INVENT iFILT®-Diamond Filter

Compact stainless-steel filter
with advanced hydraulic performance

invent®
umwelt und verfahrenstechnik

Contents

Water needs responsibility

Water is the basis and the source of all life. However, the pollution of our waters keeps reaching ever more ominous proportions. This makes the purification of contaminated water and the provision of water of high quality the most important ecological tasks of our times. Since the early 1990s **INVENT** Umwelt- und Verfahrens-technik AG has developed, produced and globally sold innovative machines, systems and processes for the purification and treatment of water. Our daily work and our efficient products contribute to the preservation of water quality on a global scale.

Find out more at
www.invent-uv.de
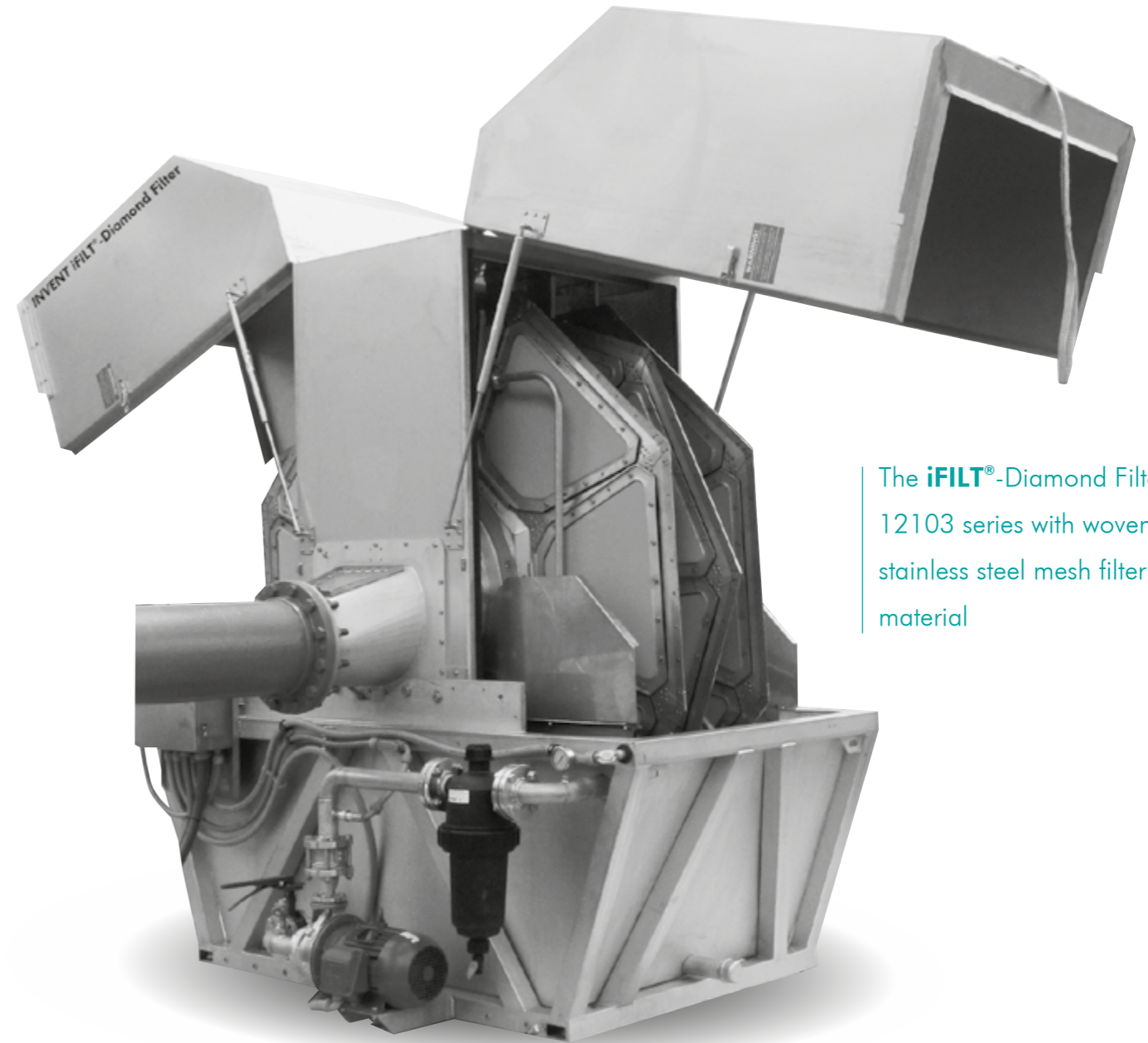
Leaders in mixing and aeration

