

# With vibration and high speed to top quality

Vibration test chambers WT/V and WK/V

# Additional safety...

## ... to temperature/humidity testing vibration test – for safety.

High product reliability is a basic requirement for today's competitive market and is often the only difference between the products of various manufacturers.

Where thermal/climate tests are not sufficient the test severity can be increased by the addition of a dynamic parameter vibration.

The reliability of electronic products can be substantially improved by the use of environmental stress screening (ESS) techniques.

ESS is a process that accelerates the occurrence of latent defects before delivery.

This will minimize the risk of errors and failures of products and simultaneously improve the reputation of a company.

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# ... Temperature + Humidity + Vibration



## ... convincing product advantages by ESS-tests

- Improvement of product reliability. The products do not simply function, they operate correctly for a long period of time.
- The quality itself is substantially improved, customer satisfaction increases and the sale of reliable products likewise. Reliable products ensure that the reputation of the manufacturer on the market remains a good one.
- ESS means reduced costs as product failures do not occur during the warranty period when they are already in the possession of the customer.
- ESS reduces the risks connected with the launching of a new product or a new technology.
- ESS means quick "feedback". Weak points of products are detected in the manufacturer's plant at an early point of time and can be remedied immediately.



# Method . . .

## The test . . .

During the ESS test, the products are subject to a precisely defined stress.

In practice, the following ESS methods have prevailed:

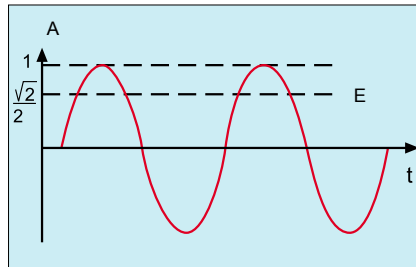
- Temperature stress
- Vibration stress
- Humidity stress

in conjunction with electrical stress.

Test tailoring is essential so as to ensure that sufficient stress is applied so as to precipitate early failures, but should not be so severe as to cause undue damage to good products.

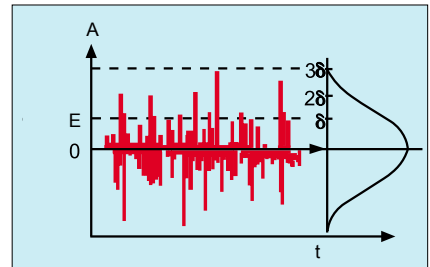
## Increased severity through vibration . . .

Sinus



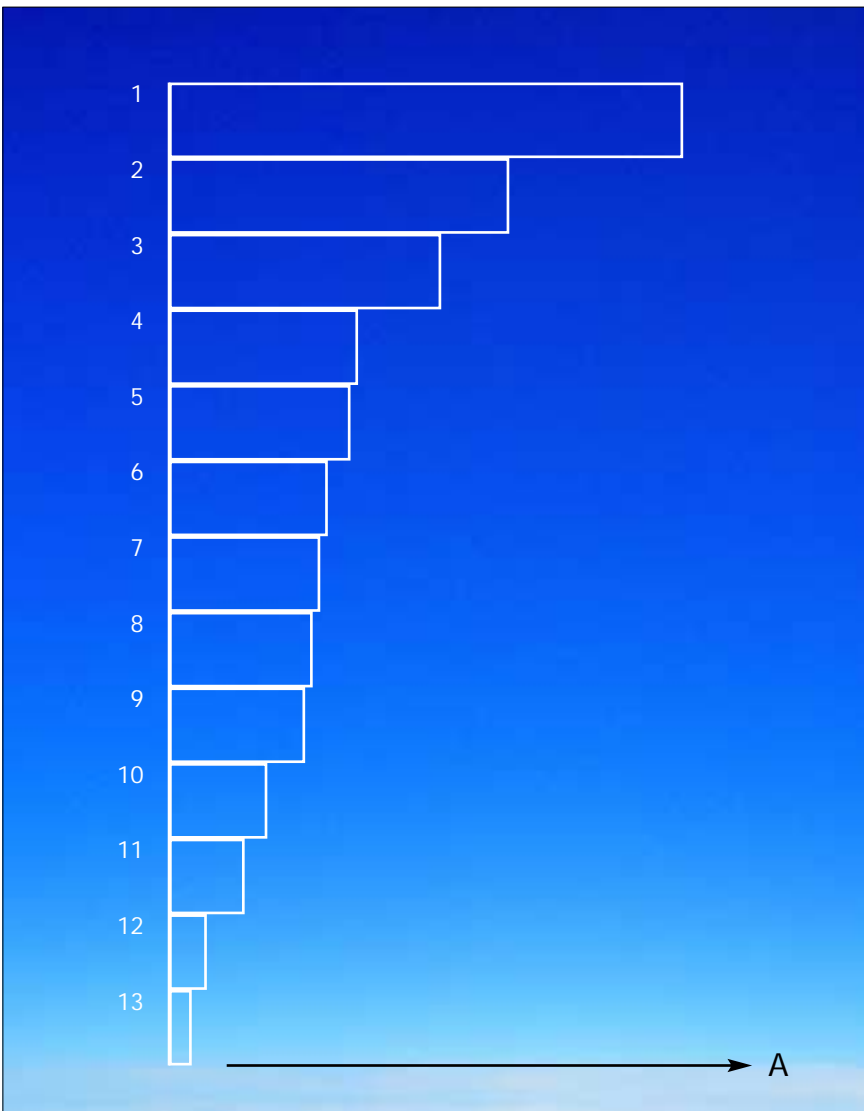
A = Amplitude  
E = effective  
t = Time

