

# LIVIC<sup>®</sup>

*The Powerful and Professional Filtration Support*



# AF

Series Bernoulli Self-cleaning Filter

[www.livicfilter.com](http://www.livicfilter.com)

## AF Series Bernoulli Self-Cleaning Filter

AF Series Bernoulli Self-cleaning Filter is designed for automatic continuous filtration of raw water, cooling water and process water in the pressurized systems. AF Series Bernoulli Filter removes suspended debris and particles from natural water sources such as sea water, river water and lake water. It is the ideal solution for the coarse water filtration ranging from 150µm to 2000µm. AF Series Bernoulli Filter works in Bernoulli Effect Principle and it cleans the filter screen with high velocity surface cross flow and the back-flushing flow. It has very low inlet pressure requirement down to 30Kpa and features higher particle removal efficiency and simple and reliable operation.

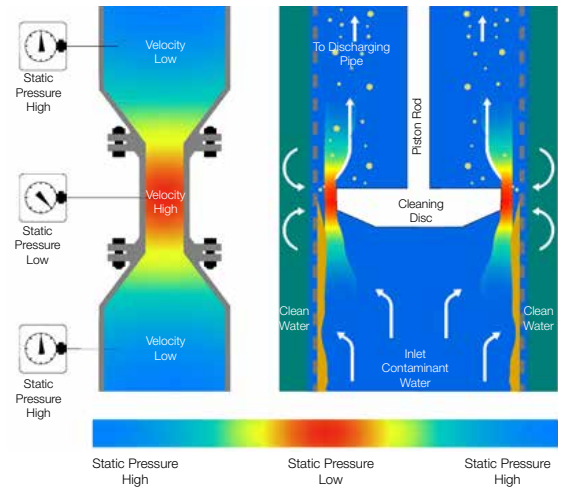
## Bernoulli Effect Cleaning Principle

The filter screen of AF Bernoulli Filter is back-flushed by the cleaning disc inside. In a pneumatic bernoulli filter, the cleaning disc is mounted on the piston rod and is driven by the pneumatic cylinder, while in a motor driven bernoulli filter the cleaning disc with a nut is mounted on two guiding rods and is driven by a bidirectional rotating thread shaft. When the cleaning action triggered, the disc moves into the filter screen and the water passes through the gap between the disc and the filter screen inner surface. Flow velocity is accelerated when the water passes the gap, while the static pressure around the gap is reduced because of the Bernoulli Effect Principle. Around the disc edge, the vacuum effect of lower static pressure back-flushes the filter screen inside surface with the filtered water.

Watch Working Principle Demo on  **YouTube**



### How Does Bernoulli Effect Happen in the Filter?



**Pneumatic Bernoulli Filter**

More competitive construction price, simple structure, very easy for maintenance



**Motor Driven Bernoulli Filter**

Ideal for very limited filter installation space or jobsite without compressed air supply

### Performance Test 200µm Filter Screen

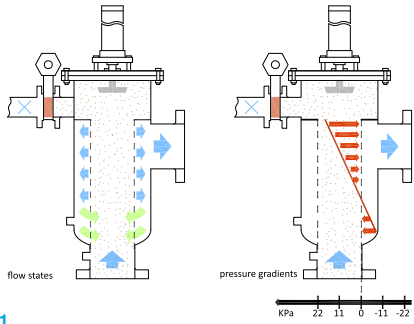


Before the self-cleaning begins

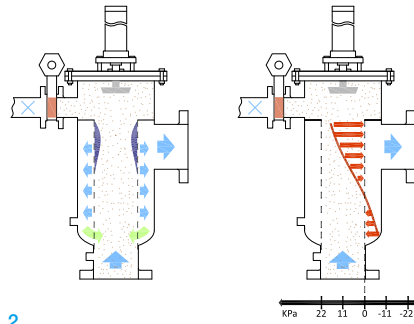


After the self-cleaning ends.

