Technical Description

SkyEvent TA-TAH

Thermal & Climatic Altitude Chamber

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Date	26/02/2018	01/01/2019	05/06/2020			
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1. PURPOSE

This chamber is designed to perform altitude, temperature, humidity at the atmospheric pressure *(only for TAH model)* as well as combined tests with altitude and temperature on aeronautical equipment.

2. PERFORMANCE DATA

Performance are given for:

An ambient temperature between:	+15°C and +35°C
A cooling water inlet temperature:	+15°C/+20°C (nominal / maximum allowable)
A mass load constituted of:	0 kg
A heat dissipation of:	0 W

2.1. TEMPERATURE

At the Atmospheric Pressure (AP):

Temperature range:	-70°C to +120°C
Cooling-down rate:	2°C/min average from +120°C to -55°C without mass load and without heat dissipation
Heating-up rate:	2°C/min. average from -55°C to +120°C without mass load and without heat dissipation
Stability of temperature:	≤ ± 0.5°C, at steady conditions
Homogeneity of temperature:	From ± 0.5°C to ± 2°C, at 10 cm of walls, at steady conditions
Temperature accuracy:	≤ ± 0.5°C

According to IEC 60068-3-5 standard

From the AP to 150 mbar:

Temperature range:	-60°C à +120°C
Cooling-down rate:	1°C/min average from +120°C to -55°C without mass load and without heat dissipation
Heating-up rate:	1°C/min average from -55°C to +120°C without mass load and without heat dissipation
Stability of temperature:	± 1.5°C, at steady conditions
Homogeneity of temperature:	From ± 2°C to ± 4°C, at 10 cm of walls, at steady conditions

According to IEC 60068-3-5 standard

From 150 mbar to 5 mbar:

Temperature is not controlled.

2.2. VACUUM

Vacuum:	From the AP to 5 mbar
Vacuum rate:	From AP to 10 mbar: 20 min at ambient temperature, in a dry, clean and empty test volume
Stability:	From AP to 5 mbar: ± 3 mbar
Sensor accuracy:	From AP to 5 mbar: ± 2 mbar

2.3. HUMIDITY *(ONLY FOR TAH MODEL)*

At the AP only:

Temperature range:	+10°C to 95°C
Humidity range:	From 15% RH to 95% RH
Dew point range:	From +5°C to +80°C
Humidity stability:	≤ ± 5 % RH, at steady conditions
Humidity homogeneity:	From ± 3 to ± 5 % RH, at 10 cm of walls, at steady conditions
Humidity accuracy:	≤ ± 2 % RH

According to IEC 60068-3-6 standard

3. EQUIPMENT DESCRIPTION

Complete unit including:

- The test volume with its conditioning at the back
- The machinery (cooling unit, vacuum circuit…) at the rear of the unit and its lower part
- The electrical cabinet including SIMPAC control system
- The HD flat touch screen control panel on the rear right-hand side

3.1. MECHANICAL EQUIPMENT AND DESIGN

3.1.1. STRUCTURE

- Inside tank made of stainless steel tight welded under nitrogen gas.
- Insulation by crossed layers made of glass wool.
- Outside panels made of soft steel, protected and covered by painting RAL 9002
- 2 silicon tight lines

	Test volume (L)			
	220	500	1000	1500
Max allowable weight on test volume floor	100 kg	100 kg	150 kg	150 kg
Max allowable weight per shelf	50 kg	50 kg	50 kg	50 kg
Max overall allowable weight on shelves (max 3 shelves)	100 kg	100 kg	100 kg	100 kg
Max overall allowable weight in the test volume (floor + shelves)	200 kg	200 kg	250 kg	250 kg

Structure overview

3.1.2. ACCESSORIES

- 4 x castors
- 4 x adjustable feet

- 1 x door with two special vacuum hinges *(hinges located by default to the left side – LHS, see options)*
- Internal lighting
- 1 x stainless steel shelf
  (see options for additional shelves, max 3 shelves in the test volume)

	Test volume (L)			
	220	500	1000	1500
Porthole diameter ø	50 mm	50 mm	80 mm	80 mm

- One Observation multi-glass view-window (350x350mm) with inner volume heated to avoid condensations
- 1 x handle with mechanical closing
  (opening by default to the right side – RHS, see options)
- 2 x portholes with silicon sealing plug, one per sidewall (RHS, LHS)

Only for TAH model

- Visible water level in the front door
- Easy access for manual refilling in case of no network for demineralization

3.1.3. DIMENSIONS

All the data below might be modified without customer warning and must be validated during technical studies and might differ depending on chosen options.