iFILT®, the INVENT Diamond Filter

INVENT is focussed on municipal and industrial water and wastewater treatment. We have used our many years of experience in this sector and our expertise in the fields of fluid mechanics, hydraulics and component design to develop the novel **iFILT**®-Diamond Filter for tertiary treating of wastewater.

The **iFILT**®-Diamond Filter 12103 series with woven stainless steel mesh filter material

This Diamond Filter was constructed especially for the separation of solids from fluids as a tertiary filtration step and was fluid-mechanically optimized with the help of CFD (Computational Fluid Dynamics). It is extraordinarily energy efficient and offers excellent separation performance using a minimum of space. Its advanced hydraulic performance is based on the principle of cross-flow-filtration (see page 8).

The **iFILT**®-Diamond Filter is entirely made of high-quality stainless steel. The design is simple and self contained, making the **iFILT**®-Diamond Filter easy to install and low-maintenance. During installation it is simply attached to the supply and drainage pipes and electrically connected – that's it!

High-tech for tertiary Wastewater Treatment

The reuse of water directly after it has been treated in a wastewater treatment plant is increasingly gaining in importance. A fundamental part of tertiary wastewater treatment is the added filtration. It is the basis for further steps of conditioning towards water recycling and treatment, such as a fourth treatment stage, separation of microplastics, retention of phosphorus, or disinfection.

The **iFILT®**-Diamond Filter was constructed especially for the separation of solids from fluids as the next treatment phase after secondary sedimentation. It removes the smallest suspended solids that are still present in secondary effluent, for example

- activated sludge particles
- precipitation particles after phosphorus reduction
- powdered activated carbon
- microplastics

In the area of industrial wastewater treatment the **iFILT®**-Diamond Filter is applied in the areas such as:

- general reuse of processing water in the paper and textile industries
- flush water in the beverage industry
- water treatment in fisheries
- irrigation in agriculture

Don't see your application on the list? Contact us!

We use optimized, three-dimensional filter cloth that is woven with extremely fine, robust and corrosion-resistant stainless steel threads. According to the particular requirements a pore size of 20-100 μm is used.

iFILT®-Diamond Filter Principles of Operation

The **iFILT**®-Diamond Filter design is based on fluid-mechanical and stability-mechanical considerations. The novel approach to combine cross-flow-filtration with a Diamond Filter construction allows for exceptionally high throughputs. Additionally, the continuous rotation of the wheel, the hereby initiated effect of tangential-dynamic filtration and the sharp cut-off of the utilized stainless-steel high-performance filter cloth guarantee the best separation results and a minimum loss of pressure. As the diamond-shaped filter is in constant rotation backwashing cycles are reduced to a minimum, which in turn reduces energy consumption.

Basic principle of cross-flow-filtration

Feed Stream
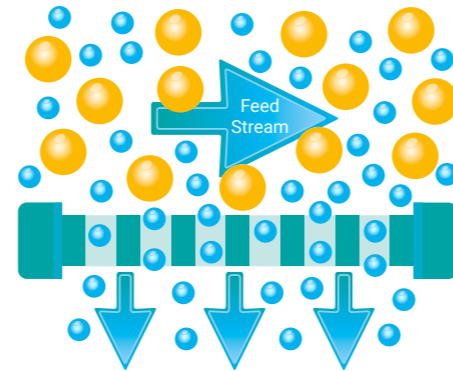
Functional model of the **iFILT**®-Diamond Filter 12108 series

