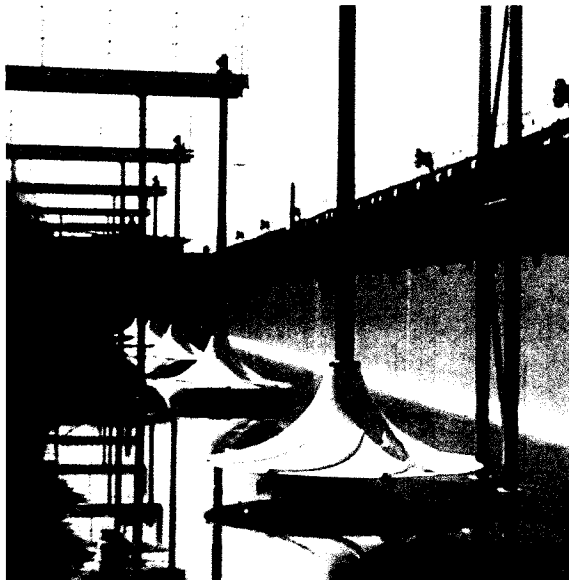


The shape of the hyperboloid mixer is based on complex potential-theoretical calculations. This results in a flow pattern, which, in summary, exhibits the following basic advantages:

- With regard to both quality and quantity, the produced macro-scale flow has the most favourable pattern. By actively re-directing the flow on the surface of the mixer, friction losses are minimized, thus achieving high efficiency.
- The highest velocities and turbulent fluctuating velocities are induced at the bottom. This means that the energy input takes place directly at the bottom, so that the input energy is specifically used to whirl up and suspend sludge flocs and is not wasted anywhere else.
- The flow stays attached to the hyperboloid mixer surface. Flow separations, eddy formations and thus energy losses are prevented. This also boosts the efficiency.
- **HYPERCLASSIC®**-Mixers operate completely without pulsation due to the closed shape and the 8 motion fins (high number of blades).