	Test volume (L)			
	220	500	1000	1500
Test volume dimensions (WxDxH) (approx.)	700 x 350 x 900 mm	700 x 800 x 900 mm	1 000 x 1 000 x 1 000 mm	1 000 x 1 500 x 1 000 mm
Test volume floor height (approx.)	1 000 mm	1 000 mm	1 000 mm	1 000 mm
External dimensions (WxDxH) (approx.)	1 250 x 2 400 x 2 400 mm	1 250 x 2 400 x 2 400 mm	1 550 x 2 600 x 2 400 mm	1 550 x 3 100 x 2 400 mm
Packing dimensions (WxDxH) (approx.)	1 500 x 2 650 x 2 800 mm	1 500 x 2 650 x 2 800 mm	1 800 x 2 800 x 2 800 mm	1 800 x 3 400 x 2 800 mm
Net weight chamber only (approx.)	1 400 kg	1 400 kg	1 850 kg	2 150 kg
Gross weight with packing (approx.)	1 850 kg	1 950 kg	2 450 kg	2 850 kg

3.2. CONDITIONING

3.2.1. REFRIGERATION

The double-stage refrigeration system comprises the following elements: main compressor, auxiliary compressor, exchanger, condenser, expansion valve and evaporator. These components are linked together by pipelines.

Apart from the evaporator all components of the refrigeration unit are integrated in the machine unit. They are well arranged and easily accessible for maintenance.

The hermetic compressors are equipped with suction and pressure shut-off valves, a crankcase heater and coil protection by a high temperature safety switch. The condenser is water-cooled. For the operation with mains water, a cooling water valve is used to reduce the indicated max cooling water quantity according to the water quantity required for each operating state.

The refrigeration unit also comprises high- and low-pressure switches, oil separator, refrigerant drier and refrigerant inspection glass.

The refrigerants used (R449A, R23) are compliant with the EU F-Gas II regulation applicable since the 01/01/2015.

3.2.2. HEATING

Finned resistance heaters made into stainless steel. The heaters are fitted with stainless steel ribs and connectors.

3.2.3. HEAT TRANSFER

Fans located at the rear of the test volume ensure a homogenous mixing of the air and thus optimize a convective exchange between the thermal sources. The conditioned air is sucked at the bottom of the rear panel and blown from its top. This method allows a very good homogeneity as hot and cold airflows are being strongly stirred.

Picture & scheme showing airflow principle, not contractual

3.2.4. VACUUM

The vacuum circuit is installed in the machinery. It includes:

- An oil sealed rotary vane pump (Leybold® or equivalent)
- Solenoid valves for pressure control
- A connecting hose between the vacuum pump and the test volume
- A manual valve to bring back the test volume to AP for redundancy

3.2.5. HUMIDIFICATION *(only for TAH model)*

Humidification is carried out by water vapor which is produced in a steam generator. The vapor is then injected directly into the chamber.

All the parts in contact with water are out of stainless steel or plastic according to temperatures.

3.2.6. DRYING *(only for TAH model)*

Water formed due to vapor excess is trapped by condensation on dedicated drying evaporator. This evaporator is independent from the main evaporator and supplied by the auxiliary refrigerating circuit which traps the excess of moisture.

