►► Archimedean screw pumps

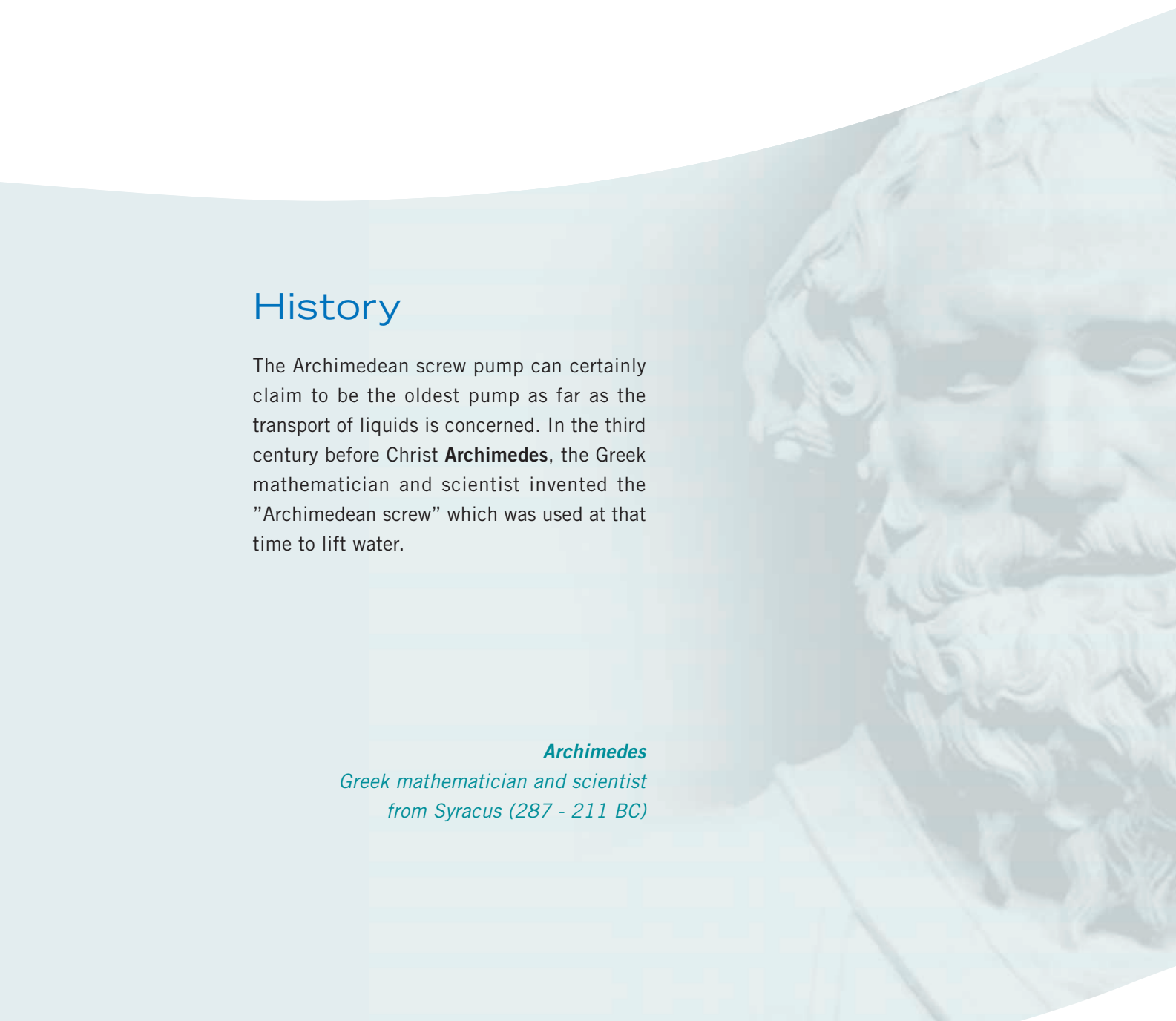
Reliable – robust – tried and tested

RITZ ATRO

Water in motion

History

The Archimedean screw pump can certainly claim to be the oldest pump as far as the transport of liquids is concerned. In the third century before Christ **Archimedes**, the Greek mathematician and scientist invented the "Archimedean screw" which was used at that time to lift water.



