Washing machines for vessels and containers
Paint and Ink producing industry
## Brochure content

### Services

### Customized Solutions

<table>
<thead>
<tr>
<th>Items to be washed</th>
<th>Contamination</th>
<th>Cleaning agent / process</th>
<th>type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Solvent based</td>
<td>Water based</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Adherence</td>
<td>Durability</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solvent based</th>
<th>Water based</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spraying</td>
<td>Brushes</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>special water based cleaning agents</th>
<th>KOH</th>
</tr>
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<td>Spraying</td>
<td>Brushes</td>
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<td>Spraying</td>
<td>Brushes</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>High boiling solvents + KOH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spraying</td>
</tr>
</tbody>
</table>

*Suitable to only a limited extend, because polyamide bristles not consistent*

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**Flow diagram**

**Further systems of D.W. RENZMANN**

**Service**

*cleaning effect:*  
- very good  
- good  
- sufficient-moderate  
- inapplicable
Wash trials in RENZMANN technical centre

In the RENZMANN technical centre, all wash procedures used by RENZMANN can be tested in original washing machines with real wash items and under realistic circumstances.

Our customers can assess the results achieved with the relevant washing machine type and the applied wash procedure.

In addition, it can be illustrated how contaminated wash solvents are treated in distillation systems. Avoiding wastewater can also be achieved by evaporating the contaminated rinsing water and used aqueous alkaline cleaning agent.

The strictly documented trial results (in writing and photos) are the basis for the contractually promised cleaning qualities by RENZMANN.

Detailed project planning

RENZMANN not only assists the customer in choosing the right wash procedure, but also explicitly plans the integration of the relevant washing machine or complete washing facility (possibly several washing machines, distillation systems, containers, pumps, fixtures, etc.) into the energy supply, air discharge, wastewater disposal and into the existing or new rooms.

Process descriptions and layout plans are created as early as the negotiation phase. Pipework schemes as well as circuit and pneumatic schemes are also created when the order is processed.

Concerning the interfaces to already existing energy supply systems (electricity, pressurized air, mains steam, thermal oil) as well as to wastewater and air discharge systems, clarification shall be sought.

Furthermore, RENZMANN offers its support when it comes to communicating with authorities, architects and consultants as well as creating authorization documents.
Customized solutions

D.W. RENZMANN is not only a supplier of machines, but also a certified business according to the ATEX directive and Water Ecology Act.

Ex protection of the machines and facilities at the operation site
• Zoning, risk assessment and suggestions regarding ex protection measures and the preparation of documents required for the explosion protection document.
• Supply with closed, ex-protected cabins for solvent washing machines, partitions and suction apparatus for the confinement of ex areas as well as gas warning devices.

Water and soil protection
• Planning and delivery of tested floor pans, fitted according to the appropriate facility with water-hazardous substances and to the room situation.

Steel construction
• Planning and delivery of statically tested steel constructions and platforms for a space-saving assembly of the wash facilities according to the room situation.
**Type HP**

- Explosion proof device, according to ATEX, for manual washing with all common solvents
- Machine with lid and separate solvent reservoir, integrated into housing
- Galvanized grid to place parts to be cleaned
- Safety handbrush with hose and hand-actuated throttle valve for controlling the flow rate
- Activation of solvent supply by kick plate (dead man’s control)
- Pneumatic diaphragm pump supplies the handbrush and can optionally be used for filling or emptying the device
- Optical filling level indicator
- Mesh between washing chamber and solvent reservoirs
- Inner exhaust with heavy-duty ventilator and vacuum valve
- Automatic washing program (SPS), including washing – dripping – exhaust; all program steps can be selected individually

**ACCESSORIES**

- Stainless steel housing upon request
- Washing device for smallest parts
- Automatic filling and emptying, optionally out of already existing devices or mobile containers
- Pneumatically operated lid
- Soaking bath device for soaking persistent stains