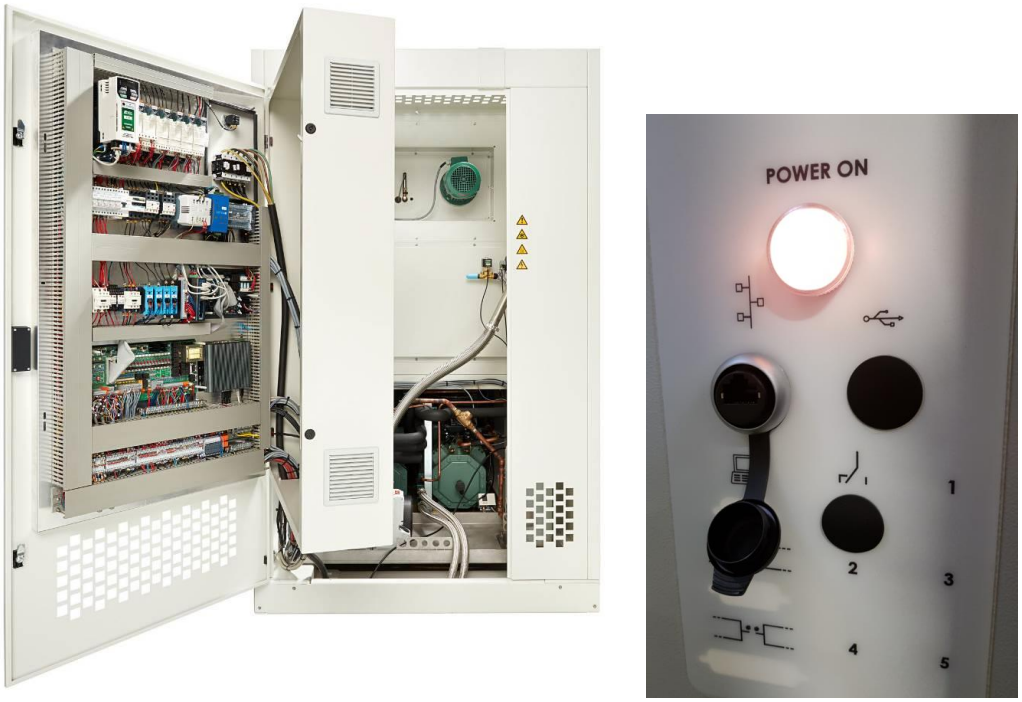
A thermostatic element limits the temperature of evaporation to +1°C (from where the temperature of min. dew of +5°C).

The drying circuit includes its own control and safety parametrizations.

3.3. ELECTRICAL EQUIPMENT

Control and safety devices:

- Power equipment in the electrical cabinet with machinery.
- Main contactor, power discontactor, static relays for resistors, fuses, connections.
- Wiring by one-line on the rack, flexible cable for connection, shielded lines for probes.
- Wires identified by marked rings.
- Ethernet interface (100/1000 megabits) for integration in a network
- USB interface for recording of measuring data on a flash drive
- Master switch panel for easy connection with USB and RJ45 inputs
  (see options for additional inputs / outputs, RS232 interface, D-sub miniature socket...)



Opened electrical cabinet with machinery and master switch panel

3.4. SAFETY DEVICES

- Main switch-disconnector for insulation of the chamber in electrical network.
- Safety thermostat to switch off the main contactor when temperature exceeds pre-set max T°C value; manual restart possible only when T°C is back below pre-set value.
- Resistors can start heating only when fan motors are on.
- Software min. / max. temperature limiter, with independent T°C sensor.
- Emergency stop button

3.5. CONTROL AND SUPERVISION

3.5.1. ALTERNATIVE 1: SPIRALE VS CONTROLLER

Spirale VS is a control and supervision real time software running on a computer with a HD flat touch screen fixed on the machine unit panel. It controls temperature, pressure, humidity *(only for TAH model)* as well as all the automation and safety devices.

Spirale VS is systematically calibrated and optimized in factory to achieve the required performances.

Parameter	**Sensor**
Temperature	PT100 sensor (100Ohm to 0°C)
Humidity / Dew point *(only for TAH model)*	Capacitive sensor *(only for TAH model)*
Pressure	Pressure sensor

The control and supervision system include:

- Data acquisition hardware
- Data acquisition, monitoring and recording software
- Computer with HD flat touch screen
- Software configuration with personalized interface

Example of Spirale VS HMI with HD flat touch screen, not contractual

The chamber can be controlled in both automatic and manual modes.

