

# Altitude

test chambers 



**Angelantoni Test Technologies**  
stay ahead to meet the needs  
of the Industry of the Future, where

**Internet Technology,**

**Remote Connections,**

**Communication & Networking**

are the keywords for success.



# Altitude test chambers

**ACS** is proud to announce the **new release** of its standard altitude test chambers.

Besides their well-known key features - **high performances, flexibility, reliability** - these chambers are now equipped with the new cutting-edge **MyKratos™** control system, which makes it possible to manage, monitor and assist the chamber from mobile and desktop devices using Wi-Fi, Ethernet, or mobile network connections.

This line of chambers comes in both thermostatic (temperature only) and climatic (temperature and humidity) versions. 500 and 1000 l models can be supplied in the ES version.

# Altitude test chambers. Temperature and pressure control at high altitude

**Angelantoni Test Technologies** is proud to present its innovative range of altitude chambers for testing **components for the aviation market**.

These technologies require the utmost reliability of the components and systems on board, since human lives are often entrusted to them. It is therefore necessary to conduct life tests, including simulations of operating conditions, in both ordinary procedure and at the Quality Control and Production levels.

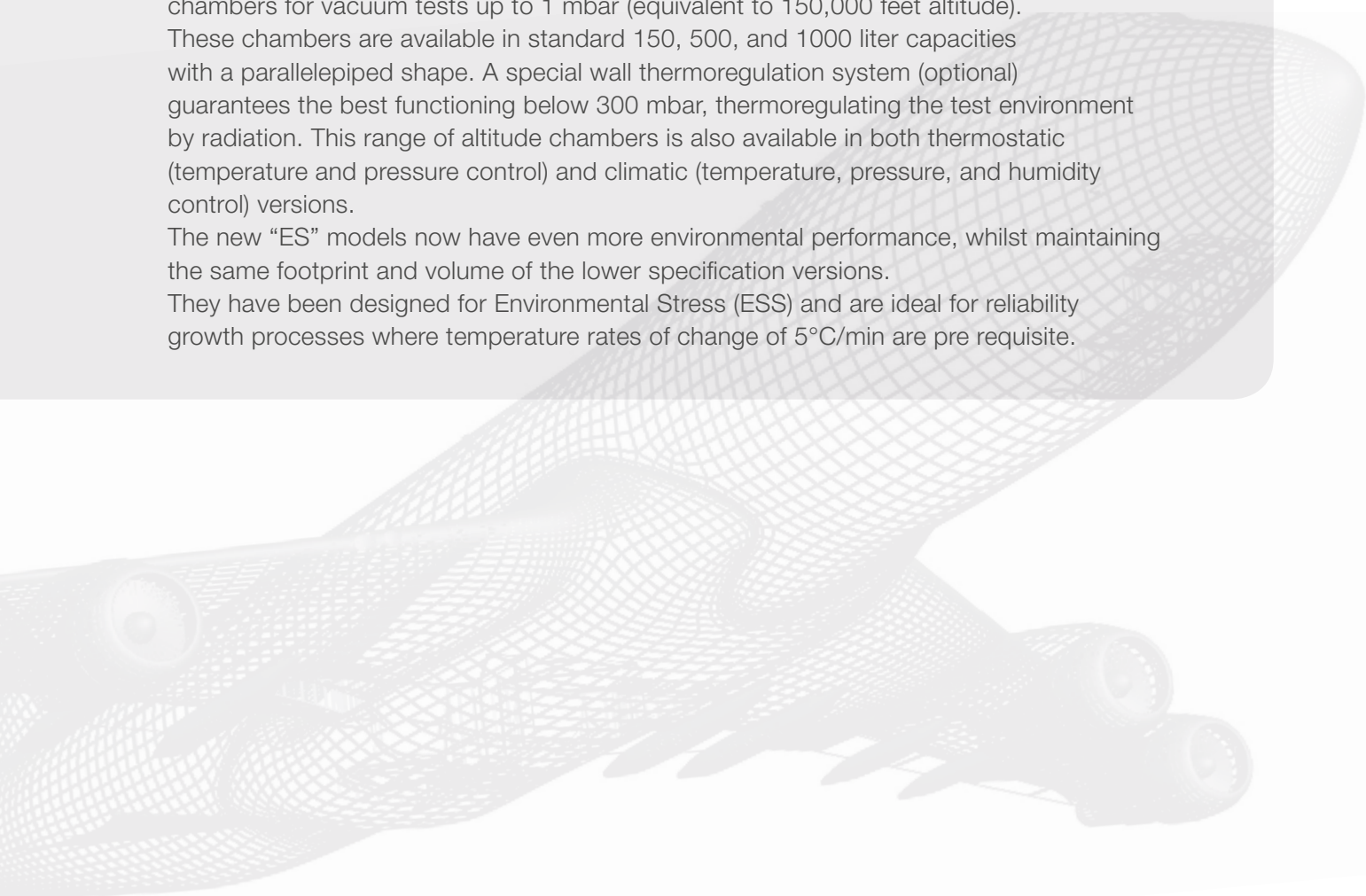
Generally speaking, when conducting tests having to do with the aviation industry, it is necessary to guarantee effective combined temperature and pressure control in the test chamber, the latter in order to simulate the altitude above sea level. In some cases, humidity control is also necessary.