Influent

Backwash water outlet

Filtrate outlet
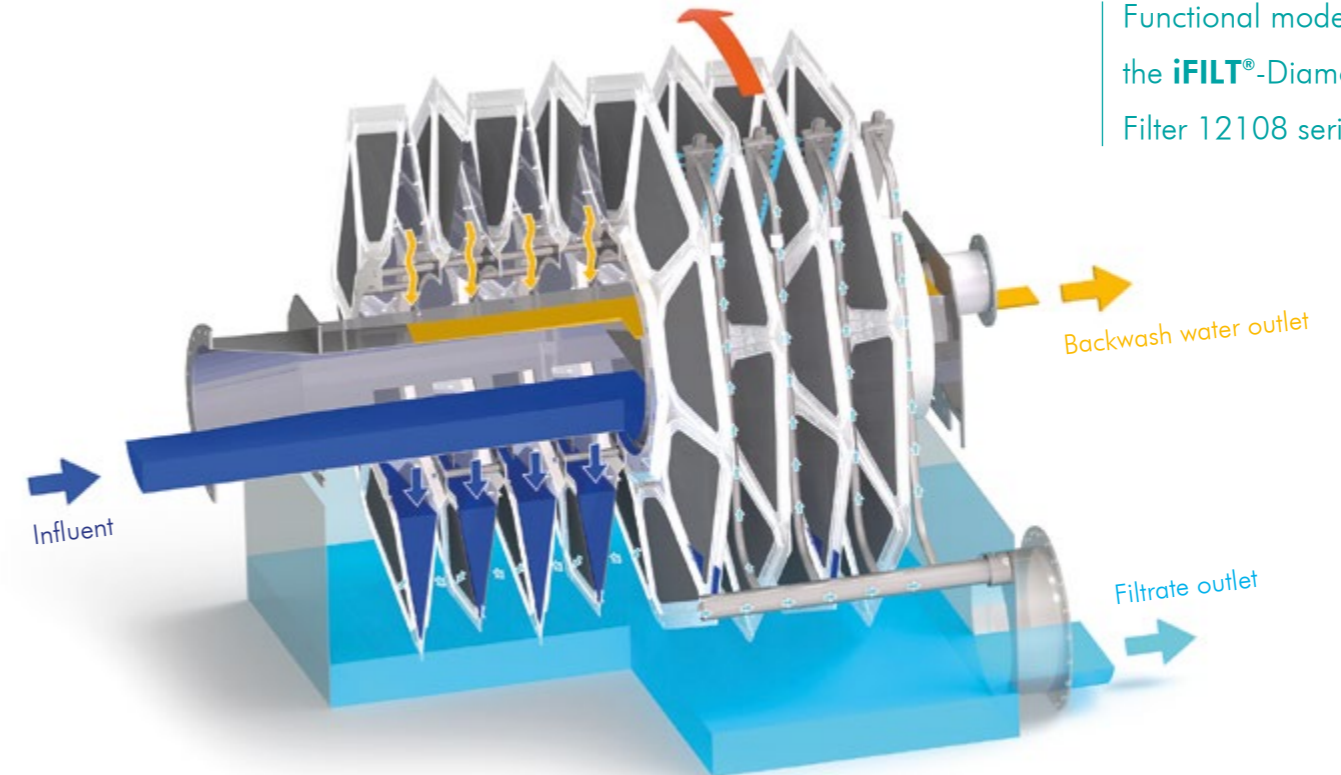
1.

Via the distributor, wastewater runs through the Diamond Filter wheels from the inside towards the outside. The **iFILT**®-Diamond Filter is connected directly into the rotor center via a fluid-mechanically optimized distributor, which eliminates the usage of an expensively sealed rotary union in the feed area. This eliminates any opportunity for leakage and filtrate contamination.

2.

Increasing loads of solids on the filter material slowly lead to a rise of the hydraulic resistance in the diamond-shaped filter wheels, which eventually leads to a rise of the water level within the filter. When a predetermined water level within the filter wheels has been reached a backwash cycle is triggered.

3.

Spray nozzles, wash the filter from the outside, and remove retained solids from the filter. The backwash water pump uses filtrate and thus does not require an external water supply.

4.

The filter rotates during backwash flushing the removed solids into an internal collectors flume and are drained off the filter separate to the filtrate. The solids can be reintroduced to the wastewater treatment plant's influent.