Archimedes
Greek mathematician and scientist
from Syracus (287 - 211 BC)

Characteristics

Traditional characteristics such as
- high operational safety
- reliability
- long serviceability
are bywords for the 'Archimedean screw pump'. Optimum efficiency, even in the partial load range guarantees considerable economy. Archimedean screw pumps are the ideal choice to lift high capacities up to fixed heads.

Large passages and the open screw make it possible to handle solids laden liquids without the danger of a blockage.

Slow speeds prevent premature wear and are also beneficial for delicate media. Self-regulating adjustment of screw pump capacity to varying inflow volume at constant speed ensures even loading of the treatment plant without additional control mechanisms.
No upstream rake equipment is required.

Applications

Waste water treatment
- Domestic sewage
- Return sludge
- Rainwater and flood water

Water supply
- Land drainage
- Irrigation

Process engineering
- Paper and pulp industry
- Different kinds of industrial waste water

Were you already aware?

Ritz-Atro additionally produces hydrodynamic screws, which can be used for energy generation by means of an energy producing reversal of the mode of working, and their application is patented.

The advantages at a glance

- **Very durable**
- **High operational dependability and reliability**
- **High efficiency and very economical**
- **Transportation of pumping mediums loaded with solid matter without blocking the machine**
- **Automatic adjustment in line with the supply quantity**
- **No upstream rake equipment required**
- **Low wear and tear**

Components

Bottom bearing

Grease lubricated journal bearing which enables continuos operation under more difficult conditions in waste water applications. The robust dimensioned journal shaft and the highly durable renewable bearing bush in special bronze with low friction properties are determined by the maximum radial forces occurring as well as axial expansion due to ambient temperature changes. During operation the bottom bearing is fed continuously with grease from an automatic lubricator and hermetically sealed against ingress of the surrounding liquid.

eco-line bearing arrangement

The eco-line bearing is a totally enclosed, maintenance-free and environmentally-friendly screw pump bearing. A multi-stage sealing system reliably prevents the conveying medium from penetrating into the bearing, thus ensuring a long service life. The permanent lubrication of the anti-friction bearing stops the conveying medium being polluted by lubricating grease. Deployment of the eco-line bearing therefore saves energy and maintenance costs and avoids the consumption of lubricating greases. The eco-line bearing can be retrofitted to all existing plant without any fuss.

Helix

Screw blades are continuously multiple-thread welded onto a rigid support tube with sealing covers welded water-tight. The top and bottom bearing arrangements are bolted onto the sealing covers and can thus be dismantled.

Surface treatment

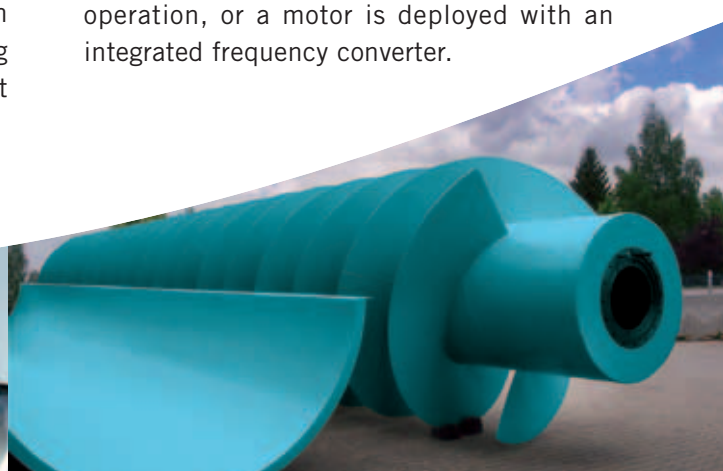
For surface treatment of helix and respective accessories are different systems and paint variants for various requirements available.

Top bearing

Generously rated grease lubricated ball/roller bearings located in a cast iron housing absorb the axial and radial forces of the Archimedean screw pump. Occurring forces will be led to the solid base.

Drive unit

The drive unit of a screw pump consists of an electric motor, gearbox, back-stop device, V-belt drive between gearbox and motor, a flexible coupling and all safety fixtures. Different gearbox designs are deployed depending on the torque requirements and the installation situation. The V-belt drive used allows the conveying performance to be easily adjusted. If automatic, speed-optimised adjustment of the conveying performance is required, the drive unit is prepared for frequency converter operation, or a motor is deployed with an integrated frequency converter.