We have put to fruition more than 75 years of know-how and experience gained through constant feedback from customers and agents, with the aim of optimizing all the devices as best as possible and thus ensuring a wide variety of possible tests.

Since 1953 ATT has been designing and developing a complete series of standard chambers for vacuum tests up to 1 mbar (equivalent to 150,000 feet altitude). These chambers are available in standard 150, 500, and 1000 liter capacities with a parallelepiped shape. A special wall thermoregulation system (optional) guarantees the best functioning below 300 mbar, thermoregulating the test environment by radiation. This range of altitude chambers is also available in both thermostatic (temperature and pressure control) and climatic (temperature, pressure, and humidity control) versions.

The new "ES" models now have even more environmental performance, whilst maintaining the same footprint and volume of the lower specification versions.

They have been designed for Environmental Stress (ESS) and are ideal for reliability growth processes where temperature rates of change of 5°C/min are pre requisite.



# Features and advantages

- ✓ Robust structure.
- ✓ Top-of-sector performance, in terms of both the breadth of the regulation field and the speed of the temperature and pressure variations.
- ✓ Optimized system for the thermoregulation of the walls of the test chamber in both the heating and cooling phase, even for pressures close to the minimum value (optional).
- ✓ All-in one MyKratos™ software: all functions in one application. The new control system - including **MyAngel24™** - makes it possible to control, monitor and assist the chamber in any place at any time in multiple ways (WiFi, Ethernet, mobile networks) via mobile and desktop devices.
- ✓ Industrialization of the control, cooling, humidification, and pumping devices, in order to guarantee maximum quality and reliability as well as ease of access to the various maintenance points.



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## Main standards

DEF STAN 0035 3-11 (High Temperatures, Low Pressures)
DEF STAN 0035 3-12 (High Temperatures, Low Pressures)
DEF STAN 0035 3-13 (Low Temp. and Pressures, High Humidity)
MIL-STD-810G METHOD 500.5 PROCEDURE I
MIL-STD-810G METHOD 500.5 PROCEDURE II
MIL-STD-810G METHOD 500.5 PROCEDURE III*
RTCA/DO-160C

\* chamber equipped with special options.

# Altitude test chambers





# Customized altitude test chambers

A wide range of solutions are available for any customer requirements. Our company has extensive experience in supplying equipment for applications in aerospace, avionic industry and defence to worldwide customers.

**2000 l capacity altitude chamber equipped with thermoregulated air blowing system**



**Altitude chamber for testing airborne large components, fully complying with MIL-STD-810-G Procedure I, II, III**



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**Altitude chamber combined with vibration system, special standard requested: DEF STAN 00-35 CL9 severities B C Y E**



