PaT
Pump as Turbine

#WATEFCON 2018

KSB Bombas e Válvulas

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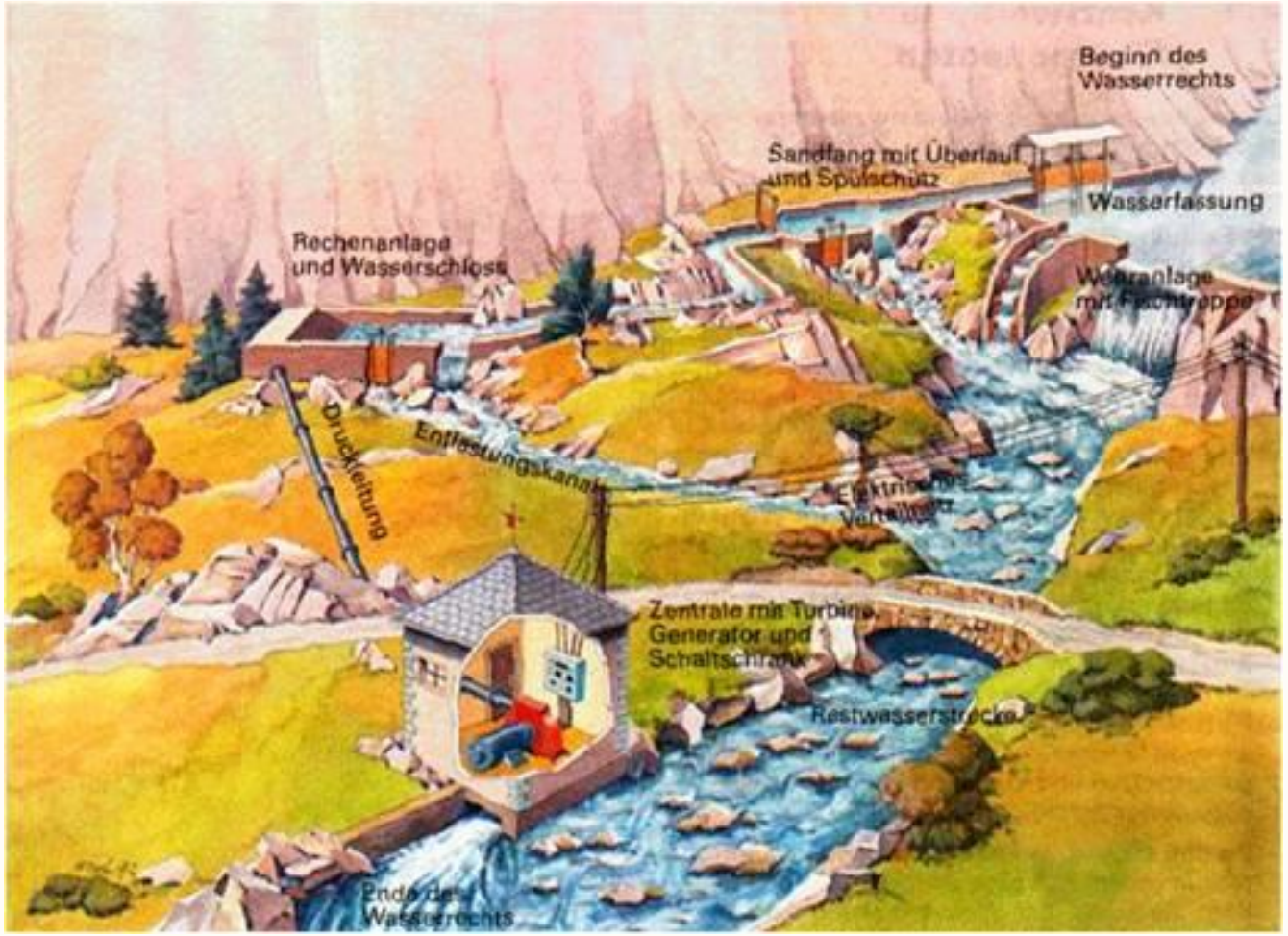
watef
Water Efficiency Network

