

Climate measurements Equipment and methods



Climate parameters

- Temperature
- Relative humidity
- Air movement / air infiltration
- Air quality / air pollution
- Light and radiation

Temperature

- Thermal expansion (ethanol, mercury)
- Electric resistance (pt 100)
- Electric voltage (thermo element, CuCo ect.)
- Infrared radiation (surface temperature)

Relative humidity

- Hygric expansion (wood, hair)
- Electric resistance/capacity (polymer)
- Psykrometric temperature (wet bulb)
- Dew point temperature (condensation)

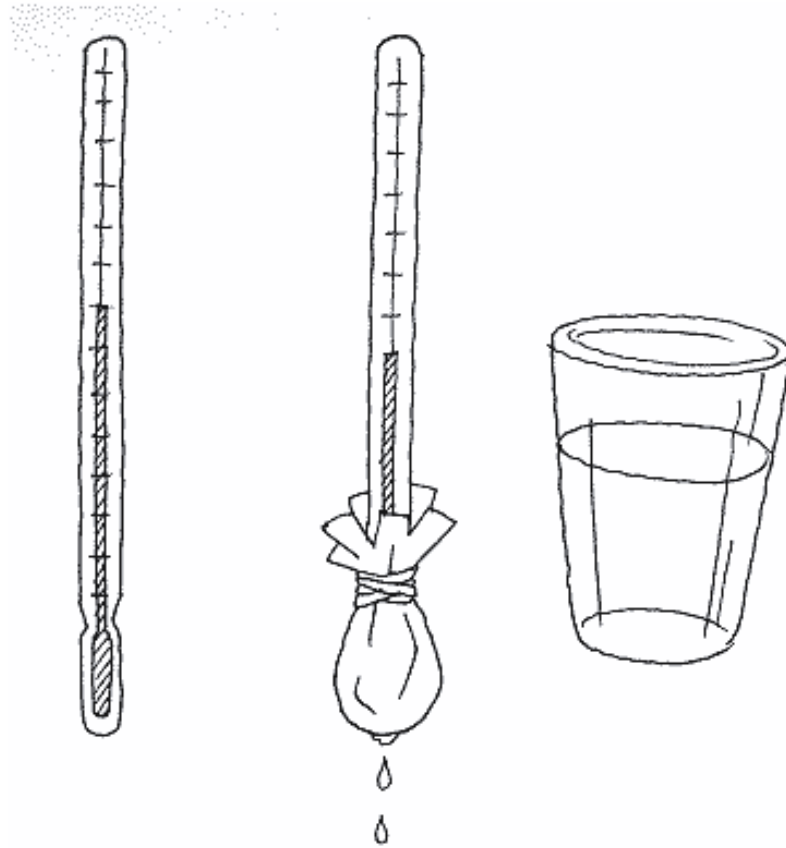
Mechanical hygrometer +/- 10 %RH



Electronic hygrometer +/- 5 %RH

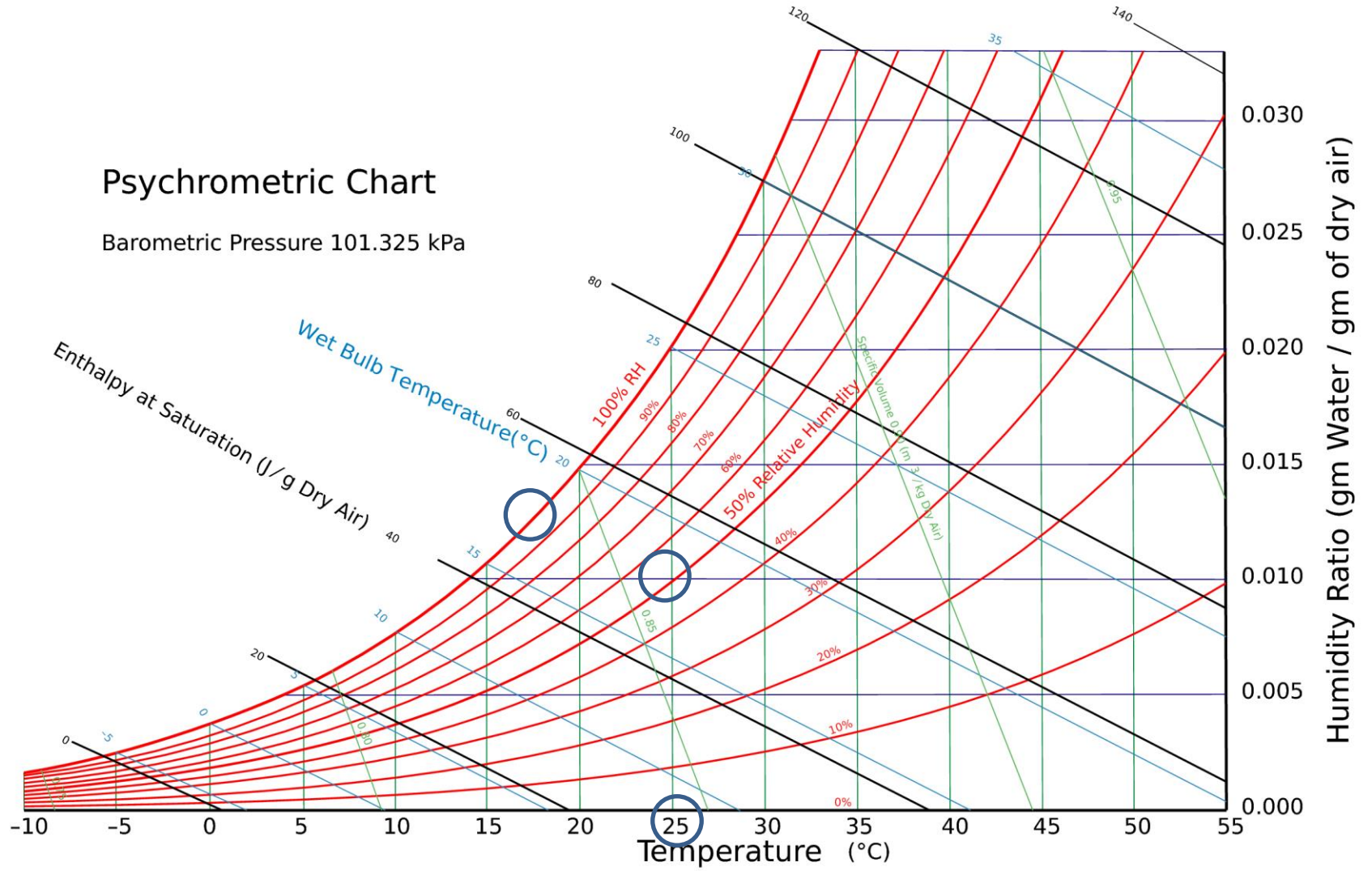


Psykrometer +/- 2 %RH



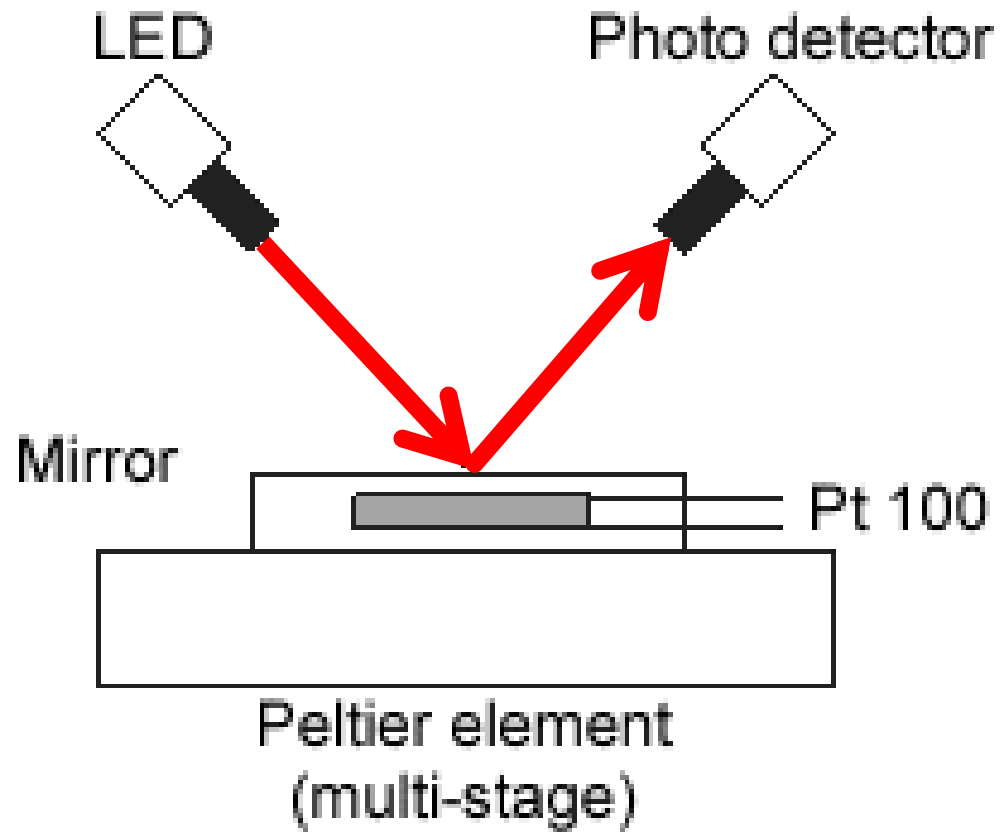
Psychrometric Chart

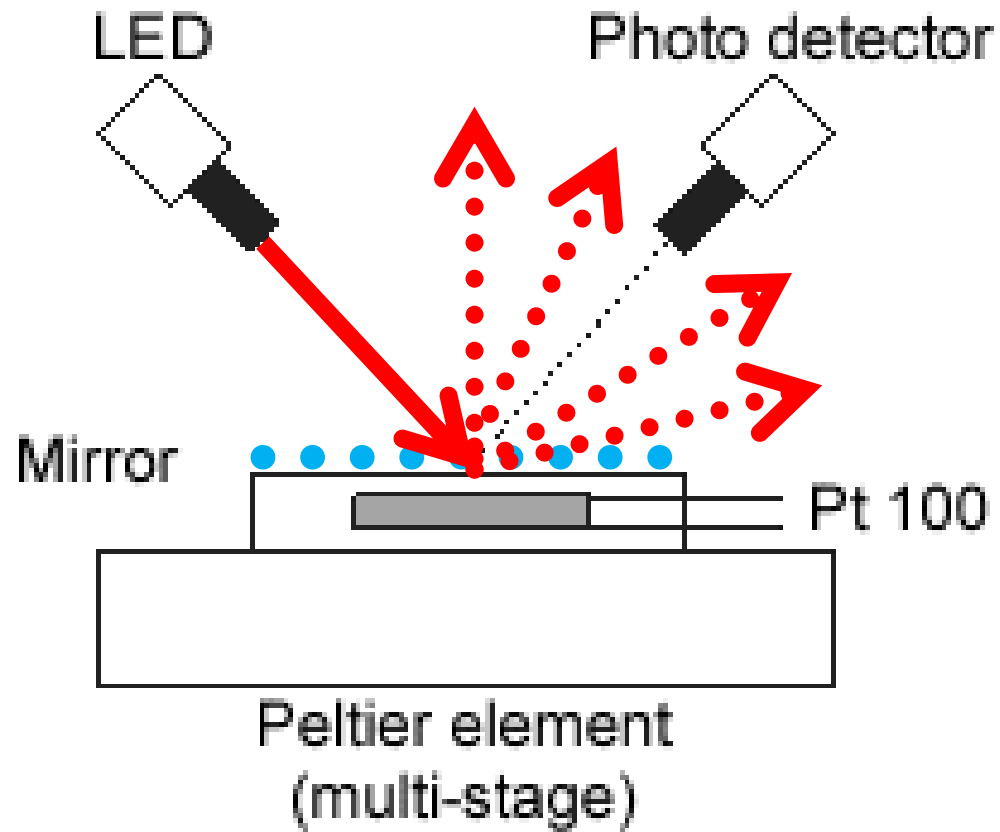
Barometric Pressure 101.325 kPa



Dew point mirror +/- 1 % RH

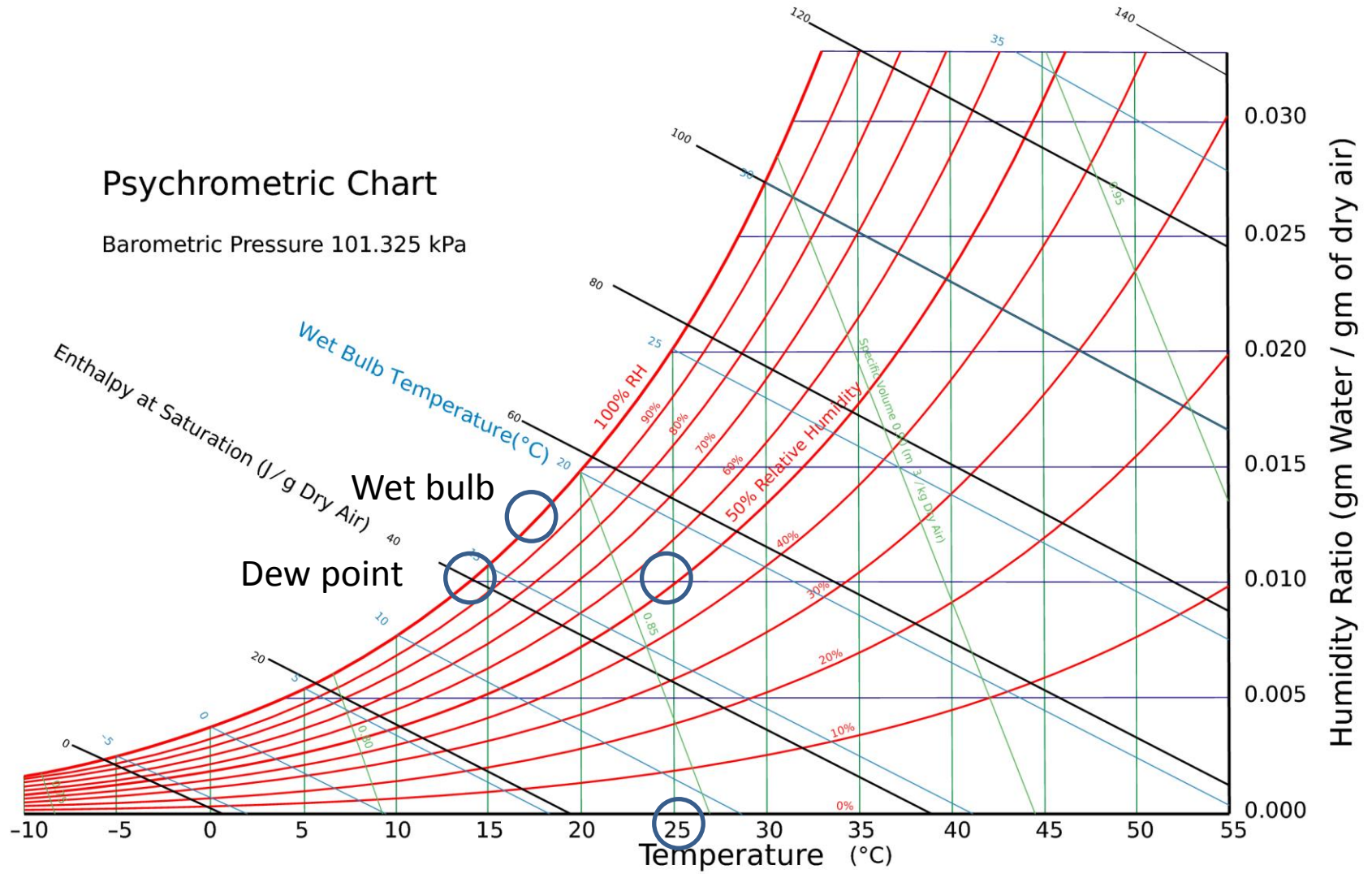