Random



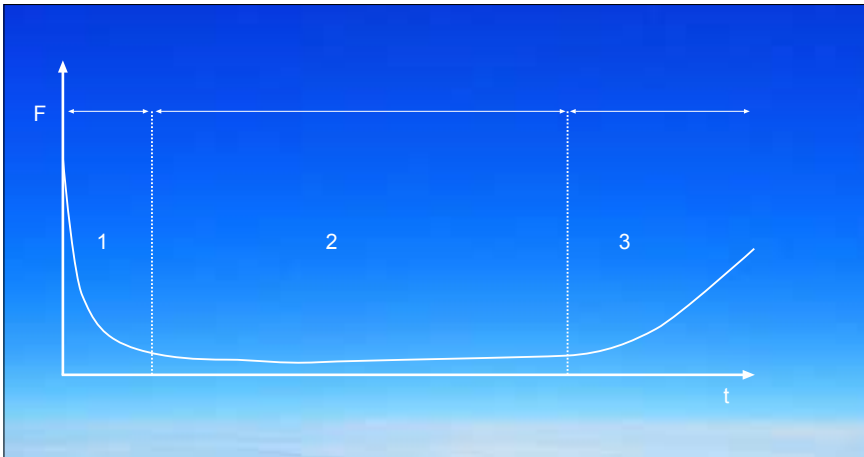
A = Amplitude  
E = effective  
t = Time

## Effectiveness of environmental screens



- 1 Temperature cycling
- 2 Vibration, Random
- 3 High temperature
- 4 Electrical stress
- 5 Temperature shock
- 6 Vibration, sinus
- 7 Low temperature
- 8 Vibration sinus, sweep
- 9 Combined test
- 10 Mechanical shock
- 11 Humidity
- 12 Acceleration
- 13 Low pressure

A = Weighted rank

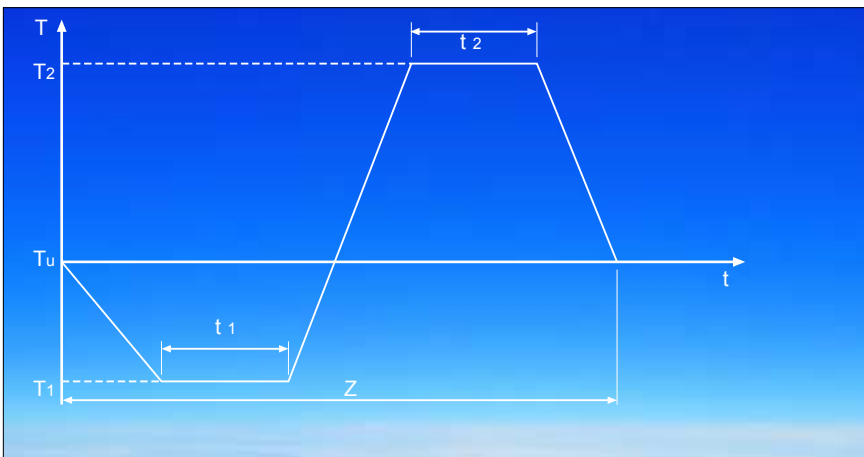


### Service life curve of electronic components

ESS means that errors which normally occur during the usage phase occur in the production phase