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**Type 120**

- Robust and user-friendly washing machine for cleaning small containers, buckets and cans through spraying with solvent
- Effective inside cleaning of containers with rotating spray heads
- Spray pipes for outside cleaning of the containers and for the lid
- Separate spraying system for rinsing with clean solvent
- Loading from the top, special supports and fixtures hold the container and lid in place, no uncontrolled movement of the washed parts due to the pressure of the spray jets
- The washing chamber is closed tightly by the lid, a position sensor ensures that spraying does not begin until the lid is closed
- Closed solvent tank under the washing chamber (no solvent vapors when the washing machine is open), level switch for filling and draining
- Powerful centrifugal pump for washing with circulated solvent, separate centrifugal pump for rinsing, pneumatic diaphragm pump for draining
- External filter with removable basket for protecting the spraying system
- Strainer in the washing machine for protection of pumps and connected pipes
- Internal air extraction system with powerful suction fan

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**Washing station type HP**

<table>
<thead>
<tr>
<th>Size 12</th>
<th>Size 18</th>
<th>Size 24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usable width / height / length</td>
<td>600 x 300 x 1200 mm</td>
<td>600 x 300 x 1800 mm</td>
</tr>
<tr>
<td>Capacity of wash pump</td>
<td>5 m³/h</td>
<td>5 m³/h</td>
</tr>
<tr>
<td>Inner exhaust</td>
<td>2000 m³/h, 1,1 kW</td>
<td>2000 m³/h, 1,1 kW</td>
</tr>
<tr>
<td>Dimensions mm</td>
<td>2285 x 1180 x 1740</td>
<td>2885 x 1180 x 1740</td>
</tr>
<tr>
<td>Required space mm</td>
<td>3800 x 2700 x 2200</td>
<td>4400 x 2700 x 2200</td>
</tr>
<tr>
<td>Clearance for installation mm</td>
<td>2400 x 1500 x 1800</td>
<td>3000 x 1500 x 1800</td>
</tr>
</tbody>
</table>

**Washing machine type 120**

<table>
<thead>
<tr>
<th>Size 04</th>
<th>Size 08</th>
<th>Size 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of spray heads</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Number of containers and lids</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Max. container height / Ø max.</td>
<td>600 x 400 mm</td>
<td>600 x 400 mm</td>
</tr>
<tr>
<td>Capacity of wash pump</td>
<td>35 m³/h, 12,5 kW</td>
<td>70 m³/h, 20 kW</td>
</tr>
<tr>
<td>Inner exhaust</td>
<td>2220 m³/h, 1,85 kW</td>
<td>2220 m³/h, 1,85 kW</td>
</tr>
<tr>
<td>Dimensions mm</td>
<td>3400 x 2380 x 1405</td>
<td>3900 x 2380 x 1405</td>
</tr>
<tr>
<td>Required space mm</td>
<td>4800 x 4200 x 3800</td>
<td>5300 x 4200 x 3800</td>
</tr>
<tr>
<td>Clearance for installation mm</td>
<td>3500 x 1900 x 1700</td>
<td>4000 x 1900 x 1700</td>
</tr>
</tbody>
</table>
**Type SPF**

- User-friendly washing machine for inside cleaning of barrels and small containers through spraying with solvent
- Spray pipe with rotating spray head, also suitable for bung barrels
- The standard version is entirely pneumatic, ready to run after connection to a compressed air supply and, if necessary, to an existing air extraction system, no electrical installation required
- Easy loading at low working height; the barrels are placed on their sides onto a shell-shaped support
- The barrel support is swivelled to close the washing chamber
- Position sensor for the barrel and the barrel support: spraying does not begin until the machine is closed and the barrel has been placed over the spray pipe
- Dirt resistant pneumatic diaphragm pump as washing pump
- Closed solvent tank under the washing chamber, visual level indicator
- Strainer for protecting the container and the pump
- Pneumatic timer for easy setting of the washing time
- Explosion protection according to ATEX, category 1 for zone 0 inside, category 2 for zone 1 outside

**ACCESSORIES**

- Filling and draining with the washing pump
- Automatic filling from the solvent line / with external pump, filling stop with electrical, explosion-proof level switch
- Air extraction with explosion-proof fan (ind. explosion-proof electric motor)
- Version for water-based alkaline washing agents on request