Psychrometric Chart

Barometric Pressure 101.325 kPa



Calibration



?



Salt solutions

MgCl_2 (33 %RH)

NaCl (75 %RH)

AZ-0012



AZ-0013



Climate chamber



How often ?

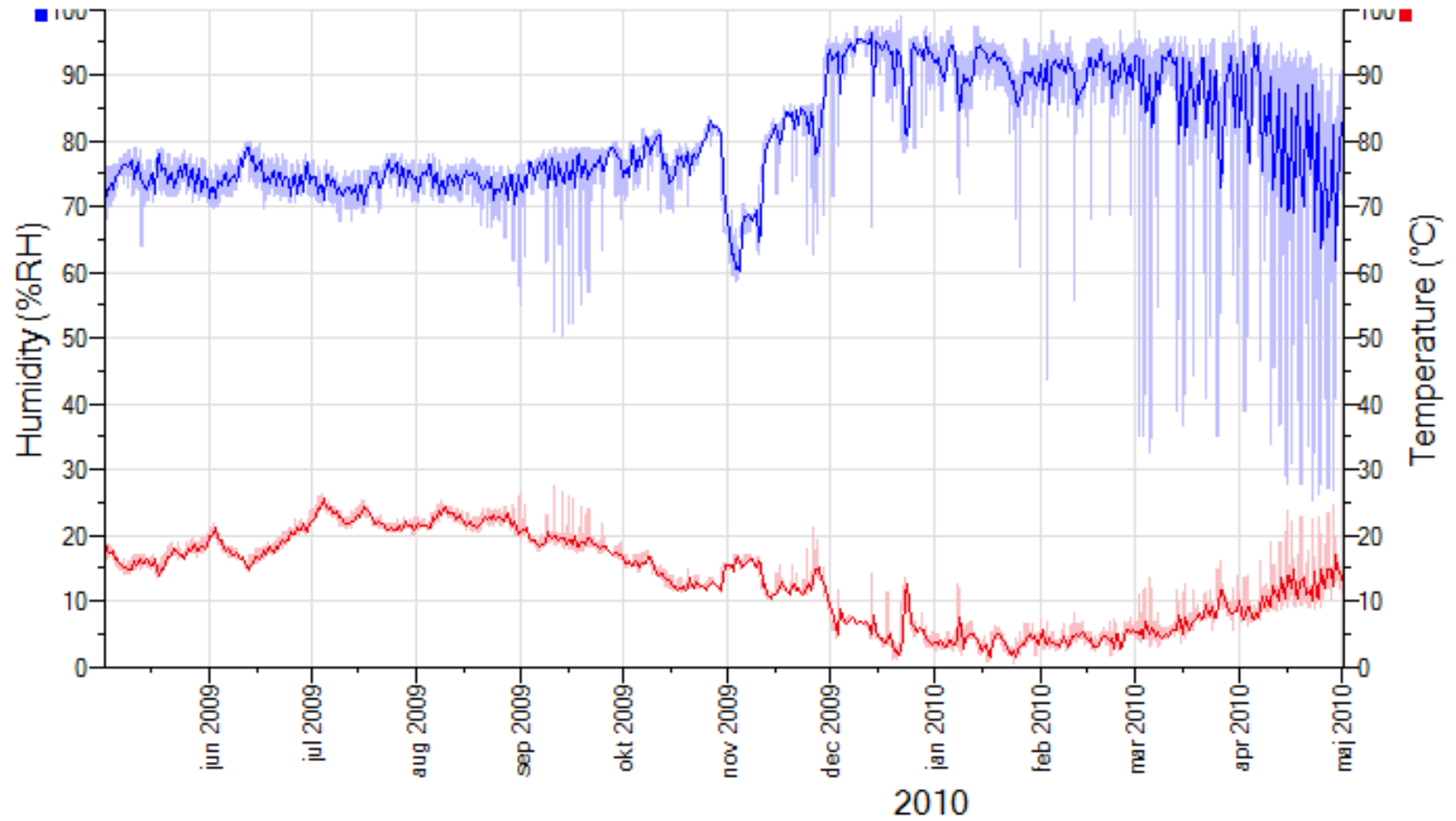
- Daily readings. Hand held devices. Will only give annual variation
- Hourly readings. Ordinary dataloggers. Sufficient for most buidings.
- Minutes interval. Buildings with HVAC systems. Only for diagnostic.

Where to measure ?



