

The background of the entire page is a warm, golden-yellow color. It features several semi-transparent, wavy-edged rectangular panels that reveal images of industrial machinery, likely heat pumps or evaporators, in a factory setting. The machinery is rendered in a lighter, almost white tone, creating a high-contrast, artistic effect.

**schulz  partner**

**Heat pump  
Evaporators**

# Heat Pump Evaporators

*Systems Nearly as Perfect as Perpetual Motion Machines*

## Schulz+Partner GmbH

Since its foundation in October 1994, Schulz+Partner GmbH, a process engineering company, has specialized in the treatment and regeneration of industrial process liquids.



As a competent and experienced systems supplier, we design and implement customized solutions in accordance with your personal needs and requirements.

## *Our main fields of expertise include:*

- distillation/evaporation
- rectification/absorption
- drying
- crystallization
- liquid-liquid extraction

*Pilot plant:  
CONfix® 50*

## The Working Principle

Heat pump evaporators operate on the basis of a compressor-driven refrigerant circuit. As the name indicates, the system “refrigerates” (or cools) on the low-pressure side while generating an equal amount of heat on the high-pressure side. Where refrigeration is the sole objective, such heat is normally dissipated into the ambient atmosphere.

Our heat-pump evaporators, in contrast, utilize both the heat output and the refrigerating capacity in a complementary manner: the heat generated is used for evaporation, while the “cold” output is simultaneously employed for vapor condensation. This explains the exceptional 90% efficiency of these evaporators. Apart from the power for the compressor, the plant requires no further energy input at all.

## Your Advantages

We offer three different type series as standard plants:

|                      |         |
|----------------------|---------|
| Natural circulation: | EVA     |
| Forced circulation:  | CONfix® |
| Dryer:               | DRYfix® |

## *The essential advantages of this technology include:*

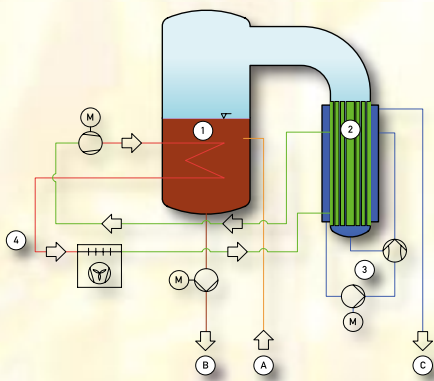
- 90% energy saving
- The system needs only electric power as an energy source - no vapor, no hot water, etc.
- No cooling water required
- Completely autonomous systems
- Modular design
- Pre-assembled in base frame
- Pretested
- Low boiling temperature under vacuum (< 50°C), therefore
  - suitable for heat-sensitive feed products
  - less corrosion
  - plastic heat exchangers can be used for hydrochloric and hydrofluoric acid concentration as well



# EVA BASIC

## Natural-Circulation Evaporator with Heat Pump

This type of plant is used for smaller volumes of process liquid and for simple tasks. More demanding tasks, such as solutions including the reprocessing of solid matter, can be better solved with the other type series mentioned above.



point where it is still free-flowing so it can be easily discharged by the pump.

The resulting vapour is transferred to the condensation stage (2) through a vapour tube, to be condensed by a heat exchanger. In this process, the flash-cooled liquid refrigerant evaporates and the vacuum system discharges the resulting distillate.

The evaporating vessel (1) features a tube-coil heat exchanger that transfers the condensation energy of the overheated gaseous refrigerant to the feed product on the high-pressure side.

### Process Description

The feed product (A) is drawn into the concentration stage (1) under level control. The vacuum required is generated by a vacuum system (3) consisting of a water-jet vacuum pump and a forcing pump.

