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Salt spraying boxes HKT 500, HKT 750, HKT 900

Order numbers:
HKT 500 basic unit: 4-HKT500V02
HKT 750 basic unit: 4-HKT750V02
HKT 900 basic unit: 4-HKT900V02

Corrosion test system to carry out atmospheric corrosion testing according to the following test regulations:

DIN EN ISO 9227 (DIN 50 021) NSS, AASS, CASS test
DIN EN 60068-2-11
ASTM B 117
ASTM B 287
ASTM B 387

Optionally extendible to implement the following test regulations:

DIN EN ISO 6270-2 (DIN 50017)
DIN EN ISO 6988 (DIN 50 018)
VDA 621-415
DIN EN ISO 11997-1 cycle B
VDA 621-415 (B or new) (separate equipment series)
VW PV 1210
DIN EN ISO 4541 Corrodkote test
DIN EN 60068-2-52 with severity level 1 to 2
DIN EN 60068-2-52 with severity level 1 to 6
SWAAT / PV1208

Quality features:

- **Precision dosing pump**
- **Polypropylene test chamber**
- **Acrylic nozzle**
- **Transparent hood**

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Basic configuration

In the basic configuration, the device already has all necessary components to carry out a saltfog test according to ISO 9227NS/AASS/CASS.

Basic configuration
• **Saltfog function according to ISO 9227 NS, AASS, CASS**
• **control system Comfort**
• **Saltfog function with dosing pump**
• **External brine tank**
• **5 carrier rods (20mm, GRP pipe)**

Technical description

External casing:
Frame design and external lining made of rustproof stainless steel, marbled.

Test chamber:
Polypropylene tank with fully transparent acrylic hood with 30 degrees roof inclination
The opening and closing movement is supported by two gas pressure springs.
5 carrier rods (20mm, GRP pipe) are included in the basic equipment to position the test specimens in the test chamber.

Test chamber heating:
Indirect heating by heating mats which are provided userfriendly on the outside of the test chamber.

Air humidifier:
First the air passes an air humidifier filled with heated deionised water for humidification.
The water level is clearly indicated by a filling level indicator and is controlled automatically.

Spraying pressure regulation:
Pre-pressure fluctuations in the compressed air supply to be provided by customer nearly have no impact on the spraying pressure thanks to the use of a constant pressure reducer.
The pressure setting is displayed on a clearly visible front manometer.

Flow control
Electronically controlled precision dosing pumps to supply the brine uniformly to the spraying nozzle. The added sole quantity can be controlled by the stroke and the frequency of the diaphragm pump.
The dosing pump works independently from the spraying pressure and the level of the salt solution and thus guarantees a very good reproducibility of the fog density.

Ventilation function
Manual or programme controlled quick ventilation by compressed air to discharge the saltfog out of the test chamber.

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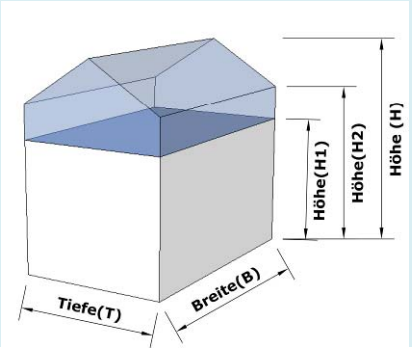
Technical data (basic equipment):

(The technical data partially depend on the additional options)

Temperature range:	from room temperature to +55°C		
Temperature constancy:	± 0.5K in time		
Voltage supply	16A, 230V/50Hz		
Compressed air connection:	connection: compressed air quick coupling pressure: 5.0 to 8.0 bar consumption: 2.5 Nm³/h to 3Nm³/h *(Note: All salt spraying standards require oilfree and particle-free compressed air)*		
Water connection: (deionised water)	connection: ½“ male thread pressure: 2.0 to 5.0 bar quality: fully deionised water (conductance value <= 20µS/cm) *(Note: Deionised water is necessary for the feeding of the air humidifier)* *(Note: The deionised water is used additionally for the rinsing device and for the automatic filling of the test chamber bottom for condensation water testing in case of devices with add-on equipment for cyclic corrosion testing.)*		
Fog outlet:	pipe socket d=32mm		
Condensate drain:	pipe socket d=32mm		
Brine tank (respectively included in the basic configuration)	**HKT 500** external 140l tank (Ø=500mm, h=860mm)	**HKT 750** external 140l tank (Ø=500mm, h=860mm)	**HKT 900** external 250l tank (Ø=650mm, h=1100mm)
	(Note: sufficient for approx. 200 h spraying operation, required brine during the salt spraying: approx. 0.4l to 0.5l (per hour))		

