



**SprayNozzle ENGINEERING**  
*Total Spraying Solutions*



# AUTOMATED SYSTEMS FOR PRECISION SPRAY APPLICATIONS

COATING, MOISTENING, AND LUBRICATING  
SPRAY TECHNOLOGY SOLUTIONS



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# EXCEEDING EXPECTATIONS

BETE'S MISSION GOES BEYOND JUST SELLING SPRAY NOZZLES. IT IS TO PROVIDE ENGINEERED SPRAY PROCESS SOLUTIONS THAT EXCEED CUSTOMER EXPECTATIONS IN EVERY DETAIL.

Our patented spray technologies are inspected for quality and proven in the field to meet the high standards of third-party certifiers.

**We manufacture tens of thousands of different products**, including fog and misting nozzles, tank washing nozzles, material injection nozzles, custom spray lances, fabrications, and spraying systems.

### THE MOST RESPONSIVE CUSTOMER SERVICE AND APPLICATIONS ENGINEERING IN THE INDUSTRY

Our experience working in dozens of industries and enhancing thousands of applications translates to expert engineering you can count on when it matters most. **Expect world-class customer service from project inception through the delivery of your final product.**

From initial discussions to design, fabrication and ongoing service – **we will make your project a success.**



Spray  
Nozzles



Spray  
Fabrications



Spray  
Systems



Applications  
Engineering



Spray  
Research

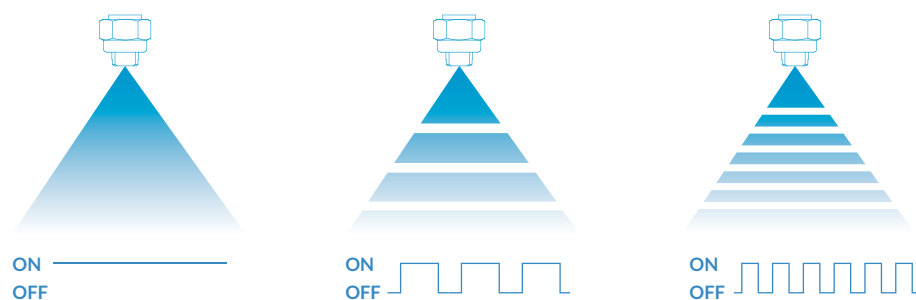
# THE ADVANTAGES OF PRECISION SPRAY AUTOMATION

SPRAY THE EXACT AMOUNT THAT YOU NEED,  
PRECISELY WHEN YOU NEED IT.

With FlexFlow™ precision spray control systems, you can activate spray zones using automatic triggers such as photoelectric and proximity sensors, or make adjustments manually. Additional trigger delay settings provide flexible parameters to reduce material consumption and minimize cleaning maintenance by fine tuning the timing of the intermittent spray onto moving targets.

## ACHIEVE UNIFORM COATING WITH PULSE WIDTH MODULATION

FlexFlow™ spray controllers achieve optimum spray precision by regulating the spray flow rate using Pulse Width Modulation (PWM). With traditional single-fluid spray nozzles, the only way to adjust the flow rate is by adjusting liquid supply pressure, which results in changes to spray performance characteristics such as drop size and spray pattern. By comparison, PWM flow control works by cycling spray nozzles on and off at high frequencies (up to 150 times per second). Adjusting the duty cycle, or ratio of ON versus OFF dwell time, enables FlexFlow to control the average flow rate without changing the supply pressure or spray performance characteristics. The high-frequency operation ensures that spray coverage remains uniform, even when coating products on high-speed conveyors.



# PRECISION SPRAY CONTROL FLEXIBILITY

BETE's intermittent spraying solutions are ideal for precision coating, lubricating, and moistening applications in Food Processing, Building Materials Manufacturing, and any other industry looking to save resources and improve product quality. Our team will help you select the right combination of products to achieve the best spraying solution for your unique application.

## AUTOMATIC PRECISION SPRAY NOZZLES

Available in a variety of configurations and spray patterns, including hydraulic or air atomized sprays. All nozzles feature compact designs that can pair with our FlexFlow™ spray control panels for a complete spray system solution.

### • HYDROPULSE® SPRAY NOZZLES

- Electric Food-Grade Hygienic Design
- Electric Industrial Design
- Pneumatic Design

### • XA AIR ATOMIZING SPRAY NOZZLES

- Achieve a variety of atomized sprays

### • SAM AIR ATOMIZING SPRAY NOZZLES

## CUSTOM SPRAY FABRICATIONS

Create the ideal header, spray bar, or manifold for your unique spray process using BETE's custom fabrication capabilities.