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**Type SP**

- Robust and user-friendly washing machine for inside cleaning of rectangular and cylindrical containers by brushes and simultaneous spraying with solvent
- Very good inside cleaning by means of a rotating spray head with pointed spray nozzles, spraying pressure 50 bars
- Depending on the shape of the container, the operator may choose between a spray head rotating around 2 axes and a spray head rotating around the vertical axis and moving up and down.
- Separate spraying system for rinsing with clean solvent
- The spray head is lowered into the container, and the upper container opening closed by the machine lid, by means of a pneumatic lifting frame
- Sensor for the lid pressure: spraying does not begin until the lid rests tightly on the container
- Washing solvent in separate container, and the upper container opening closed by the machine lid, by means of a pneumatic lifting frame
- Sensor for the lid pressure: spraying does not begin until the lid rests tightly on the container
- Washing solvent in separate container, level switch for filling and draining
- High-pressure reciprocating diaphragm pump as washing pump, separate pump for rinsing, pneumatic diaphragm pump for draining
- Edge filter for protecting the high-pressure pump from foreign matter
- 3 manometric switches for deactivating the high-pressure pump in case of insufficient pressure (e.g., hose break), excessive pressure (contraction of the pressure line) or insufficient suction pressure (e.g., clogged edge filter)
- Filter with removable basket for protecting the evacuation pump and the solvent tank
- Automatic washing program: washing – draining – rinsing – Internal air extraction, program steps can be selected individually
- Explosion protection according to ATEX, category 1 (with type examination) for zone 0 inside, category 2 for zone 1 outside

**ACCESSORIES**

- Lid versions and adapters for different container openings
- Outlet cleaning system, manual or automatic
- Floor pan for the working area in front of the lifting frame / under the lid with the spray head
- Internal air extraction system, optionally with warm air drying for nonvolatile solvents
- External air extraction system, supplements/replaces the air extraction in the room/at the workplace
- Solvent concentration measuring and regulating system for connection to an exhaust air cleaning system

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**Type SP50**

- Like model SP50, but with the following differences:
  - Washing pressure 70 bars
  - Suitable for water-based alkaline media
  - Heating of the washing agent, heat insulation of the washing agent container
  - Rinsing with water
  - Explosion protection that is adapted to the washing agent with the washed-off contamination and to the requirements of the installation site

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**Type SP70**

- Requires cleaning of barrels and small containers through spraying with solvent
- Cleaning of barrels and small containers for zone 1 outside, category 1 for zone 0 inside, category 2 for zone 1 outside

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**Washing machine type SPF**

<table>
<thead>
<tr>
<th>Number of spray heads</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. container height</td>
<td>900 x 600 mm</td>
</tr>
<tr>
<td>Inner exhaust</td>
<td>2500 m³/h, 0,75 kW</td>
</tr>
<tr>
<td>Dimensions mm</td>
<td>L x W x D</td>
</tr>
<tr>
<td></td>
<td>1750 x 1200 x 1680</td>
</tr>
<tr>
<td>Required space mm</td>
<td>3800 x 2500 x 2000</td>
</tr>
<tr>
<td>Clearance for installation mm</td>
<td>2000 x 1300 x 1900</td>
</tr>
</tbody>
</table>

**Washing machine type SP50**

<table>
<thead>
<tr>
<th>Number of spray heads</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. container height</td>
<td>950 – 1700 mm</td>
</tr>
<tr>
<td>Lateral length max.</td>
<td>1500 mm</td>
</tr>
<tr>
<td>Manhole Ø min.</td>
<td>300 mm</td>
</tr>
<tr>
<td>Capacity of wash pump</td>
<td>50 bar, 3 m³/h, 6,6 kW</td>
</tr>
<tr>
<td>Outer exhaust</td>
<td>2800 m³/h, 1,85 kW</td>
</tr>
<tr>
<td>Inner exhaust</td>
<td>400 m³/h</td>
</tr>
<tr>
<td>Dimensions mm</td>
<td>L x W x D</td>
</tr>
<tr>
<td></td>
<td>3250 x 3120 x 3160</td>
</tr>
<tr>
<td>Required space mm</td>
<td>4700 x 4200 x 3500</td>
</tr>
<tr>
<td>Clearance for installation mm</td>
<td>3300 x 1900 x 2200</td>
</tr>
</tbody>
</table>