Construction of the iFILT®-Diamond Filter

There are comprehensive and diverse procedural and fluid-mechanical requirements when constructing the Diamond Filter. **INVENT** stepped up to the task and developed the **iFILT**®-Diamond Filter. Its compact design includes the filter wheel, tray, backwashing and enclosure.
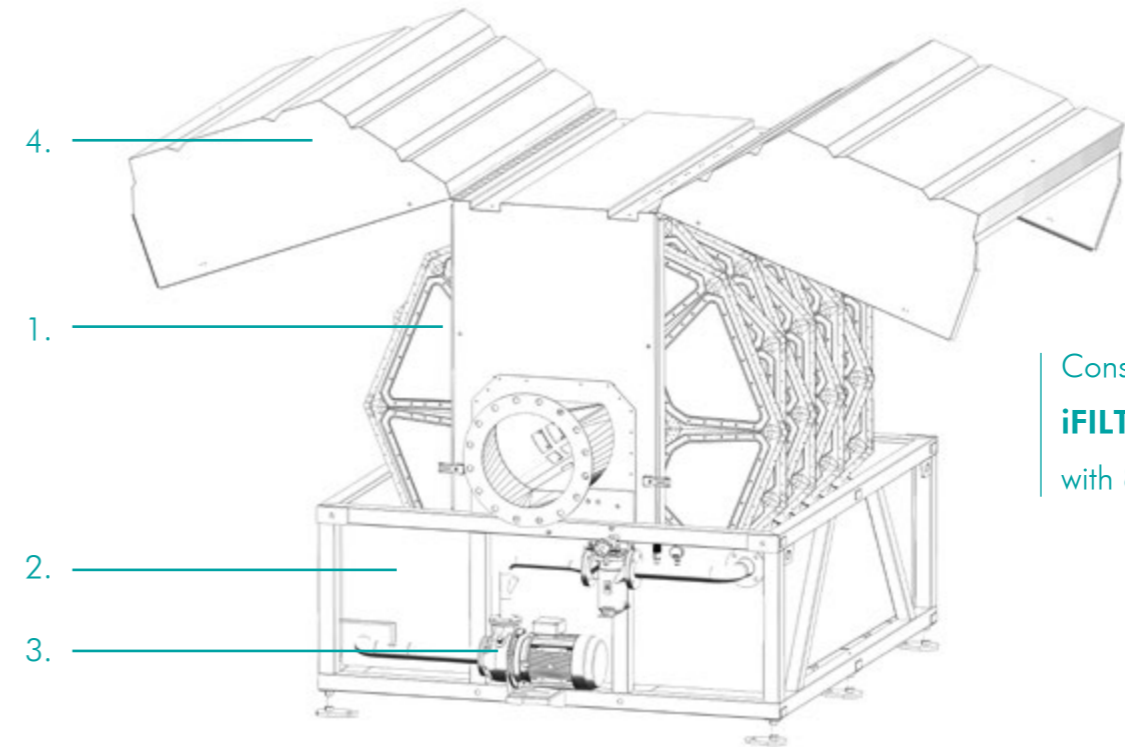
Construction of the **iFILT**®-Diamond Filter with 8 filter wheels

1.

Diamond-shaped Filter Wheel

The filter wheels, as well as the entire machine are made of stainless steel. A filter wheel consists of 16 special filter frames that are covered with a high-performance stainless steel Dutch weave filter cloth.

Particles contained in the wastewater are detained by the filter material (inside-out filtration). Due to the continuously rotating filter wheel influent is continually presented to a fresh filter panel.

2.

Tank

While the solids in the wastewater are detained by the filter material, filtrate flows through the high-performance Dutch weave filter cloth. It is collected in the filtrate tank and finally drained. There are two types of tanks for the **iFILT**®-Diamond Filter:

- If the Diamond Filter is charged with a pump or if the Diamond Filter is installed above ground the tank is made of stainless steel.

- If the Diamond Filter is filled by gravity, which requires the installation of the filter below ground, you have the option of placing a frame version of the **iFILT**®-Diamond Filter into a concrete tank provided by the customer.

3.

Backwashing

The filter material is backwashed at intermittent intervals, controlled by the water level inside the filter wheel. Backwashing is performed using filtrate, which is distributed to nozzle bars via a backwash pump. The reject water including the detained solids is collected in a flume; it drains from the Diamond Filter by gravity.