$F = \text{error} \cdot t = \text{time}$

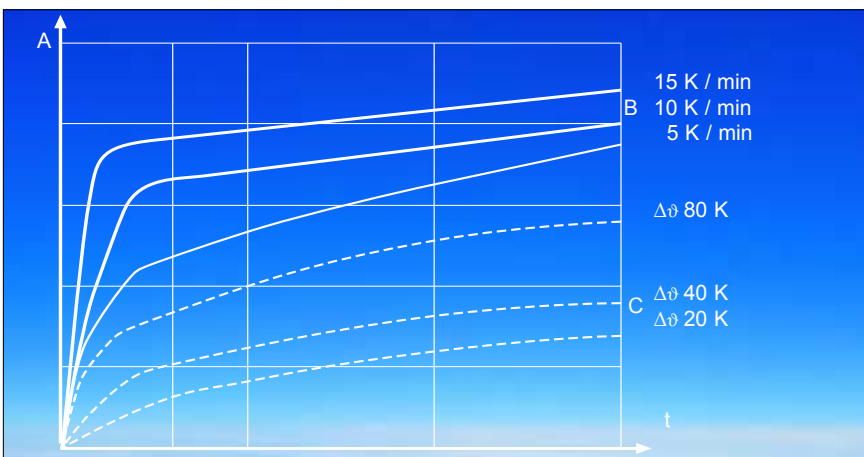
1 = early failures • 2 = usage phase • 3 = wear phase



### Temperature shock cycling test as per IEC 60068-2-14, Test Nb

$T = \text{temperature}$  •  $T_1 = \text{low temperature}$  •  $T_2 = \text{high temperature}$

$T_u = \text{ambient temperature}$  •  $Z = \text{cycle}$  •  $t = \text{time}$



### Effectiveness of thermal cycles and high temperature storage for preconditioning of circuit boards

$A = \text{effectiveness}$  •  $B = \text{thermal cycles}$  •  $C = \text{high temperature storage}$  •  $t = \text{time}$

$\Delta\theta = \text{temperature increase to max. working temperature}$

## Mode and effects ...

Our stress screening test chamber series was specially designed for temperature stress. The WK series of climate test chambers is available for humidity stress. Additionally, WT/V and WK/V chambers are available for combination of the above parameters with vibration.

Environmental stress screening on PCBs (or other products) is achieved by thermal stress with quickly changing temperatures. ESS is the most effective method of detecting poor soldering joints as well as manufacturing errors before delivery.

Typical ESS test profiles have a temperature ramping rate of 5...15 K/min over a wide temperature range (see technical data on page 10/11).

The periodic or constant switching of the boards during the thermal cycle can increase the detection of errors. The above mentioned results are achieved in special ESS chambers because the heating and cooling capacity as well as the amount of circulating air is considerably higher than that of a conventional test chamber. High amounts of circulating air improve the thermal transfer and ensure that the specimens and/or boards are homogeneously stressed.

Weiss Umwelttechnik has developed a range of systems especially for this purpose which does more than justice to the above mentioned requirements.