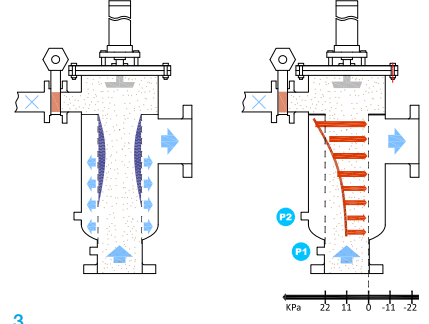
# The Complete Working Stages of Bernoulli Filter



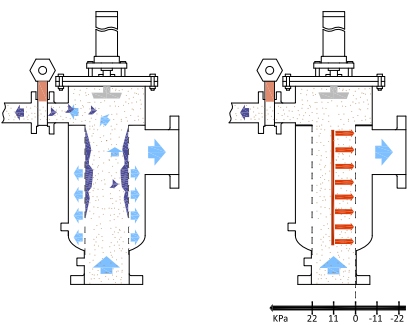
**1** filtration in the upper 2/3 screen in the lower 1/3 reverse flow takes place because of high flow velocity in the filter screen entrance. this causes no impurity deposit.



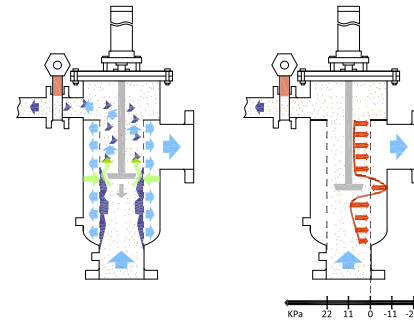
**2** filtration in progress the screen gradually gets clogged from top to down. filtration also begins in the 1/3 screen. reverse flow in the screen entrance area still takes place.



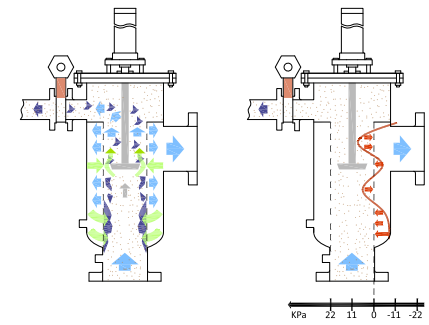
**3** filtration and self-cleaning action triggered 2/3 upper screen gets almost clogged filtration starts on the whole screen surface the differential pressure triggers the self-cleaning action



**4** cleaning and filtration the flushing valve is opened the clean disc keeps still in the initial position the coarse particles are easily flushed out the lower 1/3 screen also takes part in the filtration

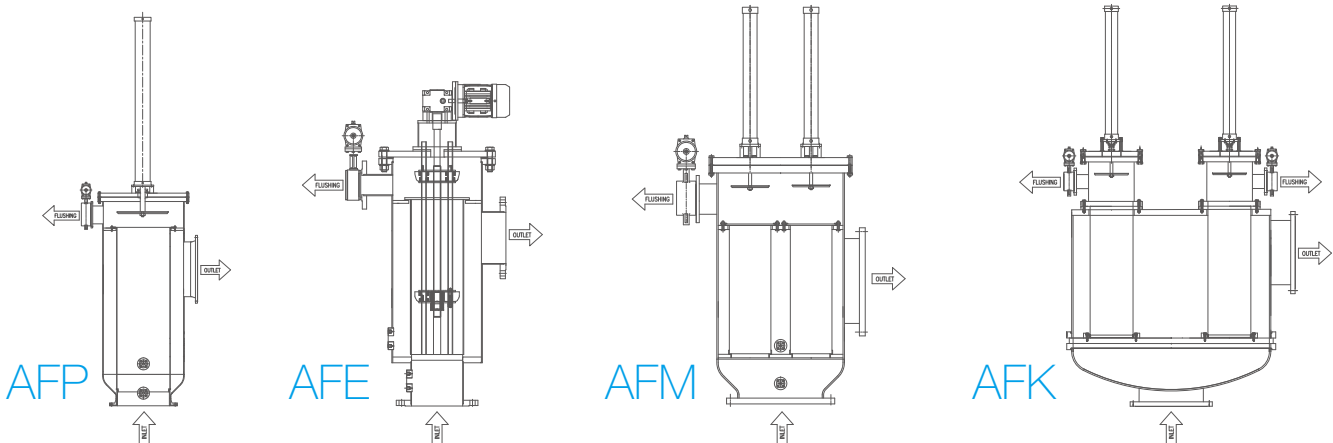


**5** cleaning and continuous filtration the disc moves down into the screen (down to 2/3) cleaning takes place on the screen surface around the disc because of the Bernoulli effect principle