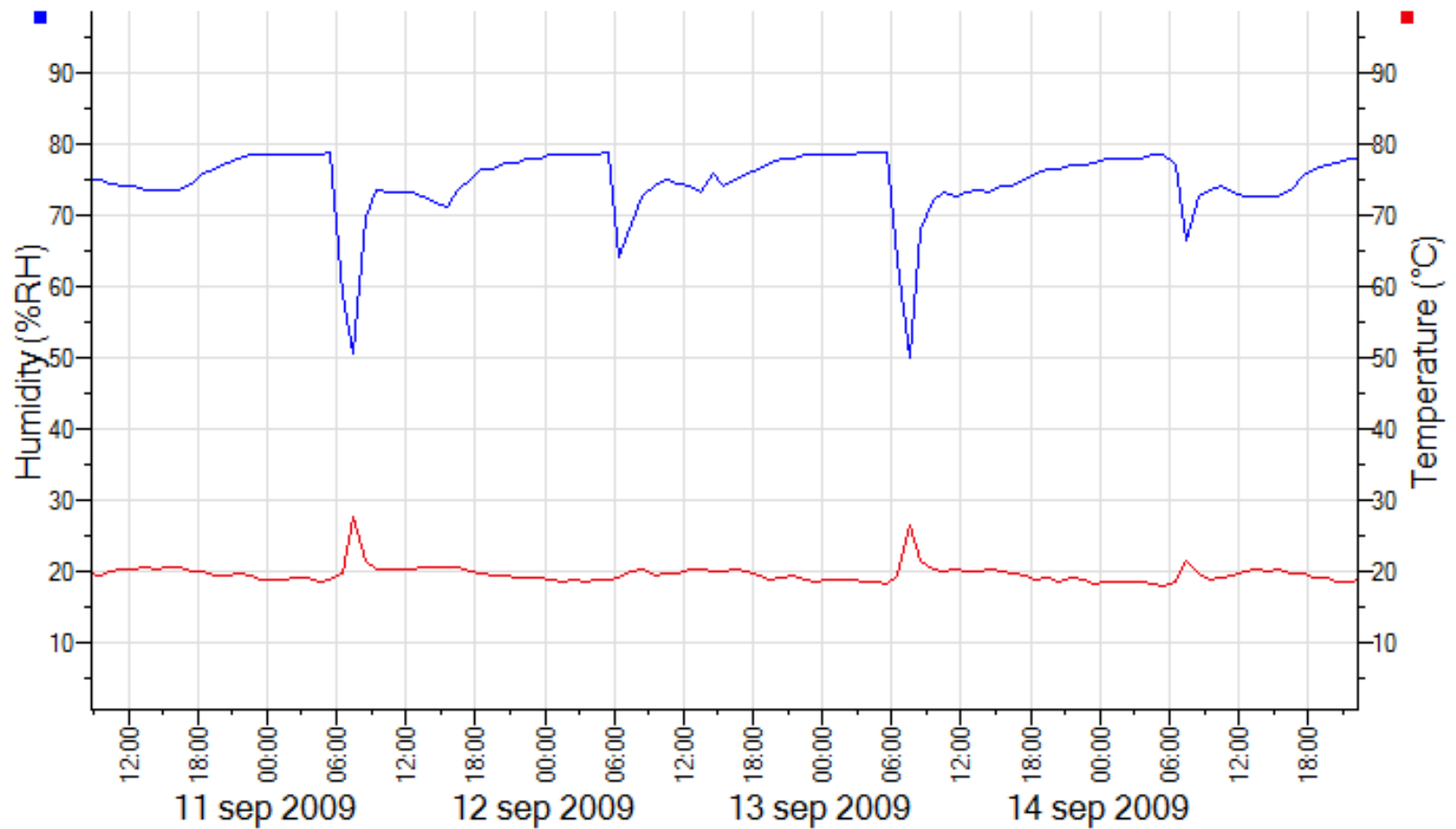
Kirke Stillinge kapel

- 304919 Humidity Kirke Stillinge kapel
- 304919 Temperature Kirke Stillinge kapel



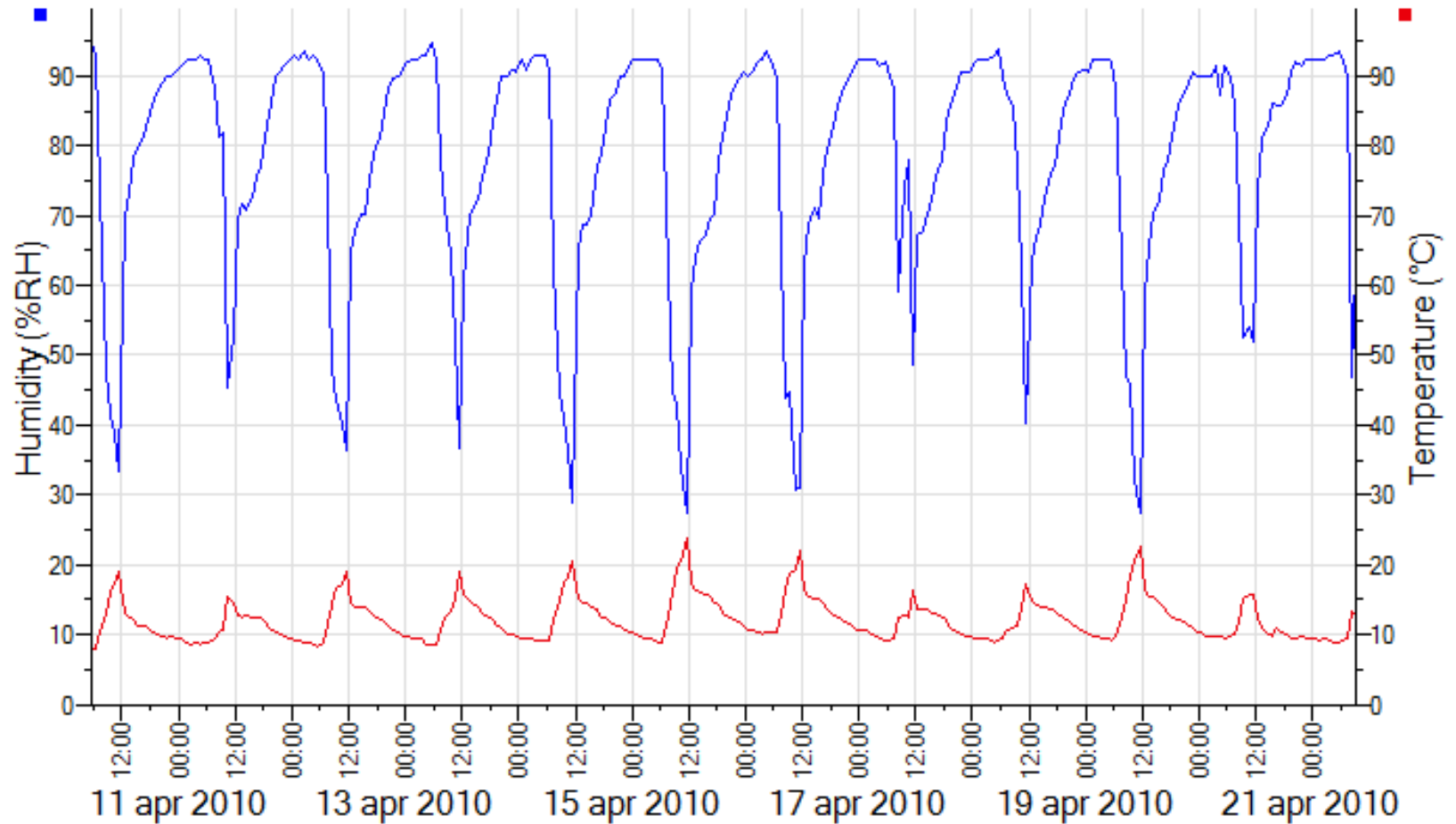
Kirke Stillinge kapel

- 304919 Humidity Kirke Stillinge kapel
- 304919 Temperature Kirke Stillinge kapel



