

Anhydro Spray Drying for the Food Industry



Typical Product Applications

With the Anhydro spray drying equipment you can produce a wide range of food powders.

Food Ingredients

Covering a wide range of products used within the Food Industry. Among these are Algae, Gum Arabic, Garlic, Tea, and Plant Extracts etc.



Vegetable Proteins

Consisting of Soy-, Potato-, Pea- and Bio Proteins, Yeast Extracts, and Amino Acids are within the SPX FLOW knowhow.

Flavours

Supplied into the marketplace in both liquid and dry form. The dry form is encapsulated or mixed with a carrier.

Products are Natural or Nature Identical Flavours, reaction Flavours and Fragrances.



Carbohydrates

The Starch family i.e. Modified Starch, and Starch Derivates), Maltodextrine, Glucose Syrups, Polyols, and CMC. These products are widely used throughout all Food-, Beverage-, Confectionary-, Cosmetic-, and Pharmaceutical Industries.

Animal Proteins

Consisting of Hydrolized Fish or Meat Proteins. Further Gelatines, Eggs, Blood, and Greaves are within SPX FLOW knowledge base.



Instant Coffee

Within Instant Coffee Processing SPX FLOW can offer the following, Aroma Recovery, Extract Concentration, Spray Drying, and Integrated Process Control.

Anhydro Spray Drying Plants

CRITICAL CUSTOMER DEMANDS

Plant solutions for customers looking for long-term competitive leadership and profitability need to meet a long line of decisive demands. These include:

- Reliable product quality and uniformity with consistent powder moisture content and particle size distribution.
- High yield at lowest possible cost.
- The ability to utilize the same plant for a number of different applications.
- Traceability and compliance with food regulations.
- New product developments with short time to market.

BENEFITS

The Anhydro spray drying plants are available in a wide range of sizes and configurations. All are based on experience gained from long-term partnerships with customers all over the world in order to provide competitive solutions for critical demands:

- Increased control over a wide range of parameters such as moisture content, particle structure, particle size and distribution, solubility, mixability, and wettability, and retention of natural aromas and flavours.
- Energy-efficient components, continuous and rapid drying, ease of operation, and process automation deliver enhanced process yield at a reduced cost.
- Top-quality and reliable components for prolonged service life together with efficient and straightforward CIP (Cleaning-In-Place) mean increased uptime.
- Automated process control enables end-to-end traceability.
- Plant designs based on experience with many different applications offer versatility for a variety of applications.



Atomization - Heart of the Process

SPX FLOW OFFERS TWO BASIC TYPES OF ANHYDRO ATOMIZERS:

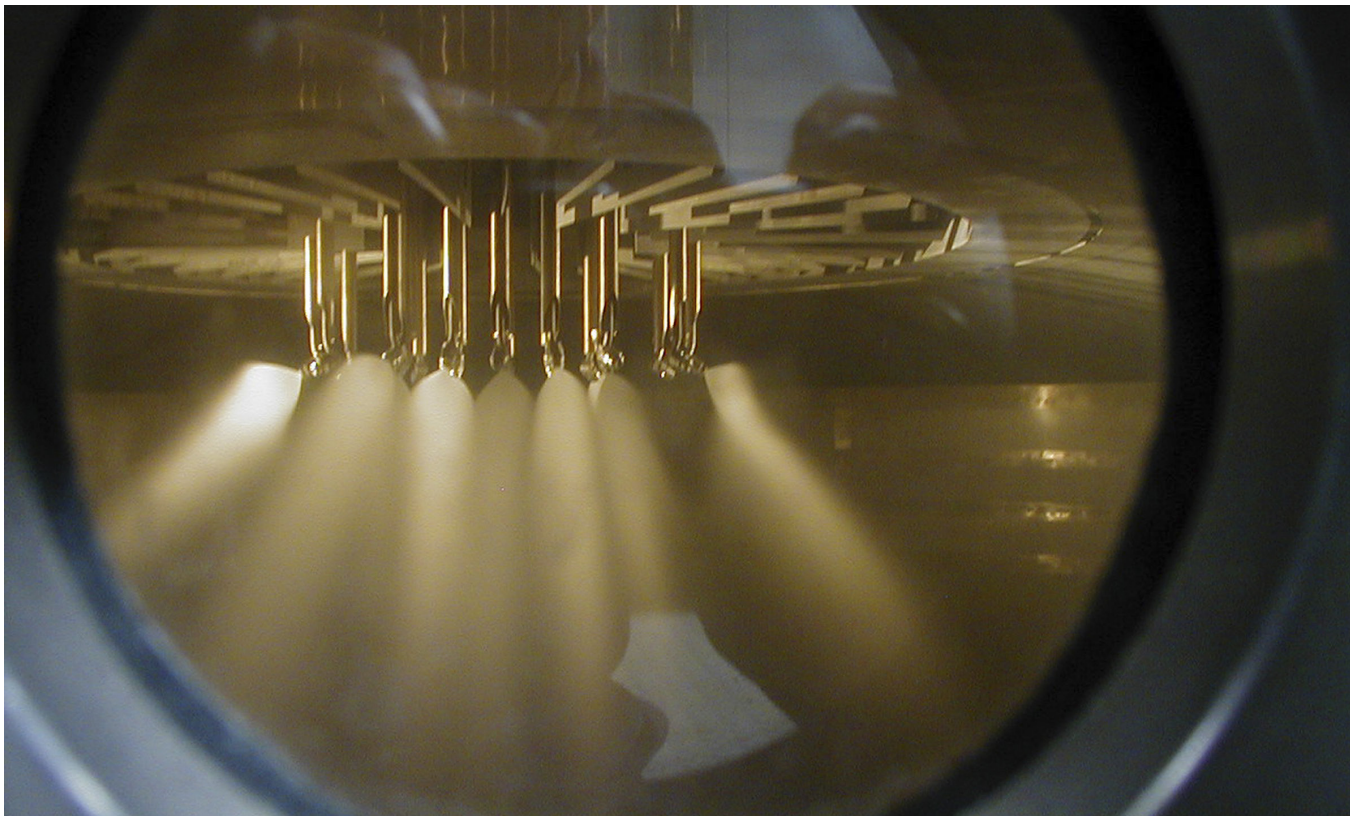
- Centrifugal atomizers, accelerating and atomizing the liquid feed using centrifugal force in a spinning disc. Can be utilized in many Food applications and available for feed rates up to 80 tons/h.
- Nozzle atomizers, spraying the liquid feed under high pressure or using compressed air. High pressure nozzle atomization is used in particular, when a coarse powder with narrow particle size distribution and high bulk density is required.

Unique Features

- High periphery speed
- Improved liquid distributor
- Operation in plants with high drying chamber pressure
- Sanitary design in stainless steel
- Less maintenance due to direct drive
- Low noise level
- Low weight
- Easy handling and operation



Atomizer CG250



Nozzle atomizer

Typical Anhydro Plant Configurations

ANHYDRO CONICAL SPRAY DRYERS

The Anhydro Conical Spray Dryer (CSD) with air outlet at the base of the chamber.

Each type offers the following options:

- Single-stage spray dryers with product outlet at the base.
- Two-stage spray dryers sending product to an external fluid bed dryer and/or cooler.
- Multi-stage spray dryers sending product to an integrated fluid bed, and then into an external fluid bed dryer and/or cooler.