# Focus on features

## Basic Configuration

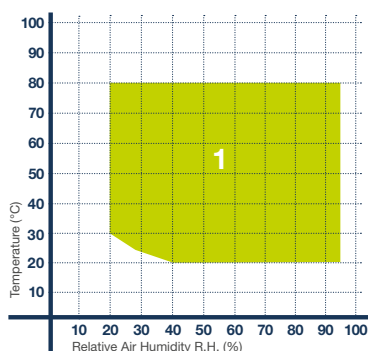
- **MyKratos™** including **MyAngel24™**
- **Inspection window:** multiple-crystal, with double heated transparent film, 300h X 300 mm size
- **Internal lighting**
- **Feet:** height adjustable
- **Closing:** mechanical
- **Porthole:** 100 mm (right side). This allows internal-external electrical, mechanical or hydraulic connections
- **Thermostat:** max./min. digital thermostat with independent probe
- **Auxiliary contacts** (specimens, alarms)
- **Interface:** Ethernet port for remote control system connection and RS232
- **Water condenser**

## Options

- **Additional portholes:** 50, 100 and 160mm, see drawing for available positions
- **Internal shelves:** AISI 304 stainless steel
- **Max temperature extension:** limit at +180°C
- **Min pressure extension:** limit at 1 mbar
- **Set of no.4 analogic inputs:** 0÷10V for user's data acquisition (no. 1 set max)
- **Set of no. 4 PT100 inputs** (no.1 set max)
- **Set of no. 8 auxiliary contacts** (no.1 set max)
- **No break power unit for PLC**
- **Remote air condenser**
- **6-channel microprocessor recorder** with no.1 PT 100 and pressure recording sensor
- **Wall cooling** (excluding door) with dedicated temperature sensor
- **Wall cooling/heating** (excluding door) with dedicated temperature sensor
- **MyKratos™ Multichamber software:** installed in a PC to monitor and control multiple chambers (to be supplied upon request)

## Humidity diagram

1. Standard  
working range





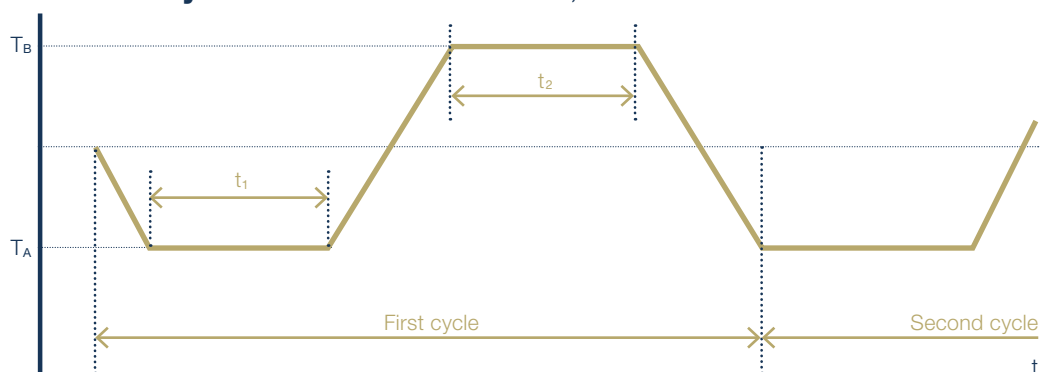
# Two test methods just in one chamber

**ACS** has enriched its offer with “ES” altitude chambers, able to perform:  
Temperature Rate of Change (at ambient pressure):

**Heating: 5°C/min from -55°C to +85°C**

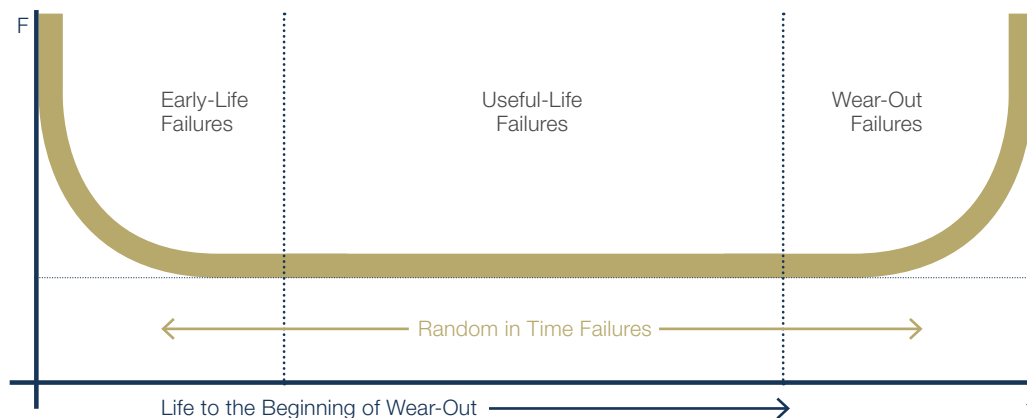
**Cooling: 5°C/min from +85°C to -55°C**

## Thermal cycle stress IEC 60068-2-14, test Nb



Stress screening ensures that defects, which normally arise during the product's useful life, are discovered during testing prior to the pre-production phase.

