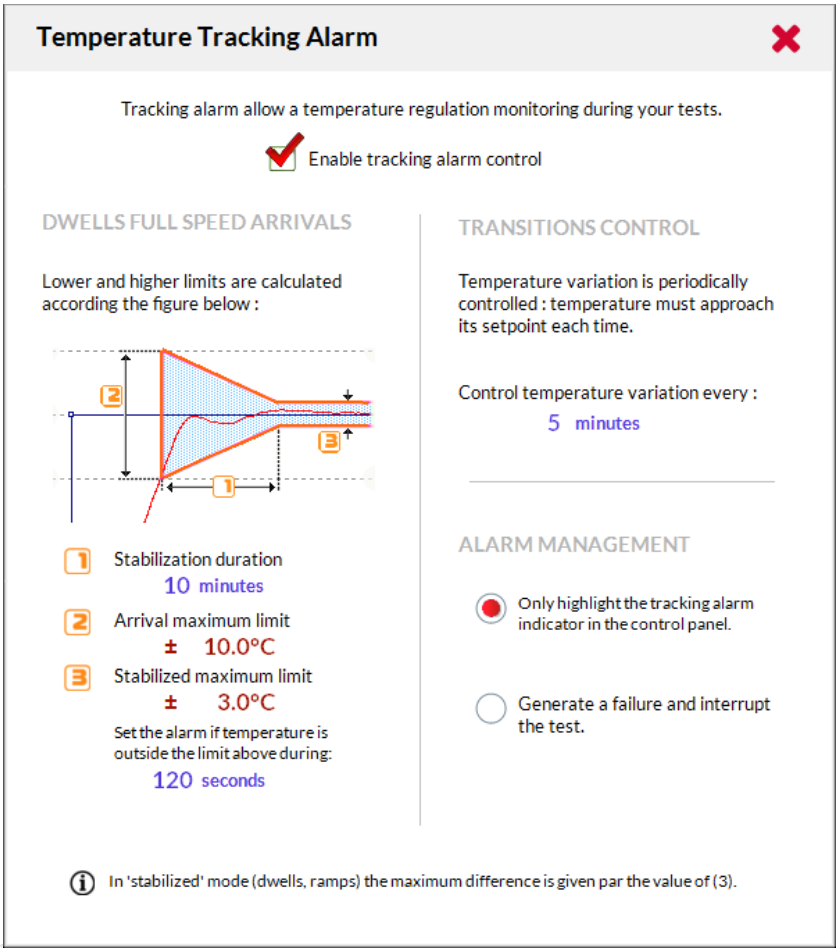
High regulation accuracy,
extractable capacitive sensor with its storage

Electric design

SPECIFICATIONS			ADVANTAGES
Electric equipment	Built into a ventilated cabinet	Positioned behind the technical compartment	CE marking Compliant with the Machinery Directive Compliant with the Low Voltage Directive Compliant with the EN-60204-1 standard Compliant with the EMC Directive
	Control circuit	Very low voltage	
Electric wiring	Cable identification	Using numbered bands	
	Overload protection	Built into the cabinet	
	Phase order controller	Built into the plate	
	Emergency stop switch/cut-off	Located on the side	
Power supply voltage	Adapted to international constraints	Power supply voltage range 380 V to 440 V / 50 Hz or 60 Hz	Simplified connection

Safety equipment

SPECIFICATIONS		
Test protection safety devices	Thermostatic high temperature safety device	Bulb thermostat Tmax +220°C
	High and low temperature safety	Built into the Spirale parameters
	Configurable tracking alarm	
	Thermal fuse	Internal protection
Equipment protection safety	Permanent compressor checks	Pressure sensor
		Intensity sensor
		Safety pressure switches
		Thermal heating safety
	Compressor auto-cooling	By automatic re-injection and cylinder head fans
	Water input and output temperature measurement	Using a stainless steel PT100 sensor



Configurable tracking alarm built into Spirale *Vision*

Maintenance and monitoring

SPECIFICATIONS		
Embedded analysis	Operating synopsis	With real time recording and archival
	Built in service tool	Machine / main compressor / auxiliary compressor hour meter
		Regulation valve activation meter
		Electronic board dynamic interface
	Auto check mode	AutoTest
Analysis assistance	Error messages	Fault identification / archival in the test and the log
	Fault list	Documented and correction solution
Remote assistance	Remote connection	Ethernet connection to take control
	Backups sent by email	Full analysis
	Corrections sent	Corrections to include via thumb drive

Metrology

SPECIFICATIONS		
Calibration	On all machines	Temperature and humidity calibrations are carried out as per the FD X 15-140 leaflet
		Characterisation on the mean of the 9 sensors using COFRAC connected measuring instruments and documented on a factory certificate Not including measurement uncertainties
	Calibration table	For temperature: For single stage units: 7 set points -30°C -10°C +20°C +40°C +60°C +100°C +125°C For cascades 8 set points -60°C -40°C -10°C +20°C +40°C +60°C +100°C +125°C
		For humidity: 11 temperature & humidity pairs 25°C/50% 25°C/80% 25°C/90% 55°C/20% 55°C/50% 55°C/80% 55°C/90% 80°C/20% 80°C/50% 80°C/80% 80°C/90%
		Each machine is calibrated for all these set points, to which are added the extreme temperature range points (depending on the chamber version).
		As an option, specific points defined by the user requirements
		All characterisation by external bodies is at the customer's expense, as are all eventual corrections
	Included on the CE certificate	Included in the user manual
	Built into the machine	Archival of the factory calibration tests, built into the chamber

TEST STANDARDS THAT CAN BE APPLIED USING YOUR EQUIPMENT

Test standards that can be carried out depending on the planned provisions using your equipment

Cold
- NF EN 60068-2-1
- GAM EG 13 Fasc 01
- MIL STD 810/502-2
- ISO 16750-4, low temperature
- JESD 22-A119

Dry heat
- NF EN 60068-2-2
- GAM EG 13 Fasc 02
- MIL STD 810/502-2
- ISO 16750-4, High
- Temperature test
- MIL STD-202 G/108A
- MIL STD-883 D/1008.2
- JESD22-A103D

Temperature variation
- NF EN 60068-2-14
- GAM EG 13
- RTCA DO160 SEC5
- ISO 16750-4, temp. steps
- ISO 16750-4, temp. cycling
- MIL-STD-331C, Test C6
- JESD22-A105C

Damp heat
- IEC 60068-2-30
- IEC EN 60068-2-38
- IEC EN 60068-2-78
- GAM EG 13 fasc 03
- MIL STD 810/507
- RTCA DO160 SEC6
- NF C 20-703
- ISO 16750-4, Damp heat steady
- MIL STD-2026/103B
- JESD 22-A 101C

Climatic cycles
- GAM EG13 fasc 08
- IEC 60068-2-30
- IEC 60068-2-38
- ISO 16750-4, Damp heat cyclic
- ISO 16750-4, Temp/Humid cyclic
- MIL STD-202 G/106D
- MIL STD-331 C/C1
- MIL STD-750-1/change 3
- MIL STD-810 G/507.5
- MIL STD-883 J/1004.7
- JESD22-A100D
- JJF 1101 STANDARD

COMPLIANCES

Compliant with the following Directives:

- Machinery
- Low voltage
- EMC
- 2011/65/EU

Compliant with CE marking

- Compliant with the EN-60204-1 standard
- Compliant with PE directive