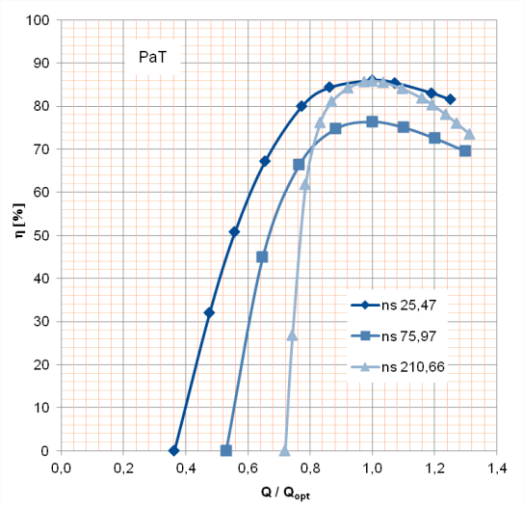
PaT - Application



PaT vs Turbine

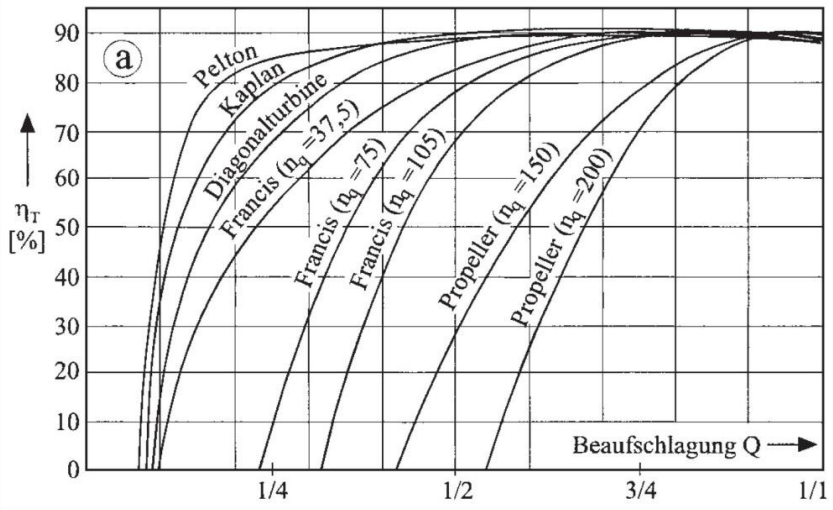
Advantage PaT over turbine

- Standardised product
- Short delivery
- Low-prised
- Can be used as pump as well with high efficiency

