Universal Controller

Control of **overall system.**

Custom programming tailored to requirements.

Data logging: Temperatures, operational statuses (valves, pumps), electrical power, heat quantity.

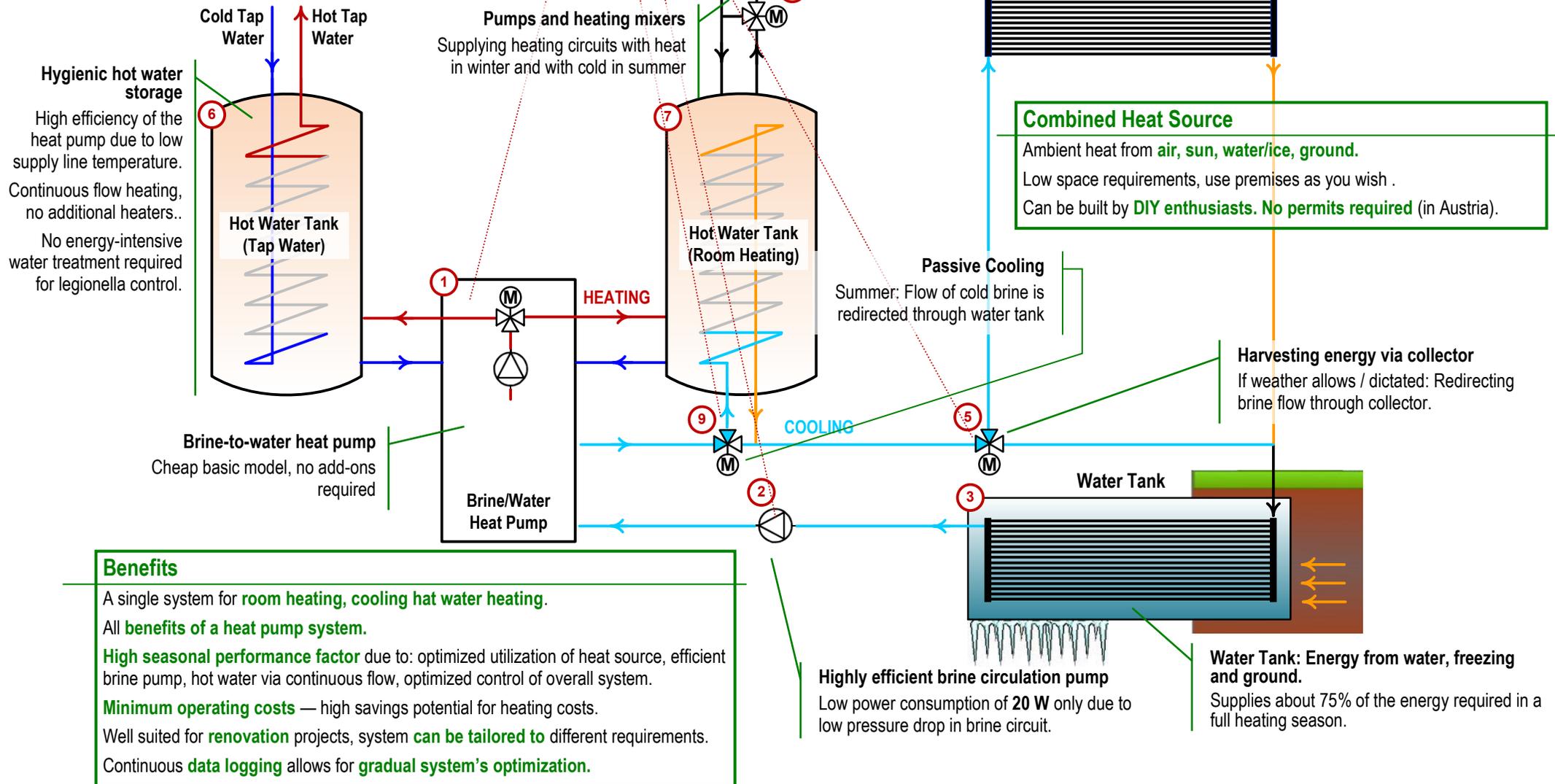**Online monitoring** of the system.