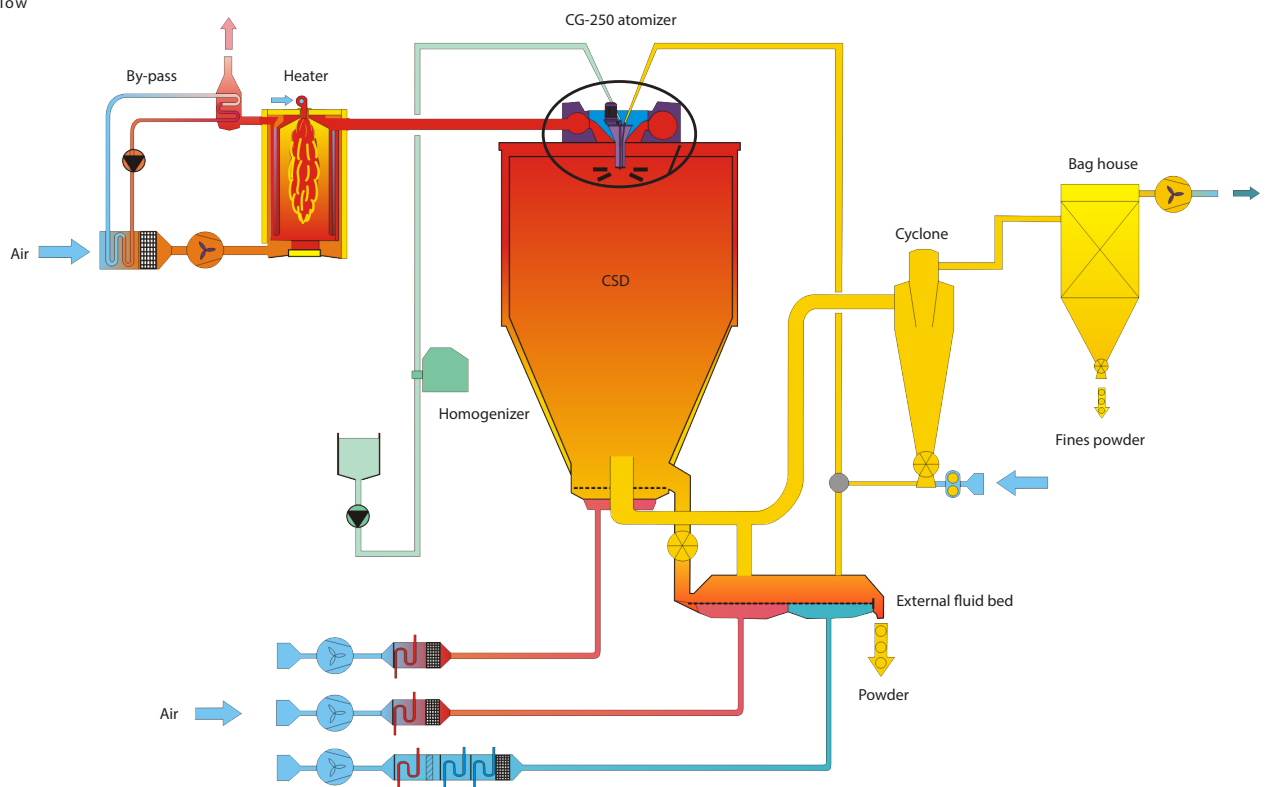
FINES RE-INJECTION

Fines are led back from the cyclones and/or bag filters to the atomization zone or integrated fluid bed for agglomeration.



A drying chamber cone and an external Fluid Bed

Process flow

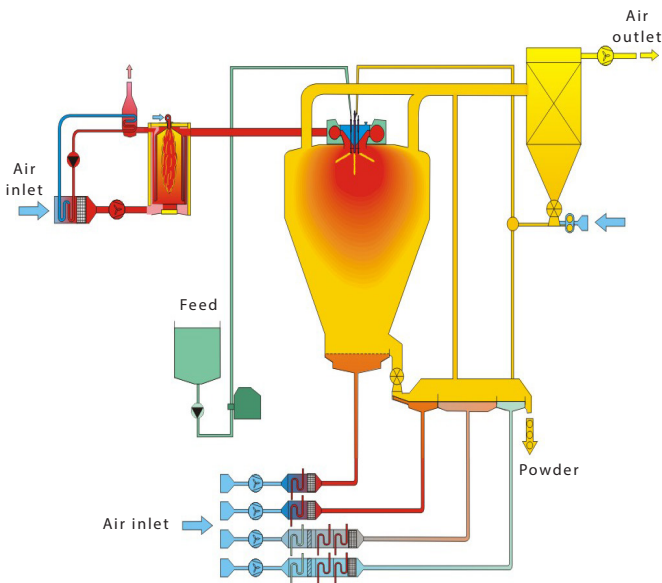


3-stage Conical Spray Dryer (3CSD)

Anhydro Spray Bed Drying Plant

Specially designed for the production of dust-free powders with a high mechanical strength.

The drying chamber is provided with an integrated fluid bed. The feed is sprayed co-currently to the drying air towards the fluid bed, where an adjustment of the fluidization rate enables increased control of the fines fraction to be removed from the product.



The fines are conveyed with the drying air to the wet zone in the drying chamber top, where the fines agglomerate with the wet droplets. Fines carried out together with the air are separated from the air in a cyclone system or a bag filter, and the fines are re-circulated to the atomizer zone for agglomeration.

The powder is further dried and cooled in an external fluid bed before discharge. The agglomerated powder produced is dust-free with an average particle size of 100 - 350 microns.

