

MVR HEAT PUMP

INDUSTRIAL HEAT PUMPS



EPCON EVAPORATION TECHNOLOGY AS

EVAPORATORS – DRYERS – DISTILLATION & DEHYDRATION – HEAT RECOVERY SYSTEMS
ENGINEERING AND AFTERSALES SERVICES

Our competence:

With its history going back to 1986, EPCON is an international supplier of separation and energy recovery technology, based in Trondheim, Norway. These technologies provide added value for our customers.

EPCONs key competence is thermal separation processes like evaporation with energy recovery based on well proven MVR technology. MVR, or Mechanical Vapour Recompression, is in principle a highly efficient heat pump typically applied directly in process vapour of water or other solvents.

The last decade EPCON has adapted the MVR heat pumps for implementation in existing thermal processes, and can today provide optimal direct or indirect MVR heat pump solutions for a number of existing or new applications where one need a certain temperature lift for reuse of the thermal energy.

EPCON offers all customers a 24-hour aftersales service that includes trouble-shooting, spare parts, preventive and corrective maintenance, as well as inspection of installations.

Applications

Suitable applications for MVR heat pumps are:

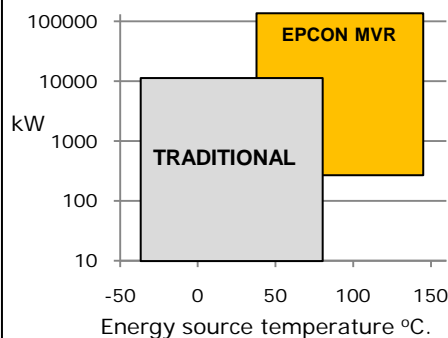
- Evaporators
- Multiple effect evaporators
- Distillation columns
- Reactors
- Boilers
- Dryers
- Waste heat recovery
- District heating

Characteristics of MVR heat pump

The typical characteristics for MVR heat pumps are:

- Heat output 200 kW to >100 MW
- Energy source temp: 40-150°C
- Temperature rise: 5-30°C
- Typical COP: 5-80
- Simple maintenance
- No steam or cooling water required
- Flexible capacity control
- ATEX available
- Tailormade solutions

Temperature and capacity range for heat pumps



MVR heat pumps are especially suitable for large capacity and temperatures higher than what is suitable for traditional heat pumps.

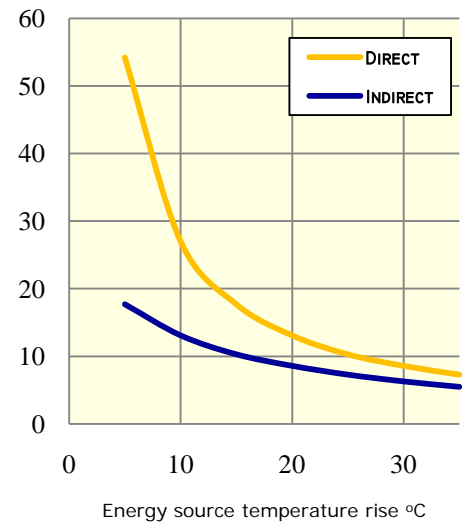
Direct and indirect

MVR heat pumps can be both direct and indirect circuit:

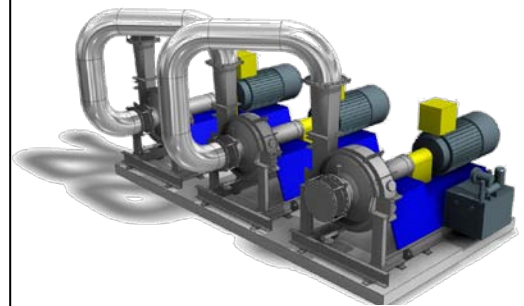
- In a direct MVR heat pump the process vapour is compressed to a higher pressure and temperature.
- An indirect MVR heat pump is operating similar to a traditional heat pump however with water as working medium and at higher temperatures.

Well proven vacuum design allow wide process temp/pressure range.

COP for MVR heat pumps



COP (Coefficient Of Performance) describes the relationship between recovered energy and energy input to the compressor.