## Bathtub curve



The ES altitude chambers allow the best cost effectiveness using the same chambers to perform vacuum and stress screening test that can force infancy failures that would otherwise occur after final assembly and product delivery, and potentially during the warranty period

## Altitude test chambers / Technical features

	MODEL <sup>1</sup>	UD150 C	UD500 C	UD1000 C	UD500 C ES	UD1000 C ES
Useful capacity (l)		151	544	1041	544	1041
Internal dimensions approx. (mm)	WIDTH	600	800	1010	800	1010
	DEPTH	500	800	1010	800	1010
	HEIGHT	500	850	1020	850	1020
External dimensions approx. (mm)	WIDTH	1152	1312	1528	1312	1528
	DEPTH	2640	2885	3455	2885	3455
	HEIGHT	1900	2490	2290	2490	2290
Temperature Range (°C) <i>pressure value &gt; 300mbar</i>		-70...+100	-70...+100	-70...+100	-70...+100	-70...+100
Temperature fluctuation (K)		±1	±1	±1	±1	±1
Temp. changing rate Heating <sup>4+5</sup> (K/min)	(-70/+100°C)	2	1,6	3,5	NA	NA
Temp. changing rate Cooling <sup>4+5</sup> (K/min)	(+100/-70°C)	3,8	1,6	2,5	NA	NA
Temp. changing rate Heating <sup>5</sup> (K/min)	(-55/+85°C)	NA	NA	NA	5	5
Temp. changing rate Cooling <sup>5</sup> (K/min)	(+85/-55°C)	NA	NA	NA	5	5
Humidity range (%) <sup>2</sup>		20...95	20...95	20...95	20...95	20...95
Temp. range for climatic test (°C)		20...80	20...80	20...80	20...80	20...80
Humidity fluctuation (%)		± 3...± 5	± 3...± 5	± 3...± 5	± 3...± 5	± 3...± 5
Min pressure (mbar)		10	10	10	10	10
Pressure Fall down time to 10mbar (min.)		12	13	18	13	18
Rated power (kW)		15	22	34	31,5	45
Rated current absorption (A)		29	39	57	53,5	83
Weight (without packing) (kg)		1600	2100	2900	2200	3000
Sound pressure level dB(A) <sup>3</sup>		65	65	65	68	73
Max water consumption (m³/h) <sup>6</sup>		2,4	3,2	5,8	5,8	8,7
Heating/Cooling of the walls (door excluded) pressure value < 300mbar <sup>5</sup> (°C) <i>(probe on the wall)</i>		+85...-70	+85...-70	+85...-70	+85...-70	+85...-70
Supply voltage (Vac)		400V ±10%/50Hz/3 + N + G				

1. For Temperature only version change the prefix UD with TD - 2. t=+4°C/+79°C for continuous test - 3. Measured at 1 m distance in front of the unit in 1,6 m height, free field measurement - 4. According to IEC 60068-3-5 and IEC 60068-3-6 - 5. The performance data refer to +22°C ambient temperature, 400V nominal voltage, without specimen - 6. With water at T +29°C and temperature difference at 5°C (water temperature range +12÷+29°C)

# mykratos

## an intelligent Control System ready for the Future

Thanks to their hyper-connectivity, ACS test chambers can match current and future needs related to the new demands of the Industrial Internet of Things and Industry 4.0 for integrated, interconnected and communicating machines.