	HKT 500	HKT 750	HKT 900
Test chamber volumes	approx. 500 litres	approx. 750 litres	approx. 900 litres
Test chamber dimensions	w=1080 mm dpt=680 mm h1=605 mm h2=765 mm	w=1580 mm dpt=680 mm h1=605 mm h2=765 mm	w=2000 mm dpt=680 mm h1=605 mm h2=765 mm
External dimensions	w=1850 mm dpt=880 mm h=1205 mm	w=2350 mm dpt=880 mm h=1205 mm	w=2770 mm dpt=880 mm h=1205 mm
Weight	approx. 250 kg	approx. 290 kg	approx. 350 kg



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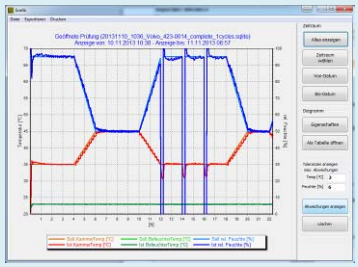
Control system

Control system Comfort

Control system on Windows 7 embedded basis.
Touch panel PC with 8.4“ SVGA (800x600) TFT LCD colour display.

Graphic display of temperature and air humidity profiles
All important tests are pre-programmed according to the expansion stage of the unit.

The internal measurement data logging as sqlite database. The export of the database as CSV or as image on an USB stick is possible directly at the device.



Easy and comfortable generation of own tests.

Command line inquiry by TCP IP access

The enclosed logging software makes monitoring and observation of the equipment condition possible in "live view" mode. The databases recorded in the unit can be transferred and displayed directly to a PC in the "transfer" mode.

Refitting:
possible

Note: A record log to retrieve the data via the network is already included in the control system Comfort.

Additionally required space:
n.a.

Safety equipment

Excess temperature protection for all heating systems built in
Safety thermal cutout according to DIN 3440 (VDE 0631)

Constant pressure reducer with reverse control and maximum pressure limit
By use of the constant pressure reducer, it is possible to compensate pressure fluctuations in the spraying air.

Pressure-relief valve for humidifier
Safety pressure relief valve with set-up certificate of the TÜV (Technical Inspection Authority)
An increase of the humidifier pressure above the permitted set range of 1.8 bar is prevented.

Dry running protection
An overheating of the chamber and the humidifier in case of a lack of water is prevented by the installed dry running protection.

Services to be provided by customer:

- The equipment is designed only for an interior installation with the following limit values to be observed: room temperature: 18 °C to 28 °C, ambient humidity: < 85% non-condensing
- Laying of the exhaust air duct with constant slope to avoid water pockets by condensate formation.
- Condensate drain near the bottom, max. 150 mm height
- Compressed air connection. The compressed air must be free from dirt, oil and other impurities. Indication for permitted residual impurities from the replaced DIN 50 021: maximum 0.2mg/m³ in form of oil and dust (< 5µm)
- Water connection / supply with demineralised water: 2.0 to 5.0 bar

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Condensation water functions

Basic condensation functions — 4-EK1000V02

By the amplified test chamber bottom heating and the disconnection of the lateral test chamber heating system, it is possible to create a test climate of +40°C and a saturated air humidity (condensation).
The chamber is filled manually with deionised water. It is possible to drain the water or switch to salt spraying operation thanks to a ball valve provided at the outlet.

Relevant for the compliance of the following standards:
ISO6270 CH (DIN 50017 KK)

Note: (only HKT500, HKT1000) (only ISO6270-2 CH and DIN 50 017 KK), max. 40°C (Higher temperatures are possible with the module 4-EK1010V02.)

Refitting:
not possible

Additionally required space:
n.a.

Condensation water testing with external flow water heater — 4-EK1010V02

This option generates a test climate of +50°C and saturated air humidity (bedewing).
The heating of the bottom water takes place by an external corrosion-resistant flow water heater with circulating pump to have a high and constant air humidity for an optimal bedewing of the test material.
The filling level of the bottom water is controlled automatically.
The discharge is carried out manually by a ball valve.

Relevant for the compliance of the following standards:
DIN EN ISO 6270-2 CH, AHT, AT (DIN 50 017 KK, KFW, KTW),
Corrodkote test DIN EN ISO 4541

Note: Higher temperatures are possible with the module4-EK1030 (condensation water temperature range expansion to +70°C).

Refitting:
not possible

Additionally required space:
n.a.