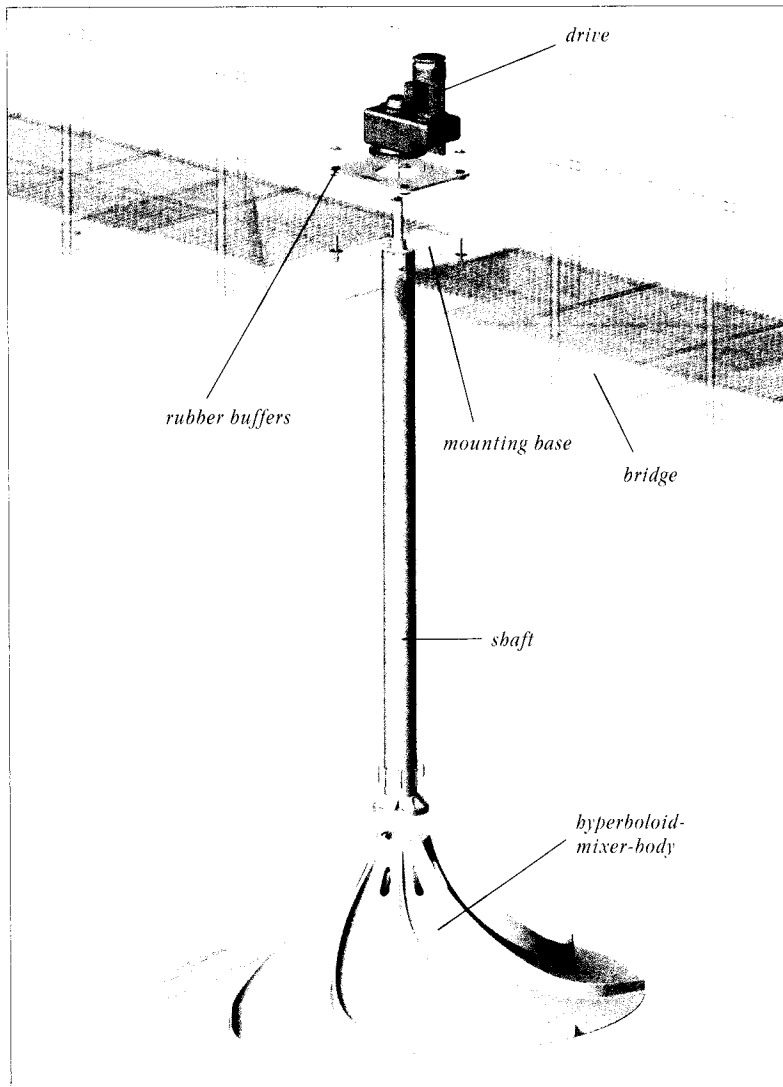


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Mixers in a wutp in Berlin, Germany

- The uniform, radial flow-off over the complete mixer-body facilitates a flow, which is largely free of periodic fluctuations. The effect of this flow is that the hyperboloid mixer centers itself. Therefore the forces on the gear and the bridges is small. In addition, no oscillations are transferred to the shaft and the bridges which allows a simple and economical bridge construction.
- All reaction forces on the gear and bridges are axial and directed downwards. The radial forces which are generated are very small. Therefore mixers with long shafts can also be constructed without problems.
- The finely graduated diameter range along with the selectable rotational direction, especially in long tanks with lengthwise through-flow, has big advantages with regard to the retention time and the flow in tanks of this type. This contributes to a high operational safety level.

## **HYPERCLASSIC®**

### **Design and Material Selection**



### **Design and Material Selection**

As illustrated in the accompanying blow-up drawing, the hyperboloid mixer is made up of three main components which are precisely fitted to each other, the drive, the shaft and the hyperboloid mixer-body.

#### **Drive**

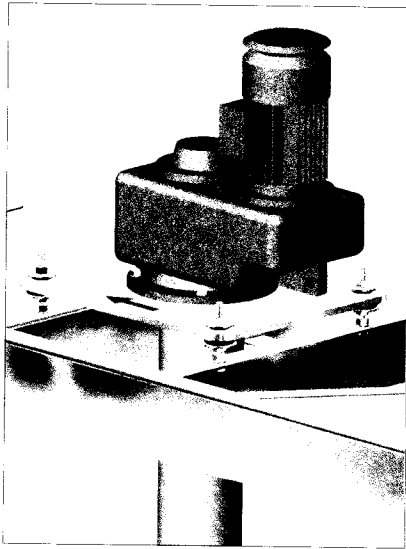
The drive is positioned above the waterlevel and is arranged on a bridge or mounting bracket where it is easily accessible for rarely needed maintenance work.

For wastewater ponds or SBR plants with varying water levels, the hyperboloid mixer can also be mounted on a special float.

Only energy-saving and robust geared motors with reinforced bearings from renowned manufacturers are used. Normally, high service factors are selected and the calculated bearing life expectancy is more than 100.000 h. Special, customer-specific models can be built at any time.

**Simple, robust and  
safe to operate**

***HYPERCLASSIC***<sup>®</sup>  
**Design and Material Selection**



The geared motor sits on a mounting base in a rubber buffer bearing. The propagation of sound waves is thus avoided and the complete mixer is thereby galvanically separated from the bridge.

#### **Shaft**

The shaft provides the connection between the drive and the mixer-body. It transfers the required torque, in order to allow the hyperboloid mixer to rotate.

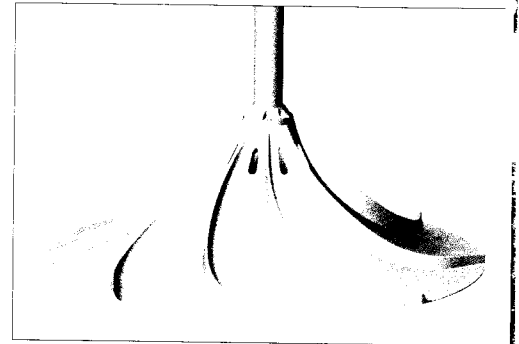
The shaft is manufactured from a specially developed FRP pipe designed for the loads which occur.