On the high-pressure side, the overheated, gaseous refrigerant gives off condensation energy that is transferred to the feed product via a heat exchanger forming an integral part of the concentration stage (1). In this process, the feed product heats up and part of its water content evaporates, thus concentrating the product to a



EVA 30 BASIC

### EVA Basic type series:

|                                    | units            | EVA 30 Basic | EVA 60 Basic | EVA 85 Basic | EVA 120 Basic | EVA 150 Basic | EVA 190 Basic |
|------------------------------------|------------------|--------------|--------------|--------------|---------------|---------------|---------------|
| evaporation capacity               | l/h              | 30           | 60           | 85           | 120           | 150           | 190           |
| specific energy consumption        | kWh/l distillate | 0,15         | 0,14         | 0,14         | 0,14          | 0,13          | 0,13          |
| operating pressure and temperature | Pa               | 8000         | 8000         | 8000         | 8000          | 8000          | 8000          |
|                                    | °C               | 38           | 38           | 38           | 38            | 38            | 38            |
| power consumption                  | kVA              | 5            | 8            | 12           | 17            | 20            | 25            |
| length                             | mm               | 1250         | 1350         | 1500         | 1750          | 2000          | 2500          |
| breadth                            | mm               | 800          | 1100         | 1250         | 1400          | 1700          | 2000          |
| height                             | mm               | 2000         | 2100         | 2200         | 2400          | 2500          | 2600          |
| waste heat                         | kW/h             | 4            | 7            | 10           | 13            | 16            | 20            |

### Fields of application EVA

#### Thin solutions

- without solids
- low viscosity
- low boiling point elevation

#### Degreasing solutions

#### Cooling lubricants

#### Oil-emulsions

#### Lye concentration

#### Acid concentration

#### Solvents

#### Waste Water from the following productions:

- Surface treatment
- Circuit boards
- Paper
- Textile
- Printing
- Colors
- Photo development
- Chromating
- Hard chrome plating
- Laminating
- Pigments

#### Concentrate extracts from:

- Membrane process
- Ion exchangers
- Dialysis process
- Electrolysis process
- Centrifuges

# CONfix®

## Forced-Circulation Evaporator with Heat Pump

This forced-circulation evaporator is recommended if heating-surface deposits caused by evaporation must be prevented. Obviously, this is the right solution when reprocessing crystallizing and deposit-forming liquids that easily lead to encrustations on the heating surfaces. This unwelcome effect can be controlled – and at least delayed – by increasing the speed of the feed product circulation through the tube bundle. To this end, a circulating pump is used to deliver the product through an external heat exchanger into the flash vessel. The product is only moderately heated without boiling when passing through the heat-exchanger, to be subsequently evaporated in the flash vessel. This minimizes deposits and encrustations.

This type series is also a better solution than its EVA natural-circulation counterpart when dealing with higher viscosities or when the process inevitably generates higher boiling temperatures.

Optionally, this evaporator is available with an agitator.



CONfix®550 S EEx

Material: 1.4539; rubber-coated steel  
 Refrigerant: R134a coolant  
 Distillation capacity: 550 l/h  
 Task: Recovery of white spirit (solvent naphtha), 2-stage plant

### Process Description

The feed product is drawn into the concentration stage under level control. The vacuum required is generated by a vacuum system

consisting of a water-jet vacuum pump and a closed cooling-water circuit.

On the high-pressure side, the condensation energy of the overheated gaseous refrigerant

