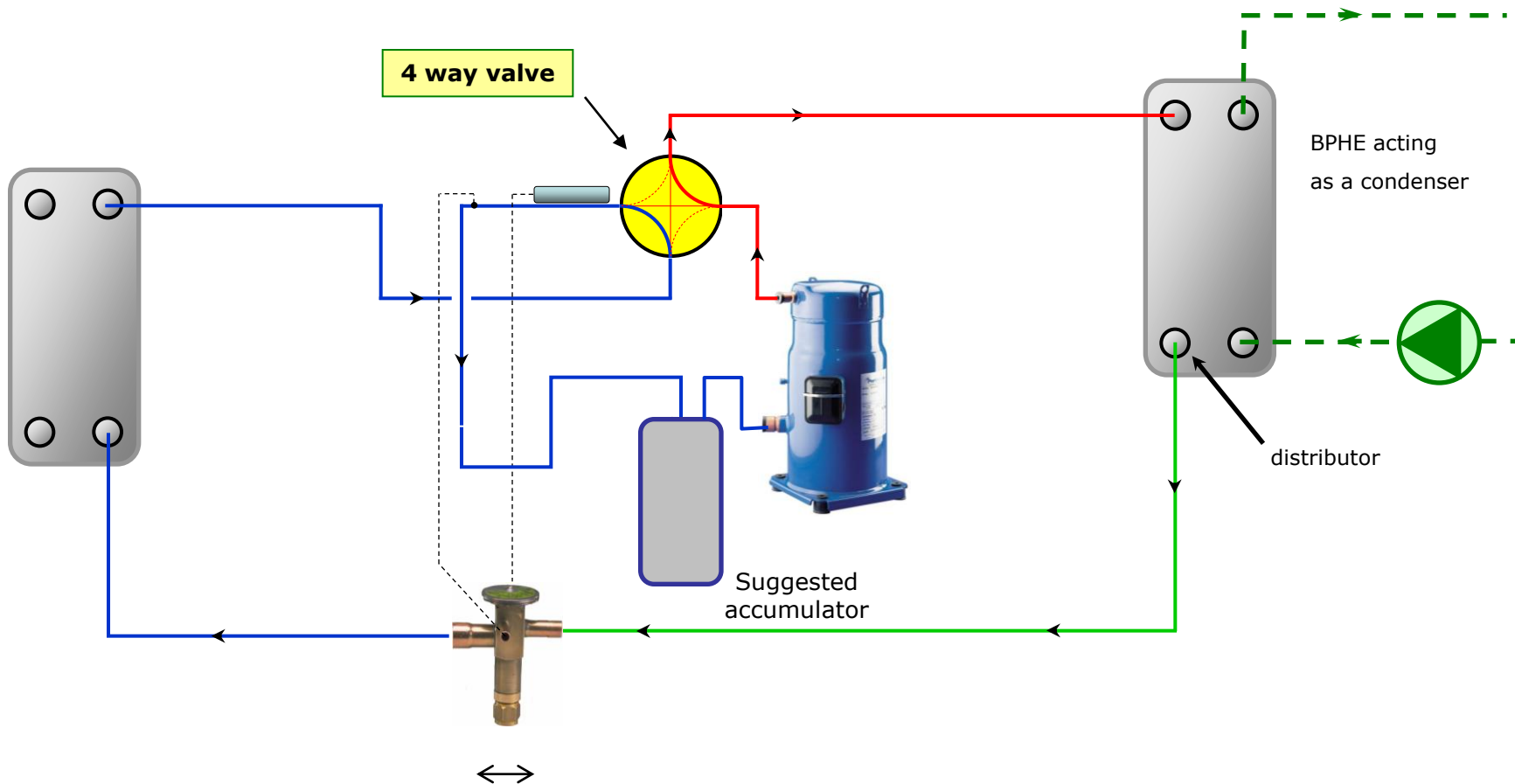




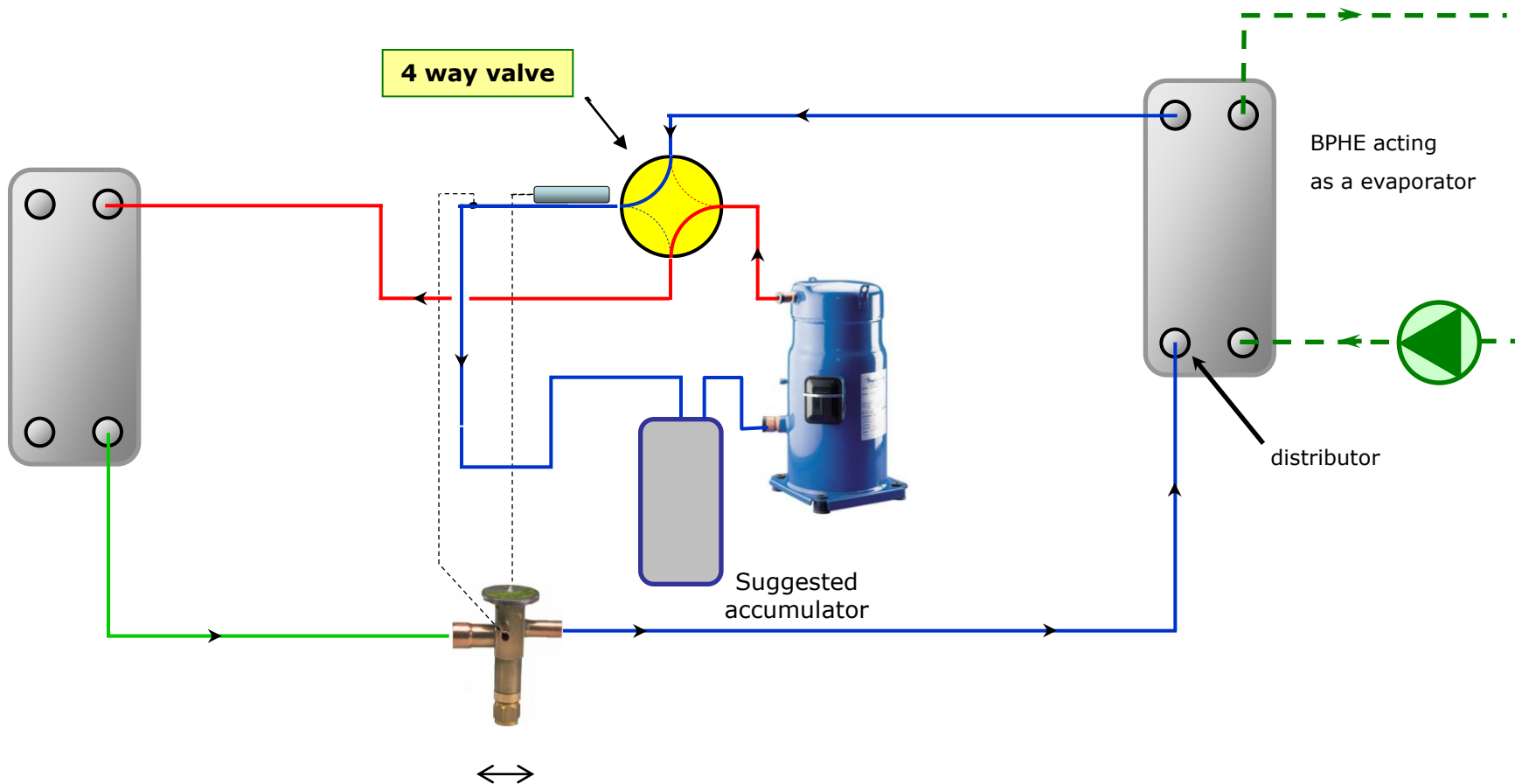
BPHE Application Air Conditioning Chillers/Reversible Systems