**6** the disc moves up and down and cleans the upper 2/3 screen reverse flow takes place and cleans the lower 1/3 screen particles are flushed out. the whole screen is cleaned

## AF Series Bernoulli Filter Types



AF Filter Types	AFP	AFE	AFM	AFK
<b>Features</b>	Single Basket, Simple Structure Price Competitive	Motor Driven, Single Basket Save Installation Space	Save Installation Space and Smaller Standard Multi-basket Design, Price Competitive	Better Back-flushing Performance Especially at 150-200 micron, Save Installation Space and Smaller Standard Multi-basket Design
<b>Self-cleaning Actuator</b>	Pneumatic Cylinder	Gear Motor	Pneumatic Cylinder	Pneumatic Cylinder
<b>Filter Screen</b>	Single Basket	Single Basket	Multi-basket	Multi-basket
<b>Filtration Degree (µm)</b>	200-2000	200-2000	200-2000	150-2000
<b>Filter Housing Material</b>	304/316L/Duplex 2205/CS/GRP	304/316L/Duplex 2205/CS	304/316L/Duplex 2205/CS	304/316L/Duplex 2205/CS
<b>Inlet and Outlet Size</b>	DN65-DN800	DN65-DN800	DN200-DN800	DN200-DN800
<b>Flushing Outlet</b>	1 Flushing Outlet	1 Flushing Outlet	1 Flushing Outlet Header	Individual Flushing Outlet for Each Basket



## Technical Features and Advantages

- Only two moving parts, the cleaning disc and the flushing valve
- Simple and reliable design structure, very easy to open for maintenance
- Non-contact back-flushing when cleaning, no wearing, no particles larger than the screen aperture extruded through the screen, high removal efficiency
- Consistant low pressure drop (<11Kpa) when the filter screen is clean or dirty
- Low working pressure requirement down to 30Kpa, less energy consumption
- Wide flowrate range from 30 to 6500 m<sup>3</sup>/h with one single filter
- No filtration or flow interruption when back-flushing
- Filtration degree ranges from 150μm to 2000μm
- Flexible installation in the horizontal or vertical position
- Configured with smart D.P. transmitter, more reliable than D.P. switch



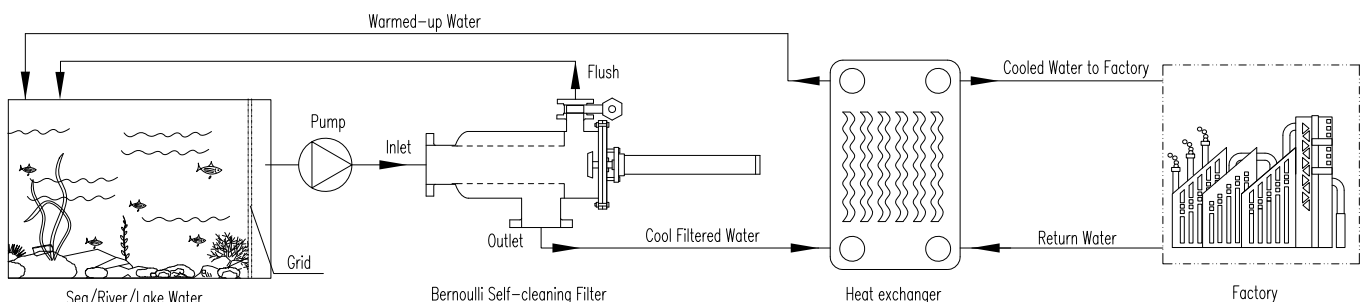
## Comparison to the Brush Filter

When a brush filter is brushing and cleaning, many particles larger than the screen aperture are extruded through the screen. And also brushing results in wearing and shortens the filter screen service life. While AF Bernoulli Filter cleans the screen by back-flushing and high velocity surface cross flow with no contact between the cleaning disc and filter screen. AF Series Bernoulli Filter removes particles much more efficiently than the conventional brush filter, which means better protection for the downstream equipments and lower running cost.