4.

Enclosure

The enclosure's innovative design features a swivel-mounted side access hatch providing, easy access to the inside of the Diamond Filter.

Two **iFILT**®-Diamond
Filters 12104 series at a
plant in Michigan, USA

Design

As early as during the design and planning stages of the process and plant layout you can count on **INVENT**'s expert support. This ensures, for example, even distribution of wastewater to several machines, as well as a flawlessly functioning hydraulic system.

Installation

The **iFILT**®-Diamond Filter is delivered as a complete solution, i.e. during installation the machine is simply connected to the supply and drainage pipes. Wastewater distribution, backwashing and drainage of reject water are integrated into the machine. This ensures a safe, easy and fast installation on site.
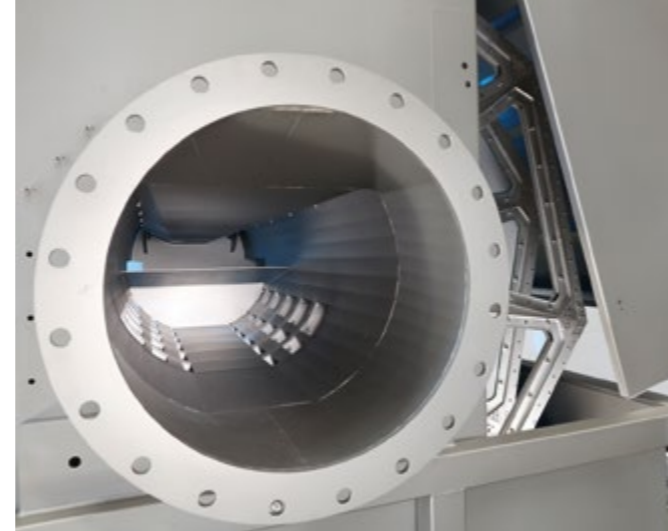
Materials

All of the **iFILT**®-Diamond Filter's components are made of high-quality, rust-free stainless steel in either grade Wst. 1.4301 or grade Wst. 1.4571. This guarantees longevity and level of high protection against corrosion.

The **iFILT**®-Diamond Filter is a robust and reliable system, with low maintenance requirements, is easy to install and meets all expectations of modern wastewater treatment – even under adverse conditions.
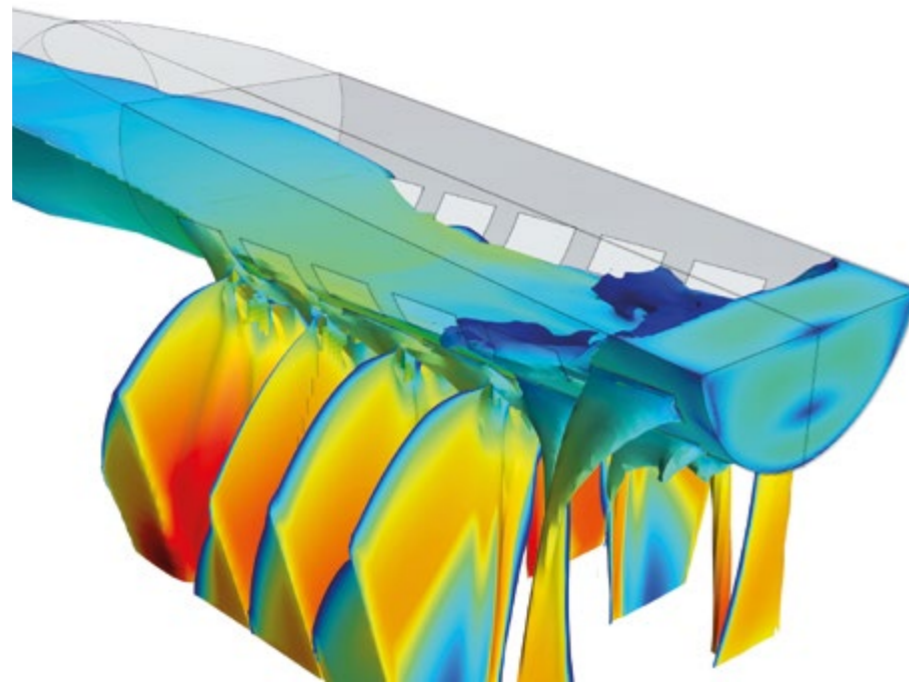
The **iFILT**®-Diamond
Filter 12103 series at a
plant in Florida, USA