Air Conditioning Chiller – Reversible Cold climate design, mode:heating

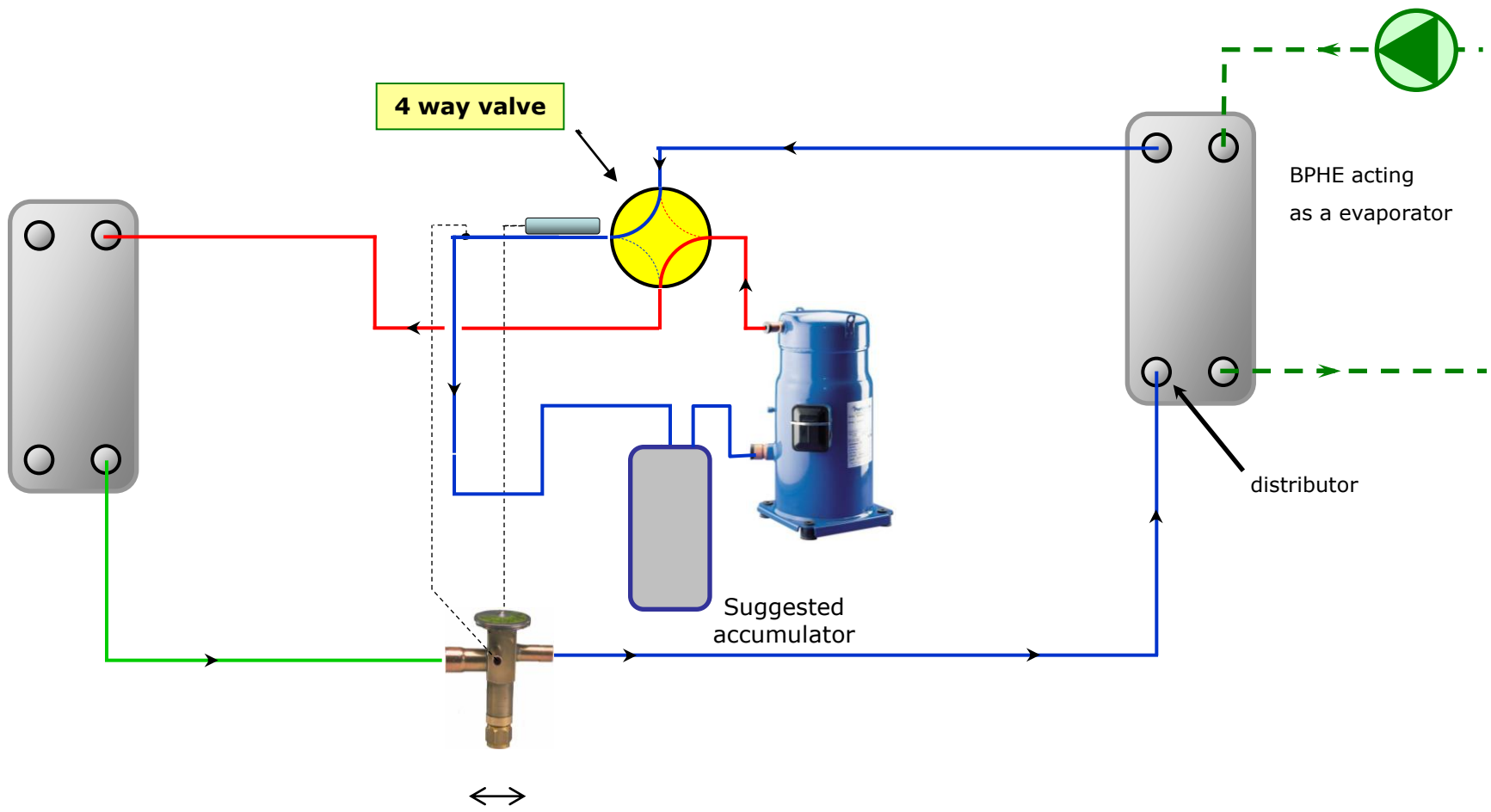