### Available on the new 10 inch display

### Simple to use graphical interface

Clarity, consistency  
and efficiency of use

### Embedded Control Software

**MyKratos™** inside, to control  
monitor and assist the  
chamber from any device.  
No additional hardware  
or software required

### Free App

to fully manage  
the chamber via mobile  
devices (Google Play  
and Apple Store)

### Easy remote access and control

via integrated Wi-Fi / mobile  
network and Ethernet

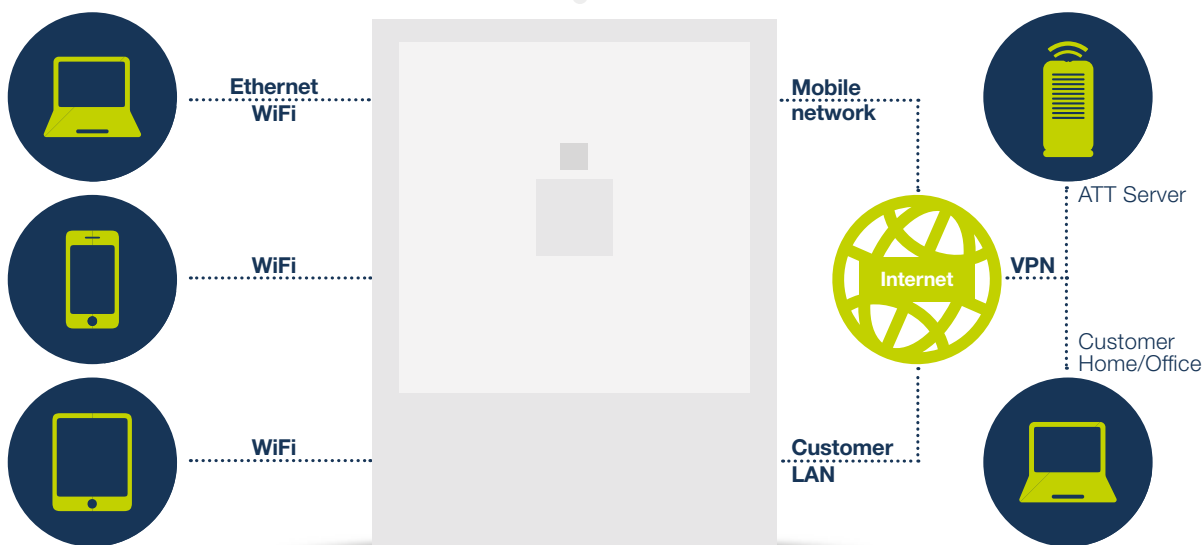
### Chamber Internal Cloud

for data storage

The interface consists of a powerful software accessible from the 10 inch on board display and from remote devices (PC, tablet, smartphone), **MyKratos™**, including the interactive assistance system **MyAngel24™**.

The chamber is equipped with a **PLC** (Programmable Logic Controller) for managing all the chamber's functions and safety interlocks. A special device controls the chamber via mobile devices, such as tablets and smartphones, or establishing a remote Internet connection.

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# MyKratos™ control system

**MyKratos™** control software makes it possible to manage, monitor and assist the chamber anywhere, at any time, in multiple ways (Wi-Fi, Ethernet, mobile network) via mobile and desktop devices.  
The chamber wireless (Wi-Fi) connection permits operation using tablets and smartphones (iOS or Android compatible). The operator interface can also be remotely accessed through a chamber connection to the client's LAN or via mobile network (on activation of a SIM card data).  
It includes the **MyAngel24™** remote-assistance system.

## Main features

- Wi-Fi or Ethernet connection to the chamber
- Visualization and graphical analysis of measures and recordings
- Synoptic charts of the entire system
- Multilanguage support
- High configurability of chamber parameters
- Unlimited measures recording possibilities
- Program and Manual chamber operation modes
- Delayed start of a program
- Possibility to select more than one chamber from a single Tablet:  
secure access by means of multiple password levels
- Automatic notifications of event and alarms
- Archive manager for easy access to the stored recordings
- Possibility to send email notification
- Possibility to send SMS notification (SIM card required)
- Multi-chamber management
- System available in several languages

## Additional S/W tools for an Easy Integration of ACS test chambers in Test Labs

Communication drivers for an easy integration into customer-developed Serial or Ethernet based applications, (LabVIEW, LabWindows CVI, Microsoft.NET, Visual Basic 6, etc...) can be supplied on request. The drivers come with a set of examples written in Visual Basic 6, LabView, LabWindows CVI, VB.NET, and permit total interaction with ACS test chambers, for both reading and writing.