Trough design

Concrete trough
The most frequently used design is the stationary open concrete trough which is cast in suit with concrete provided by a civil contractor. The concrete trough is shaped (profiled) by a rail attached to the Archimedean screw pump. This ensures an accurate and even gap between helix and trough over the entire length of the concrete bed.

Steel trough
Another alternative to conventional cast-in-place concrete troughs is the screw-trough pump construction made of steel plate. This design makes it possible to use abrasive and aggressive materials by selecting specific materials (unalloyed and alloyed materials) and ensures a high degree of wear-resistance and stability. The screw trough supplied with the Archimedean screw pump is backed up with concrete after assembly and alignment.

Fused basalt lining
The prepared local concrete trough is lined with high abrasion resistant ABRESIST fused basalt plates, laid on-site and joints grouted with ready-to-use mortar.

Oxide ceramic lining
High wear resistant inner lining of the steel trough with oxide ceramic, applied in the works with a special artificial resin adhesive.

Compact Archimedean screw pumps
Compact screw pumps are executed with self-supporting steel troughs, which at the same time serve to support the bearing arrangements and the complete drive unit.

The steel trough can be executed as a closed steel trough for mechanically pre-cleaned conveying media or as an open (U-shaped) steel trough for conveying media which have not be pre-cleaned.

The top bearing arrangement and the complete drive unit are taken up in the drive box. The drive unit is easily accessible via a weather-proof, hinged drive cover.

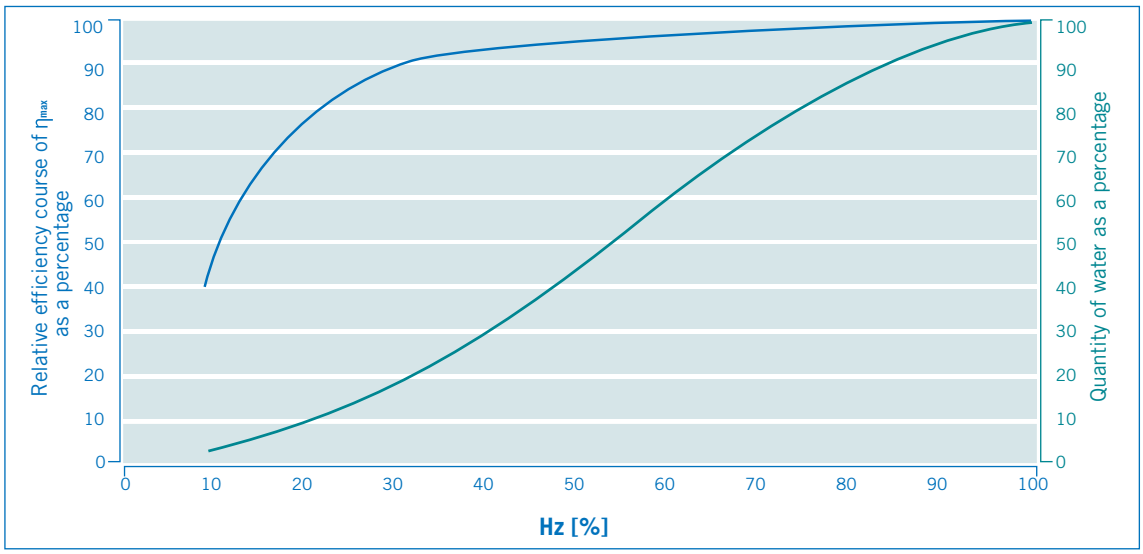
The use of compact screw pumps means that a drive unit building and inclined concreted screw pump or troughs are not required. A simple, rectangular shaft structure with a separate discharge suffices, whereby the compact screw pump is fixed in cantilever arrangement at two support points.

The method of fastening in the pump sump can be a fixed installation or suspended design.

