



## Optisol KP - H/MA Cleanliness Solution

Today's technologies require high cleanliness for air, land or sea. Precision cleaning is required in a variety of today's industrial technology applications. Kemet cleanliness solution offering development parallels today's applications' increasing challenges.

Kemet is known worldwide as an expert in industrial cleanliness solutions. With 30 years accumulated expertise, we are focused to providing an effective cleanliness solution to the most demanding industrial parts cleaning applications. Kemet's cleanliness solution is achieved with minimal process turnaround time, reduction to process costs and is environmentally friendly.

### Vacuum Cleanliness Technology

Optisol KP - H/MA is based to the expertise in the vacuum cleanliness solutions utilizing hydrocarbon or modified alcohol solvents. The Optisol KP - S system is specifically designed for industrial precision parts cleaning. The completely encapsulated solution operates constantly under vacuum providing an excellent solution to achieving a high cleanliness result while imposing no harmful effects to the environment.



The single cleaning chamber is utilized for all stages of the cleanliness cycle including spray cleaning, immersion cleaning, optional ultrasonic cleaning, rinsing, drying and optional rust inhibitor application.

### Applications

Optisol KP - H/MA is a modular design to precision cleanliness applications. Industries utilizing Optisol KP - H/MA requiring precision cleanliness are numerous and some include:

- Aviation; service and manufacturing
- Cryogenics, high vacuum
- Electronics and computer manufacturing
- General manufacturing industry
- Pharmaceutical industry
- Polishing industry
- Precision component manufacturing

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## Optisol KP - H/MA Design

Precision cleanliness solutions are demanded in a variety of manufacturing industries utilizing solvents. The single cleaning chamber solution is especially suited to precision cleaning of diverse metal, electro-mechanical devices, sintered materials, press-cut sheet-metal components, bearings, and components under overhaul/maintenance treatment. Contaminants to be removed are typically oils, swarf, polishing and grinding compounds, rust or particles.

Optisol KP - H/MA concept consists of articles requiring cleanliness being contained in metallic baskets with proper perforation for complete discharge of contaminants and solvent through the cleaning process.

## Operation and Maintenance

Optisol KP - H/MA is easy to setup and operate with minimal maintenance requirements. Teleservice link capability is an available option for remote diagnostic functions. Line connection is the responsibility of the customer.

## Materials

All tanks are of stainless steel construction, support frame and panels are of painted steel. Overall system is made to assure proper operation under vacuum conditions. The electric cabinet is installed into the main system housing. Submersible ultrasound transducer boxes, liquid valves, heating elements and level switches are of acid-proof steel to assure long and trouble free operation.

## Optisol KP - H/MA Features

### Control Panel

The Optisol KP - H/MA is equipped with an electrical control cabinet which houses high quality electric and electronic components for power supply, emergency services, control and switching and is conveniently located in the main system housing next to the loading/unloading door. All general monitoring devices and controls are available on the front control panel.

If the system is equipped with an automatic sliding door and baskets feeding system, the operating panel and control buttons are located on a control pedestal adjacent to the system.



### Load/Unload Door

Access to the cleaning chamber is by means of a rigid load/unload door. The baskets are loaded to and unloaded from the cleaning chamber and when the door is properly closed and locked by the standard safety interlock system the wash cycle may commence. The door is locked by means of a pneumatically operated cylinder to prevent opening during the washing cycle. A safety limit switch is installed to the door hinge for assuring proper positioning of the hatch in the closed position.

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### **Automatic Sliding Load/Unload Door (option)**

For automatic access with vertical movement, an optional automatic load/unload door with vertical pneumatic cylinder is available. This is of particular use when ordering optional automated loading and unloading equipment.



### **Cleaning Chamber**

The cleaning chamber is a fully sealed stainless steel pressure chamber consisting of rotary basket frame with sliding hook to extract the basket from the longer chambers, pipe for spray jets at the top of the chamber, optional pipe for hydrokinetic (submerged) jets at the bottom of the chamber and optional ultrasound transducer boxes.