## Bernoulli Filter Specifications

<b>Bernoulli Filter Types</b>	AFP/AFE/AFM/AFK	<b>Compressed Air Supply</b>	0.6Mpa, Clean & Dry
<b>Control Panel</b>	Based on Siemens Controller	<b>Working Pressure (Min.)</b>	30Kpa / 0.3Bar
<b>Control Mode</b>	D.P. and Time Mode	<b>Filtration Rating</b>	150-2000μm
<b>D.P. Instrument</b>	Differential Pressure Transmitter	<b>Design Pressure</b>	0.6/1.0/1.6/2.5 Mpa
<b>Filter Screen Material</b>	304/316L/duplex 2205/Super Duplex 2507	<b>Design Temperature</b>	80 °C
<b>Housing Material</b>	304/316L/duplex 2205/CS/GRP	<b>Flowrate Range</b>	30-6500 m <sup>3</sup> /h
<b>Flushing Valve</b>	Pneumatic / Eletrical Butterfly Valve	<b>Cleaning Pressure Drop</b>	11~16Kpa
<b>Power Supply</b>	110V/220V/380V/440V AC	<b>Inlet and Outlet Size</b>	DN65-DN800
<b>Largest Removable Particle</b>	8mm	<b>Piston Rod Material</b>	316L
<b>Housing Seal</b>	NBR	<b>Piston Rod Seal</b>	PU

## Bernoulli Filter in a Direct Sea Water Cooling System



# Typical Filtration Applications

## Typical Applications

Water Treatment Prefiltration, Circulating Cooling System, Heat Exchanger Protection, Spraying Nozzle Protection, Ballast Water Treatment System, Ultrafiltration Membrane Protection, Prefiltration Before UV

## Waters Served

Underground Water, Sea Water, Lake Water, River Water, Circulating Cooling Water, Sewage Water, Process Water, Cleaning Water



Two Bernoulli Filters remove large harmful particles from sea water before the ultrafiltration membrane system in a desalination plant.



Two Bernoulli Filters are installed before plate heat exchangers to reduce clogging and fouling in a power plant.



A Bernoulli Filter in a circulating cooling system removes suspended solids from the cooling water.



A Bernoulli Filter is working in a ballast water management system. It protects the downstream system from clogging.



A Bernoulli Filter serves as a circulating cooling filter in the steel mill.



Two Bernoulli Filters are installed before a UV sterilizer in the aquaculture industry. They remove suspended particles from the water.



A Bernoulli Filter is working in a waste water treatment system as a pre-filter removing large particles.



A Bernoulli Filter in a district cooling system removes the debris and particles, protects the tubular heat exchanger from clogging and improve the heat exchanging efficiency.



Four Bernoulli Filters are working parallelly to purify raw river water which is supplied to the paper mill as process water.



## Bernoulli Filter Screen



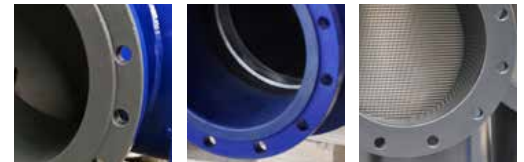
Slot Screen

Filtration Rating Convert	mesh	100	75	60	50	40	30	25	20	15	10	7
	µm	150	200	250	300	375	500	600	750	1000	1500	2000

AF Series Bernoulli Filter mainly uses the slot screen, which can be easily back-flushed clean and rarely get clogged. The slot screen has the uniform and precise slots and very long service life. The filtration degree ranges from 150µm to 2000µm. 304, 316L, duplex 2205, super duplex 2507 are available for screen material. The 304 is economic and suitable for the normal fresh water. the 316L is for the normal anti-corrosion request against the sea water. The duplex 2205 and super duplex 2507 the ideal screen materials for the long service life in sea water. The perforated screens are also available for the coarse filtration larger than 1000 µm if specially requested.