Kirke Stillinge kapel

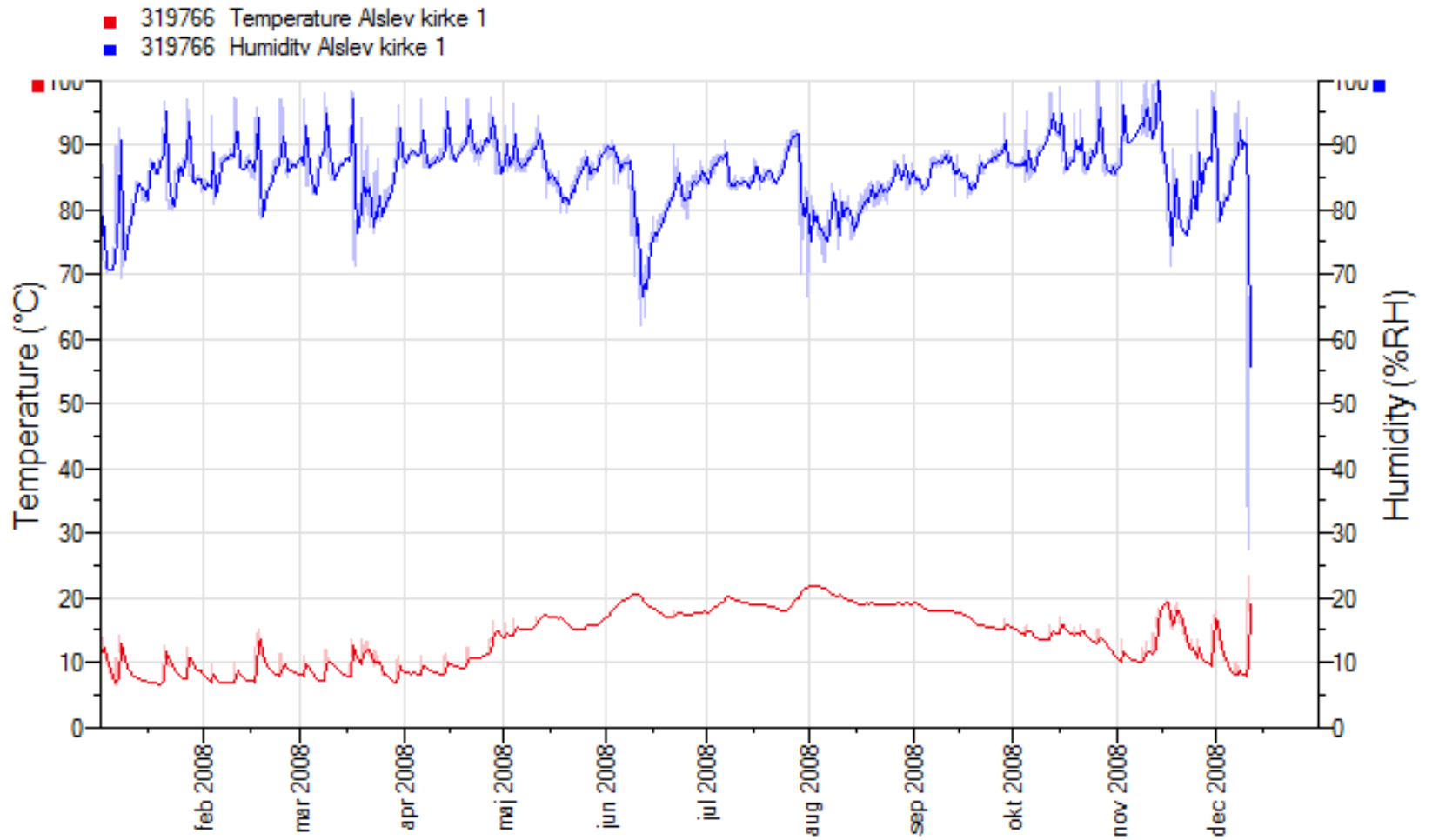
- 304919 Humidity Kirke Stillinge kapel
- 304919 Temperature Kirke Stillinge kapel



