

SULZER

Sulzer Pumps

SJT-VCN Molten Salt Circulation Pumps for Concentrated Solar Power



The Heart of Your Process

Main Applications

The SJT-VCN is a vertical mixed flow pump with high capacity and medium to high head. Its design includes hydraulics from the proven SJT range. This pump has been engineered to balance high efficiency, low submergence and Net Positive Suction Head Required (NPSHr) considerations.

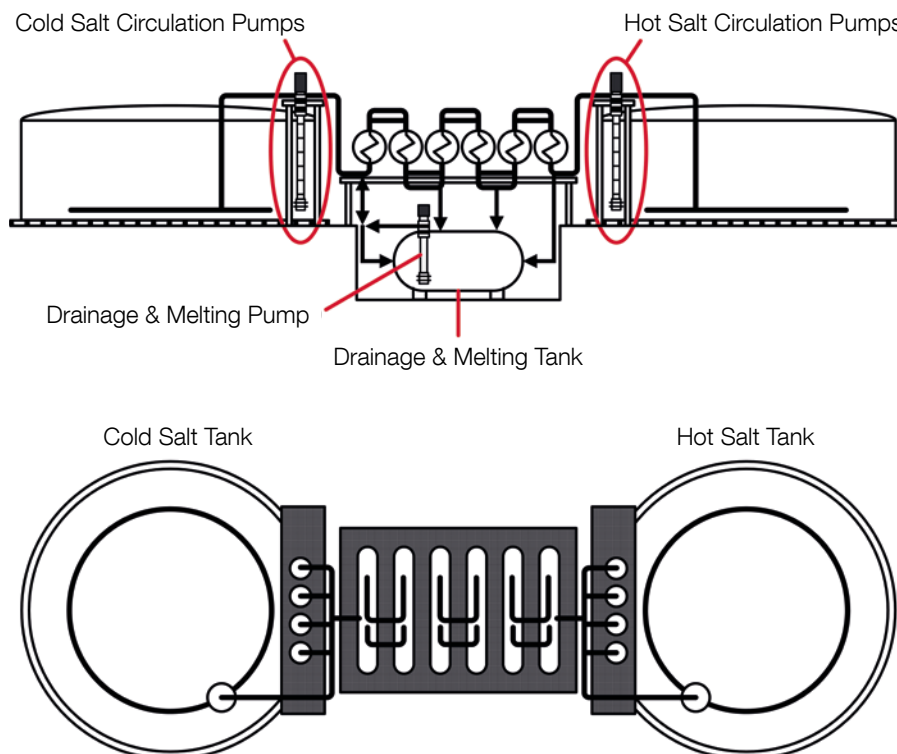
The SJT-VCN is used as:

- Cold & hot molten salt circulation pumps in parabolic trough Concentrated Solar Power (CSP)
- High pressure cold molten salt feed pumps in central tower CSP
- Hot molten salt circulation pumps in central tower CSP
- Cold molten salt attemperation pumps in central tower CSP
- Cold molten salt melting and drainage pumps in parabolic trough and central tower CSP

Molten Salts Extending the Operation Period

Molten salts are increasingly used today in CSP plants for heat storage or as primary Heat Transfer Fluid (HTF) due to their high specific heat capacity. When a thermal storage reservoir using molten salts is integrated into a CSP plant, electricity can be generated even after the sun goes down, with an extended operation period of up to 6-8 hours.

Vertical pumps mounted in tanks are preferred nowadays to simplify the molten salt system. This eliminates the pump sumps, isolating valves, level instrumentation and associated heaters. It also reduces heat losses and allows the steam generator system to drain directly into the tanks.



Features and Benefits



- 1 Umbrella device incorporated to the suction bell**
 - Reduced submergence
 - Suction strainer optional
- 2 First stage impeller**
 - High Suction Specific Speed (N_{ss}) impeller for reduced NPSHr is optional
- 3 First stage and series impellers provided with holes**
 - Effective draining during overhauls
- 4 Segmented line shaft bearings**
 - Better shaft alignment and adaptation to the thermal expansion
- 5 Main shaft sealing by single or dual throttle bushing**
 - Permanent leak-off recirculation to the molten salt tank
- 6 Auxiliary shaft sealing**
 - Prevents leakage of molten salt to the atmosphere
- 7 Support head thermal insulation**
 - Heat barrier between hot/cold sections
- 8 Top shaft heat radiators/fans**
 - Provide thrust bearing oil temperature protection
- 9 Thermal insulation and radial grooves on driver stand support head**
 - Minimize the heat transfer to the thrust bearing and the motor

Engineered to Your Needs

- **Thermal distortion Finite Element Analyses (FEA)** at steady state and stand-by conditions are performed to cater for the worst case scenario
- **Structural modal natural frequency FEA** are completed in order to identify / avoid structural resonance conditions at all the running speeds
- **Lateral and torsional rotor-dynamic analyses** are carried out to identify all the Variable Frequency Drive (VFD) harmonics and other transient or steady state excitations

