IPS Oxygen Injection Unit

Technical information

The oxygen injection unit of Industrial Product Solutions can easily increase dissolved oxygen concentrations up to the maximum physical holding capacity of the water. In our unit, we use a patented mechanism in which we mix pure oxygen with water. The water enters the unit pressurized. Pressurized water can contain more dissolved oxygen than non-pressurized water (see Figure 1). The water in our oxygen unit takes up the oxygen efficient and fast, at a low energy consumption rate. The water leaves the unit at supersaturation, which means that it contains more dissolved oxygen than normally possible.

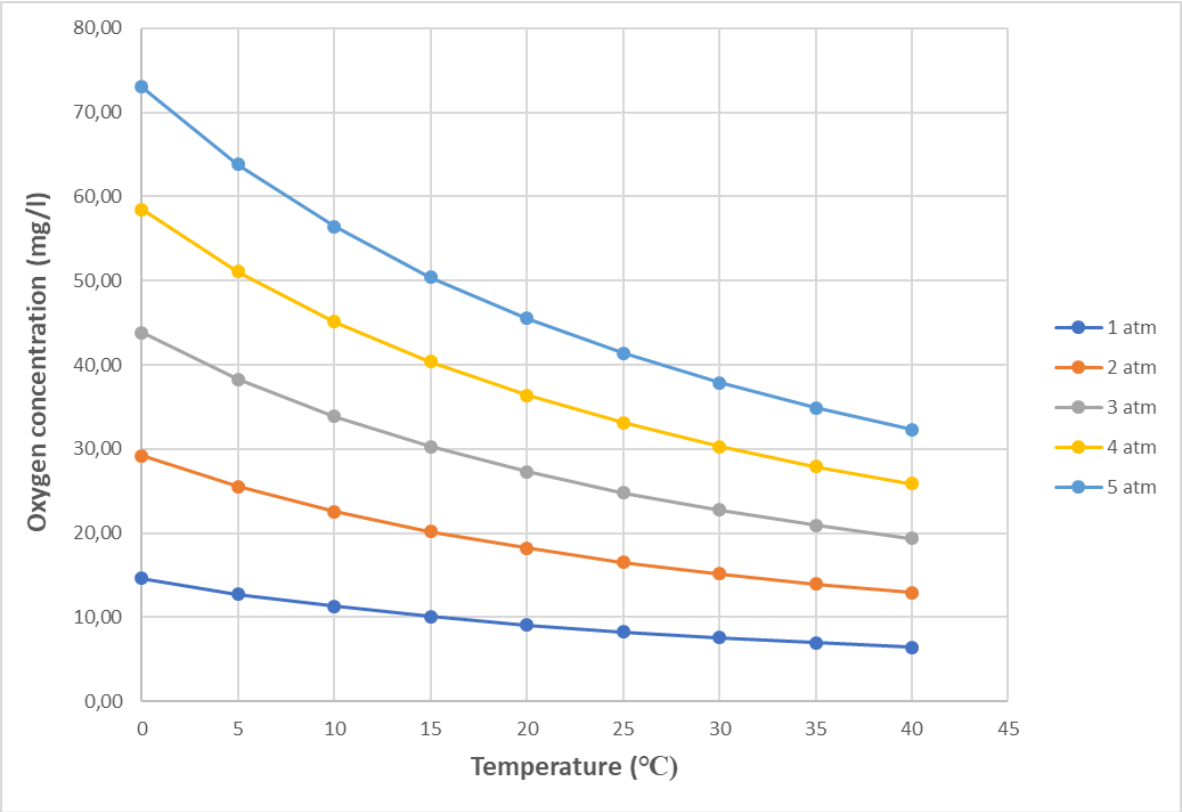

Figure 1 Physical oxygen holding capacity of fresh water as a function of temperature, demonstrated for several water pressures. Salinity of the water is not taken into account here, but typically negatively influences the physical oxygen holding capacity of the water, e.g. for water at 1 atm with EC of 1.7 the holding capacity lays on average 2-3 ppm lower.

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The supersaturated water can be used in two different ways:

- **In line with your water installation**
  The treated water is immediately applied to the crop. System pressure is used to pressurize the water in the unit. The oxygen in the supersaturated water will be taken up by your crop. Remaining oxygen will stay in the recirculation water. When system pressure is not enough to increase oxygen levels to the desired concentration, it is possible to install an extra pump.

- **Stand alone**
  The treated water is used to increase dissolved oxygen concentrations of all water in the storage tank or hydroponic pond. A patented mixing mechanism is installed. The mechanism brings the supersaturated water in contact with non-treated water to homogenize the dissolved oxygen concentration. The result is irrigation water with a homogeneous and stable dissolved oxygen concentration at the level of the physical maximum holding capacity of the water. Because of the mixing mechanism, the turnover speed of the water through the unit can be kept low.

Industrial Product Solutions offers five models of the unit. Dimensions and flow capacities of these models can be seen in Table 1. Absorption specifications for water at a pressure of 2.5 bar can be seen in Table 2. Absorption specifications for water a pressure of 3.5 bar can be seen in Table 3.

Table 1 Dimensions of the five models of the oxygen injection unit

Model number		O300	O450	O600	O800	O1000
Diameter	mm	300	450	600	800	1000
Overall height	mm	965	1325	1675	2150	2600
Max. water flow	l/minute	176	390	702	1240	1930
Max. water flow	l/hour	10560	23400	42120	74400	115800

*Table 2 Oxygen absorption specifications for the unit with water at **2.5** bar and various temperatures*

Model number		O300	O450	O600	O800	O1000
Absorption	kg/hour					
5 degrees Celsius		0.82	1.82	3.28	5.75	8.99
10 degrees Celsius		0.73	1.61	2.91	5.03	7.95
15 degrees Celsius		0.65	1.44	2.60	4.59	7.12
20 degrees Celsius		0.59	1.31	2.35	4.17	6.48
25 degrees Celsius		0.54	1.19	2.15	3.80	5.87

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*Table 3 Oxygen absorption specifications for the unit with water at **3.5** bar and various temperatures*

Model number		O300	O450	O600	O800	O1000
Absorption	kg/hour					
5 degrees Celsius		1.14	2.54	4.58	8.07	12.82
10 degrees Celsius		1.01	2.25	4.05	7.16	11.38
15 degrees Celsius		0.91	2.02	3.63	6.32	9.87
20 degrees Celsius		0.82	1.83	3.29	5.76	9.01
25 degrees Celsius		0.75	1.67	3.01	5.34	8.31

Table 2 and 3 are exemplary for different water pressures (2.5 and 3.5 bar, respectively). Each used system pressure will lead to different absorption specifications. It depends on the composition of your growing system, system pressure etc. how the application of the oxygen unit at your company will look like and whether we advise in-line or stand-alone installation.

Industrial Product Solutions offers various addition to the oxygen injection unit:

- **An oxygen control device**

  This device measures oxygen concentrations and controls the oxygen unit to deliver the right oxygen concentrations.

- **A heat exchanger**

  The heat exchanger can heat or cool your water. Root functioning depends on substrate temperature. The heat exchanger can optimize this by controlling the water temperature.

- **An algae control system**
  This ultrasonic system can be installed inside your pipelines and water storage tank, to keep them clean and free of algae.

When applying the oxygen injection unit at your firm, IPS will make a custom design based on size of your firm and oxygen requirements of your crop. The design and development will be done in close contact with you, our customer. By this, we strive to maximize the effect the oxygen injection unit will have on your crop performance.