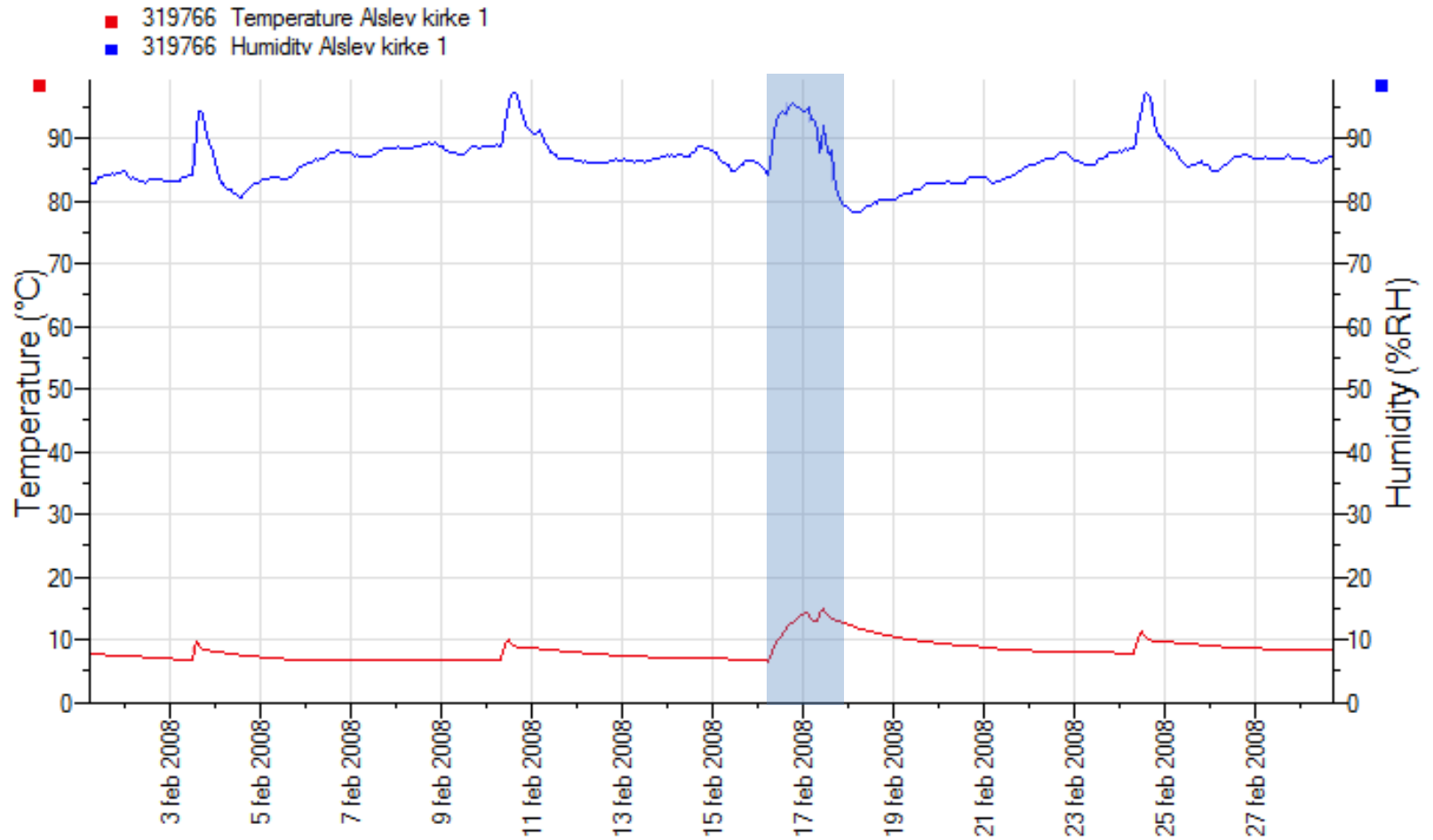


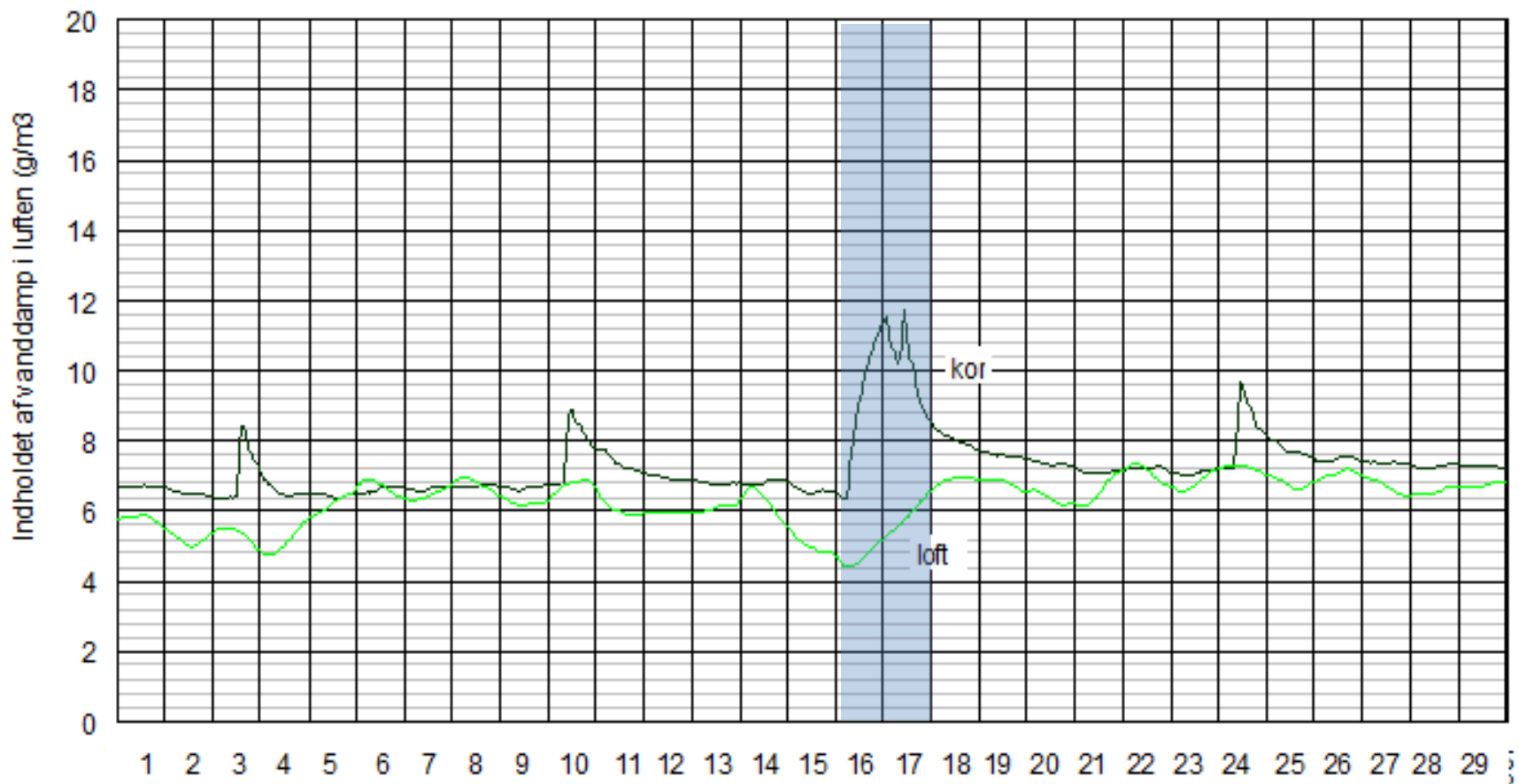


Alslev kirke 1



Alslev kirke 1





Air movement/air infiltration

- Anemometer (air speed)
- Cold smoke (air leaks)
- Soap bubbles (drafts, convektion)

- Pressurization test (blower door)
- Decay rate of inert gas concentration (CO₂)
- Constant dose of inert gas (pft –method)