- Manual mode: the user can change any parameter set point at will and can program the next steps of the test at any moment.

- Automatic mode: the test conditions are pre-programmed

Main features:

Management of all the automation required to replicate the environmental conditions: servomechanisms, safety sequences…

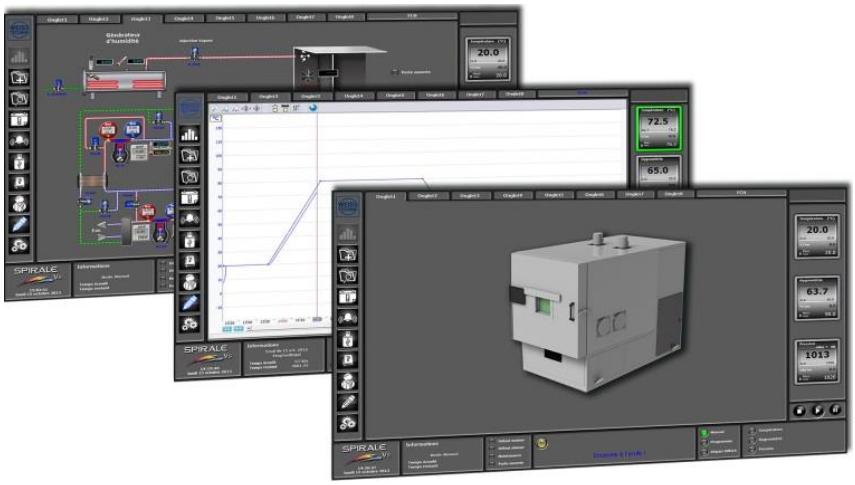
Regulation and programming of test cycles

Monitoring and user safety via messages display

Cycle monitoring with recording: test sequences (manual or programmed) can be consulted, modified, reviewed, printed... Recording test files archived at the end of the test

External control and sample measurement: electrical power supply on / off switch for example

Automated test report edition: VISUWIN test manager enables use of the archived recording test files for edition and printout



Examples of Spirale VS HMI, not contractual

Additional features:

- Complete multi-lingual environment by simple selection and without any rebooting
- User-friendly ergonomic interface via pictograms and clear displays
- Preventive maintenance with monitoring of components and planned maintenance intervention alerts: number of operation hours, number of opening / closing cycles…
- Automatic detection of USB key with program transfer wizard (import / export)
- Remote control from any company local network and deferred start up
- Digital communication with an external calculator: RS232, RS485, IEEE488 type, RJ45, CAN…
- Standard alarm tracking, min / max equipment safety and test traceability via records
- Pre-programmed tests library and database used for performance tests

3.5.2. ALTERNATIVE 2: WEBSEASON CONTROLLER

The regulation controls temperature, humidity *(only for TAH model)* and vacuum through the web-based user interface software WEBSeason either directly on a web panel fixed on the chamber or a computer or any other compliant terminal.

Parameter	**Sensor**
Temperature	Sensor PT100 (100Ohm to 0°C)
Humidity / Dew point *(only for TAH model)*	Capacitive sensor *(only for TAH model)*
Vacuum	Pressure sensor

The control and supervision system include:

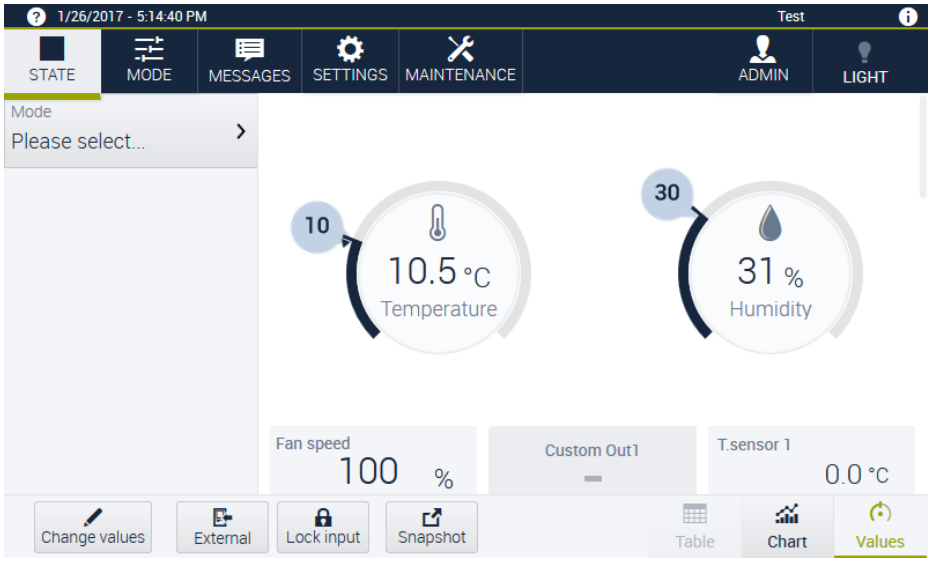
- Control, use and monitoring of the corresponding installation
- Operating data acquisition, monitoring and recording
- Display of the system and software information
- Maintenance operation
- Management of users and rights