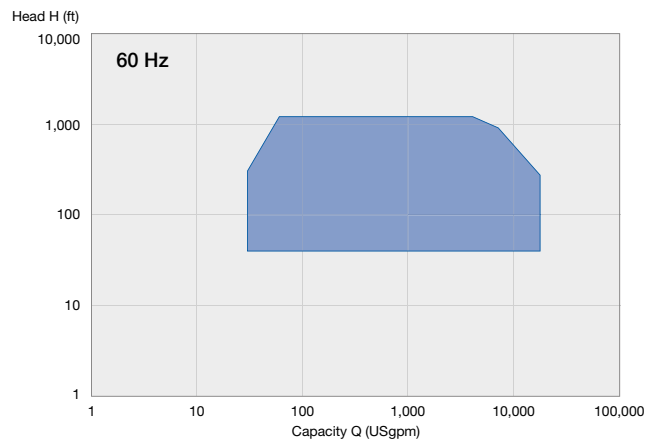
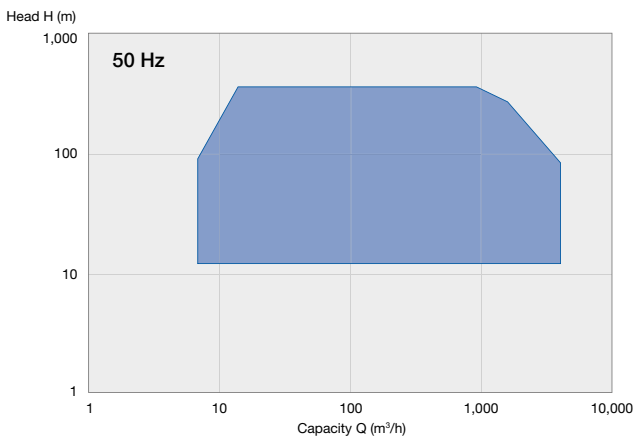
SJT-VCN Molten Salt Circulation Pumps



Operating Data

50 Hz		60 Hz
up to 914 mm	Pump sizes	up to 36 inches
up to 4,000 m ³ /h	Capacities	up to 17,600 USgpm
up to 350 m	Heads	up to 1,150 feet
up to 70 bar	Pressures	up to 1,015 psi
up to 600 °C	Temperatures	up to 1,100 °F

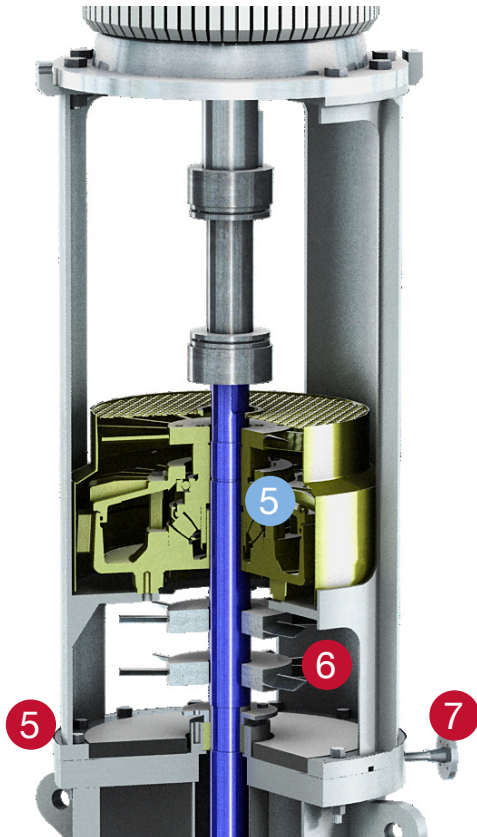
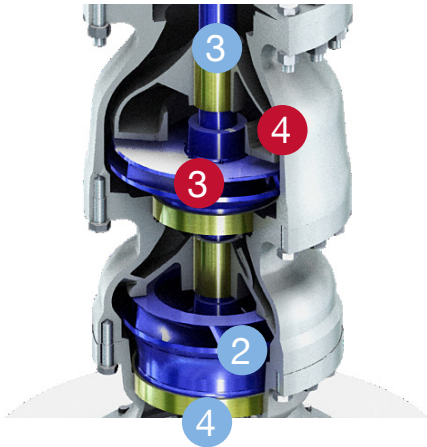
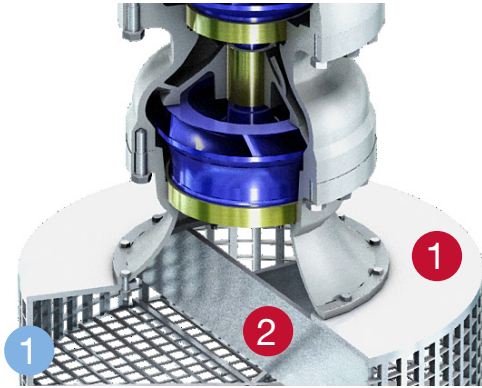
Performance Ranges



Materials

Pump part	Material
Bowl	HT carbon steel, chrome steel, HT stainless steel
Impeller	HT carbon steel, chrome steel, HT stainless steel
Shaft	Chrome steel, Nitronic 50
Line shaft bearing	Cast iron, stellited cast iron

Design Standards



- 1 Suction flare umbrella to reduce submergence
- 2 Anti-vortex ribs, either integral with the suction flare or with the umbrella
- 3 Mixed flow series stage impellers
- 4 All the impellers and bowls are provided with draining holes
- 5 Thermal insulation and radial grooves on driver stand support head
- 6 Shaft fans/radiators to reduce temperature
- 7 Nitrogen/Air quench connection to lube the auxiliary shaft seal

Design Options

- 1 Wide mesh suction strainer
- 2 High Nss mixed flow first stage impeller for reduced NPSHr
- 3 Interchangeable sleeves under the segment line shaft bearings
- 4 Impeller wear rings
- 5 Thrust bearing located in the pump



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