Measuring air exchange rate by PFT-method



The PFT-method PolyFlourcarbon Tracergas

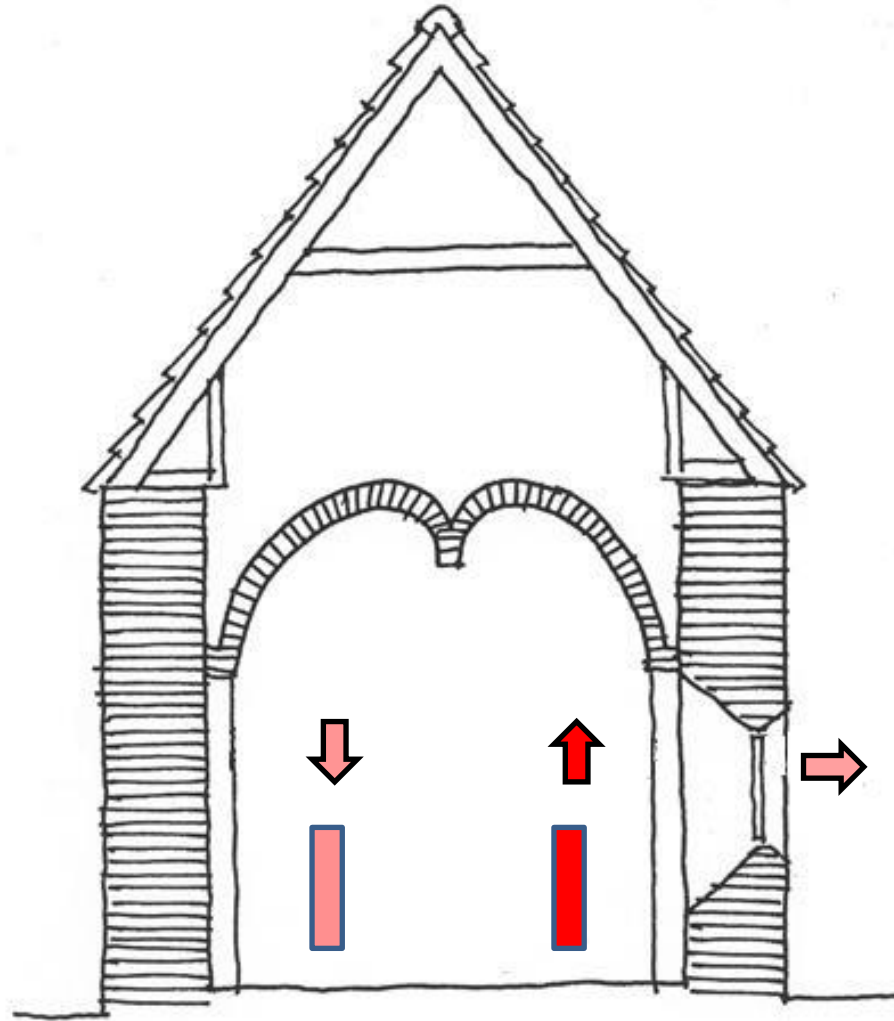


Tracergas source



Absorption tube

Measure AER by inert gas emitted at constant rate

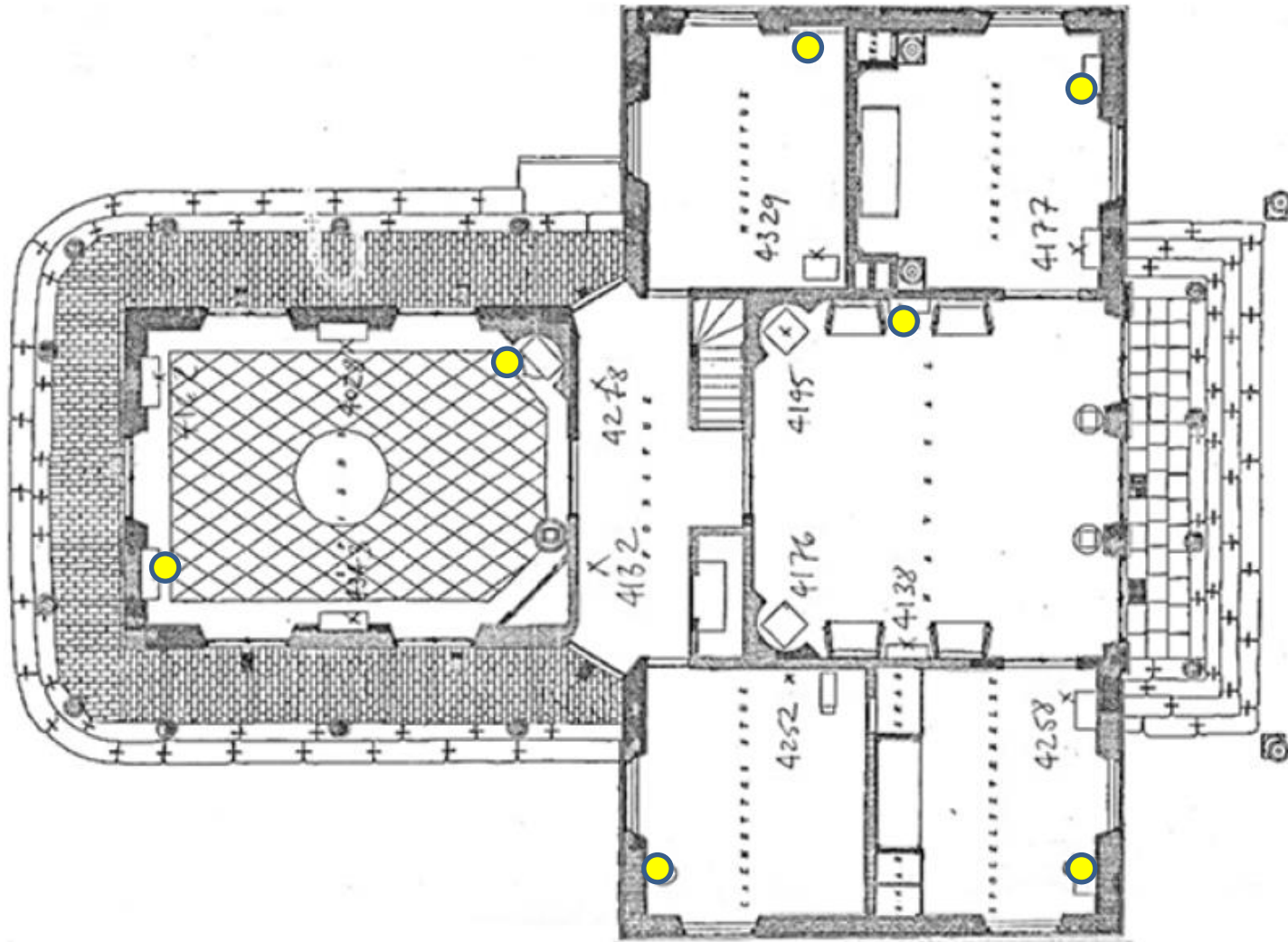


Doors and windows are single glazed and quite leaky

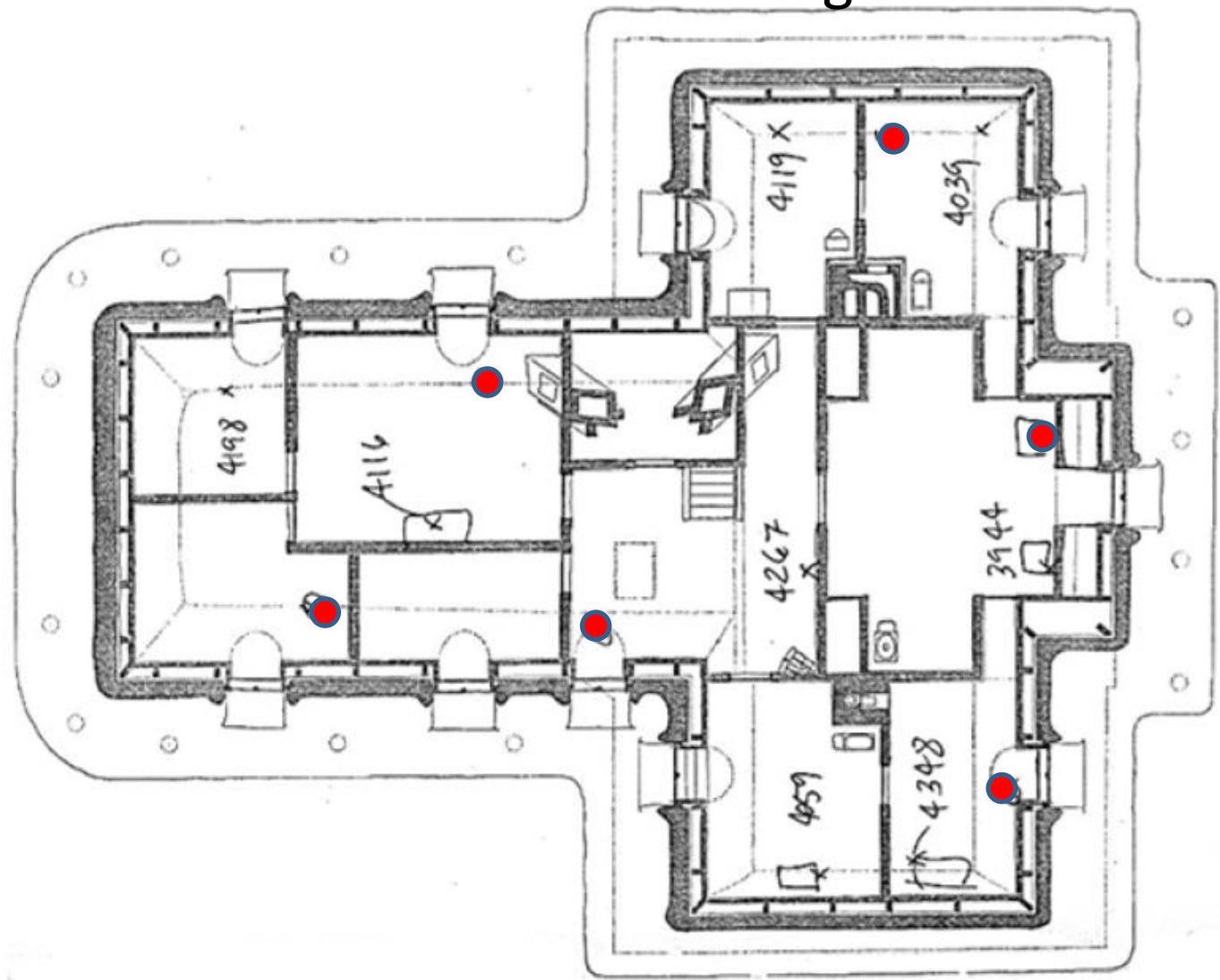