Sea Water Resistant Design



SL700 Lining

Rubber Lining

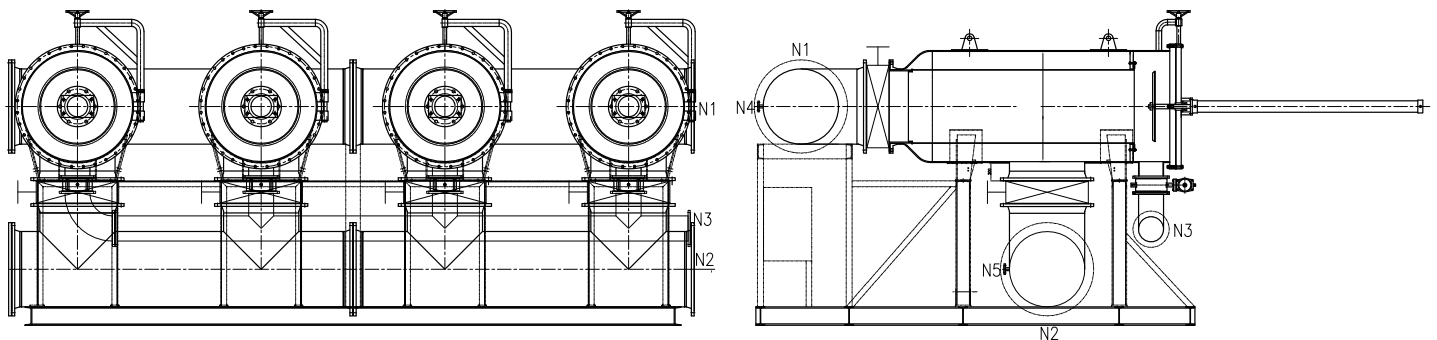
Rilsan Coating

## AF Series Bernoulli Filters in LIVIC Workshop

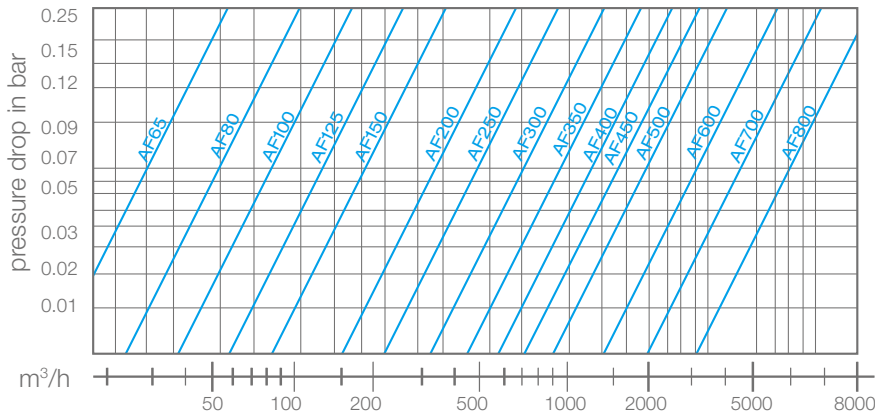


## Parallel Bernoulli Filter Installation Layout

AF Series Bernoulli Filter Skid, 20000m<sup>3</sup>/h, 3 Operation 1 Standby

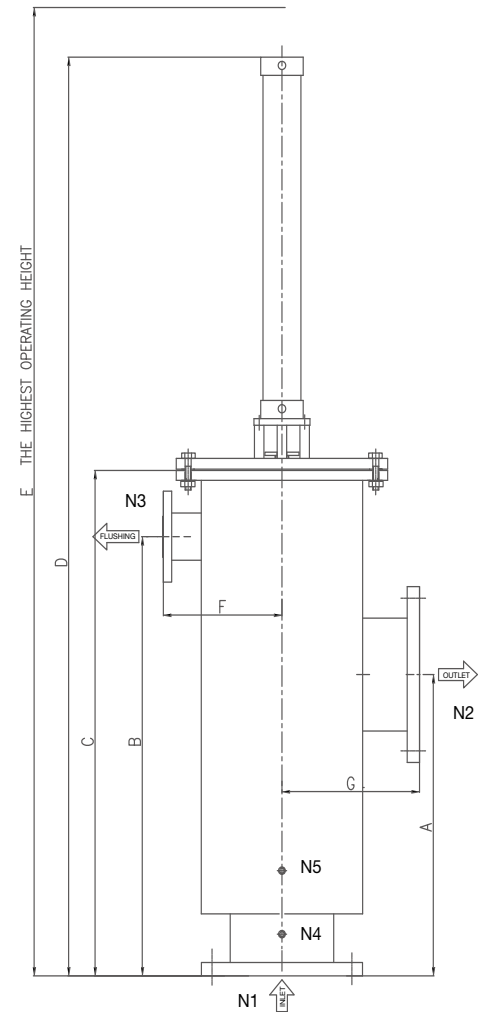


## Flowrate and Pressure Drop Chart



## Bernoulli Filter Housing Dimension

MODEL	N1/N2 DN	N3 DN	A mm	B mm	C mm	D mm	E mm	F mm	G mm
AF65	65	25	265	365	430	785	885	126	146
AF100	100	40	325	480	555	1155	1255	210	210
AF125	125	40	365	525	600	1216	1316	210	210
AF150	150	40	485	680	775	1535	1635	245	236