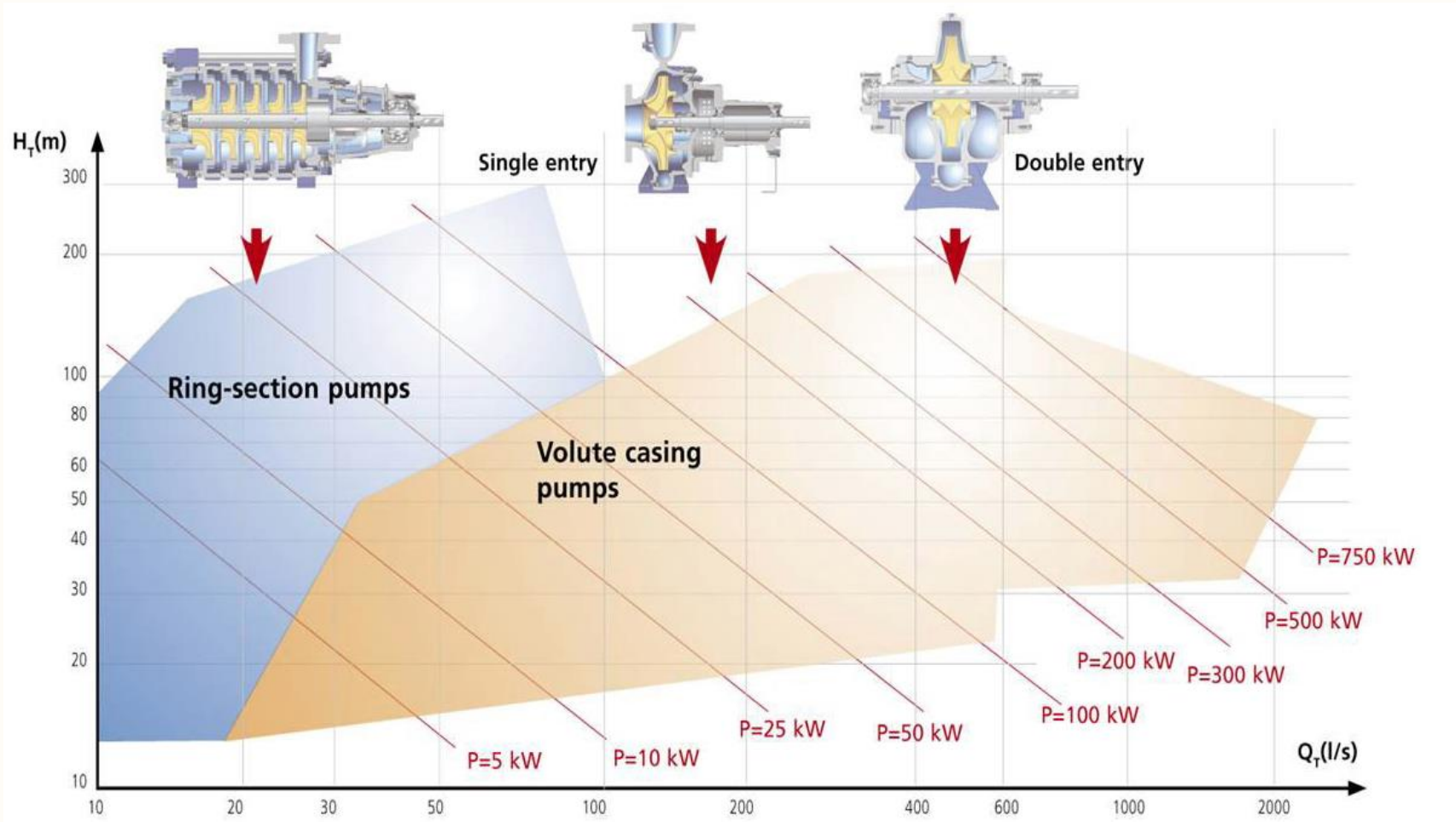


Advantage turbine over PaT

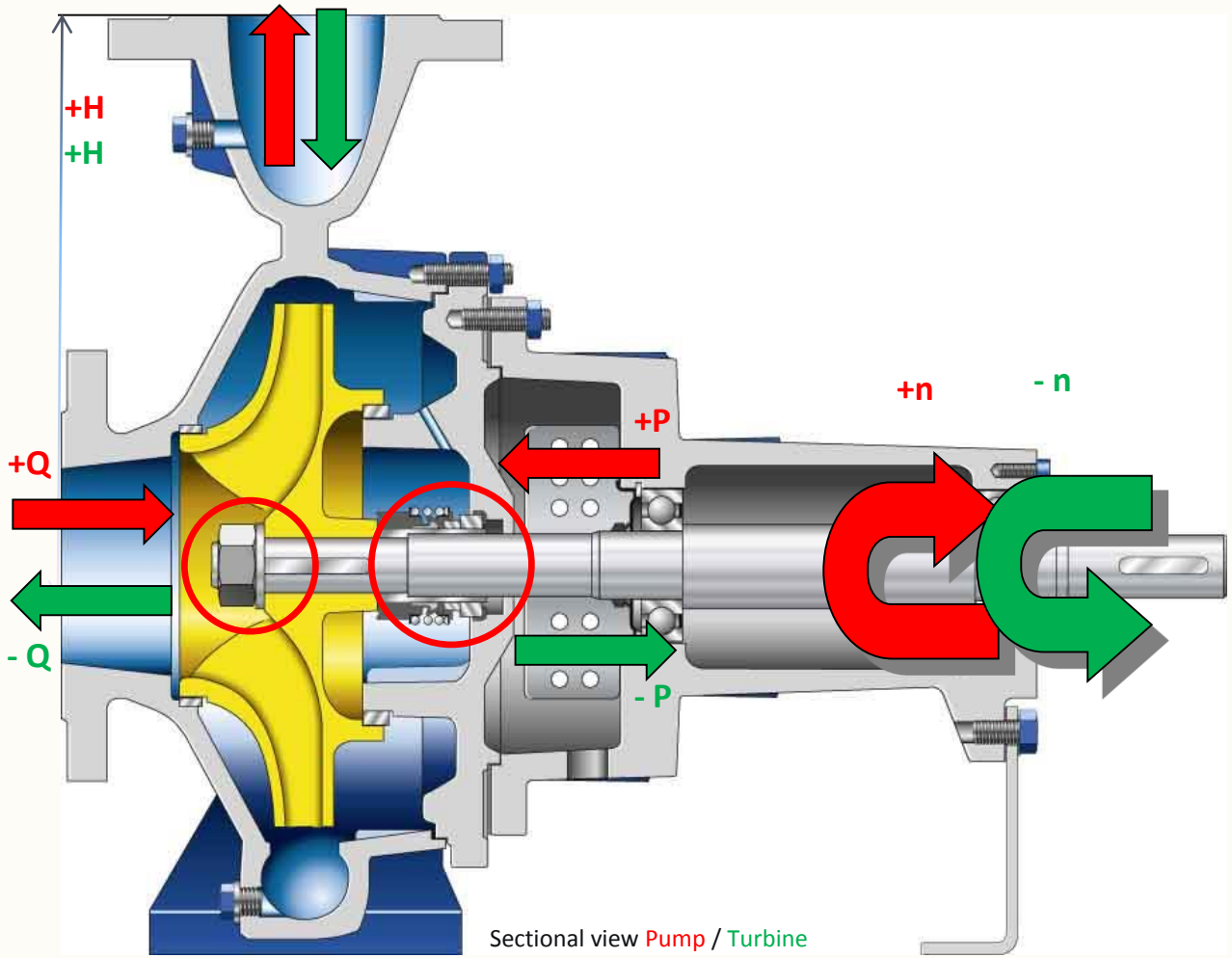
- Wide range of control
- Accurate design
- Higher efficiency