**Washing machine type SP70**

<table>
<thead>
<tr>
<th>Number of spray heads</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. container height</td>
<td>950 – 1700 mm</td>
</tr>
<tr>
<td>Lateral length max.</td>
<td>1500 mm</td>
</tr>
<tr>
<td>Manhole Ø min.</td>
<td>300 mm</td>
</tr>
<tr>
<td>Capacity of wash pump</td>
<td>70 bar, 3 m³/h, 11 kW</td>
</tr>
<tr>
<td>Inner exhaust</td>
<td>600 m³/h</td>
</tr>
<tr>
<td>Dimensions mm</td>
<td>L x W x D</td>
</tr>
<tr>
<td></td>
<td>3250 x 3120 x 3160</td>
</tr>
<tr>
<td>Required space mm</td>
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</tr>
<tr>
<td>Clearance for installation mm</td>
<td>3300 x 1900 x 2200</td>
</tr>
</tbody>
</table>
Type SKM

- Robust and user-friendly washing machine for inside and outside cleaning of containers with an open top through spraying with solvent.
- Very good inside cleaning, even with large container diameters, by means of a rotating spray pipe with pointed spray nozzles that moves up and down along the longitudinal container axis.
- Effective outside cleaning due to spray pipes rotating around the containers.
- Separate spraying system for rinsing with clean solvent.
- Tight closing, hydraulic washing chamber door; used as loading platform in front of the washing chamber.
- Position sensor for the door, spraying does not begin until the washing chamber is closed.
- Cylindrical washing chamber, tilted backward, very good draining of the solvent, no corners where residues can accumulate, hence low solvent emissions.
- Closed solvent tank under the washing chamber (no solvent vapors when the washing machine is open), level switch for filling and draining.
- Very powerful centrifugal pump for washing with circulated solvent, separate centrifugal pump for rinsing, pneumatic diaphragm pump for draining.
- External filter with removable basket for protecting the spraying system.
- Strainer for protecting the solvent tank and pumps.
- Explosion-proof hydraulic unit.
- Internal air extraction system with powerful suction fan.
- Automatic washing program: washing – draining – rinsing – internal air extraction; program steps can be selected individually.
- Explosion protection according to ATEX, category 1 (with type examination) for zone 0 inside, category 2 for zone 1 outside.
- Ramp for moving containers onto the loading platform (approx. 150 mm high); the loading platform can also be lowered into a pit for loading at floor level.
- Separate outlet cleaning system if the rotating spraying system of the inside and outside cleaning systems does not clean the outlet well enough (preliminary tests by Renzmann).
- Warm air drying, removes nonvolatile solvent residues on the container surfaces.
- External air extraction system, supplements/replaces the air extraction in the room/at the workplace.
- Solvent cooler, required for limiting the temperature and solvent emissions, various accessories adapted to the existing cooling water supply system.
- Solvent concentration measuring and regulating system for connection to an exhaust air cleaning system.

Type SKM-W

Like model SKM, but with the following differences:
- Suitable for water-based/alkaline media.
- Heating of the washing agent, heat insulation of the washing chamber and the washing agent container.
- Rinsing with water.
- Storage of washing agent and rinsing water in separate, free-standing containers (alternative to floor containers).
- Explosion protection that is adapted to the washing agent with the washed-off contamination and to the requirements of the installation site.

### ACCESSORIES
- Ramp for moving containers onto the loading platform (approx. 150 mm high); the loading platform can also be lowered into a pit for loading at floor level.
- Separate outlet cleaning system if the rotating spraying system of the inside and outside cleaning systems does not clean the outlet well enough (preliminary tests by Renzmann).
- Warm air drying, removes nonvolatile solvent residues on the container surfaces.
- External air extraction system, supplements/replaces the air extraction in the room/at the workplace.
- Solvent cooler, required for limiting the temperature and solvent emissions, various accessories adapted to the existing cooling water supply system.
- Solvent concentration measuring and regulating system for connection to an exhaust air cleaning system.