# Convincing technology...

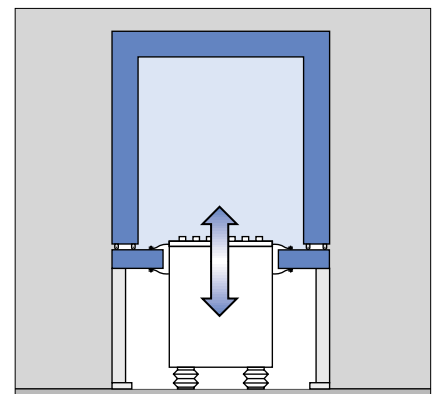
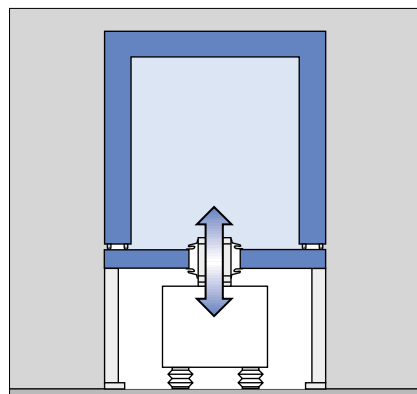
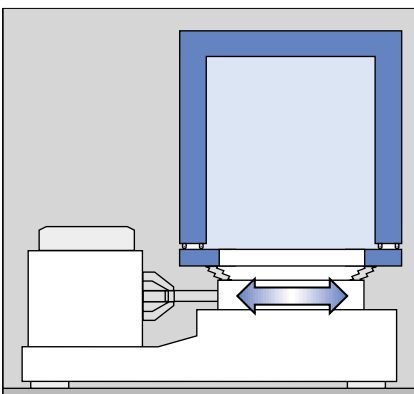
## Vibration test chamber configuration...

The test systems based on the well-tried modules of the WT and WK series with increased power for heating, cooling and circulating air and test chamber volumes of 600 to 2200 litres are capable of meeting virtually all requirements.

The WK/V series also complies with customary climatic test standards.

The technology of the systems, as is to be expected from the ergonomic design, provides optimum operation and reliable functioning:

- Powerful, homogeneous temperature and/or climate conditioning of the test chamber.
- The specimens are protected by an independent temperature measurement and monitoring.
- Optimized air ductwork for all test chamber volumes.
- No obstruction from struts or legs below test space.
- Touch panel with simple, menu-guided operation – no programming knowledge required.
- 32 bit processor
- Easily accessible maintenance elements ensure minimum service times.
- Automatic water replenishment without interrupting operation with large storage tank for the WK/V series.
- Environmentally friendly, high-quality insulation.
- Precise adjustment of system height to accommodate standard shakers.
- Optimal, compact external dimensions.
- Minimal installation work on site.
- Embossed stainless steel test space with integral shelf support with high stability even during shaker operation.
- Easy-to-clean test chambers thanks to special welding and molded racks.
- Tightly sealed and easy-to-clean surfaces thanks to powder coating.
- Simple integration of all standard shakers.
- Networking of chamber control software and shaker control software possible (TCP/IP-Protocol).



# ... and functional design



# Function and technology in detail . . .

## Construction features and function principle

The beautifully designed outer casing is made of corrosion-resistant, galvanized sheet steel with an environmentally friendly coating.

The test chamber door is hinged on the left and has optimum contact pressure when closed.

The machine unit with the large cooling units is located underneath the test chamber in a maintenance-friendly position.

The entire power electronics is located in a switch cabinet at the back of the test chamber.

Every electronic function circuit has its own safety mechanism which switches off the relevant function circuit and/or the entire test chamber when faults occur.

The test space is made of high-gloss polished, high-quality stainless steel and is vapor-tight welded. The evaporator, heating elements and the large ventilation equipment with external drive motors are installed behind the conduit which is at the back of the test space.

A special air ductwork system together with the enhanced temperature conditioning systems ensures quick and even temperature conditioning of the specimens.

The test chamber is equipped with separate sensors to protect the specimens irrespective of the temperature control system. Additional ducts in the side panels are provided for the electrical connections of the specimens from the outside.

The temperature conditioning system of the WK series is also equipped with humidification and dehumidification equipment with a humidity sensor. The humidity sensor is located in front of the specimens in the air stream together with the control sensor for the temperature.