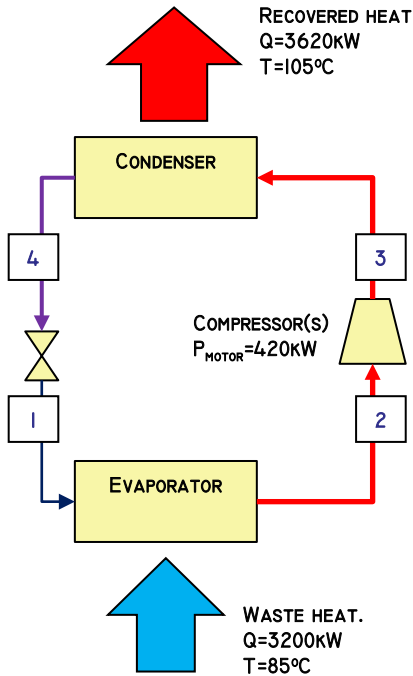
MVR fans used in MVR heat pump.

Highlights:

- Wide application range not covered by traditional heat pumps.
- Suitable for implementation in existing processes.
- Direct or indirect systems, with a number of fans in series.
- Water at low pressure used as working medium in indirect system
- Suitable for several energy sources at different temperature levels
- High coefficient of performance.
- EPCON provide well proven and robust MVR heat pump technology.

Example I

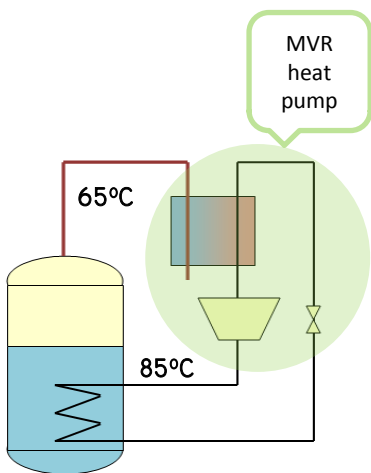
This is an example of an indirect MVR heat pump recovering waste heat at 85°C and delivering energy at 105°C.



Example II:

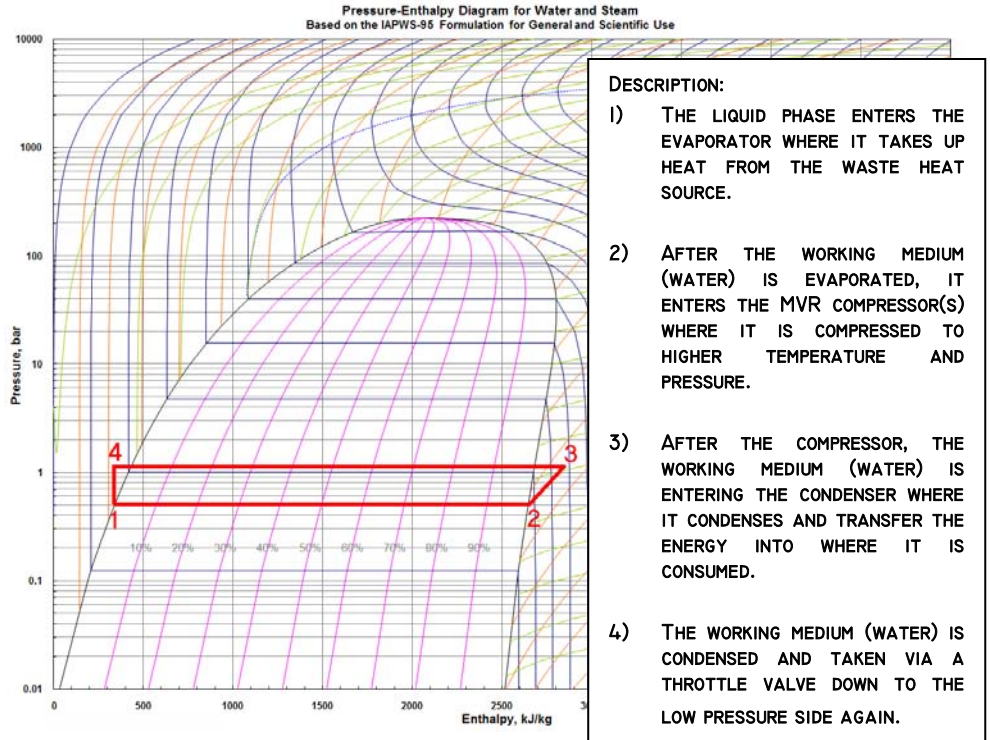
Indirect MVR heat pump used in reactor or boiler process.