### TABLE

<table>
<thead>
<tr>
<th>Washing machine type SKM</th>
<th>Size 09/11</th>
<th>Size 12/13</th>
<th>Size 15/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel Ø / height</td>
<td>900 x 1150 mm</td>
<td>1200 x 1300 mm</td>
<td>1500 x 1500 mm</td>
</tr>
<tr>
<td>Capacity of wash pump</td>
<td>50 m³/h, 20 kW</td>
<td>70 m³/h, 28 kW</td>
<td>90 m³/h, 36 kW</td>
</tr>
<tr>
<td>Inner exhaust SKM</td>
<td>2200 m³/h, 1,85 kW</td>
<td>2900 m³/h, 2,5 kW</td>
<td>4000 m³/h, 3,6 kW</td>
</tr>
<tr>
<td>Inner exhaust SKM-W</td>
<td>2200 m³/h, 1,5 kW</td>
<td>2200 m³/h, 1,5 kW</td>
<td>2200 m³/h, 1,5 kW</td>
</tr>
<tr>
<td>L x W x D</td>
<td>L x W x D</td>
<td>L x W x D</td>
<td>L x W x D</td>
</tr>
<tr>
<td>Dimensions mm</td>
<td>5150 x 1800 x 2550</td>
<td>6950 x 2200 x 3050</td>
<td>6950 x 2200 x 3050</td>
</tr>
<tr>
<td>Required space mm</td>
<td>8600 x 4000 x 3500</td>
<td>9500 x 4000 x 4000</td>
<td>10000 x 4000 x 4500</td>
</tr>
<tr>
<td>Clearance for installation mm</td>
<td>2600 x 2000 x 2800</td>
<td>3300 x 2300 x 3300</td>
<td>3600 x 2600 x 3600</td>
</tr>
</tbody>
</table>
### Type 6090

- Robust and user-friendly washing machine for inside and outside cleaning of barrels and small cylindrical containers with brushes and simultaneous spraying with solvent, conductive brushes with type examination according to ATEX.
- No nitrogen inerting required.
- Very good inside and outside cleaning with rotating roller brushes.
- Two separate spraying systems for washing with circulated solvent and rinsing with clean solvent.
- Tight closing, manual washing chamber door with counterweight.
- Position sensor for the door, spraying does not begin until the washing chamber is closed.
- Cylindrical washing chamber, tilted backward, very good draining of the solvent, no corners where residues can accumulate, hence low solvent emissions.
- Closed solvent tank under the washing chamber with powerful suction fan.
- Internal air extraction system with power.
- Strainer for protection of the solvent tank.
- Dirt resistant pneumatic double diaphragm pump as washing and evacuation pump, separate pump for rinsing.
- Automatic washing program: washing – draining – rinsing – internal air extraction; program steps can be selected individually.
- Explosion protection according to ATEX, category 1 (with type examination) for zone 0 inside, category 2 for zone 1 outside.
- Height of drum resp. vessel: 900 mm.
- Diameter of drum resp. vessel: 350 – 600 mm.
- Inner exhaust: 2200 m³/h, 1,85 kW.
- Clearances for installation mm:
  - L x W x D: 2500 x 1400 x 1850.
- Required space mm:
  - L x W x D: 3800 x 2500 x 3200.
- Clearance for installation mm:
  - L x W x D: 2300 x 1500 x 2000.

### Type RIO-C3D

- Robust and user-friendly washing machine for inside cleaning of rectangular containers with brushes and simultaneous spraying with solvent.
- Very good inside cleaning even of hard-to-reach surfaces in the container, e.g. corners, top and bottom surfaces, by means of a brush that rotates around 2 axes and whose angle can be adjusted hydraulically.
- Brush hood for low-emission washing of the container.
- Separate spraying systems for washing with circulated solvent and rinsing with clean solvent.
- Position sensor for the brush hood, spraying does not begin until the hood rests on the container.
- Edge filter for protecting the brush head.
- Internal air extraction system for the container.
- Storage of washing solvent in separate container, optionally with warm air drying for nonvolatile solvents.
- Internal air extraction system for the container, optionally with warm air drying for nonvolatile solvents.
- Centrifugal pump for washing with circulated solvent and rinsing with clean solvent.
- Solvent concentration measuring and regulating system for connection to an exhaust air cleaning system.
- Very good inside cleaning even of hard-to-reach surfaces in the container.
- Robust and user-friendly washing machine.
- Flow monitor; the brush rotation does not start until solvent has been sprayed on the containers to prevent dry friction caused by the brush rotation.
- Automatic washing program: washing – draining – rinsing – internal air extraction; program steps can be selected individually.
- Explosion protection according to ATEX, category 3 for zone 2 inside, category 2 for zone 1 outside.
- Zone 2 on the inside is achieved through nitrogen inerting.