Our communication protocol - ModBUS RTU for serial or Fetch/write for Ethernet communication, can be supplied to allow any chamber connection using the customer's own programming languages and operating systems.

### Example program LabVIEW User interface



Development environment



# MyAngel24™ remote assistance system



**MyKratos™** software includes the innovative ACS remote-assistance system **MyAngel24™**, operating via mobile network wireless connection, complete with SIM card. This makes it possible to access the operator interface remotely via VPN and send **SMS notifications**. Cabled connection is also available, via customer's LAN. N.B.: MyAngel24™ activation on demand.



With **MyAngel24™**, the climatic chambers stay connected to the remote server 24 hours a day, monitoring running conditions in order to guarantee faster and more efficient service and maintenance activities.



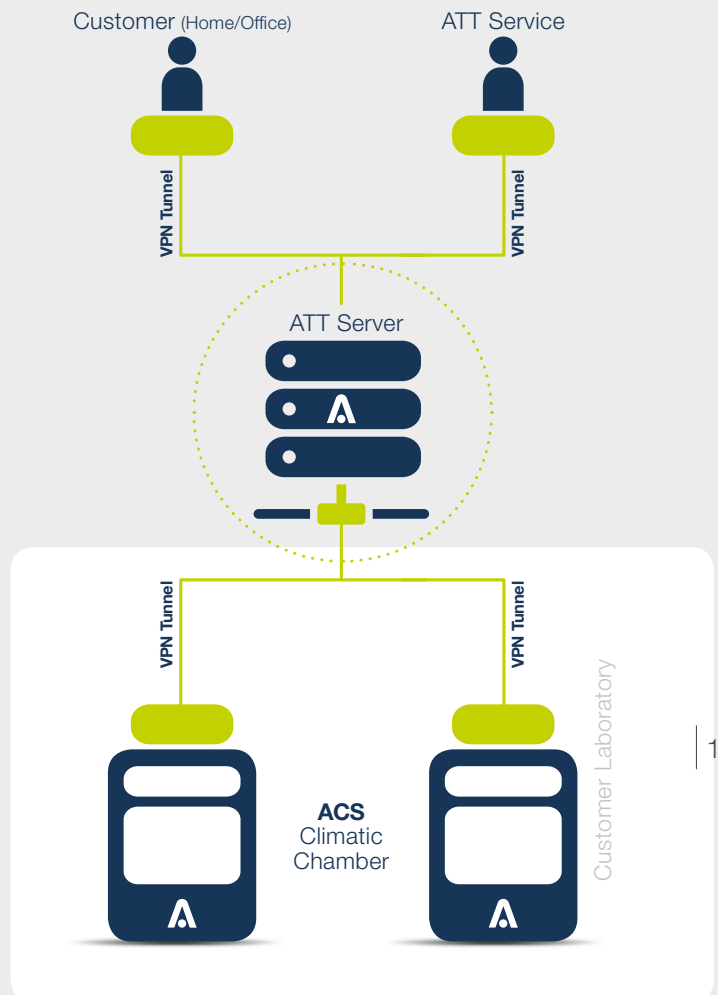
With **MyAngel24™**, you can stay in contact with the climatic chamber whenever you want and wherever you are, accessing its control panel from any web browser.



**MyAngel24™** uses the highest security standards available for authentication, secure connection, data encryption and storage. Moreover, you can suspend or limit the data sent to the central server for security reasons during one or more test sessions.

## New!

- ✓ Automatic Reporting
- ✓ Self Diagnosis
- ✓ Preventive Maintenance



## Maintenance Cost Reduction

### • Less on-site intervention

- **MyAngel24™** permits the identification of problems with a remote test and an examination of the recorded data
- ACS can diagnose many problems remotely ensuring the service engineers know how to resolve the problem before visiting site and in some instances avoiding the need for a site visit.