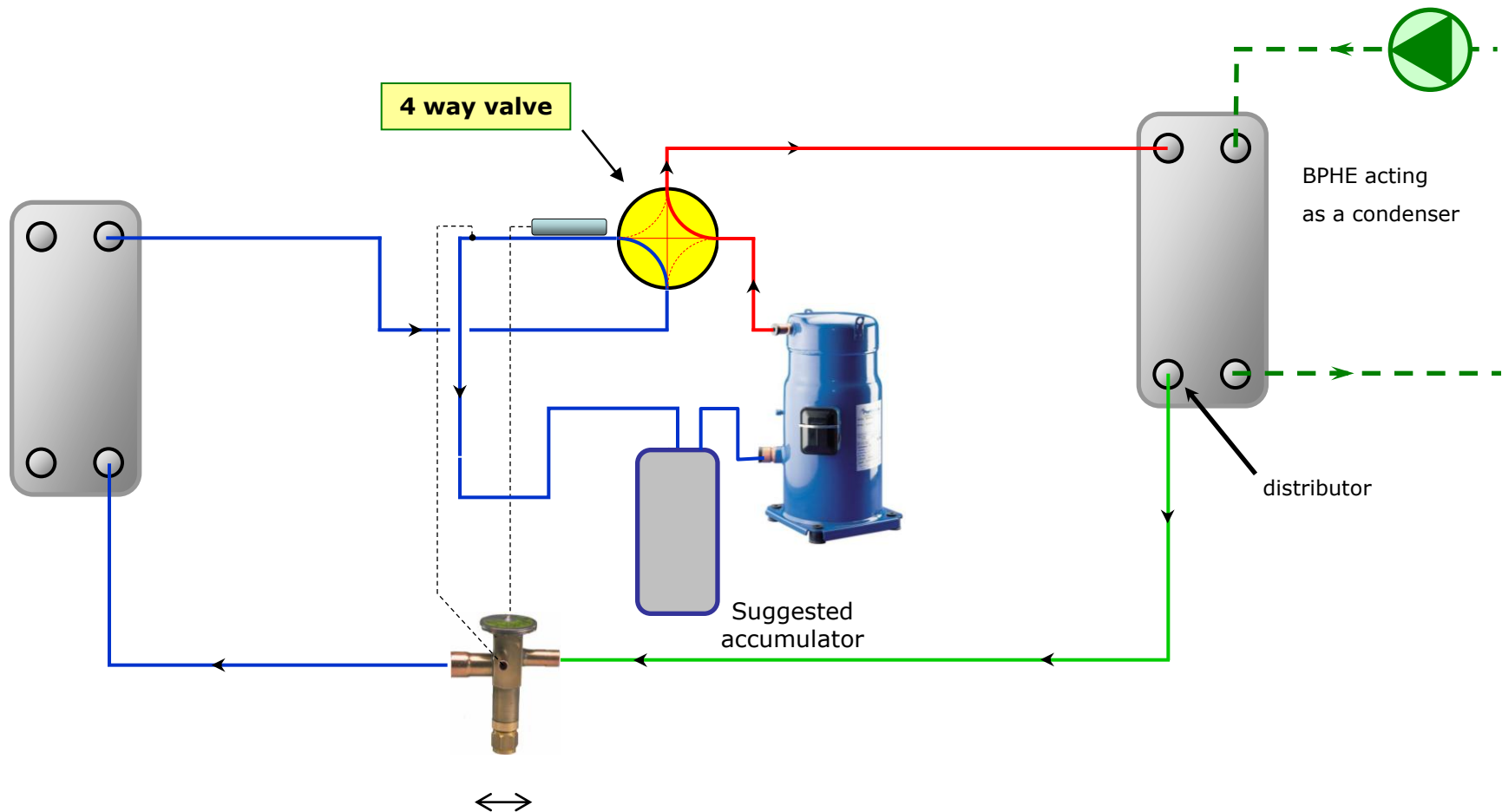
Air Conditioning Chiller – Reversible Cold climate design, mode:cooling