Technical Information:

Pore size:	20-100 μm
Filter wheel diameter:	2.1 m
Number of filter wheels:	Up to 16 filter wheels per machine
Hydraulic performance:	Up to 2,500 m³/h per machine
Discharge quality:	TSS[1] discharge concentrations of ≤ 5 mg/l can be realized

Technical Details:

- No sealed rotary union in the feed area
- Direct drive, no chains inside of filter
- Constructed without the use of plastics
- High robustness and longevity
- Compact, flexible design

[1] TSS: Total suspended solids

View into
the distributor

Fluid-mechanically optimized distributor.
Watch the video on our website www.invent-uv.de
to learn more about **THINK** Fluid Dynamix®.

Many Advantages for the User

As the **iFILT**®-Diamond Filter reliably retains solid particles, an effluent almost entirely free of solids is guaranteed, the strain on bodies of water is reduced and the reuse of water is enabled.

Overview of Advantages of the iFILT®-Diamond Filter:

- Improved hydraulic performance due to the principle of cross-flow-filtration
- No complex and large-scale sealed rotary union in the feed area
- Entire machine, including filter material, made of high-quality stainless steel
- Exceptional separation performance
- Fluid-mechanical optimization
- Low generation of rinsing wastewater
- Robust construction
- Virtually maintenance-free system
- Low space requirements

Technical Data of the iFILT®-Diamond Filter:

Machine size	Number of filter wheels	Throughput [m³/h]	Weight [kg]	Dimensions [length x width x height]	Number of rotors per machine
12101	1	up to 160	850	1,500 x 2,300 x 2,550	1
12102	2	up to 320	1,000	1,750 x 2,300 x 2,550	1
12103	3	up to 480	1,210	1,900 x 2,300 x 2,550	1
12104	4	up to 640	1,850	2,550 x 2,300 x 2,550	1
12105	5	up to 800	2,100	2,800 x 2,300 x 2,550	1
12106	6	up to 960	2,400	3,050 x 2,300 x 2,550	1
12107	7	up to 1,120	2,750	3,300 x 2,300 x 2,550	1
12108	8	up to 1,280	3,150	3,550 x 2,300 x 2,550	1
22108	8	up to 1,280	3,800	2,550 x 4,300 x 2,550	2
22112	12	up to 1,920	4,800	3,175 x 4,300 x 2,550	2
22116	16	up to 2,560	6,000	3,675 x 4,300 x 2,550	2

INVENT worldwide

Headquarter

INVENT
Umwelt- & Verfahrenstechnik AG

Am Pestalozziring 21
91058 Erlangen
Deutschland

Tel: +49 (0) 9131 690 98 - 0
Fax: +49 (0) 9131 690 98 - 99
Email: info@invent-uv.de
www.invent-uv.de

US Office

INVENT Environmental
Technologies, Inc.

218 Little Falls Road · Units 7 & 8
Cedar Grove, NJ 07009, USA

Tel: +1 973 571 2223
Fax: +1 973 571 2474
Email: info@invent-et.com

Italy Office

INVENT Aeration Services S.R.L.

Via Castellazzo 4
20040 Cambiago (MI)
Italy

Tel: +39 02 31052184
Email: info@invent-as.it

Middle East Office

INVENT Middle East (FZE)

SAIF Office P8-09-07
P.O. Box 121720
Sharjah
United Arab Emirates

Tel: +971 (06) 54 89 139
Fax: +971 (06) 54 89 138
Email: info@invent-me.ae

Pacific Office

INVENT Pacific Pty. Limited

Unit 3, 1 Trappit Place
Orange NSW
Australia 2800

Tel: +61 408 997 774
Email: info@invent-pacific.com

Leaders in mixing and aeration

Please find our current list of sales partners at www.invent-uv.de

iFILT 1000 01.20 E