Example of WEBSeason HMI with flat touch screen, not contractual

WEBSeason allows to drive the measuring and control system S!MPAC for operation, monitoring and documentation especially designed for use in environmental test systems. Thanks to its computing efficiency, S!MPAC excels in process technology requirements. It handles all functions necessary for control and programming. In addition to temperature, vacuum and humidity control, it contains an efficient Software PLC which coordinates and monitors all functions and provides information on operating failures.

The chamber can be controlled in both automatic and manual modes:

- Manual mode: the user can change any parameter set point at will, and can program the next steps of the test at any moment
- Automatic mode: the test conditions are pre-programmed



Examples of WEBSeason HMI, not contractual

WebSeason features:

- Modern and dynamic design with wipe gesture control for intuitive operation
- Multi-user concept for simultaneous access by multiple users, user rights are assigned individually: password protection to prevent accidental settings, access level setting
- Easy programming of test sequences and loops
- Program preview in chart format
- Device-independent: browser application and worldwide access, via tablet, PC and smartphone
- Program synchronization with S!MPATI

4. CONNECTION REQUIREMENTS

- Electric power supply (breaker, cable) to the switch cabinet is excluded
- Provision of fluid connections (inlet/outlet) to the customer's network as well as the isolating valves on the customer's network are excluded
- All civil works are excluded

All the data below might be modified without customer warning and must be validated during technical studies and might differ depending on chosen options.

4.1. ELECTRICITY

	Main power supply	Power to be supplied
TA 220	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	28 kW
TAH 220	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	30 kW
TA 500	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	28 kW
TAH 500	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	30 kW
TA 1000	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	50 kW
TAH 1000	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	52 kW
TA 1500	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	50 kW
TAH 1500	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	52 kW

IMPORTANT: user must put a due switch (ex: breaker or fuse) before this item.

4.2. INDUSTRIAL WATER FOR CONDENSER

Water must be clean and no inlaying (recycled water):

	Maximal flow	Water inlet T°C (nominal / maximal)	Water outlet T°C (nominal / maximal)	Minimum differential pressure	Connecting
TA 220 TAH 220	2.4 m^3/h	+15°C / +20°C	+20°C / +30°C	2 bars	G 3/4'' male
TA 500 TAH 500	2.4 m^3/h	+15°C / +20°C	+20°C / +30°C	2 bars	G 3/4'' male
TA 1000 TAH 1000	4 m^3/h	+15°C / +20°C	+20°C / +30°C	2 bars	G 1'' male
TA 1500 TAH 1500	4 m^3/h	+15°C / +20°C	+20°C / +30°C	2 bars	G 1'' male

NOTA 1: the maximal flow is given for transient phase, this value can be reduced, according to the set point, the mass load inside the chamber, the change rate, etc…

NOTA 2: operate the chamber out of the indicated nominal range may reduce performances (cooling down rate, minimal temperature, etc…)

4.3. DRAIN

To connect condensates without counter-pressure.

	Connecting
TAH 220	G 1'' female
TAH 500	
TAH 1000	
TAH 1500	

4.4. DEMINERALIZED WATER *(ONLY FOR TAH MODEL)*

This type of water is mandatory for tests in controlled humidity.