Air Conditioning Chiller – Reversible Warm climate design, mode:cooling



Air Conditioning Chiller – Reversible Warm climate design, mode:heating



Specific needs / Practical advices

BPHE as an evaporator:

BPHE offers very little internal volume. The compressor can then quickly enter into a vacuum condition.

- Expansion device must be sized correctly
- Sufficient pressure differential across the expansion device must be always available (condensing pressure)
- Normally no pump-down required → Also risk of freezing
- Suction line must be trapped to avoid refrigerant migration
- Protection against freezing on water side (flow switch, water thermostat)
- Protection against freezing on refrigerant side (hot-gas by-pass, evaporating pressure regulator, etc.)
- Delayed water pump stop when stopping the compressor
- Start water pump before starting the compressor
- Minimum channel velocity $> 0,3$ m/s (?) to ensure proper oil return.
- Water strainer in the inlet of BPHE (mesh size: 16-20)
- Avoid water hammer (slow closing solenoid valve, etc.)
- Water treatment to avoid/minimize fouling, corrosion, etc.
- Tilted evaporator can have significant capacity reduction
- Care with dual circuit (back to back system) → risk of freezing !



Specific needs / Practical advices

BPHE as a condenser:

BPHE offers very little internal volume. There is no free space to avoid excess pressure buildup.

- At least 1 meter of discharge line is necessary to generate volume to accumulate discharge gas.
- Under normal conditions, immediately after compressor start-up we must have this volume reduced, so the supply of cooling water may be provided before the compressor starts up.
- In addition – a small receiver is used to help avoid nuisance trips on HP
- For very low ambient temperatures, insulation and/or heaters for the outdoor BPHE may be required.
- Water strainer in the inlet of BPHE (mesh size: 16-20)
- Avoid water hammer (slow closing solenoid valve, etc.)
- Water treatment to avoid/minimize fouling, corrosion, etc.



Specific needs / Practical advices

Reversible Systems:

BPHE acts as a condenser and evaporator. Water flow usually doesn't reverse. Specify main operation mode.

- If chiller is used mostly in warm climates, evaporator should operate in the most efficient way, so use counter-current flow for the evaporator and co-current flow for the condenser.
- If chiller is used mostly in cold climates, condenser should operate in the most efficient way, so use counter-current flow for the condenser and co-current flow for the evaporator.
- Distributor should be added in the inlet of the BPHE (evaporator mode). This do not affect when it acts as a condenser (liquid thought distributor is not a problem).
- The bulb of the expansion valve should be always located in the suction line segment between the four-way-valve and the compressor suction port.
- A suction accumulator should also be considered to prevent liquid floodback after reversing.