### CONfix® type series

|                                    | units            | CONfix® 50 | CONfix® 85 | CONfix® 120 | CONfix® 150 | CONfix® 190 | CONfix® 250 | CONfix® 290 | CONfix® 390 | CONfix® 490 | CONfix® 620 |
|------------------------------------|------------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| evaporation capacity               | l/h              | 50         | 85         | 120         | 150         | 190         | 250         | 290         | 390         | 490         | 620         |
| specific energy consumption        | kWh/l distillate | 0,18       | 0,16       | 0,15        | 0,15        | 0,15        | 0,15        | 0,15        | 0,15        | 0,15        | 0,15        |
| operating pressure and temperature | Pa               | 8000       | 8000       | 8000        | 8000        | 8000        | 8000        | 8000        | 8000        | 8000        | 8000        |
|                                    | °C               | 38         | 38         | 38          | 38          | 38          | 38          | 38          | 38          | 38          | 38          |
| power consumption                  | kVA              | 9          | 14         | 18          | 23          | 29          | 38          | 44          | 59          | 74          | 93          |
| length                             | mm               | 2200       | 2200       | 2300        | 3500        | 3500        | 3500        | 3500        | 4000        | 4000        | 4000        |
| breadth                            | mm               | 1300       | 1500       | 1500        | 1700        | 2000        | 2000        | 2150        | 2250        | 2350        | 2350        |
| height                             | mm               | 2500       | 2600       | 2700        | 2900        | 3100        | 3200        | 3300        | 3400        | 3500        | 3500        |
| waste heat                         | kW/h             | 7          | 11         | 14          | 18          | 23          | 30          | 35          | 47          | 59          | 74          |

Other dimensions up to 1400 l/h are available on request

is transferred to the feed product via a tube-bundle heat exchanger. A circulating pump permanently circulates the product through the heat exchanger into the evaporator. Due to flash vaporization, the solvents partially evaporate in the process and the circulating liquid cools down. Thus, the feed product is continuously concentrated to the desired degree.

The concentrate is automatically discharged with a pump under level control.

The resulting vapor is delivered into the condensation stage (3) via a vapor tube. Vapor condensation is achieved through a tube-bundle heat exchanger in which the flash-cooled liquid refrigerant evaporates, thereby absorbing the heat of the vapor and condensing it in the process.

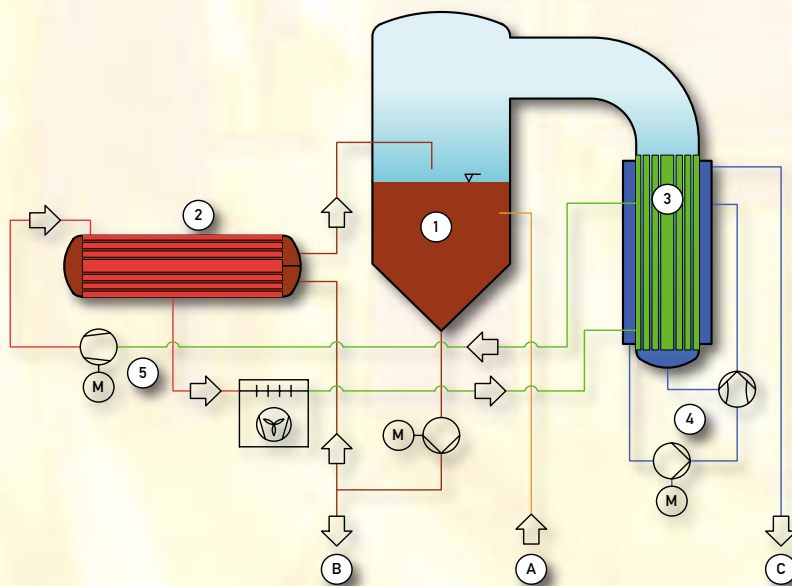
The resulting distillate is discharged by the vacuum system as well.

These plants can be operated either continuously or on a batch basis.



CONFIX®620 S

|                        |                                      |
|------------------------|--------------------------------------|
| Material:              | 1.4404                               |
| Refrigerant:           | R134a coolant                        |
| Distillation capacity: | 620 l/h                              |
| Task:                  | Concentration of alkaline wastewater |



## Fields of application CONFIX®

### Solutions

- With low solids content
- low viscosity
- low boiling point elevation up to 10°C

### Degreasing solutions

### Cooling lubricants

### Oil-emulsions

### Lye concentration

### Acid concentration

### Solvents

### Waste Water from the following productions:

- Surface treatment
- Circuit boards
- Paper
- Textile
- Printing
- Colors
- Photo development
- Chromating
- Hard chrome plating
- Laminating
- Pigments

### Concentrate extracts from:

- Membrane process
- Ion exchangers
- Dialysis process
- Electrolysis process
- Centrifuges

# DRYfix®

## Dryer with Heat Pump

This type series is ideal for processing media requiring an evaporator with agitator, as well as in cases where the concentrate must have a low residual humidity.