See below for automatic filling:

	Maximal flow	Minimum differential pressure	Connecting
TAH 220	5 L/h	2 bars	Rapid 6/8 mm for smooth tubes
TAH 500			
TAH 1000			
TAH 1500			

NOTA: a manual filling can be performed by filler lid (see chapter 3.1.2)

5. OPTIONS

Demineralization *(only for TAH model)*	
68003011	**Portable demineralization unit *(only for TAH model)***  1 x polyamide compact cartridge with mixed bed ion exchange resin E200 type including: furnished top head, connecting set and electrical conductivity meter Dimensions (⌀ x H) = 205 x 655 mm Dry weight = 17 kg Working pressure = 3 bars recommended (max 6 bars) Working flow = 150 L/h recommended (max 200 L/h) Exchange capacity = approx. 1 200 L of raw water with 10°dH salt content (approx. 500 L for 20°dH) Connection to on-site domestic water supply network = R 3/4'' supply line Assembly and power supply by battery. External implementation, connection to on-site water supply network and to the chamber must be carried out by the customer.
68003012	**Stationary demineralization unit *(only for TAH model)***  1 x filtration wall panel including: flow control valve, pressure controller, upstream and downstream pressure gauges and filters, electrical conductivity meter with digital display, LED, mini controller, measurement probe Dimensions (L x P x H) = 660 x 175 x 310 mm Power supply = 220V, 50 Hz Connection to on-site domestic water supply network = R 3/4'' supply line 2 x polyamide compact cartridge with mixed bed ion exchange resin E200 type including: furnished top head, connecting set and electrical conductivity meter Dimensions (⌀ x H) = 205 x 655 mm Dry weight = 17 kg Working pressure = 3 bars recommended (max 6 bars) Working flow = 150 L/h recommended (max 200 L/h) Exchange capacity = approx. 1 200 L of raw water with 10°dH salt content (approx. 500 L for 20°dH) External implementation, connection to on-site water supply network and to the chamber must be carried out by the customer.
68003013	**Spare/second cartridge for demineralization unit *(only for TAH model)*** [1]  1 x polyamide compact cartridge with mixed bed ion exchange resin E200 type Dimensions (⌀ x H) = 205 x 655 mm Dry weight = 17 kg Working pressure = 3 bars recommended (max 6 bars) Working flow = 150 L/h recommended (max 200 L/h) Exchange capacity = approx. 1 200 L of raw water with 10°dH salt content (approx. 500 L for 20°dH) The cartridge is regenerated in a treatment plant. The regeneration time can be bridged with the second cartridge.

Access port		
68003021	**Additional porthole Ø50 mm with sealing plug (220L/500L)** Additional porthole with one silicone sealing plug. Dimension Ø = 50 mm Max one additional porthole per sidewall in addition to the 2 base portholes already included (see §3.2.1): max 2 portholes per sidewall, total of max 4 portholes *Due to specific steel manufacturing, this option increases the delivery time: delivery time to be confirmed in that case.*	
68003022	**Additional sealing plug for Ø50 mm (220L/500L)** Silicone sealing plug for access porthole with diameter Ø50 mm	
68003036	**Additional porthole Ø80 mm with sealing plug (1000L/1500L)** Additional porthole with one silicone sealing plug. Dimension Ø = 80 mm Max one additional porthole per sidewall in addition to the 2 base portholes already included (see §3.2.1): max 2 portholes per sidewall, total of max 4 portholes *Due to specific steel manufacturing, this option increases the delivery time: delivery time to be confirmed in that case.*	
68003037	**Additional sealing plug for Ø80 mm (1000L/1500L)** Silicone sealing plug for access porthole with diameter Ø80 mm	
68003041	**ISO KF feedthrough replacement (flange port Ø50 mm) (220L/500L)** Replacement of existing or additional standard portholes by altitude rated DN 50 ISO-KF access feedthrough with blank flange. Extruding width: approx. +40 mm	
68003046	**ISO-K feedthrough replacement (flange port Ø80 mm) (1000L/1500L)** Replacement of existing or additional standard portholes by altitude rated DN 80 ISO-K access feedthrough with blank flange. Extruding width: approx. +40 mm	