## Standard version

- Chamber height adaptable to shaker system
- Low/high temperature safety cutout as per EN 60519-2 (1993) with separate sensor, thermal safety class 2
- Parallel printer interface for HP deskjet color and EPSON printer
- Serial interface RS 232 C
- 4 potential-free switching inputs and outputs
- Contactless switching of heating elements
- 50 mm Ø entry port in the left and 125 mm Ø in the right side panel
- Water-cooled condensers
- Control system **SIMCON/32\*** with Touch-Panel
- DKD-calibration

### Additional features for WK/V series

- Capacitive humidity sensor
- Special temperature conditioning system in the climate working range for high temperature and humidity constancy.
- Low water indicator

## Options

- Mobile version
  - Electro-mechanical height adjustment
  - Test chamber floor without vibrator port
  - Test chamber floor with rectangular port for slip table
  - Software package **SIMPATI\***
  - Additional potential-free switching inputs and outputs
  - Measured data recording system for Pt 100 and voltage signals  $\pm 10$  V
  - Configuration modules for interface standards e.g. RS 422, RS 485, IEEE 488.2 and optical waveguide
  - Analog outputs for set and actual values
  - Additional Pt 100-sensor/thermal elements
  - Door with window
  - Door with window and reach-through openings
  - Fresh air purge system
  - Adjustable air speed
  - Entry ports 50 mm, 80 mm, 125 mm Ø
  - Other mains supplies and frequencies
  - Air-cooled condenser
  - GN<sub>2</sub>-purge
  - LN<sub>2</sub>-shock cooling
  - Compressed air drying for protection against condensation
  - Sound insulation
  - Notches
- For WK/V series
- Water demineraliser
  - Dewpoint extension in the climate range



Further options and special accessories on request.



# ... Operation and documentation

## ... convenient and stress-free operation

The touch panel for defining the program is on the left or right side of the door. It can be adjusted to the height of the operating personnel and is removable.

The operating interface with a resolution of 320 x 240 Pixel is menu-guided for the input of constant and program operation with representation of the set and actual values as graphs, the operating time and remaining number of cycles etc. including help functions.

The created programs are downloaded into the measurement and control system **SIMCON/32\***.

**SIMCON/32\*** is a self-monitoring, digital 32 bit measurement and control system and is responsible for all control functions. The highly efficient software SPS monitors and coordinates all functions and provides information on any in operational faults.

The program memory can store a max. of 100 programs which are simple to create and store. Connection to a host computer system is possible via the serial interface RS 232 C.

The possibility to operate the system using a "notebook" is also available as an option.

The system is compatible with the simulation management software **SIMPATI\***.



## ... SIMPATI\* software – the optimum choice

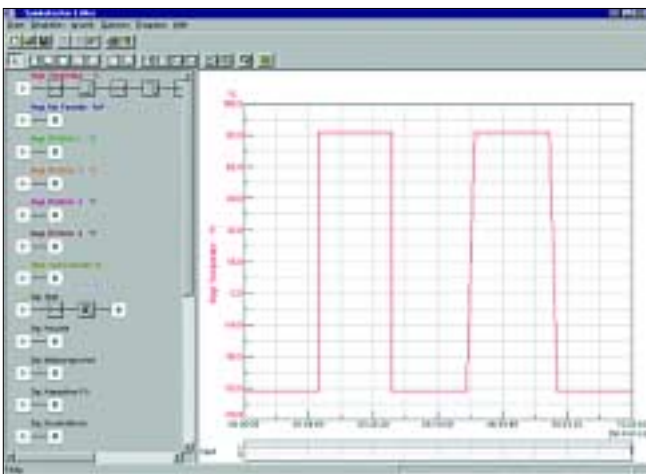
# SIMPATI\*

**SIMPATI\***, the computer-aided simulation management software provides complete documentation and evaluation represented in the form of a graph. Installed on a separate PC (Windows 98/ME, Windows NT 4.0/2000/XP

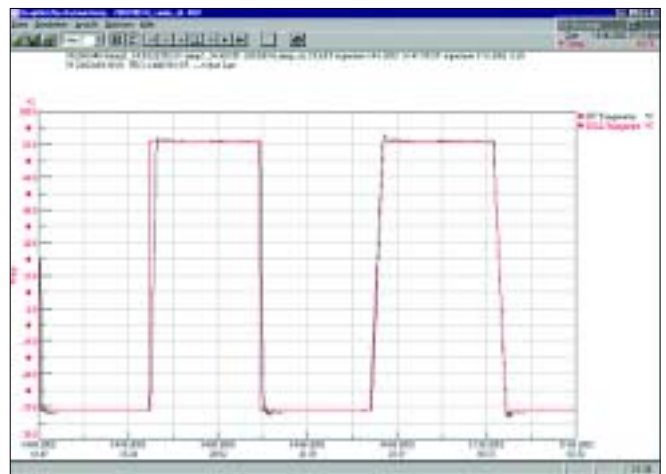
Prof), the user has access to the full PC performance potential.