### • Reduced chamber downtime

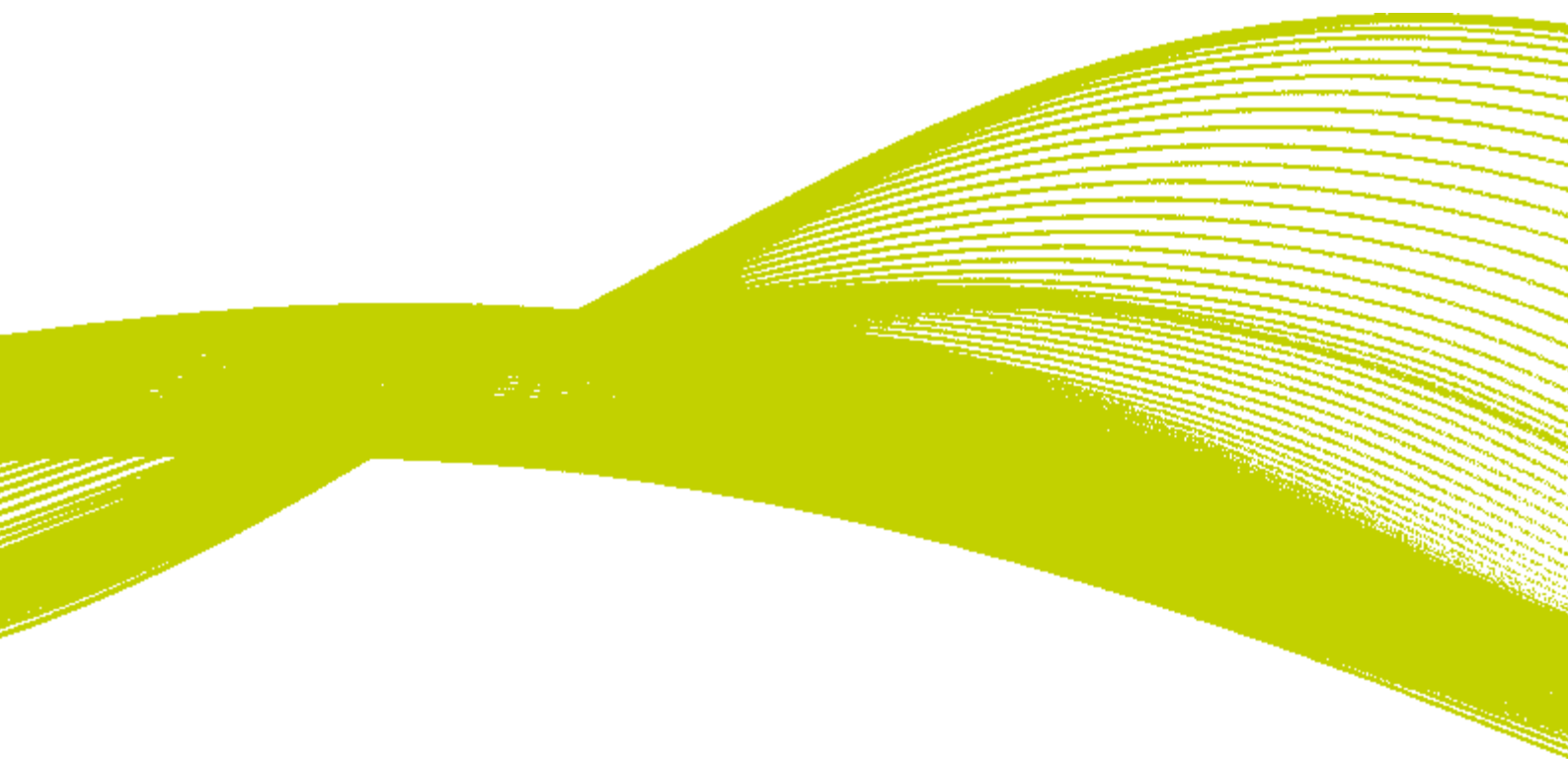
- ACS is able to schedule maintenance to chamber test plan and life cycle monitoring of the main components

### • Efficient on site intervention

- Service staff know the problem and which parts may require replacing before attending site

### • Remote support

- ACS can adjust PID parameters remotely
- ACS can make changes to PLC programs remotely for chamber optimisation.



