DANTEK
Micro-Nanobubble Technologies
شرکت دانش بنیان دانا تجهیز پترو آب

Phone
+98 3132326801-02
+98 905 9290800

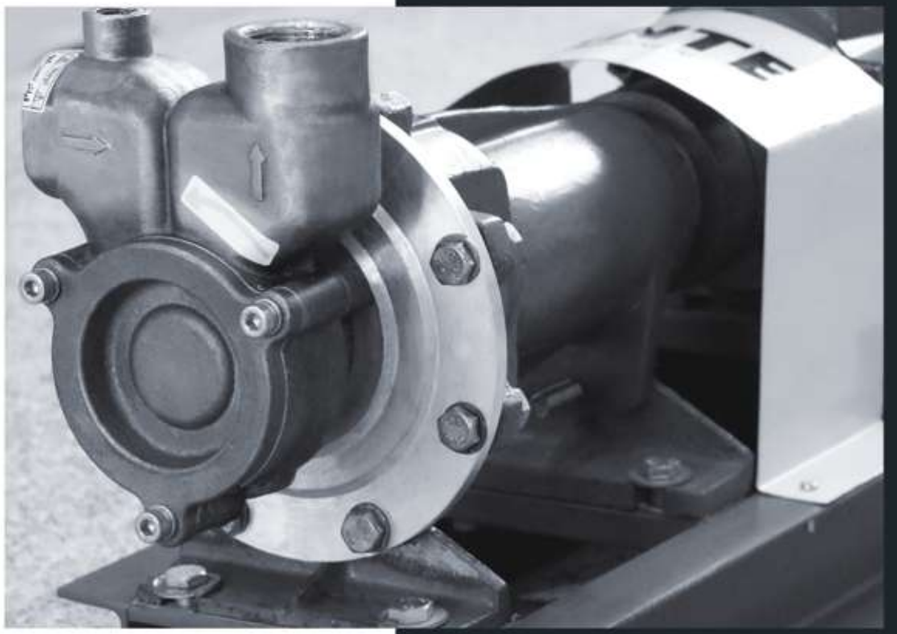
Email
Dantek.Group@gmail.com

Web
www.Dantek-Group.com

Dantek Agricultural Solution

An Innovative Idea Micro Nanobubble Technology

Contents



Dantek Introduction

"Dana Tajhiz Petro Ab" is a knowledge-based company in the field of water and energy, focusing on knowledge-based projects and interdisciplinary projects. Dantek Group has started its activity based on continuous research and development since 2017. Our main mission in Dantek interdisciplinary group is to design and manufacture two-phase vortex pumps and related equipment with the aim of using this type of equipment in water and wastewater, refinery and petrochemical, food, mining, agriculture and fishery industries. Vortex pumps are an advanced generation of two-phase pumps that have the ability to combine gas-liquid, and we use them in the processes of various industries with Dantek solutions

Nanobubble Technology

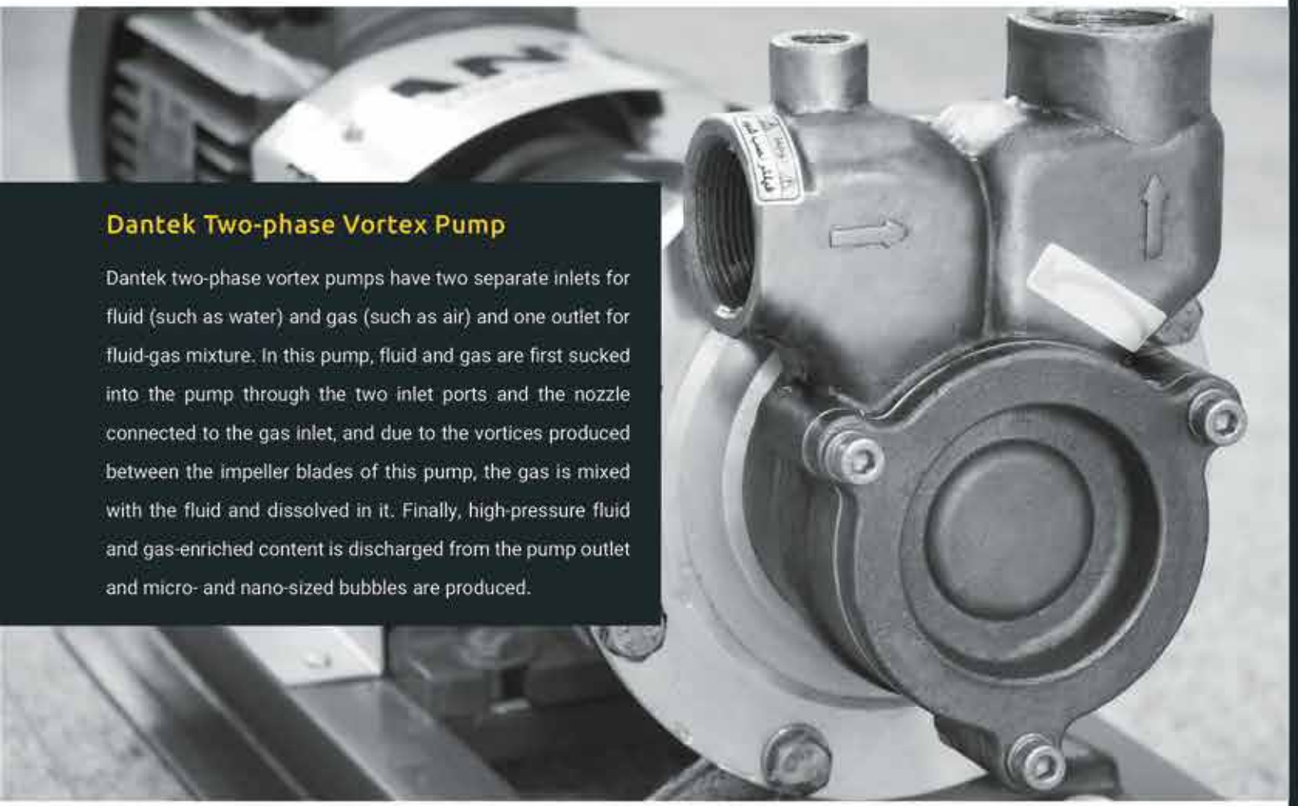
Nanobubbles are very small bubbles, to give you an idea of their size, about 3000 of them can fit in a grain of salt. Nanobubbles have unique capabilities, including that they can improve the health of water sources by increasing dissolved oxygen content and breaking down harmful pathogens and organic microorganisms.