### ACCESSORIES

- Container cleaning device (lid and removable base plate for cleaning of mixing containers).
- Outlet cleaning system with ergonomic handling.
- Floor plate for the operator’s area.
- Brush hood for low-emission container washing.
- Internal air extraction system for the container, optionally with warm air drying for nonvolatile solvents.
- External air extraction system, supplements replaces the air extraction in the room/at the workplace.
- Washing solvent in separate container, optionally with warm air drying for nonvolatile solvents.
- Inerting with residual oxygen measurement, low nitrogen consumption due to exact metering.
- Nitrogen generator, nitrogen is generated from compressed air for inerting.

### Washing machine type 6090

- Diameter of drum resp. vessel: 350 – 600 mm.
- Height of drum resp. vessel: 900 mm.
- Inner exhaust: 2200 m³/h, 1,85 kW.
- Dimensions mm: 2500 x 1400 x 1850.
- Required space mm: 3800 x 2500 x 3200.
- Clearance for installation mm: 2300 x 1500 x 2000.

### Washing machine type RIO-C3D

- Basic size of container: 800 x 1200 mm.
- Height of container: 2000 mm.
- Capacity of wash pump: 3,6 m³/h, 2 kW.
- Inner exhaust: 2500 m³/h, 2 kW.
- Dimensions mm: 3500 x 2500 x 6500.
- Required space mm: 6000 x 4000 x 7000.
- Clearance for installation mm: 3500 x 3000 x 3500.
**Type Robus**

- Robust and user-friendly washing machine for inside cleaning of cylindrical and rectangular containers with brushes and simultaneous spraying with solvent, conductive brushes with type examination according to ATEX, no nitrogen inerting required
- Very good inside cleaning of cylindrical containers with a centrifugal folding brush.
- Inside cleaning of rectangular containers by a centrifugal brush with long bristles; by pressing a button on a rapid-action coupling, the operator can easily exchange the brush for a centrifugal folding brush.
- Spraying system for washing with circulated solvent and rinsing with clean solvent.
- The brush is lowered into the container, and the upper container opening closed by the machine lid, by means of a pneumatic lifting frame.
- Position sensor for the lid; spraying and brush rotation do not begin until the lid rests on the container.
- Washing solvent in separate container, level switch for filling and draining.
- Dirt resistant diaphragm pump as washing pump, separate pump for rinsing, pneumatic diaphragm pump for draining.

**ACCESSORIES**
- Centrifugal folding brush with active, reinforced contact pressure and much higher driving power, removes even very difficult residues.
- 3D cleaning of rectangular containers with brushes rotating around 2 axes with variable speed and angle, better cleaning of inside container surfaces that are hard to reach for a conventional brush, such as corners, lid and floor.
- Outlet cleaning system, manual or automatic.
- Floor pan for the working area under the lifting frame.

**Filter with removable basket for protecting the evacuation pump and the solvent tank**

**Flow monitor:** the brush rotation does not start until solvent has been sprayed on the container to prevent dry friction.

- Automatic washing program: washing – draining – rinsing – internal air extraction; program steps can be selected individually.
- Explosion protection according to ATEX, category 1 (with type examination) for zone 0 inside, category 2 for zone 1 outside.

**Type ROBUS-W**

- Like model ROBUS, but with the following differences:
  - Suitable for water-based/alkaline media.
  - Heating of the washing agent, heat insulation of the washing agent container.
  - Rinse with water.
  - Explosion protection that is adapted to the washing agent with the washed-off contamination and to the requirements of the installation site.

**OPTION:**

- **BRUSH WITH STAINLESS STEEL BRISTLES**
  - The folding brush is not pressed against the container’s lateral area just by centrifugal force but also by the driving torque of the brush shaft. The contact pressure on the bottom will also be increased.
  - The execution of the centrifugal force folding brush with stainless steel bristles can improve the washing result particularly with rough inner surfaces. This can be tested during trials in our showroom.
  - NOT suitable for aluminium containers or containers with smooth surfaces (surfaces will be roughed up by the stainless steel bristles).