Reduction of heating costs based on **optimized operating parameters.**

Integration with **computer network / remote control.**

Control of **auxiliary devices** such as emergency heating system or solar collector.

Heating Loops

Simple swmming pool collector: Energy from ambient air and solar radiation

Supplies about 75% of the energy required in a full heating season.

Unglazed Solar Collector

④

Cold Tap Water / Hot Tap Water

Pumps and heating mixers

Supplying heating circuits with heat in winter and with cold in summer

⑧

Combined Heat Source

Ambient heat from **air, sun, water/ice, ground.**

Low space requirements, use premises as you wish .

Can be built by **DIY enthusiasts. No permits required** (in Austria).

Hygienic hot water storage

High efficiency of the heat pump due to low supply line temperature.

Continuous flow heating, no additional heaters..

No energy-intensive water treatment required for legionella control.

⑥

Hot Water Tank (Tap Water)

⑦

Hot Water Tank (Room Heating)

Passive Cooling

Summer: Flow of cold brine is redirected through water tank

Harvesting energy via collector

If weather allows / dictated: Redirecting brine flow through collector.

① **HEATING**

⑨ **COOLING** ⑤

Brine-to-water heat pump

Cheap basic model, no add-ons required

Brine/Water Heat Pump

Water Tank

② ③

Benefits

A single system for **room heating, cooling hat water heating**.

All **benefits of a heat pump system.**

High seasonal performance factor due to: optimized utilization of heat source, efficient brine pump, hot water via continuous flow, optimized control of overall system.

Minimum operating costs — high savings potential for heating costs.

Well suited for **renovation** projects, system **can be tailored to** different requirements.

Continuous **data logging** allows for **gradual system's optimization.**

Highly efficient brine circulation pump

Low power consumption of **20 W** only due to low pressure drop in brine circuit.

Water Tank: Energy from water, freezing and ground.

Supplies about 75% of the energy required in a full heating season.

How it works

The heat pump system LEO_2 developed by **punktwissen** allows for room heating, cooling and hot water.

The system utilizes a space-saving **combination of heat sources** that allow for harvesting energy from the ambient air, solar radiation, soil and water / ice (Ice Storage) at high seasonal performance factors.

Components: A simple **unglazed solar collector (plastic tubes)** (4), as it is used for pool heating, an underground **water tank** (3) using another plastic tube collector as **heat exchanger** transferring heat from water to the brine circuit.

Depending on ambient temperature and solar radiation an automated **3-way valve** (5) redirects the brine flow through the collector or through the heat exchanger in the water tank only.

Harvesting of ambient heat. Whereas the **collector** utilizes ambient air and solar radiation, in the **water tank** energy is harvested from:

- Cooling water
- Freezing water
- Heat transfer from the surrounding ground

Superfluous energy from the solar collector is used to melt ice and to heat water in the tank.

Heating mode. The heat pump is equipped with a 3-way valve and a pump that supplies either the **tank for hot water heating** (6) or the **tank for room heating** (7) with water.

The latter supplies the heating circuit(s) with water using a **heating mixer and pump** (8).

Cooling mode. For passive cooling in summer an automated **3-way valve** (9) redirects the cool brine flow to a heat exchange in the 'room heating water tank'. The room heating circuit becomes a cooling circuit. If the heat pump is running at the same time to supply hot **water to the hygienic storage tank**, the 'room cooling tank' is **cooled further.** Requirement for room cooling: using floor or wall heating.

Detailed information on the system, measurement data, return on investment etc. are currently mainly available in German, but we are working on updates in English, too:

http://punktwissen.at/heatpump/

punktw**i**ssen

punktwissen Proyer & Stangl OG

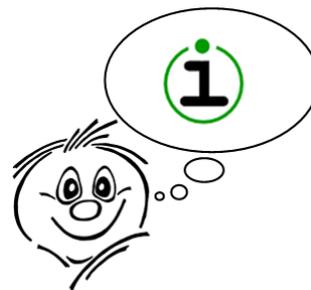Consulting Engineers in Applied Physics

We plan heat pump systems using 'ice storage' sources - we support self-builders and DIY enthusiasts.

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Heat Pump System LEO_2

Summary (February 2016)