By increasing the amount of dissolved oxygen and improving the quality of irrigation water, nanobubble technology is very effective in absorbing more nutrients, conserving water, plant growth and suppressing diseases, and ultimately increasing plant health.

Nano-sized bubbles increase oxidation-reduction potential (known as ORP), which removes pathogens and biofilms through a process called oxidation.

The combination of high dissolved oxygen and oxidation reduction potential (ORP) improves water quality, restores aquatic ecosystems and improves root structure in plants.

Water enriched with nanobubbles has many advantages for agriculture, especially in irrigation and increasing the absorption of healthy nutrients by plants and increasing oxygenation in the root zone.



Dantek Two-phase Vortex Pump

Dantek two-phase vortex pumps have two separate inlets for fluid (such as water) and gas (such as air) and one outlet for fluid-gas mixture. In this pump, fluid and gas are first sucked into the pump through the two inlet ports and the nozzle connected to the gas inlet, and due to the vortices produced between the impeller blades of this pump, the gas is mixed with the fluid and dissolved in it. Finally, high-pressure fluid and gas-enriched content is discharged from the pump outlet and micro- and nano-sized bubbles are produced.

Dantek Nanobubble Pump and Agriculture

- Bubble production in very small size in the range of micro-nano scale
- Use of ozone gas in additional purification of agricultural water with high efficiency
- Increase of dissolved oxygen to the supersaturation state
- Reducing energy consumption due to not using compressors and air blowers
- Save chemicals additives for purification
- High efficiency in mixing two fluids and high pressure pumping
- Low start-up cost
- Easy installation, repair and maintenance

Nanobubble Technology and Sustainable Agriculture

Due to climate change and water scarcity and environmental concerns, the agricultural industry must achieve more sustainable growing methods that rely on less water and produce less nutrient runoff that negatively impacts aquatic ecosystems and can cause harmful algal blooms in rivers and lakes.

Nanobubble technology could allow farmers to implement more sustainable agricultural practices that include a range of water treatment, nutrient optimization, disease prevention, and biofilm control.

In addition, increasing oxygenation in the root zone and maintaining a stable aerobic environment stimulates the growth of beneficial bacteria. This in turn mineralizes nutrients and suppresses pathogenic organisms such as Pythium and Phytophthora.

Another feature of using micro-nano bubble technology is increasing fruit size, increasing nutrient absorption, improving vegetative growth, increasing chlorophyll content and healthier root growth.

Effects of Utilzing Nanobubbles in Hydroponic Greenhouses

The plants grown with the help of the nano bubble system are healthy and have the best shelf life and taste.

Another advantage of the nanobubble system is the possibility of avoiding the installation and continuous operation and costs of a pond aeration system using aeration stones.

The Advantages of having Nanobubbles in Irrigation in Hydroponic Culture

- Correcting the surface tension of water improves penetration and has many positive effects such as increasing crops and reducing salinity in the root zone.
- Increases root growth
- The more homogeneous dispersion of nutrient ions increases the availability of nutrients in the culture medium
- Super oxygen supply causes more activity of beneficial soil microbes, better absorption of water and nutrients by root cells.
- Improves salt washing to remove salt from the root area for better plant and root health.

Healthier Roots with Nanobubbles in Hydroponic Greenhouses

Plant roots need beneficial bacteria that thrive in oxygen-rich environments. Pathogens thrive in an environment that contains no or severely deficient oxygen.