PaT - Operating Range



PaT / Pump: Operation



Sectional view Pump / Turbine

Pump ↔ Turbine

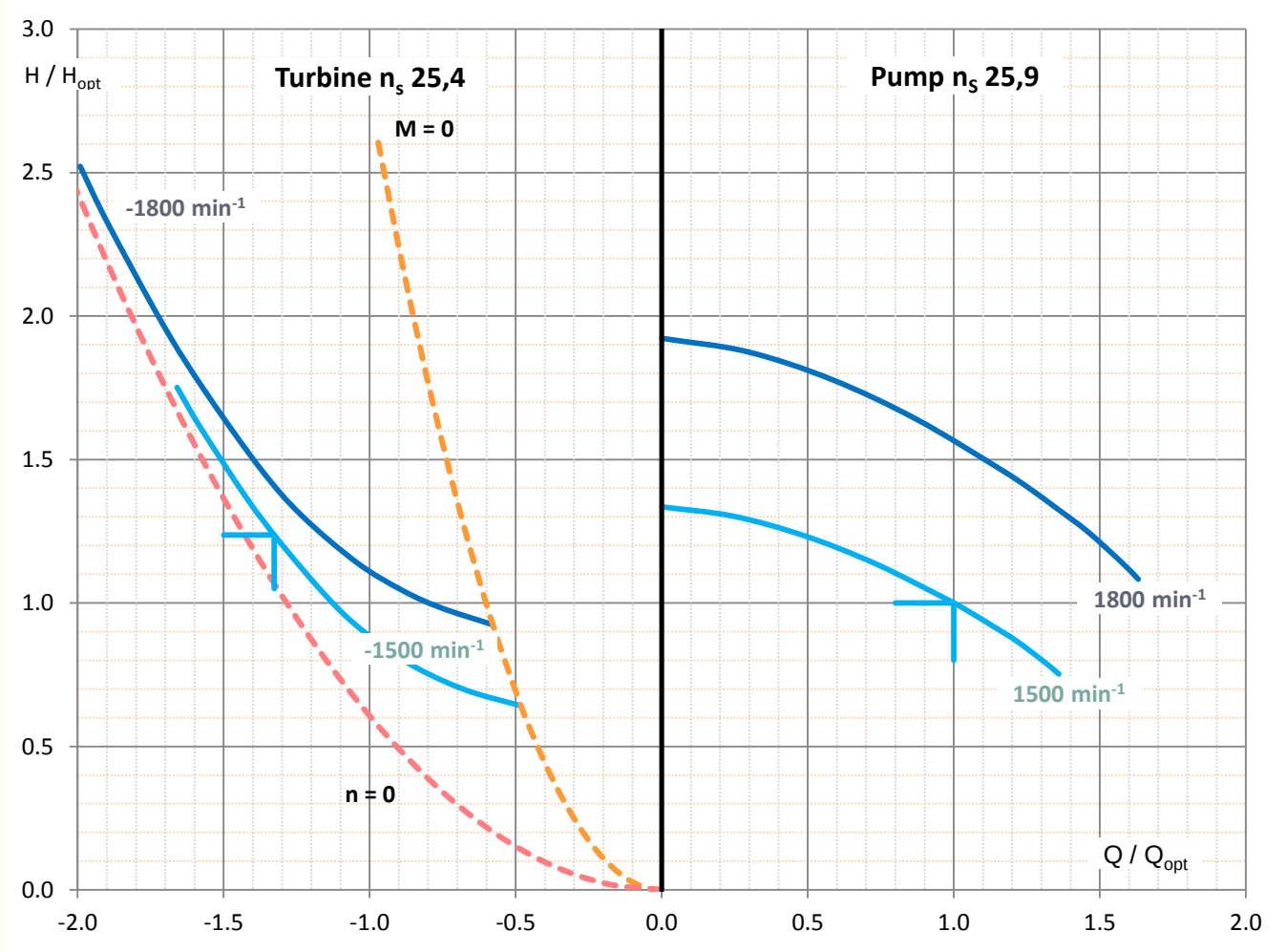
Please note:

