

## Peltier heat pump

Article no: P2410800



### Principle

As well as the cooling and the heating capacity and efficiency rating of a Peltier heat pump are determined under different operating conditions.

### Benefits

- Open design allows to fully understand function and applications
- Individual instruments for distinct functions (no "black box")
- Key products of the experiment setup can also be used for investigating the Seebeck effect

### Tasks

1. To determine the cooling capacity  $P_c$  of the pump as a function of the current and to calculate the efficiency rating  $h_c$  at maximum output.
2. To determine the heating capacity  $P_w$  of the pump and its efficiency rating  $h_w$  at constant current and constant temperature on the cold side.
3. To determine  $P_w$ ,  $\eta_w$  and  $P_c$ ,  $\eta_c$  from the relationship between temperature and time on the hot and cold sides.
4. To investigate the temperature behaviour when the pump is used for cooling, with the hot side air-cooled.

### Learning objectives

- Peltier effect
- Heat pipe
- Thermoelectric e. m. f.
- Peltier coefficient
- Cooling capacity
- Heating capacity
- Efficiency rating
- Thomson coefficient
- Seebeck coefficient
- Thomson equations
- Heat conduction
- Convection
- Forced cooling
- Joule effect

## Scope of delivery

|   |          |   |
|---|----------|---|
| Thermogenerator with 2 water baths  | 04366-00 | 1 |
| Flow-through heat exchanger   | 04366-01 | 1 |
| Air cooler  | 04366-02 | 1 |
| Heating coil with sockets   | 04450-00 | 1 |
| Distributor   | 06024-00 | 1 |
| Rheostat 33 Ohm, 160 W  | 06112-03 | 1 |
| Connecting plug, 2 pcs.   | 07278-05 | 1 |
| PHYWE Power supply, universal, analog display DC: 18 V, 5 A / AC: 15 V, 5 A           | 13503-93 | 1 |
| PHYWE Digital multimeter, 600V AC/DC, 10A AC/DC, 20 MΩ, 200 μF, 20 kHz, -20°C...760°C | 07122-00 | 4 |
| Digital stopwatch, 24 h, 1/100 s and 1 s  | 24025-00 | 1 |
| Hot/cold air blower   | 04030-93 | 1 |
| Lab thermometer, -10..+110 °C   | 38056-00 | 1 |
| Thermometer -10...+50 °C  | 38034-00 | 2 |
| Rubber hose   | 39282-00 | 1 |
| Universal clamp   | 37715-01 | 1 |
| Tripod base PHYWE   | 02002-55 | 1 |
| Support rod, stainless steel, different lengths                                       | 02031-00 | 1 |
| Right angle clamp expert with fulcrum screw   | 02054-00 | 1 |
| Connecting cord, 32 A, 500 mm, red  | 07360-01 | 3 |
| Connecting cord, 32 A, 500 mm, red  | 07361-01 | 3 |
| Connecting cord, 32 A, 500 mm, blue   | 07361-04 | 2 |
| Connecting cord, 32 A, 500 mm, blue   | 07362-04 | 2 |
| Connecting cord, 32 A, 500 mm, red  | 07362-01 | 1 |
| Heat conductive paste, 60 g   | 03747-00 | 1 |