It is generously dimensioned and designed for endurance. Through the use of the most modern composite materials, the shaft is very light, extremely corrosion-resistant and flexible. It is particularly easy to mount because of the light weight. All **HYPERCLASSIC**<sup>®</sup>-Mixers can be designed without a bearing because of their innovative design. The small bearing forces are transferred to the geared motor via the shaft and absorbed there. Consequently, no parts whatsoever which require maintenance lie below the water line.

#### **Hyperboloid Mixer-Body**

The hyperboloid mixer-body, developed out of the **INVENT** laboratory in accordance with the most up-to-date knowledge on the mechanics of fluids, is likewise manufactured using fiber-reinforced plastic. The use of the most modern fiber-reinforced composites also guarantees a high-strength, corrosion-resistant and light component here.

The hyperboloid mixer-body is connected to the lower end of the shaft by means of a flange connection. The **INVENT Safety Lock Technology**<sup>®</sup> is used for this purpose.



This enables a simple and rapid assembly as well as a simple removal even after many years of operation. Under operation conditions the connection is safely protected against self-loosening.

The complete hyperboloid mixer is not just producing a favourable flow field but is also absolutely non-clogging because of the optimal shape and the motion fins which are seamlessly integrated in the mixer-body.

The latest development step "**evolution 6**" uses the newly developed **INVENT Progressive Fin Technology**<sup>®</sup>. This technology allows for further significant improvement of the efficiency compared to previous versions.

# The INVENT HYPERDIVE®-Mixer

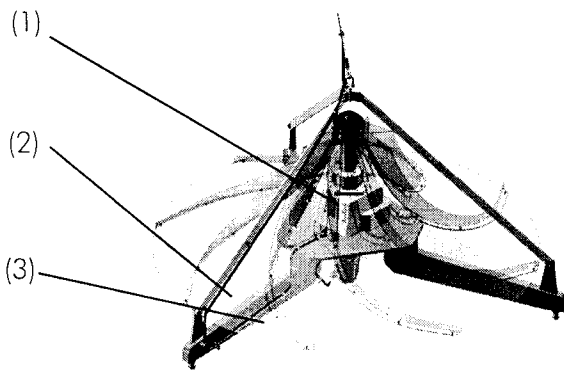
Complementary to the well-known **HYPERCLASSIC®**-Mixer Series with top mounted drive and shaft we also offer the submersed driven version. The **HYPERDIVE®**-Mixer Series features the same excellent mixing characteristics and advantages as the top mounted version but can be applied in cases where bridges cannot be realized or submersed driven solutions are preferred.

## Hyperboloid Mixing Technology – Energy Saving Mixing

**INVENT** made a significant contribution to the efficiency and cost-effectiveness of water and wastewater treatment plants by introducing the hyperboloid mixing technology more than 25 years ago. Since then, the hyperboloid mixing technology has been continuously further developed and improved. Thousands of successful installations in municipal and industrial water and wastewater treatment plants worldwide impressively demonstrate that the hyperboloid mixing technology has already become the industrial standard in this field.

### Design

The **HYPERDIVE®**-Mixer features exactly the same flow-pattern and fluid mechanical advantages as the **HYPERCLASSIC®**-Mixer. The main components such as the high performance hyperboloid mixer-body are identical.



The **HYPERDIVE®**-Mixer with submersible drive

#### (1) Drive Unit

Only energy-saving and robust geared motors with reinforced bearings from renowned manufacturers are used. High service factors are selected and the calculated bearing life expectancy is more than 100,000 h.

#### (2) Tripod and Lifting Frame

The tripod is made from massive coated carbon steel which provides a sufficient weight to keep the **HYPERDIVE®**-Mixer in position safely during operation and standstill. It supports the submersed drive and guides the electrical supplies away from the mixer-body.