- Mechanical seals to be independent on sense of rotation
- Impeller nut retention

$$P_{Ppe} = \frac{Q * H}{const. * \eta_{Ppe}}$$

$$P_{Turb} = \frac{Q * H * \eta_{Turb}}{const.}$$

PaT / Pump: Operation



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PaT – KSB Power House

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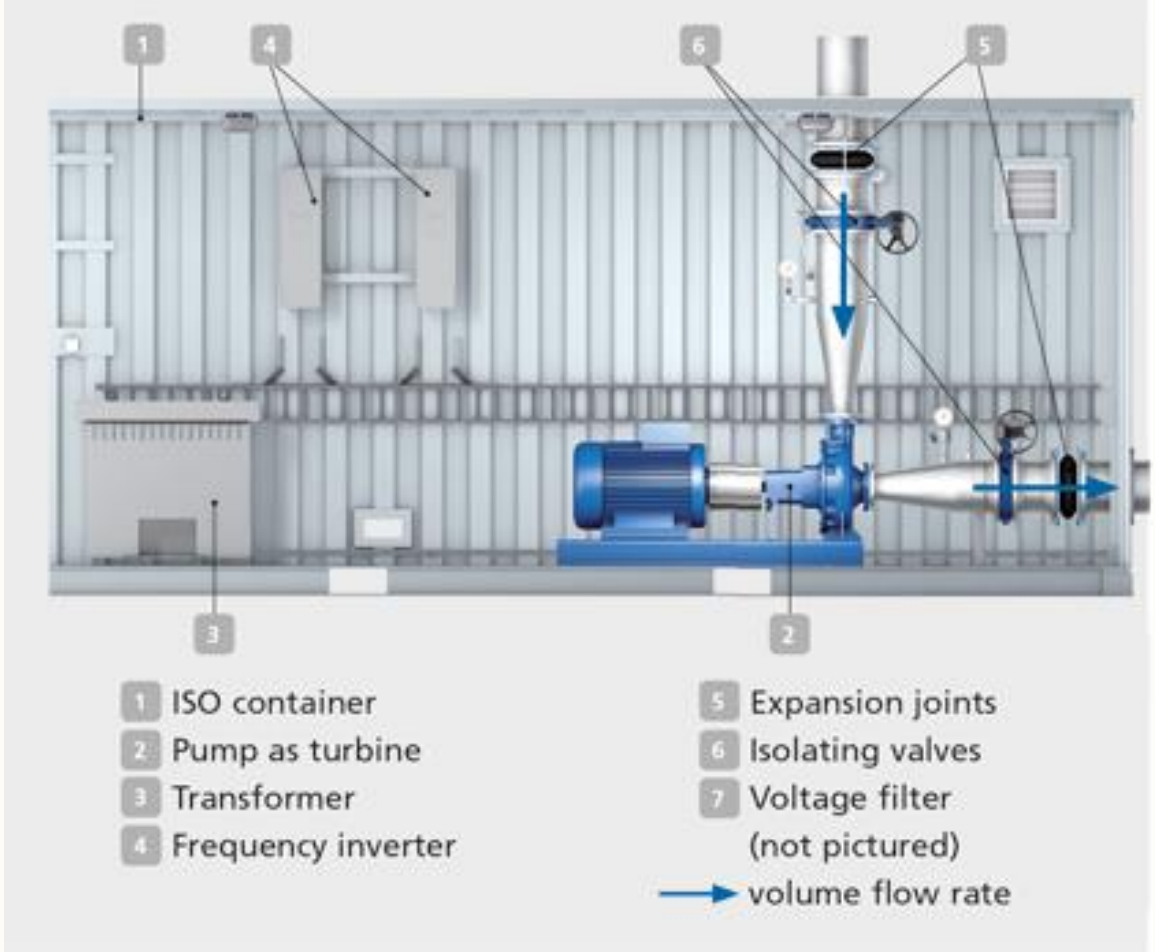
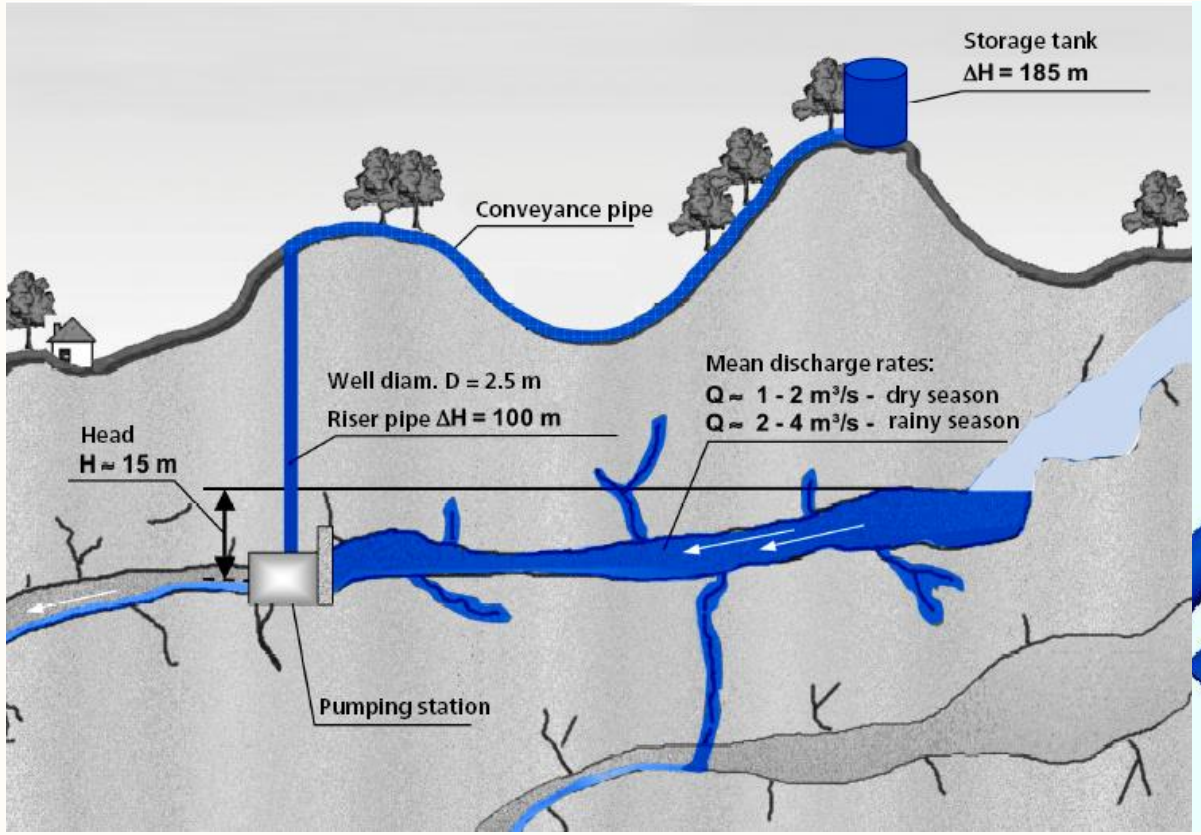
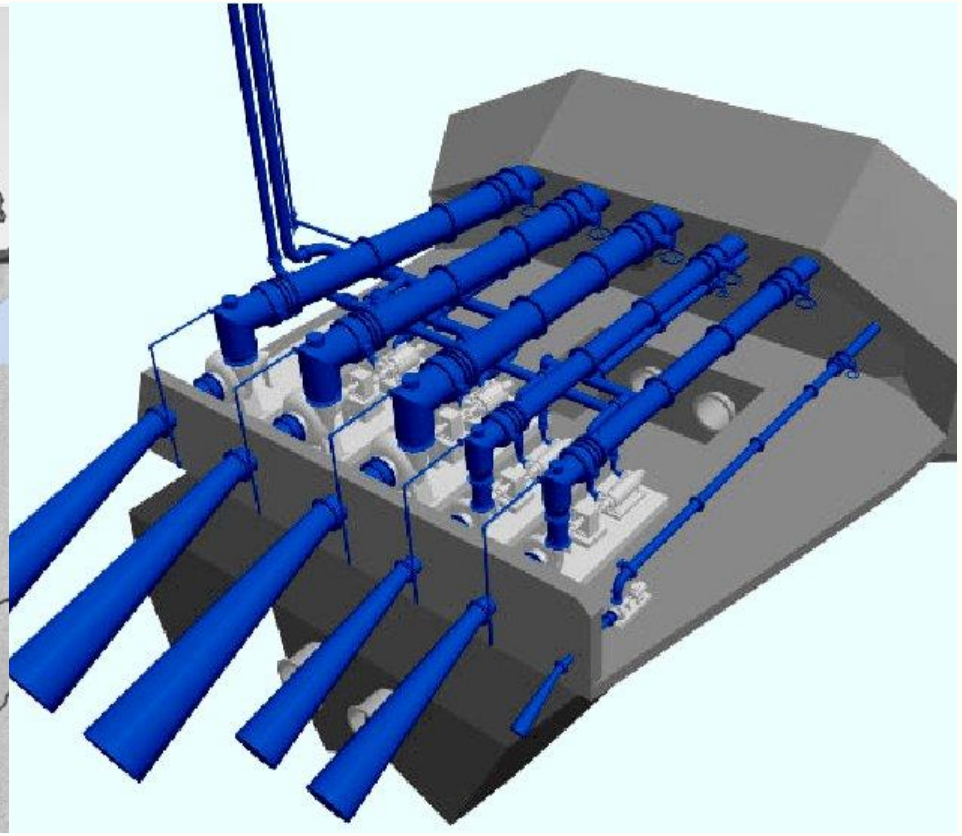
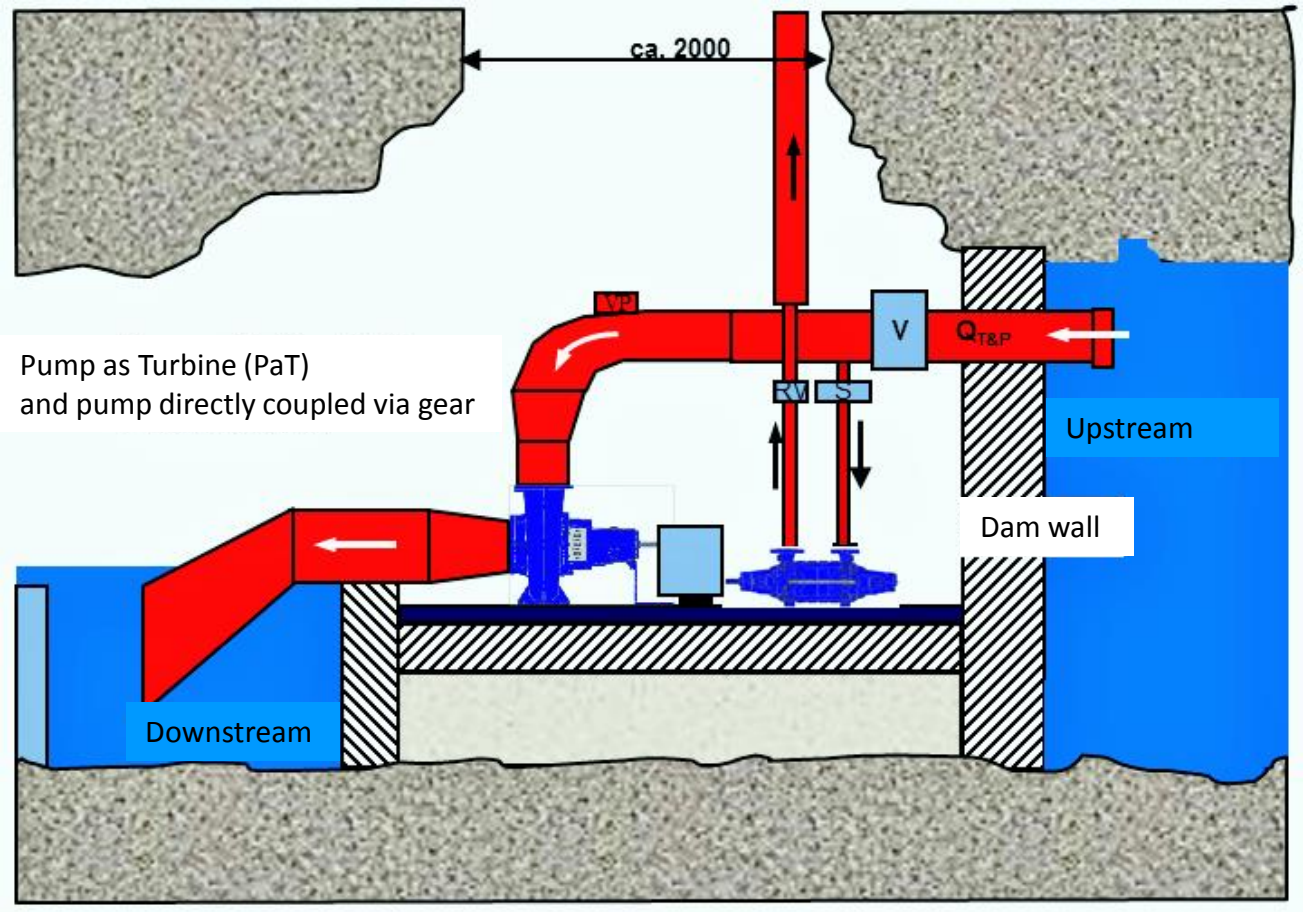