Condensation water temperature range expansion to +70°C — 4-EK1030V02

Expansion of the temperature range of the condensation water function (EK1001) from +50°C to +70°C. A hood made of a special material with a larger temperature range is used due to the high temperature (still transparent).

Relevant for the compliance of the following standards:
Nissan M 0158 CCT-IV

Refitting:
not possible

Additionally required space:
n.a.

Requires:
condensation water testing with external flow water heater 4-EK1010 or
4-EZ 1000

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Cyclic corrosion testing

Add-on equipment for cyclic corrosion testing: 4-EZ1000V02

Extends the device by the condensation water function and makes a cycle corrosion testing possible by switching the device automatically between the saltfog, condensation water and ventilation phases (ventilation with compressed air).

Filling with deionised water and discharge of the test chamber take place automatically.

Relevant for the compliance of the following standards:
VW PV 1210, DIN_EN_ISO_11997-1 cycle B, VDA621-415

Note: A standard climate module should be used in case of non-air-conditioned environmental conditions at the place of installation to implement the standard PV 1210 (DIN EN ISO 554-23/50). (Module 4-EB1010)

Refitting:
not possible

Additionally required space:
n.a.

Also included:
condensation water testing with external flow water heater 4-EK1010

Test chamber rinsing system 4-EK1040V02

The walls of the test chamber are rinsed with deionised water to clean the test chamber and the bottom automatically after a saltfog phase.

Refitting:
not possible

Additionally required space:
n.a.

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Ventilation/climate control

Test chamber lifting with ambient air:	4-EB1000V02
The test chamber is ventilated by a fan with ambient air. The compressed air ventilation provided in basic configuration does not apply. Air quantity adjustable between 50 to 200m³/h by a frequency converter	
Relevant for the compliance of the following standards: **DIN EN ISO 11997-1 cycle B, VDA 621-415, VW PV1210 (indoor climate)**	**Refitting:** not possible **Additionally required space:** device width +670 mm
Note: A standard climate module should be used in case of non-air-conditioned environmental conditions at the place of installation to implement the standard PV 1210 (DIN EN ISO 554-23/50). *(Option EB1010)*	

Standard climate module for a climate control of the test chamber:	4-EB1010V02
The climate control takes place by an air circulation and a dehumidification by means of a cooling system to 23(+2)°C/50(+5)%. Measurement and control are carried out by a capacity humidity sensor which is encapsulated against the test chamber air during non-climate control phases.	
Relevant for the compliance of the following standards: **VW PV1210(DIN EN ISO 554-23/50), VDA 621-415, DIN EN ISO 11997-1 cycle B**	**Refitting:** not possible **Additionally required space:** device width +670 mm
Note: necessary climate conditions at the place of installation: temperature: 18 – 28°C, air humidity: max 85% *This module can be used instead of the test chamber ventilation with ambient air (4-EB1000).*	

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Climate module

Climate module for extended test conditions: 4-EC1000V02

With this module it is possible to generate climate conditions in the range of +23°C to +50°C and 30% to 95% (± 6%) with a dew point between +9°C...+50°C in the test chamber.
The air is led by a dew point controlled water bath and correspondingly conditioned by an air circulation.
Measurement and control are carried out by a capacity high humidity sensor which is encapsulated against corrosion during non-climate control phases.

Relevant for the compliance of the following standards:
VW PV1210(DIN EN ISO 554-23/50),
DIN EN ISO 60068-2-52 severity level 1-6,
Volvo 423-0014,
Volvo VCS 1027_1449,
Ford CETP 00.00-L-467,
as well as standards with climate conditions between 30% to 95% with 23°C to 50°C (dew point 9°C to 50°C).

Note: Due to the design of the unit as salt spraying and condensation water chambers, the speed of changes (coldness/heat humidity/climate) as in climate test cabinet are not possible.

Climate conditions at the place of installation: temperature: +18 to +28°C, air humidity: max 85%

Refitting:
not possible

Required space:
Device depth +900 mm

Also included:
damp air storage (4-ES1000) warm air drying (4-ES1010)

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Other extensions

Extension module humid air storage: 4-ES1000V02

The climate control takes place by an air circulation and a humidification line to 40(+2)°C/93(+2/-3)%.
Measurement and control are carried out by a capacity high humidity sensor which is encapsulated against corrosion during non-climate control phases.

Relevant for the compliance of the following standards:
DIN EN ISO 60068-2-52 severity level 1-2

Note: A standard climate storage is necessary for the severity level 3-6.
It can either be generated via ambient air (4-EB1000) or via the standard climate module (4-EB1010).