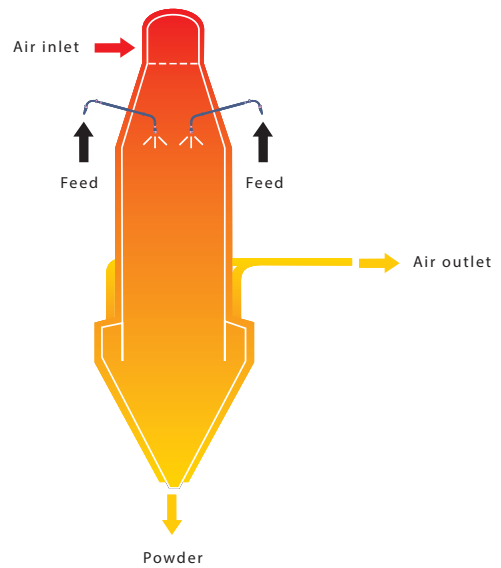
Anhydro Tall Form Drying Plant

Specially designed for the production of large spherical single, non-agglomerated particles.

The feed is atomized at a low-pressure co-current to the drying air being introduced at the chamber top as a laminar flow.

The chamber has a large cylindrical section providing sufficient residence time for large particles to dry out under gentle conditions. The main part of the powder is discharged at the chamber bottom and can be further dried or cooled in an external fluid bed.

The fines are conveyed with the drying air to a separation system. Many tall form drying plants are provided with a bustle on the cylinder for the air outlet, reducing the dust fraction of the powder.



The Anhydro Triple-A® Spray Dryer

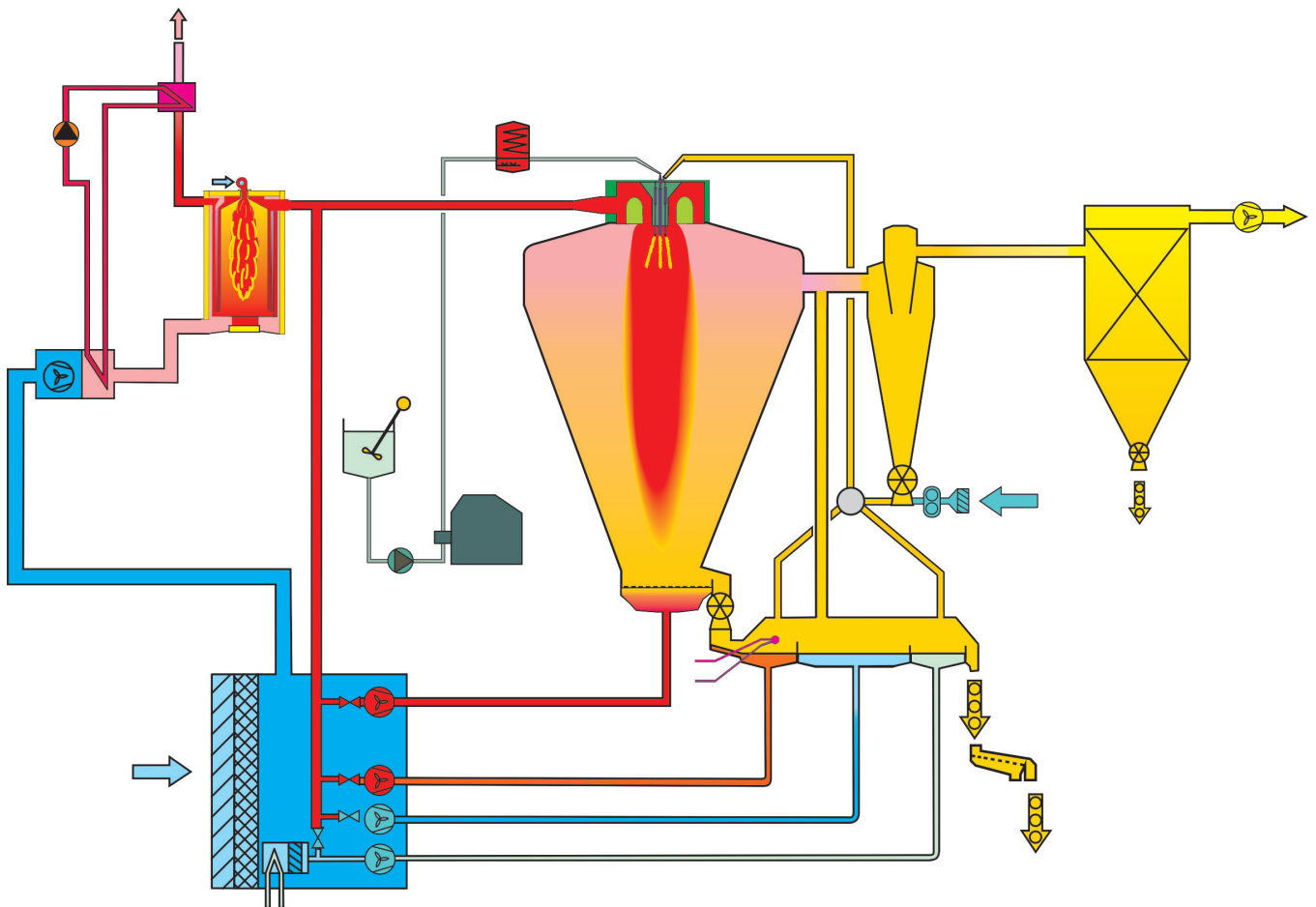
The Anhydro Triple-A® spray dryer offers plant customisation options enabling you to take full control of particle size (up to 300 microns) and structure in your production of free-flowing dustless powders and agglomerates, for example:

FOCUS ON END-PRODUCT QUALITY

Powder manufacturers are facing increasingly rigid quality demands requiring control over powder structures and functional properties.

The Anhydro Triple-A® Spray Dryer enables you to customize a plant which ensures competitive and consistent end-product quality, while providing control over your production run-time, yield, and operating costs:

- Innovative drying chamber design for efficient drying and long production time between CIP (Cleaning-In-Place)
- Nozzle atomization for optimum spray of feed material
- Selection of integrated second-stage fluid bed drying
- Third-stage external fluid bed option for final drying and/or cooling
- Selection of exhaust systems and fines recirculation options to enhance product quality and yield
- The Triple-A Dryer can be an effective solution for sticky products, because of the short exhaust duct



A typical Triple A Dryer with air outlet at the top of the chamber

Anhydro Fluid Beds – Gentle and Efficient Finishing

Temperature and residence time in the spray drying chamber are important parameters affecting powder consistency and the retention of nutrients, flavours, and aromas.

After-drying of powder is typically used for heat-sensitive products and for obtaining a free-flowing powder.

FLUID BEDS

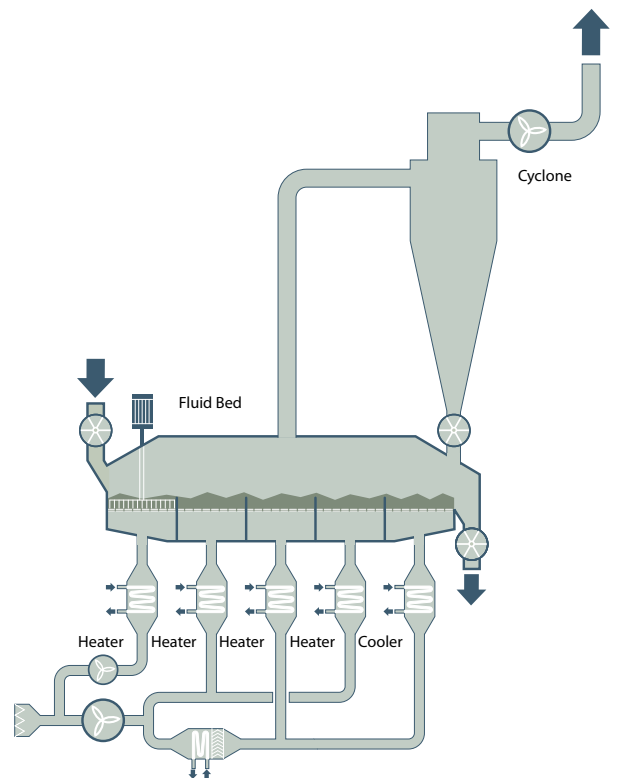
An Anhydro Fluid Bed can be used for after-drying and/or cooling of powder leaving the drying chamber with relatively high moisture content. Use of a fluid bed enables adjustment of process parameters in order to achieve an excellent overall drying economy and powder quality. An external fluid bed is also ideal for other kinds of powder treatment such as mixing, agglomeration, dust binding, and instantising.