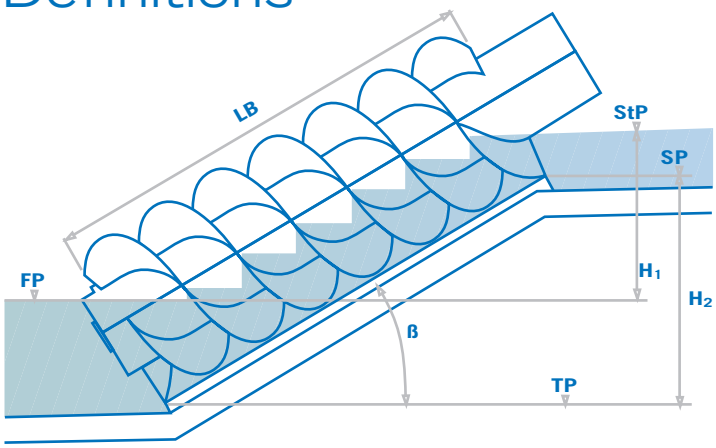
This considerably reduces the scale of the structural works and therefore of the overall investments.

Flow capacity and efficiency

The screw pump achieves optimum efficiency with a height of Hz at the filling point or over. The diagram shows the ratio between flow capacity and degree of efficiency to the height Hz. In a range of 100-30% flow capacity substantial savings on energy can be made through the flat efficiency curve by comparison with other types of pump.



Definitions



FP Filling Point
Intake water level at which the screw pump reaches its full capacity and best efficiency but also the highest power consumption

LB Length of Helix

ß Angle of Installation
Angle of installation can be determined between 30° and 40°

StP Delivery Point
Level of water leaving the screw pump. This represents the maximum level against which the screw pump can deliver without backflow/recirculation

