OXYGEN-ENRICHMENT-SYSTEMS

Increasing demands of fish quality, higher stocking densities, declining water supply and the use of high quality, expensive feed necessitate more effective oxygen transfer methods than surface aerators alone. With surface aeration, it is only possible to achieve a maximum of 100 % saturation, and then with the expense of high energy costs. This is because oxygen is only present in air at a low concentration (about 20 %).

This is the reason why the peak demand of oxygen in many operations cannot be covered any more with surface aerators. Due to this, a situation of lack of oxygen (at least temporarily) occurs. During periods of low oxygen, feed is poorly digested. The fish subsist, resulting in little or no growth, and poor health. Oxygen is a very important factor in fish farming. With abundant dissolved oxygen, fish growth is maintained, food conversion rate is optimised and less faecal waste is generated. In addition, fish health improves, and they are less susceptible to disease. These benefits result in cost savings.

A 'fish stock formula' can be found by referring to the technical literature. From this it is possible to calculate the fish stock in kilograms per litre of intake water. The most important factor when calculating stock capacity is available oxygen and oxygen consumption per kg of feed. A simple example will readily illustrate the importance of adequate oxygen levels. Example: a pond at 250 m altitude, stocked with 10 cm long rainbow trout, water temperature 10 °C and a daily feeding rate of 1.5 % of the bodyweight. With a dissolved oxygen saturation of 10 mg/l (= 90 % saturated) this formula calculates a production of 1.3 kg trout per litre intake water. If the dissolved oxygen concentration can be increased to 11.1 mg/l (= 100 % saturated) the production will increase to 1.7 kg trout per litre intake water. This corresponds to an increase of 30 %.

This example illustrates the profound effect that oxygen has on the stock of a pond, and shows very clearly the potential offered by the use of oxygen with effective enrichment systems. Clearly, the decision to use pure oxygen in fish-farms is cost effective because the environment for the fish can be 100 % oxygen-saturated all year round. LINN Gerätebau has developed specialised oxygen-enrichment systems for this purpose. They are used directly in the pond, usually floating like an aerator. LINN systems offer high oxygen transfer rates with high dissolution efficiency.

Comprehensive information and technical data on the different LINN systems appear on the following pages.

linn aqua technology germany

LOXY®

Loxy® LINN.eu
THE LATEST GENERATION OF OXYGEN ENRICHMENT

LINN Germany has been manufacturing oxygen enrichment systems for 20 years. The design brief for the latest development was to produce a robust and reliable system with a high oxygen transfer efficiency. In addition, the new floating device was to be as light, convenient, easily-serviced and quickly-deployable as possible.

The development trials were a success, and **LOXY®** was born – the latest state-of-the-art oxygen enrichment system from LINN!

This new enrichment system contains a novel rotary mixing mechanism within the plastic body. This is driven by an electric motor located above the water surface. This mixer propels the water outwards in the contained system, due to its rotation. The resulting fast-flowing water generates a vacuum, and pure oxygen is drawn in and entrained through a tube in the mixer, and is distributed in very fine bubbles within the water.

With the help of this new invention, **LOXY®** achieves a very good level of oxygen enrichment with low energy consumption.

Previous systems worked with 'bottlenecks' (for example, the venturi nozzle – disadvantage: a relatively high water pressure is required) or with wheels or brush wheels (disadvantage: a lot of energy is required to move the water) Compared to these systems, **LOXY®** has the advantage that, due to the rotary mixer, only a very small portion of the water needs to

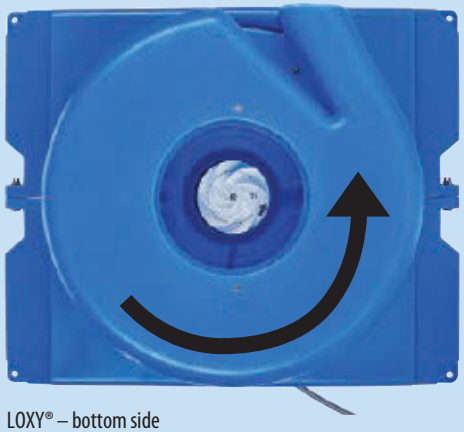
LOXY® – motor cover easy removable without tools

LOXY® – 0.37 or 0.55 kW

ADVANTAGES:

- Low energy consumption – very efficient
- Pioneering technology
- Safe operation
- Maintenance-free
- Lightweight and compact
- Clog-free
- Great value for the money

1000 times proven!



LOXY® – bottom side

LOXY® – lightweight and compact – easy to install!

be accelerated; no water pressure is required. A fluidised bed that lowers energy consumption and leads to excellent oxygen enrichment is created on the surface of the novel rotary mixer.

The main plastic body of **LOXY®** is shaped such that water is sucked up from below and exits through an opening on the side. Therefore, short-circuiting cannot occur. The main body is enclosed by two floats. All of the plastic parts are made of polyethylene and are extremely robust.

This elegantly simple LINN development does away with submersible motors, belt drives and external bearing blocks.