PaT for water pumping





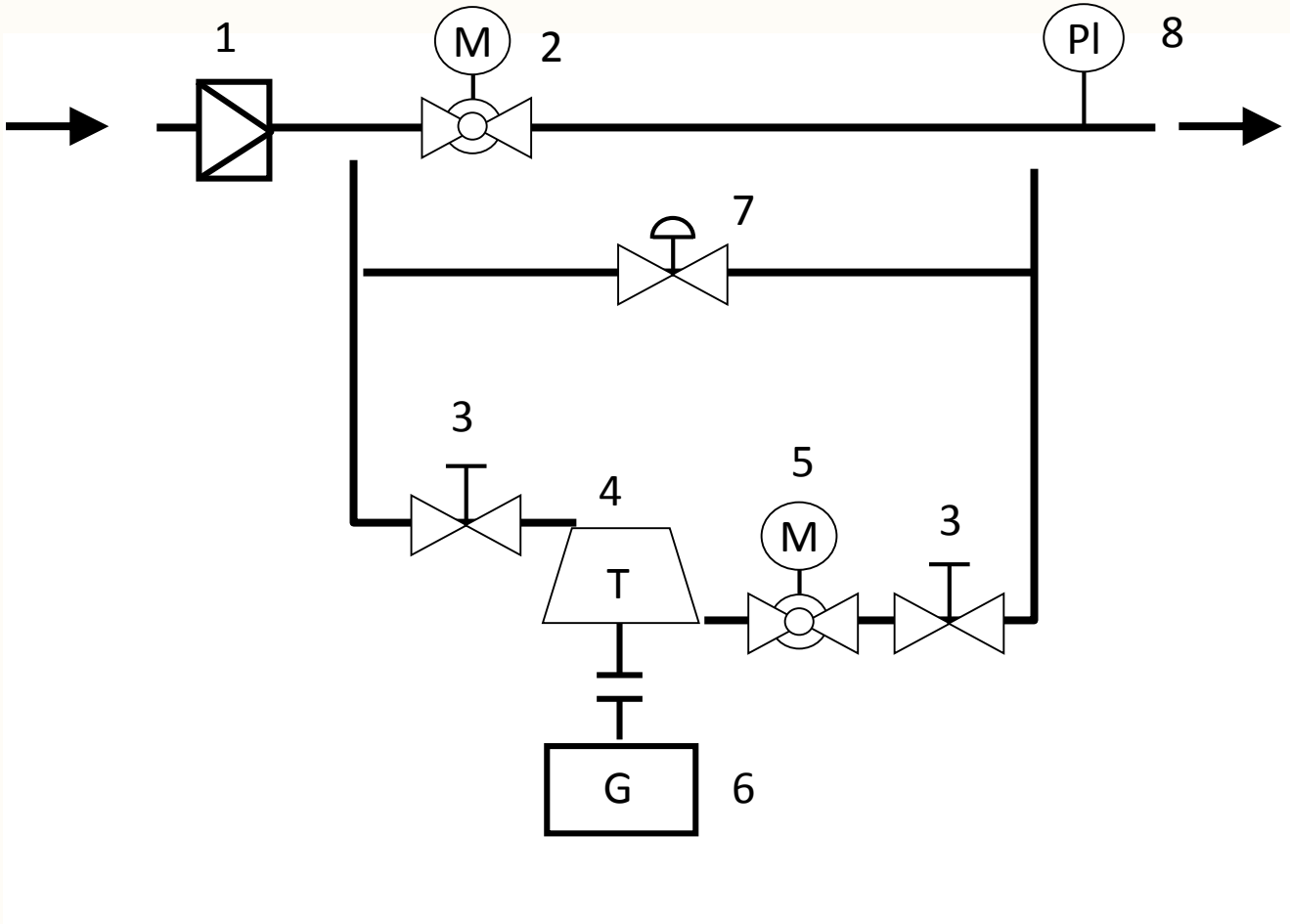
PaT – for water pumping



Pump – gear box – PaT

- PaT: **Eta R 300-340**
  Q = 370 l/s; H = 15 m; η = 81%
- Pump: **Multitec 65/9-6.1**
  Q = 16 l/s; H = 190 m; η = 74%

PaT – Simplified Scheme Bypass



Application of PaT

Scheme with bypass

(1) Flow measurement
(2) Control valve
(3) Isolation valve
(4) Pump as Turbine
(5) Start / Stop / Control valve
(6) Generator
(7) Bypass, rapidly opening valve
(8) Pressure measurement

PaT – Pump as Turbine

Thank You