### Process Description

The feed product is sucked into the dryer under level control. A vacuum system consisting of a water-jet vacuum pump and a closed cooling-water circuit generates the needed vacuum.

On the high-pressure side, the condensation energy of the overheated gaseous refrigerant is transferred to the feed product via a double-walled heat exchanger. In the dryer, an agitator with wipers prevents encrustation of the product on the heat exchanger's surfaces.

As a result of the energy input, part of the solvents evaporates.



DRYfix®15

Material: 1.4539  
 Distillate capacity: 15 l/h  
 Fields of use: Various effluents containing Cr and Cl

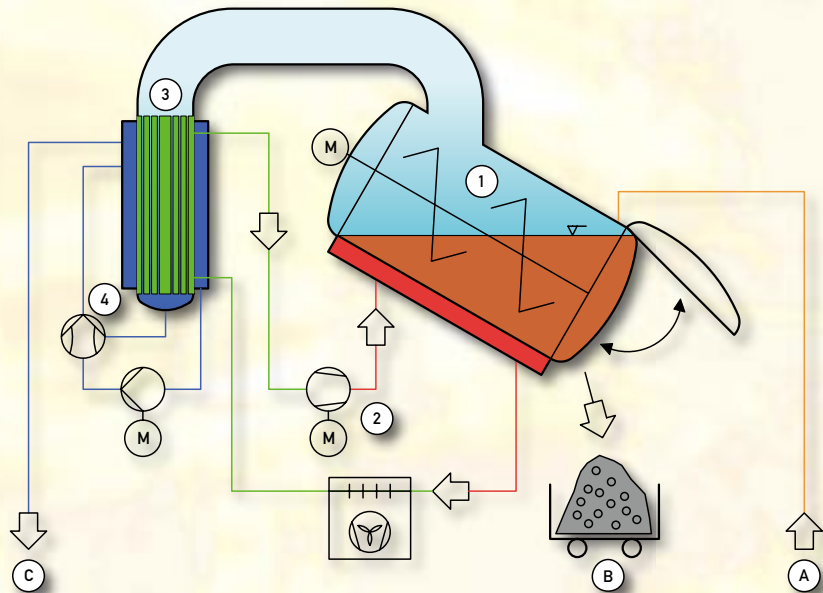
In this way, the feed product is evaporated and thereafter dried to the pre-determined level. The resulting vapor is delivered into the condensation stage (3) via a vapor tube. Vapor condensation is achieved through a tube-bundle heat exchanger in which the flash-cooled liquid refrigerant evaporates, thereby absorbing the heat

of the vapor (and condensing it in the process).

The resulting distillate is discharged by the vacuum system as well.

The residual concentrate is removed via an opening on the front side of the plant.

These plants are operated on a batch basis.



### DRYfix® type series

|                                    | units            | DRYfix® 10 | DRYfix® 15 | DRYfix® 20 | DRYfix® 25 | DRYfix® 35 | DRYfix® 50 |
|------------------------------------|------------------|------------|------------|------------|------------|------------|------------|
| evaporation capacity               | l/h              | 10         | 15         | 20         | 25         | 35         | 50         |
| specific energy consumption        | kWh/l distillate | 0,25       | 0,25       | 0,20       | 0,20       | 0,20       | 0,20       |
| operating pressure and temperature | Pa               | 8000       | 8000       | 8000       | 8000       | 8000       | 8000       |
|                                    | °C               | 38         | 38         | 38         | 38         | 38         | 38         |
| power consumption                  | kVA              | 3          | 4          | 4          | 5          | 7          | 10         |
| length                             | mm               | 1500       | 1650       | 1800       | 1900       | 2000       | 2500       |
| breadth                            | mm               | 1300       | 1500       | 1600       | 1700       | 1900       | 2250       |
| height                             | mm               | 2000       | 2000       | 2100       | 2200       | 2300       | 2400       |
| waste heat                         | kW/h             | 2          | 3          | 3          | 4          | 6          | 8          |