LOXY® uses a durable, energy-saving electric motor (according to the latest IE3 standard) with a stainless steel shaft on which the rotary mixer is directly mounted. The drive is thus completely maintenance-free! The electric motor is located in a protective housing on the body base and can be removed easily and quickly. **LOXY®** does not need any screens to protect the fish or exclude leaves, so clogging within the system is impossible!

LOXY® is supplied assembled, ready for use and with a 20 m cable and a motor protection plug.

Technical

Motor rating	kW	0.37	0.55
Power take-up	W	540	650
Voltage	V	230/400	230/400
Motor	rpm	1400	1400
O_2 enrichment max.	l/min	16	25
	m^3/h	1.0	1.5
Dimensions	cm	114 x 94 x 80	
Weight	kg	45	

Oxyplus®

Enrichment with oxygen in a self-contained system – developed by LINN Germany!

Oxyplus works with a comparatively low pressure difference (max. 0.1 bar). Oxygen-poor water is drawn in and mixed intensively with the pure oxygen which has been introduced. An increase in the surface area of the medium is obtained by mixing and oxygen is taken up. By this means, other gases (e. g. Nitrogen) will also be driven out. These gases escape through the ventilation pipe of the apparatus with a minimal amount of oxygen.

Water supported by **Oxyplus** can be enriched by 4-10 mg/ltr.

LINN enrichment systems makes it possible to introduce oxygen to water with a high level of efficiency.

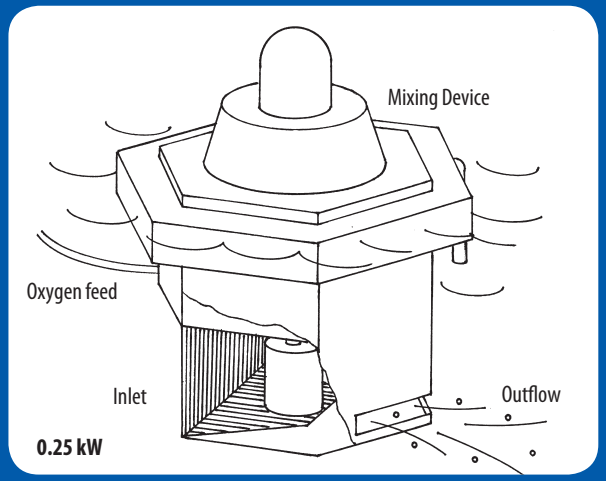
Oxyplus floats (except for the 0.10 kW model), is lightweight, handy and simple to install in the water. It has a directable current. The inlet and outlet are positioned on opposite sides – so avoiding short-circuiting.

OXYPLUS 0.25 kW

Oxyplus is supplied completely self-contained and ready for use. You simply have to fit the loose floats (included) and the apparatus can then be positioned in the water. An flowmeter is mounted onto the oxygen supply, which is attached to the apparatus. After having connected the apparatus to your power supply, you can begin.

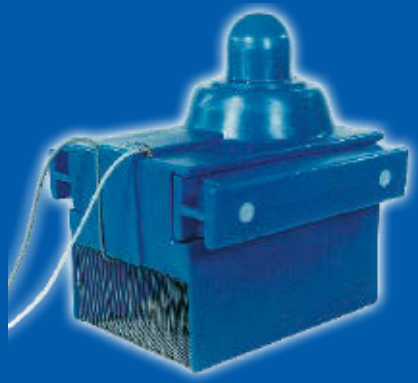
Linn's tried and tested Pipe Pumps take care of water supply with the **Oxyplus** system. The submersible motor's housing is made entirely of stainless steel, the seal is produced with a high quality sliding sealer ring. Mountings and screws are, of course, also made from quality stainless steel.

The basic housing and the floats are constructed from synthetic materials and are robust, easy-care items which contribute to the low weight of the apparatus. Practical carrying handles are moulded directly onto the floats. The inlet requires a screen



A standing apparatus for use in hatcheries, circular and small pools. We use an L3 pipe pump as supply unit onto which the mixing device is fitted. The height of the mixing device can be custom made in according to the location requirements (water level).