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**Washing machine type ROBUS**

<table>
<thead>
<tr>
<th></th>
<th>Size 1</th>
<th>Size 2</th>
<th>Size 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diameter container (inside)</strong></td>
<td>600 – 1200 mm</td>
<td>750 – 1600 mm</td>
<td>900 – 2000 mm</td>
</tr>
<tr>
<td><strong>Diameter container (outside)</strong></td>
<td>1250 mm</td>
<td>1600 mm</td>
<td>2050 mm</td>
</tr>
<tr>
<td><strong>Height of container (inside)</strong></td>
<td>500 – 1300 mm</td>
<td>500 – 1500 mm</td>
<td>500 – 1700 mm</td>
</tr>
<tr>
<td><strong>Max. total height</strong></td>
<td>1500 mm</td>
<td>1700 mm</td>
<td>1900 mm</td>
</tr>
<tr>
<td><strong>Capacity of wash pump</strong></td>
<td>3 bar, 4 m³/h</td>
<td>3 bar, 4 m³/h</td>
<td>3 bar, 4 m³/h</td>
</tr>
<tr>
<td><strong>Inner exhaust ROBUS</strong></td>
<td>400 – 2200 m³/h, 2.5 kW</td>
<td>400 – 2200 m³/h, 2.5 kW</td>
<td>400 – 2200 m³/h, 2.5 kW</td>
</tr>
<tr>
<td><strong>Inner exhaust ROBUS-W</strong></td>
<td>600 m³/h, 1.5 kW</td>
<td>600 m³/h, 1.5 kW</td>
<td>600 m³/h, 1.5 kW</td>
</tr>
<tr>
<td><strong>L x W x D</strong></td>
<td>L x W x D</td>
<td>L x W x D</td>
<td>L x W x D</td>
</tr>
<tr>
<td><strong>Dimensions mm</strong></td>
<td>2500 x 2020 x 4250</td>
<td>2800 x 2310 x 4600</td>
<td>3350 x 2650 x 6150</td>
</tr>
<tr>
<td><strong>Required space mm</strong></td>
<td>5500 x 4000 x 8500</td>
<td>5800 x 4500 x 5000</td>
<td>6300 x 5000 x 6800</td>
</tr>
<tr>
<td><strong>Clearance for installation mm</strong></td>
<td>4400 x 2700 x 1900</td>
<td>4900 x 2000 x 2200</td>
<td>5800 x 3500 x 2700</td>
</tr>
</tbody>
</table>
Type BKM

- Strong and simple to use washing machine for inside and (optional) outside cleaning of open vessels with brushes, while at the same time spraying with solvent. Electrically conductive, type-examined brushes according to ATEX, nitrogen inerting is not required.
- Thorough cleaning of vessels inside/outside (optional), even with large vessel diameters by roller brushes and concurrent spraying of cleaning agent.
- Positioning of vessel during wash cycle diagonally downward, so detached contaminants can be rinsed out regardless of size and quality of vessel bottom.
- Tight closing hydraulic door, also used as loading platform (designed as rotating table) in front of machine, driven by external explosion-proof motor. Container-centering by interlocking guide rails at container and door, a locking sleeve and two strips have to be welded at the bottom of the containers to be cleaned.
- A sensor checks if the container is locked correctly and then enables door movement.
- Automatic position control for the door: spraying of solvent, and container and brush rotation are only possible while the door is closed tightly.
- The roller brush head moves and is pressed against the container floor, and the roller brush is pressed against the inside surface of the container sides for the duration of several container revolutions; the movement and pressure of the brush are controlled by hydraulic cylinders mounted to the outside of the rear panel, the pressure and speed can be adjusted infinitely.
- Strong washing pump for washing with solvent in close cycle.
- Solvent reservoir underneath the machine, separated from the washing chamber by a flap, (no open solvent when washchamber is open), level sensor for filling and emptying: flowmeter: the brush does not begin rotating until solvent has been sprayed on the container.
- External filter with removable strainer basket, protects the spraying system from foreign matter.
- Explosion-proof hydraulic unit, oil reservoir with integrated pump and all valves and fittings, ex-proof drive motor, power (kW) according to size, motor speed adjustable by frequency converter according to requested brush rotation speed.
- Inner exhaust through strong exhaust ventilator.
- Automatic washing program with programmable logic control (PLC): washing – draining – rinsing – venting and brush rotation program steps can be selected individually.
- Ex-protection according to ATEX, category 1 (type examination) for zone 0 inside, category 2 for zone 1 outside.

Options
- Roller brush for outside cleaning with conductive polyamide brush segments, type-examined brushes according to ATEX, nitrogen inerting is not required.
- Bottom Outlet Cleaning Device with outlet cleaning nozzle at the upper side of the washing chamber.
- Warm air drying: warm air is blown into the machine chamber by a separate ventilator, the wet surfaces of machine and container are dried effectively even with high boiling solvents.
- Drying Cabin: This device dries the container without the necessity of sucking off the solvent on the brushes, walls and in the air of the washing chamber. This reduces solvent losses and emissions and shortens the drying time.
- Solvent Content Concentration for connection to a thermal oxidizer system.