## Special Types

In some applications, it is important to prevent direct contact between the medium (or feed product) and metallic heat exchanger surfaces. While it is a theoretical possibility to have the metallic surfaces of the heat exchanger tubes coated, this is not a feasible option in practice. Therefore, plastic heat exchangers are used in such cases.

However, this requires an additional coolant circuit, which leads to a 10% higher energy input.

Please note that the type series presented here are just a sample of our comprehensive product range. In fact, we routinely implement heat pump evaporators with distillate capacities of up to 1,000 l/h.

Special plants with explosion protection according to ATEX guidelines are also available. These are designed and implemented on a fully customized basis.

Our plants are available in many different materials, such as

- stainless steel
- hastelloy, titanium, zirconium
- PP/PE
- PVDF/PFA
- silicon carbide
- graphite

## Service

Schulz+Partner GmbH is a competent and experienced thermal systems supplier with a focus on customized solutions.

We design, implement and service complete plants as well as individual process stages and single components in the field of thermal process engineering.

A safe and optimized plant design is ensured by computer simulation coupled with extensive testing in our lab and pilot plants. Moreover, we are dedicated to continuous further development and integration of innovative technologies. This puts us in a position to satisfy the highest customer demands in the long term as well, combining economy with guaranteed operational safety.

In addition, Schulz+Partner GmbH provides valuable planning and after-sales services through its trained service team. For example, we help you clarify process engineering issues and will be at your side with competent advice and support should troubles occur with the control or refrigeration system. To this end, we offer customized service contracts that are available on a European scale.

Especially in light of the growing importance of plant optimization, you can always count on us as your reliable partner.

## Fields of application DRYfix®

### Solutions

- all kind
- with solids
- higher viscosity

### Degreasing solutions

### Cooling lubricants

### Oil-emulsions

### Lye concentration

### Acid concentration

### Solvents

### Waste Water from the following productions:

- Surface treatment
- Circuit boards
- Paper
- Textile
- Printing
- Colors
- Photo development
- Chromating
- Hard chrome plating
- Laminating
- Pigments

### Concentrate extracts from:

- Membrane process
- Ion exchangers
- Dialysis process
- Electrolysis process
- Centrifuges

*Process wastes – Salt solutions – Organic liquids – Acids – Lyes –  
Pickling baths – Fermentation wastes – Solvents – Mineral oils – Landfill effluents*

# ***Fields of Activity***

## ***Evaporation***

- Heat pump evaporators
- Falling film evaporators
- Circulation/Forced circulation evaporators
- Evaporators with thermal or mechanical vapour compression
- Thin film evaporators
- Short path evaporators

## ***Crystallization***

- Evaporation crystallisers
- Cooling crystallisers

## ***Drying***

- Thin film dryers, 'Combi' dryer
- Heat pump dryers

## ***Rectification - Absorption***

- Rectification columns, trays and packings
- Absorption columns
- Revamping

## ***Liquid-Liquid Extraction***

- Extraction columns, agitated and pulsed
- Mixer-Settlers

## ***Engineering***

- Consulting
- Laboratory/pilot tests
- Process developments, simulations
- Project evaluation
- Basic and detail engineering
- Installation planning 3D
- Automation, measuring and control engineering
- Procurement of materials
- Erection and supervision
- Start up
- Operators instruction

## ***Plant construction***

- Turn key plants
- Complete process units
- Special apparatus
- Plant equipments

## ***Maintenance – spare parts***

- Service contracts, especially for heat pump units
- Spare parts express delivery

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