AF200	200	50	695	965	1075	2040	2140	310	340
AF250	250	100	730	1060	1225	2220	2350	315	365
AF300	300	100	905	1245	1415	2605	2735	375	390
AF350	350	100	1060	1480	1665	2945	3075	435	465
AF400	400	100	1110	1540	1730	3235	3365	465	480
AF450	450	100	1230	1780	1930	3650	3510	490	510
AF500	500	150	1400	1990	2200	3970	4100	530	560
AF600	600	200	1800	2370	2590	4705	4835	575	605
AF700	700	200	1885	2505	2725	5035	5355	705	755
AF800	800	200	2135	2855	3125	5735	6055	755	805



## Filter Code Order Guide

■ AF Bernoulli Filter Ordering Code Example: AFP300SFP10EN-S2000L

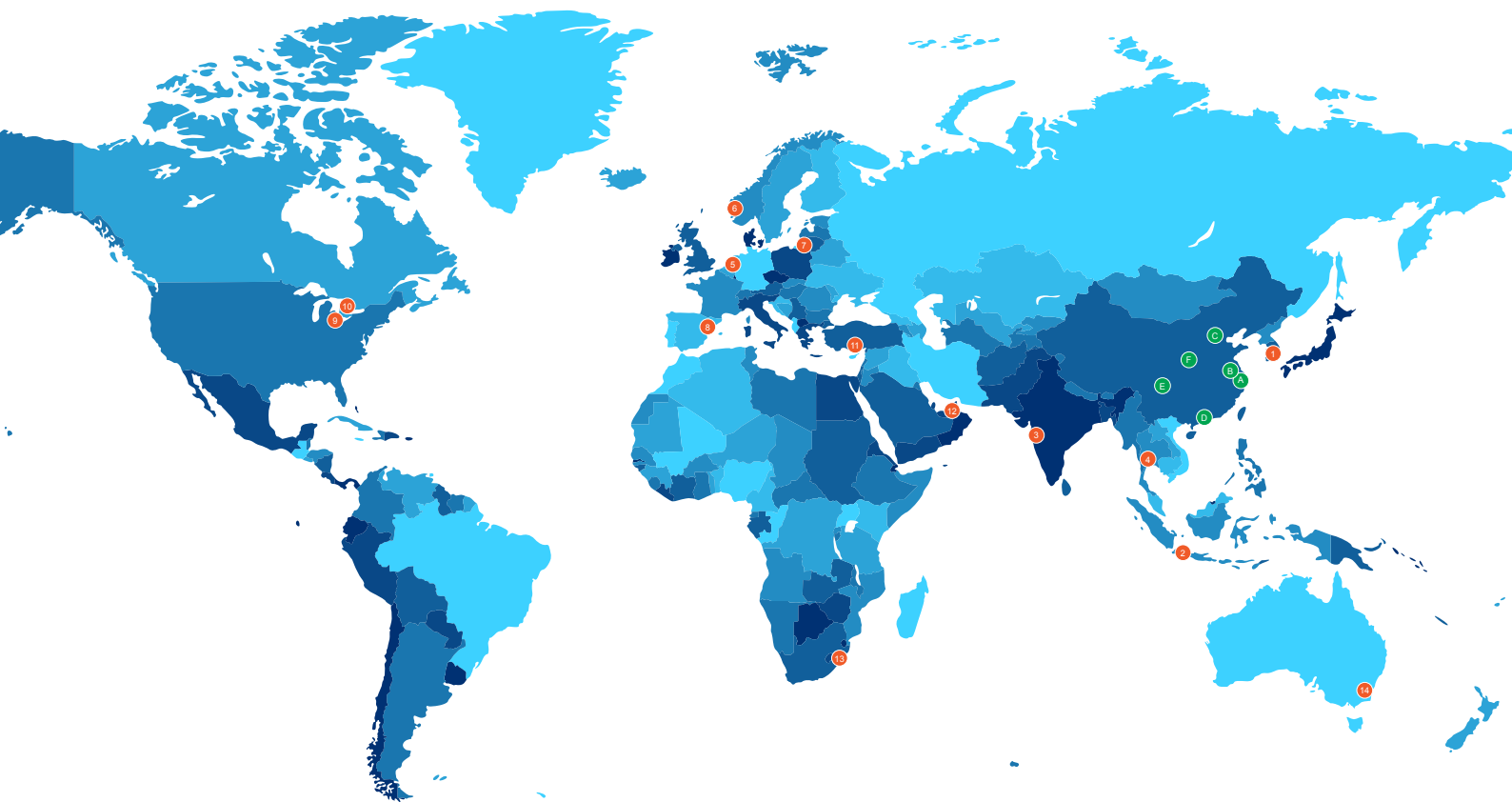
1	2	3	4	5	6	7	-	8	9	10
AFP	300	S	F	P10	E	N	-	S2000	L	