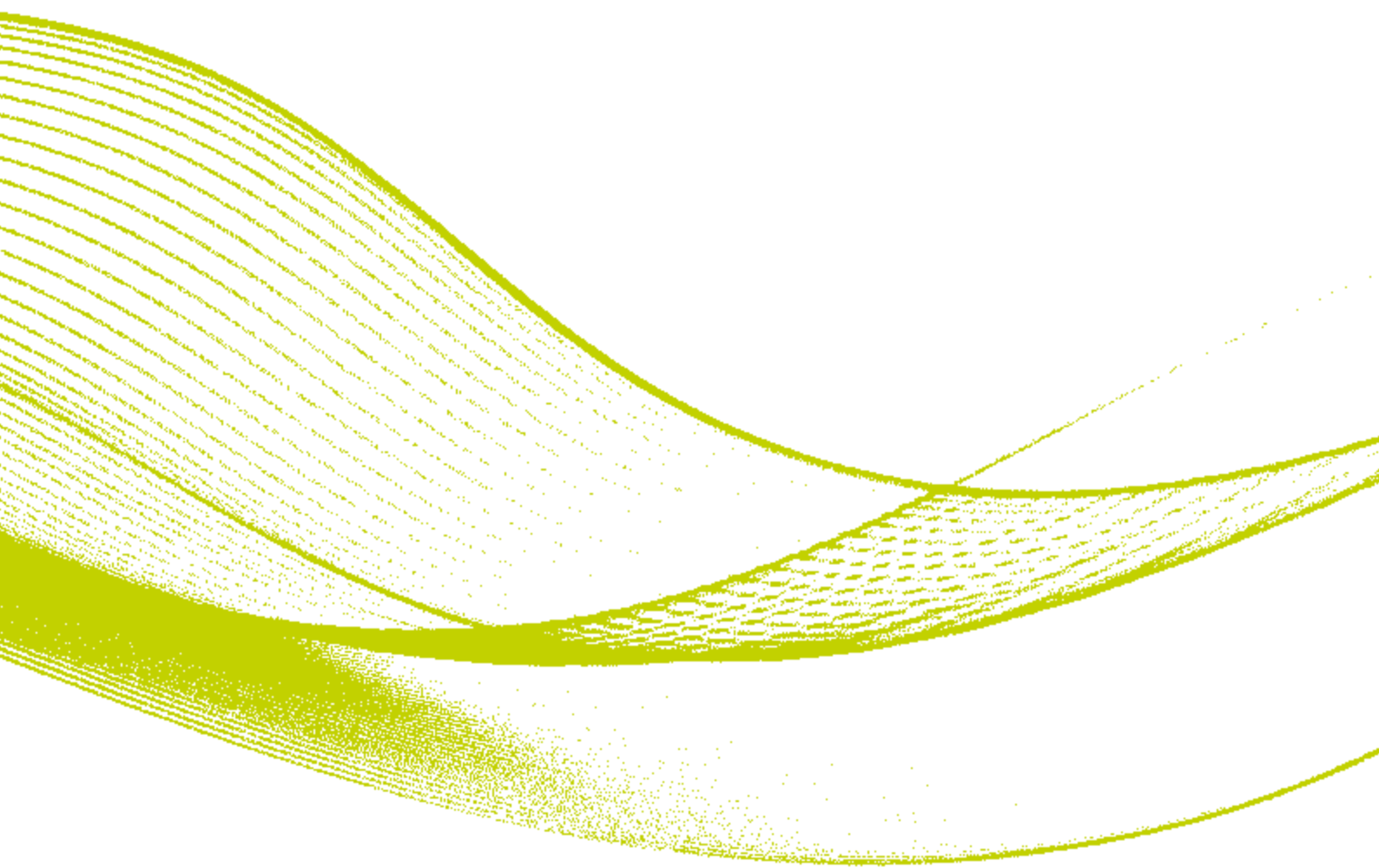
**Angelantoni Test Technologies**, owned by the **Angelantoni Group**, is the only company capable of offering a comprehensive range of environmental test chambers - **ACS** branded - for a great variety of applications, thanks to the expertise and technical know-how of its teams of experts. Innovation, flexibility and organization have always been the keys to success for ACS, world-famous since 1952 also for its high-tech test equipment such as Thermal High Vacuum Chambers for Aerospace applications and Calorimeters.



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