SP Chute Point
Discharge level, water shed to discharge channel

TP Touch Point
Level of intake water at which delivery will cease

H_1 Hydraulic Delivery Head StP - FP

H_2 Constructional Delivery Head SP - TP

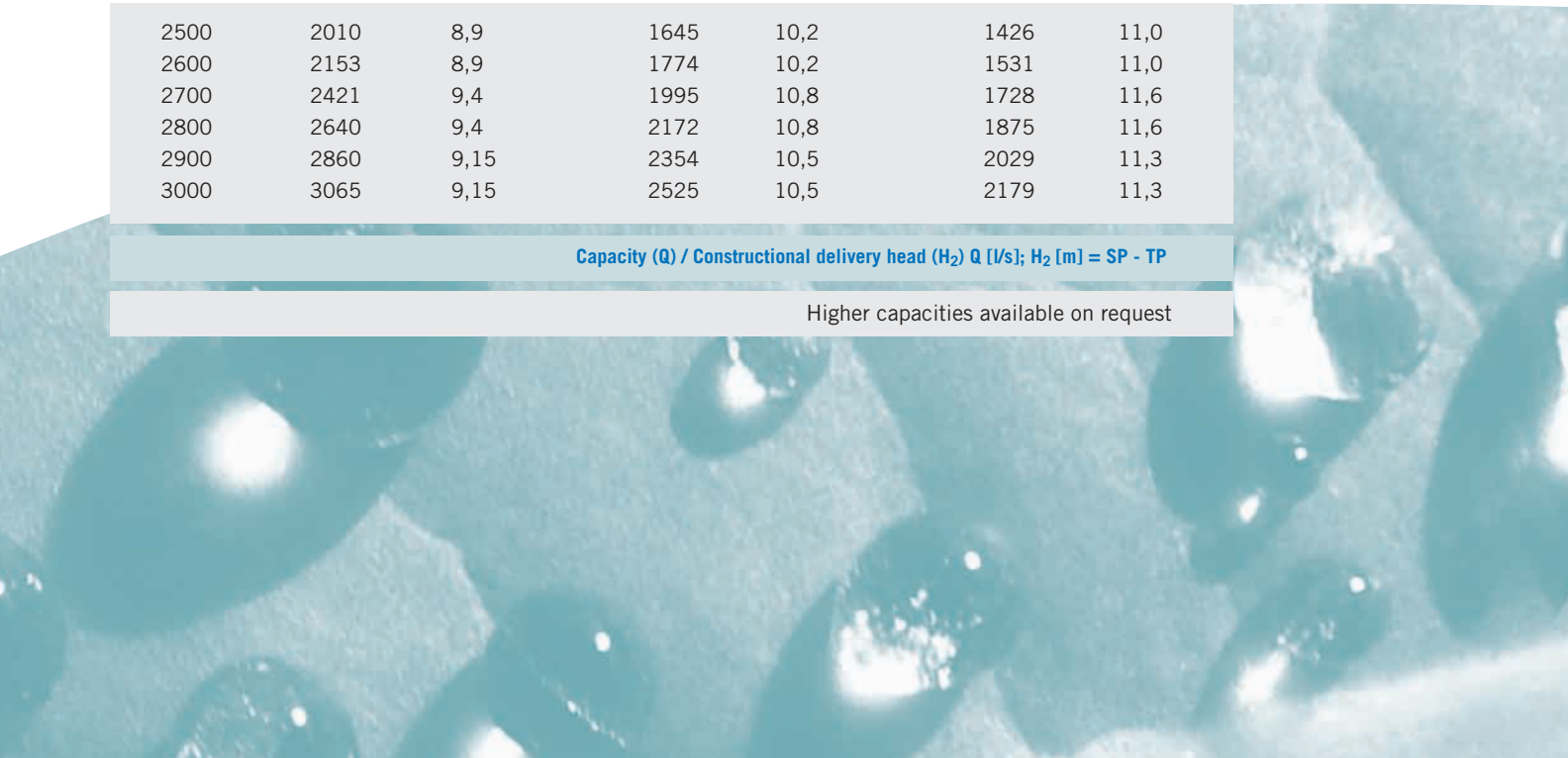
Selection table

This table gives a rough idea of the attainable capacities in relation to diameter and angle of installation. The above figures are meant as a planning guide only. Intermediate angles between 30° and 40° are possible. Exact values for any specific project have to be determined individually since the output of the screw pump is related to the diameter of the helix and centre tube, inclination, also number and pitch of Helices.

ø	30°	H_2	35°	H_2	38°	H_2
	Q	SP - TP	Q	SP - TP	Q	SP - TP
[mm]	[l/s]	[m]	[l/s]	[m]	[l/s]	[m]
400	27	3,4	22	3,8	19	4,2
500	46	3,65	38	4,2	33	4,5
600	69	4,4	57	5,05	45	5,4
700	103	4,4	85	5,05	73	5,4
800	138	4,15	114	4,8	93	5,1
900	183	5,65	151	6,5	131	6,95
1000	239	5,4	197	6,2	170	6,65
1100	276	6,9	227	7,9	194	8,5
1200	347	6,9	286	7,9	248	8,5
1300	432	6,65	356	7,6	309	8,2
1400	524	6,65	431	7,6	372	8,2
1500	606	6,65	499	7,6	431	8,2
1600	704	6,4	581	7,35	502	7,9
1700	808	7,65	666	8,8	579	9,4
1800	947	7,4	779	8,5	673	9,1
1900	1074	7,4	884	8,5	763	9,1
2000	1160	7,4	957	8,5	826	9,1
2100	1320	7,5	1087	9,1	937	9,7
2200	1498	7,5	1236	9,1	1067	9,7
2300	1635	7,4	1349	8,5	1167	9,1
2400	1848	8,9	1521	10,2	1314	11,0
2500	2010	8,9	1645	10,2	1426	11,0
2600	2153	8,9	1774	10,2	1531	11,0
2700	2421	9,4	1995	10,8	1728	11,6
2800	2640	9,4	2172	10,8	1875	11,6
2900	2860	9,15	2354	10,5	2029	11,3
3000	3065	9,15	2525	10,5	2179	11,3

Capacity (Q) / Constructional delivery head (H_2) Q [l/s]; H_2 [m] = SP - TP

Higher capacities available on request



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Ritz-Atro, founded in 1969, is now one of the most significant companies in the area of effluent treatment and environmental protection – and indeed throughout the world. Innovative drive and pioneering spirit characterised the company from the very beginning.

Ritz-Atro sees itself as its customer's partner. Right from the phase of the initial planning the customer is supported by well qualified staff, who guarantee the secure and economic realisation of the construction project.

Ritz-Atro takes all conceivable measures to constantly further improve the high standard of quality of its products. A quality management system certified in accordance with DIN EN ISO 9001 is thus an important component part of the company philosophy.

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