Movement of the baskets during the cleanliness cycle is fully programmable to ensure full drainage of solvent, particularly in the vacuum drying stage. In addition, the movement also provides maximum washing efficiency and removal of solids from the washed components. For loads with more sensitive components without cavities or blind holes on the top which may trap solvent which cannot be secured in the basket, a static cleanliness cycle with none or limited movement may be selected. Basket movement (static, tilting at different, programmable angles or rotation) can be easily selected at the control panel.

### **Solvent Storage Tank**

The solvent storage tank is located on the top of the unit, above the cleaning chamber and maintains the solvent in four sections for various required cleanliness stages within a cycle.



Each section has an inspection window, a level sensor and a series of automatic valves that open/close after completion of the various steps as defined in the program for the selected cleaning process. The third and fourth sections are heated by electrical heaters directly immersed in the solvent.

### **Solvent Boiler**

The solvent boiler is divided into two sections. The main boiler sets above the optional sludge (waste) separator. Solvent is heated in the main boiler which then permits vapours to move to the cleaning chamber if required by the cleaning process or to the condenser coil to distillate. The boiler is equipped with electrical heaters and level sensors to assure appropriate temperature throughout the cycle.



### **Sludge Separator (option)**

For further distillation of the sludge (oil and solvent mixture) the optional sludge separator is available. To maintain degreasing capacity, it is useful to periodically reduce the amount of oil in the cleaning solvent. This is achieved by transferring solvent from the main boiler to the sludge separator where the sludge is then heated to separate solvent from the oil. The solvent is then condensed and returned to the tank.

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Residual sludge primarily created from oil can then be transferred to an external vessel for proper disposal.

### **Vacuum Pumps**

The Optisol KP - H/MA operates in a single encapsulated cleanliness solution constantly under vacuum. A series of three vacuum pumps and related circuits provide the necessary vacuum environment. A liquid ring pump with a typical vacuum level of 100 mbar provides the overall vacuum for the system with the exception of the cleaning chamber. An oil lubricated rotary vane pump with a typical vacuum level of 100 mbar provides the vacuum in the cleaning chamber. A roots pump combined with the lubricated pump provides the vacuum in the cleaning chamber during the drying stage, 1 mbar typical vacuum level.

### **Coarse Filter**

Solvent flows from the storage tank into the cleaning chamber by gravity. From the cleaning chamber the solvent flows by means of a centrifugal pump that provides each the loop chamber to chamber flow and the transfer to the storage tank. During either flow process the solvent passes through a bag filter which traps chips and other metallic contaminants and particles of any material. An alarm will trigger in the wash cycle when the coarse filter requires changing.



### **Cooling Systems**

Optisol KP - H/MA has cooling systems for safety of temperature control. A feed from sensors will activate the step by step cool down and if needed a complete shut down of the system will occur. Machine is equipped with several safety circuits to prevent explosion hazard.

### **Process control**

The Optisol KP - H/MA process control offers flexible automation control for the entire cleaning system. The control features a touch screen Graphic User Interface (GUI). Through the GUI operator can activate various pre-programmed cleaning cycles or produce and save even cleaning program cycle.

Each process stage is programmable through the process control; also each stage status can be displayed at anytime on the process control.

The number of cleaning programs is virtually unlimited in the process control; any of the pre-programmed cleaning programs can be queued for achieving a continuous automated process.

Parameters that are programmable for up to 4 treatments in 1 washing cycle include the following:

- ◆ Treatment time for each stage for spray, hydrokinetic or (optional) ultrasound
- ◆ Type of basket movement (stationary, oscillation or rotation)
- ◆ Drain time for each stage

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- ◆ Complete draining from pump, filter and pipes of residual solvent after elapsed time for wash 4
- ◆ Dirty coarse filter alarm time
- ◆ Pump delayed start time
- ◆ Time out pump
- ◆ Rush inhibitor treatment time
- ◆ Filling time for wash cycles 1 through 3
- ◆ Minimum level in boiler
- ◆ Vaporization time
- ◆ Vaporization drain time
- ◆ Vacuum drying time
- ◆ Deodorizing time
- ◆ Maximum level in total draining vessel

Safety features are monitored on continuous basis by the process control and operation is halted if serious alarm or operator is warned when such situation occurs.