1	AF Bernoulli Filter Types
AFP	Pneumatic, Single Basket One Flushing Outlet
AFE	Motor Driven, Single Basket One Flushing Outlet
AFM	Pneumatic, Multi-basket One Flushing Outlet for All Baskets
AFK	Pneumatic, Multi-basket Individual Flushing Outlet for Each Basket
2	Inlet/Outlet Nominal Size
65	DN65
80	DN80
~	~
700	DN700
800	DN800
3	Housing Material Type Code
S	S Series (Stainless Steel Housing)
L	L Series (CS housing+SL700 Lining)
G	G Series (CS housing + Rubber Lining)
R	R Series (CS housing + Rilsan Coating)
F	GRP

4	Inlet and Outlet Connection Standard
F	DIN Flange (HG20592-2009)
A	ANSI Flange (HG20615-2009)
5	Design Pressure Class
P6	0.6MPa
P10	1.0MPa(Standard Design)
P16	1.6MPa
6	Housing Material
A	304
D	316L
E	Carbon Steel(Q235-B)
L	2205 Duplex Stainless Steel
G	GRP
7	Installation Option
H	Support Saddle for Horizontal Installation
V	Support Lugs for Vertical Installation
N	No Support Designed, Mounted by the Customer

8	Filter Screen Rating
S150	150µm Slot Screen
S200	200µm Slot Screen
~	~
S1500	1500µm Slot Screen
S2000	2000µm Slot Screen
9	Filter Screen Material
A	304
D	316L
L	2205 Duplex Stainless Steel
S	2507 Super Duplex Stainless Steel
10	Design and Manufacturing Standard
Per LIVIC Factory Standard, Refer to Pressure Vessel Code	
A	Comply with ASME Code Section VIII, No U Stamp
U	Comply with ASME Code Section VIII, U Stamp
G	Comply with GB150 Code, No Stamp
S	Comply with GB150 Code, Stamped

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### Shanghai LIVIC Filtration System Co., Ltd.

Add: No. 8, Hehua Rd., Pudong New District, Shanghai, China

Tel: ++86.21.68173577 Fax: ++86.21.68173570

Hotline: 400.101.1315 E-mail: sales@livicfilter.com

Website: www.livicfilter.com