A stainless steel lifting wire is attached to the top of the tripod to enable easy lifting in and out of the whole unit and also keeping the power and signal cable in place. The drive shaft and the hub of the **HYPERDIVE®**-Mixer are made from high quality stainless steel. They feature a high resistance to chemical attack and corrosion.

#### (3) Mixer-Body

The hyperboloid mixer-body was developed in the **INVENT** laboratories applying the most up to date fluid mechanical expertise. The use of most modern plastic components results in a high-strength, corrosion-resistant and light-weight mixer-body.

The hyperboloid mixer-body is connected to the drive shaft by means of a shaft/hub connection. The **INVENT Safety Lock Technology®** is used for this purpose. This enables a simple and rapid assembly as well as a simple removal even after many years of operation. Under operation conditions the connection is safely protected against self-loosening.

The complete hyperboloid mixer is not just producing a favorable flow field but is also absolutely non-clogging because of the optimal shape and the motion fins which are seamlessly integrated into the mixer-body design.

The latest development step "**Evolution 7**" uses proprietary **INVENT Progressive Fin Technology®**. In conjunction with an enlarged opening for the secondary current an increase in efficiency of up to 25 % compared to previous models was achieved.

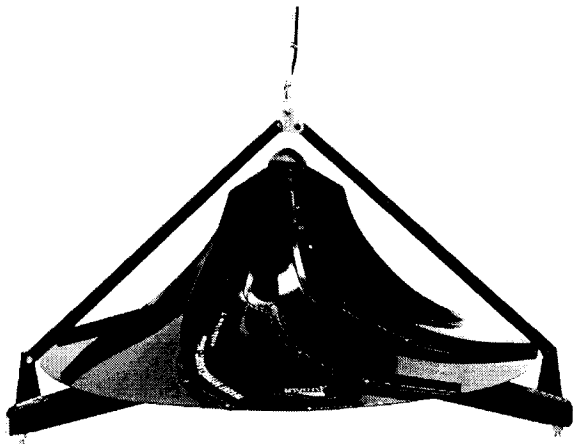
# The INVENT HYPERDIVE®-Mixer

## Installation

The **HYPERDIVE®**-Mixer can be shipped as a complete and ready-to-use unit. Further assembly works on site are not necessary. Install the lifting wire at the basin rim, connect the power cables and the mixer is ready to operate!

## Operation

After a short test run and a check of the direction of rotation the **HYPERDIVE®**-Mixer can start operating without any further work. It is designed for permanent operation and does not require intensive maintenance work.



The **HYPERDIVE®**-Mixer ready to go

## Options and Accessories

**INVENT** offers options such as alternative oil grades, thermistors for monitoring the motor temperature or a leakage sensor.

## Technical Data

### 2,000 series

Mixer Diameter	2,000 mm
Motor Power	0.55 kW to 4 kW
Mixer Speed	20 – 42 rpm

### 2,500 series

Mixer Diameter	2,500 mm
Motor Power	0.75 kW to 7.5 kW
Mixer Speed	16 – 34 rpm

## Material Specification

Drive Unit	<p>Gearbox housing made from cast iron with:</p> <ul style="list-style-type: none"> <li>▪ 2 K Polyurea coating</li> <li>▪ Color black</li> <li>▪ Reinforced Bearings</li> <li>▪ Mineral Oil ISO VG 220</li> </ul> <p>Three-phase asynchronous motor suitable for direct start :</p> <ul style="list-style-type: none"> <li>▪ Thermal Protection PTC-F</li> <li>▪ Efficiency class IE 3</li> <li>▪ Enclosure IP 68</li> </ul>
Tripod and Lifting Frame	Carbon steel with high-quality Polyurea coating
Shaft/Hub	Stainless Steel 316
Mixer-Body	High-strength impact resistant polymer material
Assembly Hardware	Stainless Steel 316