Energy saving in the range of 80% was achieved.



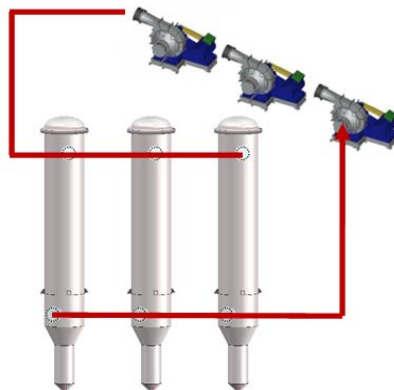
Example of indirect MVR heat pump in revamp of existing plant.

PRESSURE ENTHALPY DIAGRAM



Example III:

Substantial energy savings in industry using direct MVR heat pump.



The existing evaporator, located at a food and ingredients factory in Norway, was considerably upgraded by EPCON. The original multiple effect was upgraded to one effect MVR. This reduced the energy consumption by more than 80%.

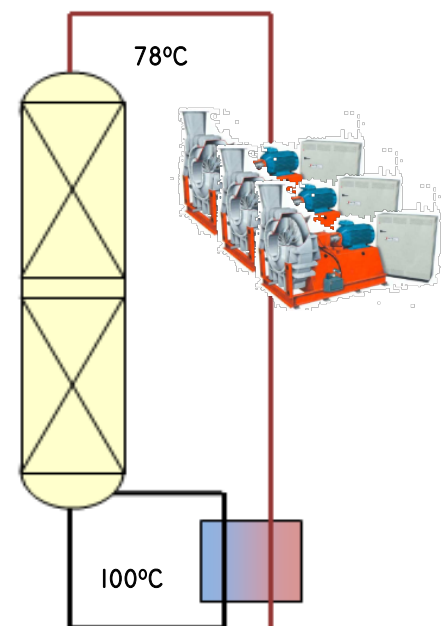


MVR fans installed at the factory.

Example IV:

Direct MVR heat pump used in an ethanol / water distillation column. Similar principle is used for aqueous methanol and isopropanol solvents.

Energy saving compared to direct steam energy system is significant, and typically 80-85%..



Schematic drawing of a distillation process with MVR heat pump.

Partners & distributors

Finland

AJON APU OY

Viertotie 3

15560 Nastola

Tel: +358 400 467051

Mail: simo.ajo@phnet.fi

South Korea



5th FL, HP building 23-6,

Yoido-Dong

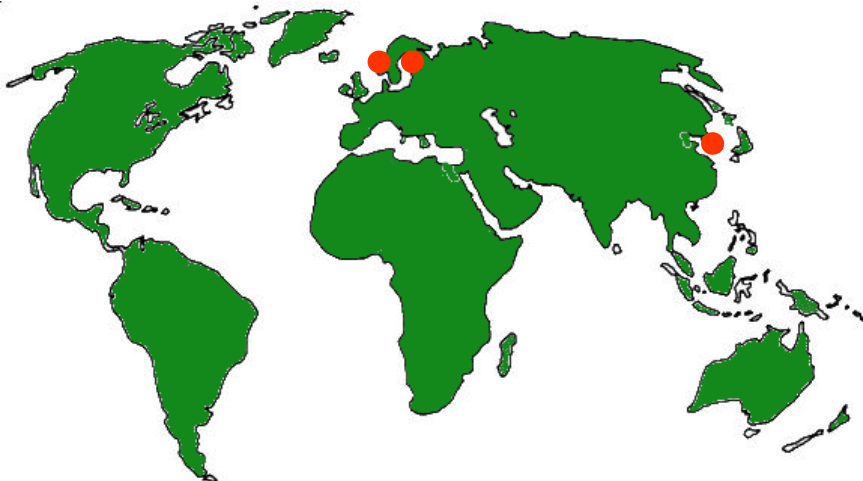
Youngdeungpo-Gu,

Seoul, Korea, 150-724

Tel: +82-2-2167-9093

Fax: +82-2-2167-9178

Mail: evapor@sc-eng.com



Location: Jarleveien 17
Address: N – 7041 Trondheim,
Norway
NO 994 469 126MVA/VAT
Phone: (+47) 73 99 04 50
Fax: (+47) 73 99 04 51
companymail@epcon.org
www.epcon.org