Refitting:
not possible

Additionally required space:
device width +670 mm

Extension module warm air drying: 4-ES1010V02

A dry, warm test climate (humidity uncontrolled) up to +60°C is generated by a circulation system and a warm air heater. The air humidity is typically <30%

Relevant for the compliance of the following standards:
Nissan M 0158 CCT-I, CCT-IV, GMW 14872

Refitting:
not possible

Additionally required space:
device width +670 mm

Extension option for SWAAT testing: 4-ES1020V02

This option makes a SWAAT testing possible.
The test chamber bottom is constantly covered with water in case of a SWAAT test.
Cycle: 30 minutes spraying, 90 minutes storage with respectively +50°C.

Relevant for the compliance of the following standards:
ASTM G85 Annex 3(SWAAT), PV1208(SWAAT)

Note:

Refitting:
not possible

Additionally required space:
n.a.

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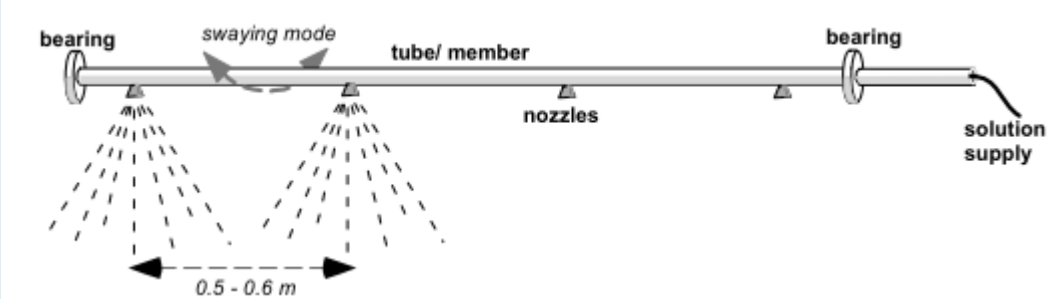
Raining modules

Raining module with swaying movement, fan nozzles 4-ER1000V02

The raining module with driven swaying-spraying device.
The flow control is carried out by a precision dosing pump (adjustable 0 to 63l/h).
The test solution is sprayed into the fan nozzles of type "Uni Jet 800050VP" as specified in the standard. The condensation amounts to 15 mm/h ±5mm/h



Relevant for the compliance of the following standards:
Volvo 423-0014, Volvo VCS 1027_1449, Ford CETP 00.00-L-467

Note: The spraying solution is used only once and not pumped into the circuit.

Refitting:
possible

Additionally required space:
floor space required for the storage tank (250l) with pump (Ø=650mm)

Raining module without movement, full-cone nozzles 4-ER1010V02

The test solution is sprayed into the test chamber all over the bottom by the full-cone nozzles provided below the hood/the roof.
The flow quantity can be set by a compressed air diaphragm pump.

Relevant for the compliance of the following standards:
GMW 14872

Note: The spraying solution is used only once and not pumped into the circuit.

Refitting:
possible

Additionally required space:
floor space required for the storage tank (250l) with pump (Ø=650mm)

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Other options

Elapsed time counter — 4-OW1020V02

5 digits, not resettable to zero

Cable lead-through — 4-OW1050V02

Nominal width 110 mm with closing lid

Enhanced compress air humidifier — 4-OW1070V02

With a storage volume of approx. 22 litres

Note: If no interruption-free deionised water supply can be guaranteed by customer (switch-off during the week-end), this option makes a self-sustaining operation of the spraying function for approx. one week possible.

Brine tank and accessory

Description	Order no.	Required space
140l tank (PE natural/transparent)	4-SB0140V02	Ø=500mm, h=860mm
250l tank (PE natural/transparent)	4-SB0250V02	Ø=650mm, h=1100mm
500l tank (PE natural/transparent)	4-SB0500V02	Ø=820mm, h=1190mm
Stirrer for 140l tank	4-SB1140V02	Assembly on the tank
Stirrer for 250l tank	4-SB1250V02	Assembly on the tank
Stirrer for 500l tank	4-SB1500V02	Assembly on the tank
Roller board adapted for the 140l sole tank	4-SB2140V02	circular, beneath the tank h=80mm
Roller board adapted for the 250l sole tank	4-SB2250V02	circular, beneath the tank h=80mm
Roller board adapted for the 500l sole tank	4-SB2500V02	circular, beneath the tank h=80mm

Note: Experiences have shown that too large storage quantities may result in problems. Storage quantities for 1 to 2 weeks proved to be good.