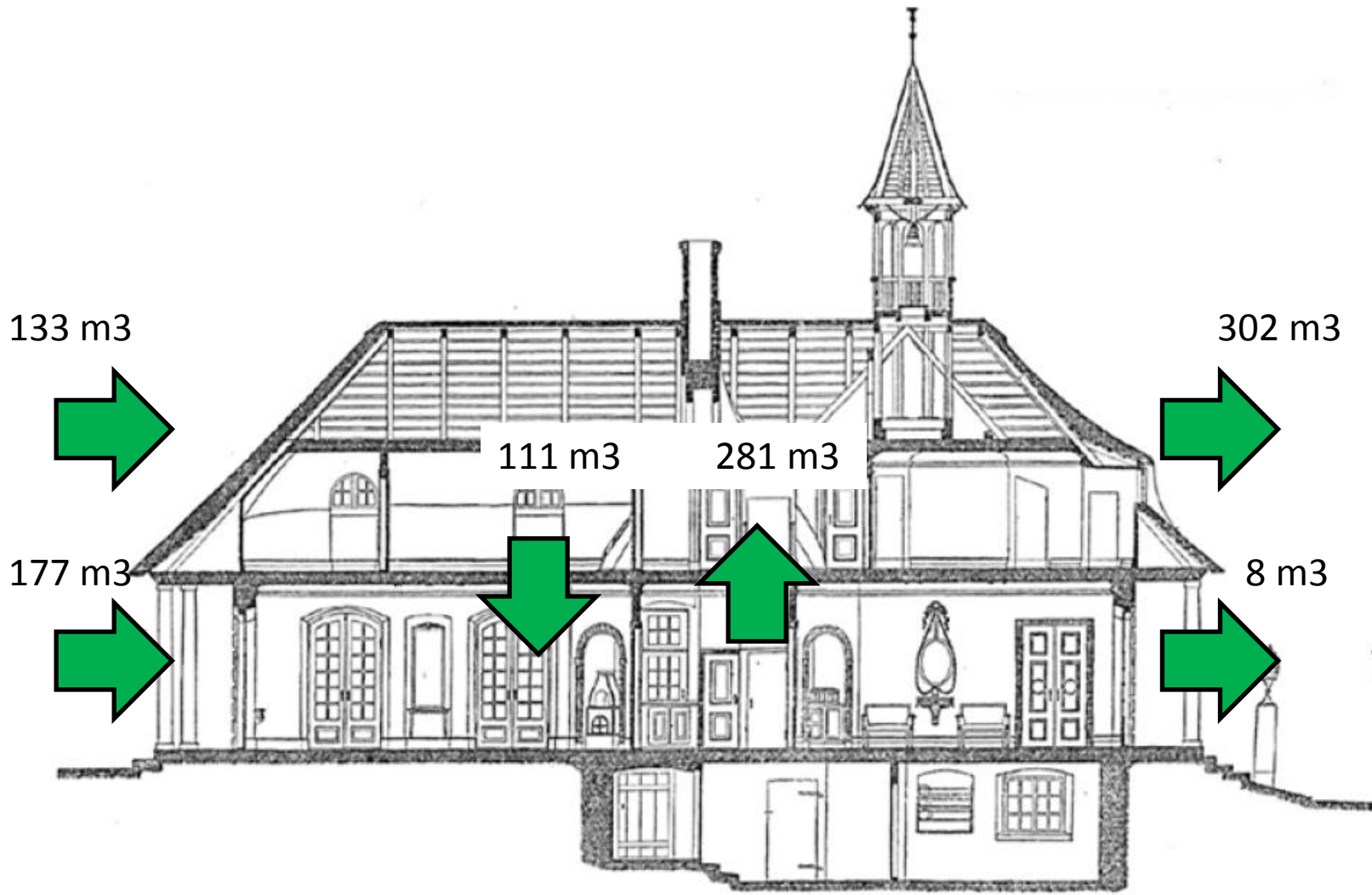
Ground floor 547 m³

'Yellow' tracergas

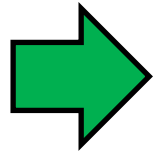


First floor 301 m³ 'Red' tracergas

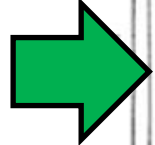




133 m³



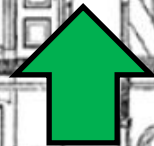
177 m³



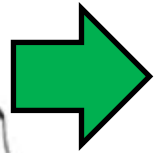
111 m³



281 m³



302 m³



8 m³