Increasing the DO level in the root zone promotes the growth of good bacteria and helps the roots grow stronger. Conversely, harmful bacteria and diseases such as pythium can exist when the environment around plant roots becomes anaerobic or oxygen depleted.

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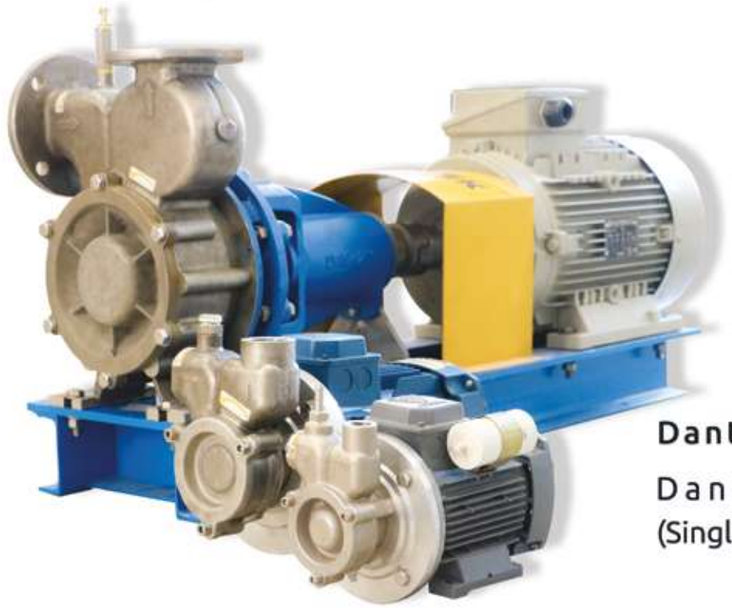
Dantek Solutions Irrigation Operations in Hydroponic Systems

Dantek micro nano bubbler SVP pumps are compatible with a variety of systems that can be used in ponds and irrigation tanks, storage tanks and daily irrigation, hydroponic systems, etc. These pumps can be used in different production capacities and for tanks of different sizes and also use different gas sources, usually air or oxygen. In some cases, the use of nano bubbles in agriculture is to improve water quality and reduce bacteria and pathogens. In other projects, the goal of treatment is to achieve supersaturated levels of dissolved oxygen in irrigation water to improve plant health and growth. Farmers can use nanobubble pumps to increase and maintain dissolved oxygen levels and improve water quality by reducing iron, controlling algae growth, and removing pathogens.

These several advantages for agricultural operations can reduce the operation and maintenance costs of using chemical treatments to clean and maintain the water source, and can increase the quality of water for irrigation. Plants need water to live, but they need quality water to grow. Dantek's nanobubble technology injects oxygen into the irrigation water, bringing market-leading efficiency in oxygen transfer: more oxygen near the root zone, increasing nutrient absorption and plant resistance to environmental stresses. An oxygen-enriched root zone improves root mass, increases uptake of key nutrients such as calcium and potassium, and helps suppress pathogen growth.



Dantek products list

Dantek SVP Pumps
(Single Stage Vortex Pump)

		1	2	3	4	5	6	7
		SVP22AL05	SVP40S22-A	SVP40S22-AC	SVP40S22-B	SVP40S22-BC	SVP63S110-A	SVP63S110-B
1	Material	Aluminum	SS304/316	SS304/316	SS304/316	SS304/316	SS304/316	SS304/316
2	Power(kW)	0.55	2.2	2.2	2.2	2.2	11	11
3	RPM	2900	2900	2900	2900	2900	1460	1460
4	Input Voltage	220V/380V	380V	380V	380V	380V	380V/660V	380V/660V
5	Inlet	3/4"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/2"	2 1/2"
6	Outlet	1/2"	1"	1"	1"	1"	2"	2"
7	Flow rate (m^3/hr)	1	4	4	7	7	20	25
8	Flow rate (lit/s)	0.27	1.2	1.2	2	2	5.5	7
9	Working pressure (bar)	1.5-4	1.5-4	1.5-4	1.5-4	1.5-4	1.5-4	1.5-4
10	Gas flow rate (lit/min)	1.5	5	5	7	7	20	25
11	Coupling Type	--	--	Coupling	---	Coupling	Coupling	Coupling

Dantek SVP Pump
(Complete Package)

		1	2	3	4	5	6	7
		SVP22AL05	SVP40S22-A	SVP40S22-AC	SVP40S22-B	SVP40S22-BC	SVP63S110-A	SVP63S110-B
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10	Gas flow rate (lit/min)	1.5	5	5	7	7	20	25
11	Coupling Type	--	--	Coupling	---	Coupling	Coupling	Coupling
12	Input/Output valves	Included	Included	Included	Included	Included	Included	Included
13	Bubble separator (L)	4	10	10	10	10	100	100
14	Flow meter (LPM)	0-5	1-10	1-10	1-10	1-10	5-50	5-50