Performances

68003051

Temperature range extension to +180 °C (220L/500L)

At the atmospheric pressure: temperature range extended to [-70°C / +180°C].
From the AP to 150 mbar: temperature range extended to [-60°C / +165°C].
Homogeneity, stability and change rates remain valid on range [-55°C / +120°C].
Below 150 mbar, temperature is still not controlled.
If this option is chosen, the power connection requirement mentioned below supersedes the one stated in §5.1:

	Main power supply	Power to be supplied
TA 220	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	30 kW (instead of 28 kW)
TAH 220	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	32 kW (instead of 30 kW)
TA 500	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	30 kW (instead of 28 kW)
TAH 500	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	32 kW (instead of 30 kW)

68003056

Temperature range extension to +180 °C (1000L/1500L)

At the atmospheric pressure: temperature range extended to [-70°C / +180°C].
From the AP to 150 mbar: temperature range extended to [-60°C / +165°C].
Homogeneity, stability and change rates remain valid on range [-55°C / +120°C].
Below 150 mbar, temperature is still not controlled.
If this option is chosen, the power connection requirement mentioned below supersedes the one stated in §5.1:

	Main power supply	Power to be supplied
TA 1000	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	52 kW (instead of 50 kW)
TAH 1000	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	54 kW (instead of 52 kW)
TA 1500	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	52 kW (instead of 50 kW)
TAH 1500	3/N/PE AC, 400V AC, ±3% to ±10%, 50Hz	54 kW (instead of 52 kW)

Structure

68003061

Additional shelf

Max 2 additional shelves in addition to the base shelf already included, total of max 3 shelves

	Test volume (L)			
	220	500	1000	1500
Shelf dimensions (W x D)	700 x 350 mm	700 x 800 mm	1 000 x 1 000 mm	1 000 x 1 500 mm
Max allowable weight per shelf	50 kg	50 kg	50 kg	50 kg
Max overall allowable weight on shelves (max 3 shelves)	100 kg	100 kg	100 kg	100 kg
Max allowable weight on test volume floor	100 kg	100 kg	150 kg	150 kg
Max overall allowable weight in the test volume (floor + shelves)	200 kg	200 kg	250 kg	250 kg

68003062

Door opening to the left

Special vacuum hinges to the right side (RHS) for a door opening to the left side (LHS) (by default door opening to the right side with hinges to the left side)

68003039

Insulation for condenser water under +15°C

Cooling water leading pipes reinforced insulation in the chamber

Safety equipment	
68003071	**Independent min/max temperature limiter** Independent adjustable min/max temperature limiter in addition to the temperature software limiter according to EN/IEC 61010. 
68003072	**Fault signal lead onto potential-free contact (5A max)** A potential-free (high load) NC/NO contact accessible via a Binder connector on master switch panel is actuated if a fault occurs in the test chamber. Contact for max 230 V, 5 A (female connector). Option coming with the Binder corresponding male connector.
68003073	**Safety electromagnetic door switch & lock** Position and locking device with guard interlocking: conditioning and ventilation stop when door opens. Electronically and/or manual locking and unlocking. *This option increases the delivery time: delivery time to be confirmed in that case.*
Control and measuring	
68003081	**Digital inputs & outputs** 4 digital outputs to control external systems via potential free contact: max load 24V DC, 0.5A 4 digital inputs controlled via interface with an input voltage of 24V DC Accessible on dedicated connectors on master switch panel.
68003082	**Analogue inputs & outputs** 4 analogue outputs from 0V to 10V and 4 analogue inputs to record analog measuring signals. Outputs and inputs are accessible via D-sub miniature sockets on master switch panel
68003083	**J type thermocouple inputs** [2,3] 4 J-type Tc inputs accessible via D-sub miniature socket on master switch panel. 4 recording channels, 4 sensors in test volume with wires, adapted feedthrough. *This option increases the delivery time: delivery time to be confirmed in that case.*
68003084	**K type thermocouple inputs** [2,3] 4 K-type Tc inputs accessible via D-sub miniature socket on master switch panel. 4 recording channels, 4 sensors in test volume with wires, adapted feedthrough. *This option increases the delivery time: delivery time to be confirmed in that case.*
68003085	**T type thermocouple inputs** [2,3] 4 T-type Tc inputs accessible via D-sub miniature socket on master switch panel. 4 recording channels, 4 sensors in test volume with wires, adapted feedthrough. *This option increases the delivery time: delivery time to be confirmed in that case.*
68003086	**PT100 sensors** [4] 4 PT100 inputs accessible via D-sub miniature socket on master switch panel. 4 recording channels, 4 sensors in test volume with wires, adapted feedthrough
68003087	**Temperature measurement on sample (PT100 sensor x1)** [4] One PT100 sensor in test volume dedicated to sample temperature control. Switchable by reversible control sensor.