Oxyplus 0.10 kW

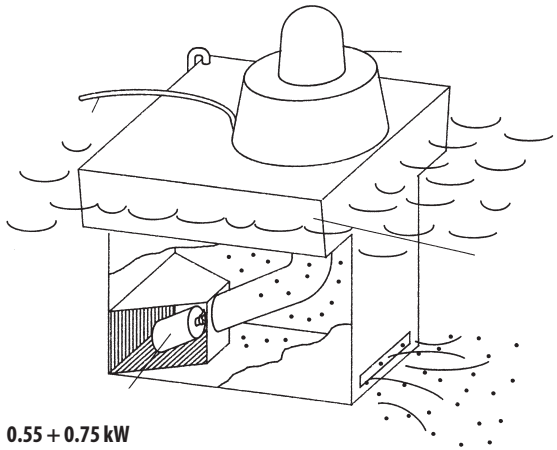


OXYPLUS 0.55/0.75 kW

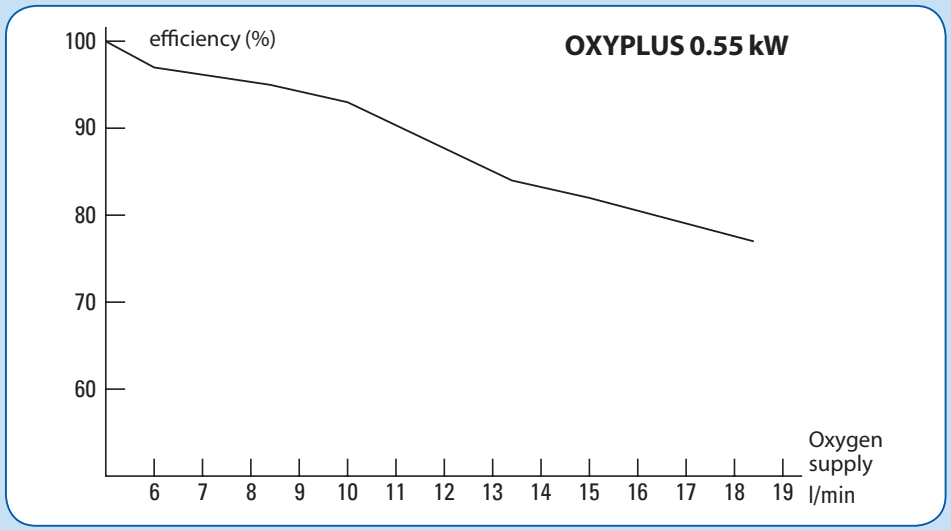
which excludes fish and other floating debris. Internal blockages in the system cannot occur. The inlet screen can be supplied in several mesh sizes. Standard equipment is a stainless steel screen with 9.5 mm bar spacing – for a fry pool, the stainless steel screen has a bar spacing of 5.5 mm and for hatcheries a stainless steel screen with bar spacing of 2-3 mm is supplied. All **Oxyplus** apparatus are designed for use directly in the pool. Please take into consideration that the volume of water flow through the pool must suit the capacity of the machine in order to achieve optimum results. Speak to us, we will be happy to advise you.

Oxyplus does not spray water out of the apparatus and runs almost silently. In the summer months, the water is only slightly warmed by the apparatus, in winter only slightly cooled. This is particularly important for winter feeding in watercourses fed by spring water!

suitable oxygen flowmeter see page 38



0.55 + 0.75 kW



Oxyplus – the solution for healthy fish, optimum living conditions and better feed conversion!

ADVANTAGES:

- highly efficient
- almost silent
- lightweight and compact
- pump grill not susceptible to blockage
- tested and reliable

Technical

Motor rating	kW	0.10	0.25	0.55	0.75
Power take-up	W	155	400	800	1100
Voltage	V	230	230/400	230/400	230/400
Motor	rpm	2900	1400	1400	1400
Min. water depth	m	0.90	0.60	0.70	0.70
O_2 enrichment max.	l/min	4	9	17	25
	m^3/h	0.24	0.5	1.0	1.5
Water del ca.	m^3/h	17	50	110	150
Dimensions	cm	⌀ 30	⌀ 105 H 110	100 x 105 x 120	
Weight	kg approx.	20	35	50	

Oxyjet

Oxyjet is an open oxygen input system which is put directly into the pond or channel. The system is ideal for use in re-circulation complexes where the water must be circulated anyway. Then **Oxyjet** circulates the water and enriches it with oxygen at the same time. **Oxyjet** can be used wherever there is a hydraulic pressure head of at least 60cm.

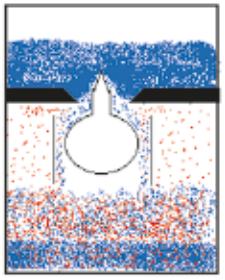
The outstanding performance of **Oxyjet** is due to patented special jets. Compared to conventional jets, a very high gas transfer is achieved. The jets result in a very high bubble detention time in the mixing chamber, and therefore a very high effectiveness and efficiency.

Typ 02-03

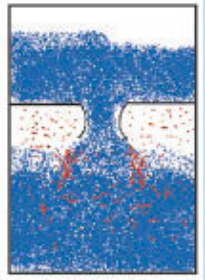
Oxyjet mounted in the pond

According to the flow to be enriched with oxygen, **Oxyjet** is fitted with a suitable number of jets. Furthermore, **Oxyjet** is flexible for times of low flow – plugs are supplied to block jets to reduce the flow capacity. If the water flow increases temporarily, there is an overflow, that bypasses the jet system.

Oxyjet offers effective oxygen enrichment without energy or maintenance costs.



LINN mixing jet



conventional systems

Technical

		Type 01	Type 02	Type 03	Type 05	Type 06
no. of mixing jets		1	2	3	1	1
Minimum water flow	l/s (ca.)	15	30	45	2	4
O_2 enrichment max.	l/min	10	20	30	1,5	3
Dimensions	cm	⌀ 40 H 166	square 85 x 60 x 175		⌀ 20 H 125	