### **Ultrasonic Cleaning (option)**

Optisol KP - H/MA may also have the optional integrated ultrasonic cleanliness as a step in cleanliness cycle where appropriate application requires. Ultrasonic cleaning is immersion cleaning, based to high frequency sound vibrations which cause strong cavitations in the liquid. The microscopic cavitation bubbles implode the surface of the work piece removing contaminants by means of powerful pressure strokes. Ultrasonic cleaning will penetrate any channel or hole where the liquid can reach.

### **Rust Inhibitor Tank (option)**

The optional rust inhibitor tank is available where specific applications require such process. This is integrated as part of the cycle in the cleaning chamber and fully programmable through the PLC control.

### **Third Washing Stage (option)**

If required, the Optisol KP - H/MA can be supplied with the optional third washing stage. Where extraordinary process is required to achieve required cleanliness results it can be integrated into the standard system.

### **Fine Filtration System (option)**

For an additional filtration beyond the coarse filter, the fine filtration system option can be added to the Optisol KP - H/MA.

### **Water Chiller for Safety Cooler Circuit (option)**

An optional external water chiller for the safety cooler circuit can be integrated into the cleanliness system.

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### Automatic Basket Transport System (option)

Optisol KP - H/MA can be equipped with a variety of automated basket transport systems depending upon your requirements. Automation options include the following:

- Basket lift is available from lower level such as transport cart to cleaning chamber level for manual insertion/extraction to and from the chamber. Lifting device is attached to the frame of the machine.



- Conveyor system is available for buffering dirty baskets for transport to the machine and exit to clean basket buffer. Buffer conveyors can be customized modularly to length based to standard feed system module.

- Multi machine automation is available from single dirty basket buffer system connected to a wagon system which moves the baskets to machine. Automatic program selection can be accomplished by identification system to the baskets.



- Basket handling system can be designed to handle stacks of baskets.

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**Optisol KP – H/MA model**

	<b>KP 50 H/MA</b>	<b>KP 100 H/MA</b>	<b>KP 150 H/MA</b>
<b>Overall dimensions (mm )</b>			
Width	1750	1900	1900
Depth	1750	2150	2150
Height	2600	2600	2600
<b>Basket capacity</b>			
Length ( mm )	450	900	900
Width ( mm )	300	300	450
Height ( mm )	200	200	200
Weight ( kg)	50	100	150
<b>Cycles/hour</b>			
Depending on cleaning process and treatment times	Up to 8	Up to 8	Up to 8
<b>Power requirements</b>			
Standard system	3 x 400 V / 50 Hz	3 x 400 V / 50 Hz	3 x 400 V / 50 Hz
Total load (kW approx)	25	33	38
<b>Cleaning fluid</b>	Hydrocarbons in VbF class A3	Hydrocarbons in VbF class A3	Hydrocarbons in VbF class A3
	Modified alcohols (alkoxy-propanols)	Modified alcohols (alkoxy-propanols)	Modified alcohols (alkoxy-propanols)
<b>Capacity of the system (litres)</b>			
Tank 1 (spray)	60	60	60
Tank 2 (spray) (option)	60	60	60
Tank 3 (immersion)	90	150	200
Rust inhibitor tank (spray option)	60	60	60
Distillation unit (approx)	100	150	150
Solvent capacity (approx)	370	480	530
<b>Empty Weight of the machine</b>			
Kg	2000	2700	3000

Data herein is for estimation purposes only and can be changed at any time without any prior notice.

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