Connection	
68003091	**Serial interface for remote control** Interface RS232 accessible via D-sub miniature socket on master switch panel with SIMPAC control and input for connection to a host computer or 3rd party networking.
68003092	**Electrical socket 1A in the electrical cabinet** Schuko-type 230V, 1A electrical socket added in the electrical cabinet and protected by a differential breaker max 1A / Δi 30mA *Other standards: on request, please ask us about possible available standards.* 
68003095	**Electrical supply 380V ± 10%, 60 Hz, 3/N/PE** Voltage adaptation on all components. Voltage conversion performed by a transformer which is installed next to the test chamber (connection cable designed for a permanent connection). Chamber is tested in factory at 380V, 50 Hz. Dedicated transformer delivered with the chamber, to be installed besides by customer.
68003096	**Electrical supply 460V ± 10%, 60 Hz, 3/N/PE** Voltage adaptation on all components. Voltage conversion performed by a transformer which is installed next to the test chamber for tests at factory at 460V, 50 Hz. No specific transformer delivered with the chamber.
Software	
64241243	**Software package S!MPATI** Operation and monitoring of testing systems as well as the evaluation and documentation of testing procedures with extended network function. Software on CD-ROM including one license and operating instructions. Compatible with Windows Server 2008 or 2012, Windows 7, 8.1 or 10 Professional Features: - Up to 99 systems can be connected - Programs for automated processes - Documentation, visualization and management of process data - Traceability of process data for seamless quality control *To be ordered when S!MPATI software package is not already available on customer site*
64241166	**S!MPATI licence** In addition to the basic version of S!MPATI software To be associated to a registration number. *To be ordered when S!MPATI software is already available on customer site*

Calibration	
68003001	**Temperature homogeneity test report at AP** Temperature calibration in the test volume at AP with 9 COFRAC (French State agreed calibration laboratory) certified sensors (empty, 1st value) *Temperature value on customer request*
68003002	**Additional temperature homogeneity test report at AP** For each additional temperature value in the test volume at AP *Temperature value on customer request*
68003003	**Temperature homogeneity test report in vacuum** Temperature calibration in the test volume at 150 mbar with 9 COFRAC certified sensors (empty, 1st value) *Temperature value on customer request* *This option increases the delivery time: delivery time to be confirmed in that case.*
68003004	**Additional temperature homogeneity test report in vacuum** For each additional temperature value in the test volume at 150 mbar *Temperature value on customer request* *This option increases the delivery time: delivery time to be confirmed in that case.*
68003005	**Temperature & hygrometry homogeneity test report at AP *(only for TAH model)*** Temperature and hygrometry calibration in the test volume at AP with 10 COFRAC certified sensors (1 dew point mirror hygrometer, 9 Pt100) (empty, 1st value) *Humidity value (temperature + % RH) on customer request*
68003006	**Additional temperature & hygrometry homogeneity test report at AP *(only for TAH model)*** For each additional temperature and hygrometry value in the test volume at AP *Humidity value (temperature + % RH): on customer request*

[1] Only compatible with the following options: 68003011, 68003012

[2] Only available with Spirale VS software, not available for WebSeason yet

[3] Options 68003083, 68003084 and 68003085 not mutually compatible

[4] If option 68003087 is chosen, only 3 PT100 remain available for option 68003086