Note: An appropriate tank for the device is already included in the basic equipment.

Black tanks are available on request.

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Accessory

Compressed air compressor	4-ZB1000V02
Compressed air compressor, including fine filter, manometer for a self-sustaining operation	

Compressed air filter unit	4-ZB1010V02
Prefilter and fine filter for a compressed air supply with low oil and solids according to DIN EN ISO 9227 (DIN 50 021)	

Water deionisation unit	4-ZB1020V02
Blending bed cartridge including conductivity measuring unit and solenoid valve to manufacture fully deionised water for a connection to the home water system Capacity 1000 l/h, capacity 2,800 litres with 10° dH	

Reserve cartridge for water deionisation unit	4-ZB1030V02
Blending bed cartridge Capacity 1000 l/h, capacity 2,800 litres with 10° dH	

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Useful auxiliaries

Aerometer — 4-HI1000V02

To measure and monitor the brine concentration
Density readable on scale

Digital refractometer — 4-HI1010V02

To simply measure and monitor the brine concentration
Indication in text display: Density and salt content of the solution

pH-value measuring device — 4-HI1020V02

For an easy measurement and monitoring of the pH value in the brine.
Indication in the text display: pH value and temperature of the solution

Condensation measuring cup set (2 pieces) — 4-HI1060V02

Hopper according to DIN EN ISO 9227

Diameter=100mm
Receiving surface=80cm²
Measuring volume=50ml

Single condensation measuring cup (4 HI1050V02): 50.00€

Hooks made in form of an S made of glass — 4-HI1090V02

Glass hooks, S form, d=5mm

Hooks in S form made of stainless steel — 4-HI1100V02

Stainless steel hooks, S form, d=2mm

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Test sheets

Description	Order no.	Note
Test sheet set according to ISO 9227, steel CR4 5 test sheets 150x70x1mm	4-HI1120V02	*The relevant European steel quality is delivered (German description DC04 according to DIN EN ISO 103 as in DIN 50 021)*
Test sheet set according to ISO 9227, pure zinc 5 test sheets 100x50x1mm	4-HI1130V02	*Pure zinc with purity of 99.975%, copper content of maximum 0.002%*

Scratching graver according to "Sikkens"

4-HI1160V02 (1 mm)
4-HI1170V02 (0.5 mm)

For the exact generation of scratch marks for corrosion tests.
In the design with 0.5mm or 1mm blade.
Delivery in a case

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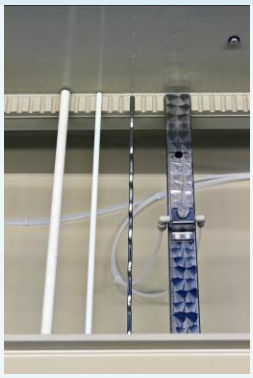
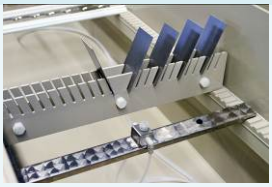
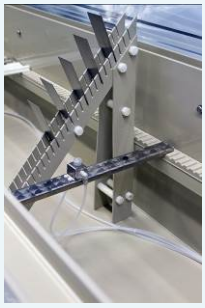
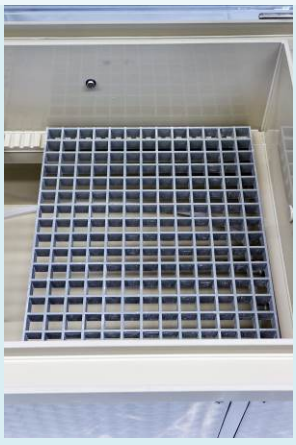
Sample fixtures, carrier rods, support grids

Description	Order no.	Description	
Carrier rod, GRP pipe	ZP3100V02	Diameter 20 mm, carrying capacity approx. 12 kg	
Carrier rod, glass-fibre reinforced plastic	ZP3090V02	Diameter 12 mm, carrying capacity approx. 8 kg	
Carrier rod, full rod, special stainless steel	ZP3110V02	Diameter 8 mm, carrying capacity approx. 16 kg	
Test sheet carrier, horizontal	ZP1100V02	to take up approx. 10 test sheets, 150 x 70 mm	
Test sheet carrier, diagonal	ZP1110V02	to take up approx. 15 test sheets, 150 x 70 mm	
Support grid, carrying capacity 50kg Width: 25cm Depth: as in the test chamber	ZP2030V02		
Support grid, Width: 50cm Depth: as in the test chamber	ZP2040V02		