Additional drying using one or more Anhydro Fluid Beds adds a number of advantages compared to single-stage spray drying e.g.:

- Energy savings due to a high temperature difference in the dryer.
- Improved product quality, in particular in heat-sensitive products, due to a more gentle drying process.
- Higher powder bulk density and lower air content due to lower drying temperature.
- Lower powder loss due to reduced powder content in the air.

REWET AGGLOMERATION

Anhydro fluid beds are also used for rewet agglomeration for the production of coarse and stable agglomerates as well as adding atomized additives. Agglomeration results in better free-flowing properties, less dust, and improved solubility and wettability.



Examples of various Anhydro Fluid Bed plants

List of products

FOOD PRODUCTS

- Acerola
- Alfalfa extract
- Algae
- Apple juice
- Arrow root
- Bakery mix
- Beetroot
- Beef flavour
- Bilberry
- Blood plasma
- Blood/protein
- Cappuccino
- Caramel colour
- Carrageenan
- Carrot extract (colour)
- Chocolate flavour
- Citrus emulsion
- Citrus pomace
- Cocoa
- Coconut cream/protein
- Coffee extracts
- Coffee whitener
- Corn steep water
- Dextran
- Dough
- Drink mix
- Egg white
- Egg, whole
- Egg yolk
- Emulsifier
- Fat
- Fish solubles
- Flavours
- Food colours, natural
- Food ingredients
- Fruit juice
- Garlic extract
- Gensing extract
- Glucose
- Glue concentrate
- Gum arabic
- Herbal extracts
- Haemoglobin
- Hibiscus
- Horlicks
- Hydrolyzed fish
- Hydrolyzed gelatine/protein
- Lecithin
- Lemon
- Licorice extract
- Malt extract
- Maltodextrine
- Meat extract/flavor
- Monoglycerides
- Oat starch
- Orange juice
- Passion fruit
- Pectin
- Plant extracts
- Potato fruit water - juice
- Potato starch
- Protein isolate
- Raspberry
- Saccharin
- Saccharose
- Sorbose
- Soups
- Soya lecithin
- Soya protein
- Spice mixtures
- Spirulina-algae
- Starch
- Starch, modified
- Strawberry
- Sugar syrup
- Tea extract
- Tobacco extract
- Tomato flavour
- Vegetable protein
- Vegetable extracts
- Vinegar
- Wheat bran
- Wheat flour
- Wheat starch
- Wort
- Yeast



Global Services for Individual Needs

CUSTOMER FOCUS

SPX FLOW can assist in designing complete spray drying plant solutions and enhancing process parameters as well as plant maintenance and spare parts services.

The SPX FLOW worldwide service organization is ready to provide any necessary spare parts at short notice. The SPX FLOW service technicians can help you rectify problems on site, thus reducing unscheduled downtime.

SPX FLOW offers a number of service agreement options, depending on individual needs, and the SPX FLOW service engineers are always available to provide application and development support.

INNOVATION CENTRE

SPX FLOW's state-of-the-art test facility close to Copenhagen in Denmark enables customers to perform confidential product development and trials together with knowledgeable SPX FLOW technologists on drying and evaporation equipment ranging from laboratory-scale testing to full-scale pilot production runs. Here it is possible to test applications and processes, facilitating fast time to market. Small plants are also available on a rental basis for in-house laboratory trials.

ENGINEERING STANDARDS

Environment protection is incorporated in accordance with local rules and regulations and is a key point in the plant design. SPX FLOW ISO 9001:2008 certified. All our plants meet the CE marking and ATEX requirements, where applicable.



SPX FLOW innovation centre in Soeborg, Denmark

Anhydro Spray
Drying Plants for the
Food Industry

SPXFLOW

Global locations

USA

SPX FLOW

Getzville, NY 14068

USA

P: +1 716 692 3000 or 800 828 7391

F: +1 716 692 6416

E: anhydro.americas@spxflow.com

APAC

SPX FLOW CHINA

Shanghai 2000052

Peoples Republic of China

P: +86 21 2208 5888

E: anhydro.china@spxflow.com

Based in Charlotte, North Carolina, SPX FLOW, Inc. (NYSE: FLOW) is a multi-industry manufacturing leader. For more information, please visit www.spxflow.com

SPX FLOW TECHNOLOGY DANMARK A/S

Oestmarken 7

2860 Soeborg

Denmark

P: +45 7027 8222

F: +45 7027 8223

E: ft.dk.soeborg@spxflow.com

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