This means controlling the test sequence, storing measured data, creating comfortable test programs with the graphics editor and printing the measured data in the form of a graph and copying in other programs for evaluation purposes. Max. 32 systems can be networked.

Thanks to an internal interface, the software is compatible with Microsoft Word, Microsoft Paint, Microsoft Excel, National Instruments Labview and special user software.



Symbolic editor



Graphic display

# Technical data . . .

## Vibration test chambers

## WT/V – WK/V 5 K/min

Type	WT/V – WK/V	600/ 40/5/V	600/ 70/5/V	1200/ 40/5/V	1200/ 70/5/V	2200/ 40/5/V	2200/ 70/5/V
Test space contents	Litres	600	600	1150	1150	2156	2156
Test space dimensions	Height	mm	950	950	950	1100	1100
	Width	mm	800	800	1100	1100	1400
	Depth	mm	800	800	1100	1100	1400
Outside dimensions	Height	mm	2150	2150	2150	2150	2300
	Width	mm	1225	1225	1525	1525	1825
	Depth	mm	2860	2860	3210	3210	3560
Chamber width (incl. touch)	mm	1500	1500	1800	1800	2100	2100
Height (up to bottom side test space floor min/max)	mm	660/1380	660/1380	660/1380	660/1380	660/1380	660/1380
Largest shaker port diameter	mm	680	680	980	980	1280	1280
Largest slip-table port	mm	600*600	600*600	900*900	900*900	1200*1200	1200*1200
<b>Performance for temperature tests</b>							
Temperature range	°C	-40...+180	-70...+180	-40...+180	-70...+180	-40...+180	-70...+180
Change rate as per IEC (1)	Cooling	K/min	5.5	5.0	5.5	4.5	6.5
	Heating	K/min	5.0	5.0	5.5	5.5	6.0
Heat compensation	at +20 °C	W	5000	5000	5000	5000	5000
	at -20 °C	W	2000	5000	2000	5000	2000
Temperature fluctuation	K	±0.1 to ±0.8 in time, ±0.5 to ±2.0 spatial					
Calibration values		+23 °C and +80 °C					
<b>Performance for climate tests</b>							
Temperature range	°C	+10 ... +95					
Dewpoint range (5)	°C	+4 ... 94					
Humidity range	% r. h.	10 ... 95					
Humidity fluctuation	% r. h.	±1 to 3 in time					
Temperature fluctuation	K	±0.1 to ±0.3 in time, ±0.5 to ±1.0 spatial					
Heat compensation (2)	W	500					
Calibration values		+23 °C / 50 % r. h. and +95 °C / 50 % r. h.					
Electrical connection		3/N/PE AC, 400 V ±10 %, 50 Hz					
Max. connected load	kW	11	16	23	26	26	34
Max. current consumption	A	19	29	33	38	38	50
Sound pressure level – 1 m from the front (3)	dB(A)	68	71	75	76	76	77
Cooling water consumption (4) max.	m <sup>3</sup> /h	2.2	2.7	3.3	3.8	4.1	6.6
Weight	kg	1000	1075	1450	1600	2100	2500

Performance data refer to +25 °C ambient temperature

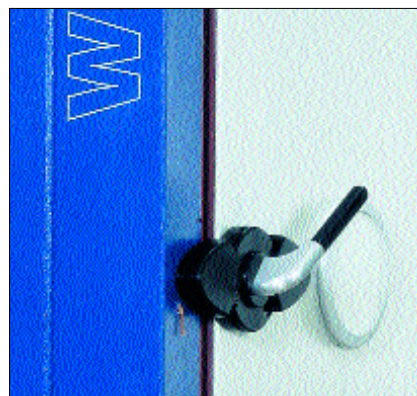
(1) Change rate as per IEC 60068-3-5, measured in the supply air stream

(2) At +25 °C to +90 °C, humidity to max. 90 % r. h.