Washing machine type BKM

<table>
<thead>
<tr>
<th>Size</th>
<th>Size 09/11</th>
<th>Size 12/13</th>
<th>Size 15/15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel Ø / height</td>
<td>900 x 1100 mm</td>
<td>1200 x 1300 mm</td>
<td>1500 x 1500 mm</td>
</tr>
<tr>
<td>Capacity of wash pump</td>
<td>30 m³/h, 5,5 kW</td>
<td>45 m³/h, 7,5 kW</td>
<td>60 m³/h, 10 kW</td>
</tr>
<tr>
<td>Inner exhaust BKM</td>
<td>2200 m³/h, 1,85 kW</td>
<td>2900 m³/h, 2,5 kW</td>
<td>4000 m³/h, 3,6 kW</td>
</tr>
<tr>
<td>L x W x D</td>
<td>L x W x D</td>
<td>L x W x D</td>
<td></td>
</tr>
<tr>
<td>Dimensions mm</td>
<td>4100 x 3200 x 3000</td>
<td>4800 x 3700 x 3400</td>
<td>5500 x 4200 x 3800</td>
</tr>
<tr>
<td>Required space mm</td>
<td>8000 x 5000 x 3000</td>
<td>9000 x 5500 x 3400</td>
<td>10000 x 6000 x 3800</td>
</tr>
<tr>
<td>Clearance for installation mm</td>
<td>3200 x 2000 x 2400</td>
<td>3500 x 2400 x 2700</td>
<td>3800 x 2700 x 3000</td>
</tr>
</tbody>
</table>
Setting up the system for safe operation

- Ex-protection of all electrical and mechanic components according to explosion protection guidelines 94/9EG (Atex 95), spray system with type examination.
- The compliance with all applicable EC safety regulations is evidenced by a declaration of conformity and a CE notice on the machine.
- Solvent stability of all parts, which are in contact with the medium.
- Washing machine with overload protection (LS1).
- Pumps, pipes and spray register are protected against contamination by large perforated baskets in the washing machine.
- Spraying only possible if door is closed due to automatic retrieval of door position.
- Dry-run protection of wash pump (P1) due to retrieval of minimum fill-level in the washing machine (LS1) before wash process starts and due to locking of discharge function during the wash procedure.
- Many more safety precautions according to known Atex risk assessments.

Fulfillment of the "CRITERIA FOR THE SELECTION OF EQUIPMENT AND PROTECTIVE SYSTEMS" according to the ATEX workplace directive 1999/92/EC (ATEX 137)

D.W. RENZMANN uses a certified quality assurance system according to ATEX and consistently implements all relevant legal requirements.

The operator:
- is required by ATEX to use equipment of the correct category for the respective hazard zones, e.g. category 1 equipment for zone 0.

D.W. RENZMANN supplies category 1 washing machines with a type examination according to ATEX and thereby protects customers from any liability due to unsuitable or prohibited washing machines, irrespective of the solvent used.
Further systems of D.W. RENZMANN

<table>
<thead>
<tr>
<th>Distillation units and washing machines</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="ROTO" /></td>
</tr>
<tr>
<td>ROTO</td>
</tr>
<tr>
<td><img src="image3" alt="CLEANfleX" /></td>
</tr>
<tr>
<td>CLEANfleX</td>
</tr>
<tr>
<td><img src="image5" alt="3400" /></td>
</tr>
</tbody>
</table>

Services

**Benefit from our know-how:**

Once you have chosen a RENZMANN system, you will be well looked after. For installations, commissioning, maintenance contracts, repairs and spare parts, our technically trained and qualified service personnel will be at your disposal.

If new installations are carried out, we will explain all interfaces in detail, plan all work steps and, as far as possible, determine them in advance, whereby possible connections to existing systems will be taken into account. Our technicians are trained and experienced employees and will instruct - on site - the employees who will later be operating the systems.

In the event that spare parts are needed, we will do our utmost to ensure fastest possible delivery.

Maintenance works and recurring checks will be carried out by specially trained technicians.
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