(3) Free field measurement as per DIN 45635, Part 1, accuracy class 2

(4) At a cooling water temperature of +28 °C and temperature difference of 5 K, water temperature +12 °C to +28 °C

(5) Data only valid with blank floor element



**WT/V – WK/V 10 K/min**

**WT/V – WK/V 15 K/min**

600/ 40/10/V	600/ 70/10/V	1200/ 40/10/V	1200/ 70/10/V	2200/ 40/10/V	2200/ 70/10/V	600/ 40/15/V	600/ 70/15/V	1200/ 40/15/V	1200/ 70/15/V	2200/ 40/15/V	2200/ 70/15/V
600	600	1150	1150	2156	2156	600	600	1150	1150	2156	2156
950	950	950	950	1100	1100	950	950	950	950	1100	1100
800	800	1100	1100	1400	1400	800	800	1100	1100	1400	1400
800	800	1100	1100	1400	1400	800	800	1100	1100	1400	1400
2150	2150	2150	2150	2300	2300	2150	2150	2150	2150	2300	2300
1225	1225	1525	1525	1825	1825	1225	1225	1525	1525	1825	1825
2860	2860	3590	3590	3940	3940	2860	2860	3590	3590	3940	3940
1500	1500	1800	1800	2100	2100	1500	1500	1800	1800	2100	2100
660/1380	660/1380	660/1380	660/1380	660/1380	660/1380	660/1380	660/1380	660/1380	660/1380	660/1380	660/1380
680	680	980	980	1280	1280	680	680	980	980	1280	1280
600*600	600*600	900*900	900*900	1200*1200	1200*1200	600*600	600*600	900*900	900*900	1200*1200	1200*1200
-40...+180	-70...+180	-40...+180	-70...+180	-40...+180	-70...+180	-40...+180	-70...+180	-40...+180	-70...+180	-40...+180	-70...+180
12.0	10.5	11.5	10.5	11.5	11.0	17.5	14.5	17.0	14.5	16.0	15.5
9.5	9.5	12.0	11.0	10.5	10.5	15.5	16.5	16.0	16.0	15.0	15.0
8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
3000	8000	3000	8000	3000	8000	3000	8000	3000	8000	3000	8000
±0.1 to ±0.8 in time, ±0.5 to ±2.0 spatial +23 °C and +80 °C <b>only WK/V</b> +10 ... +95 +4 ... +94 10 ... 95 ±1 to +3 in time						±0.1 to ±0.8 in time, ±0.5 to ±2.0 spatial +23 °C and +80 °C <b>only WK/V</b> +10 ... +95 +4 ... +94 10 ... 95 ±1 to +3 in time					
±0.1 to ±0.3 in time, ±0.5 to ±1.0 spatial 500 +23 °C / 50 % r.h. and +95 °C / 50 % r.h. 3/N/PE AC, 400 V ±10 %, 50 Hz						±0.1 to ±0.3 in time, ±0.5 to ±1.0 spatial 500 +23 °C / 50 % r.h. and +95 °C / 50 % r.h. 3/N/PE AC, 400 V ±10 %, 50 Hz					
16	20	28	34	35	44	20	24	35	44	54	65
30	43	41	50	51	63	30	43	51	63	88	111
74	75	76	77	76	77	74	75	76	77	76	78
3.5	4.2	6.6	6.6	8.4	8.3	6.1	6.3	8.4	8.3	10.0	10.1
1250	1400	1850	2150	2350	2750	1300	1450	2000	2300	2500	2900

We reserve the right to make any technical alterations.  
Some equipment photos show chambers with optional accessories.



# Test systems for professionals. Test the best . . .



A complete line of systems is available offering test space volumes ranging from approx. 60 l to 1,500 litres, a working range from  $-75 \dots +180 \text{ }^\circ\text{C}$  and relative humidity values ranging from 10 . . . 98 % r. h.

We also offer an extensive line of field-proven test systems specially for simulating exposure to weather, temperature shock, corrosion and long-time tests for application in research, development, quality control and production.

Of course, Weiss – as one of the leading producers of environmental simulation systems world-wide – offers the entire spectrum of high-tech test systems starting from a series of cost-effective test systems up to customized walk-in chambers and in-line systems.

If it's know-how, service and reliability that you are looking for – contact Weiss Umwelttechnik.

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