### • SPRAY HEADERS & MANIFOLDS

- Achieve uniform spray coverage across wide areas
- Common for conveyor coating applications
- Optimize liquid/air flow and nozzle placement

## FLEXFLOW™ PRECISION SPRAY CONTROLLERS

### • FLEXFLOW 1000 SPRAY CONTROLLER

Program two zones of unique precision spray control with up to six nozzles in each zone – or synchronize up to twelve nozzles.

### • FLEXFLOW 2000 PREMIUM SPRAY CONTROLLER

Manage up to twenty spray nozzles in up to twenty independently controlled spray zones. Auto-adjust duty cycle to match conveyor speed in each zone. Includes an Ethernet port for process integration with your existing plant operations.

SPECIFICATIONS FOR ALL PRODUCTS ON THIS PAGE DETAILED ON PAGES 5-11



# BETE® FLEXFLOW™ PRECISION SPRAY CONTROL SYSTEMS FOR AUTOMATIC SPRAY NOZZLES

BETE's FlexFlow Spray Systems ensure precision control and flexible automation for our Electric HydroPulse® and other automatic spray nozzles for use in Food Processing, Building Materials Manufacturing, and any other industry looking to save resources and improve product quality. These plug-and-play controllers are an elegant solution for precision coating, moistening, and lubricating applications. Consider the FlexFlow for any industrial process where expensive compounds or ingredients need to be sprayed directly onto the process target. Each control panel can function as a standalone system. Our 2000 model features an Ethernet port to allow integration with your existing plant operations. Visit [www.bete.com/flexflow-spray-systems](http://www.bete.com/flexflow-spray-systems) for more information.



## FLEXFLOW 1000

- HMI touch screen includes intuitive operations for streamlined control and diagnostic overview for troubleshooting
- Operate up to 12 nozzles total
- Two zones of precision control
  - Operate up to 6 nozzles in each zone
  - Zones 1 and 2 can be programmed with independent or synchronous settings



## FLEXFLOW 2000

Experience increased precision spray flexibility by controlling up to 20 unique spray nozzles with up to 20 independently managed spray zones. With individual spray zone assignment for each nozzle, you can group nozzles into as many zones as needed to accomplish your spray process objectives.

- HMI touch screen includes intuitive operations for streamlined control and diagnostic overview for troubleshooting
- Match spray volume to conveyor speed with auto-adjust duty cycle
- Extremely flexible in zone operations – can operate up to 20 nozzles with up to 20 triggers in up to 20 zones
- Ethernet port for process integration
- Three versions available with an easy upgrade path:
  - Model 2010 operates up to 10 nozzles
  - Model 2016 operates up to 16 nozzles
  - Model 2020 operates up to 20 nozzles



## FLEXFLOW™ PRECISION SPRAY CONTROL FOOD PROCESSING BENEFITS

BETE's precision spray control systems provide even spray coverage with minimal waste. Discover optimal spray performance for applying flavors, coatings, mold inhibitors, antimicrobials, preservatives, release agents, and moisturizers with exceptional accuracy.

- Control a wide range of flow rates
- Guarantee an even and uniform application rate that connects with conveyor line for automated speed adjustments
- Reduce consumption of expensive coatings
- Reliable spray dosing provides an accurate calorie count
- Reduce overspray waste and improve product quality
- Exact target coatings secure a clean and safe environment
- Promote increased production
- Reduce maintenance and downtime

## USE AS A PRECISION SPRAY SYSTEM FOR A WIDE VARIETY OF FOOD PROCESS COATING OPERATIONS:

- Application of antimicrobial agents for food safety
- Application of preservatives and mold inhibitors to help extend shelf life
- Application of egg wash
- Coat bottles to minimize scuff damage
- Apply water to balance moisture loss from the freezing process
- Apply coatings and release agents to pans, cookie sheets, and conveyors to prevent sticking
- Apply flavors, oil, and butter to enhance the appearance and improve the taste of products
- Apply viscous coatings like syrups and glazes

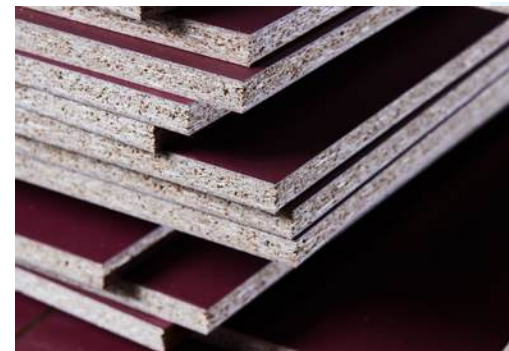
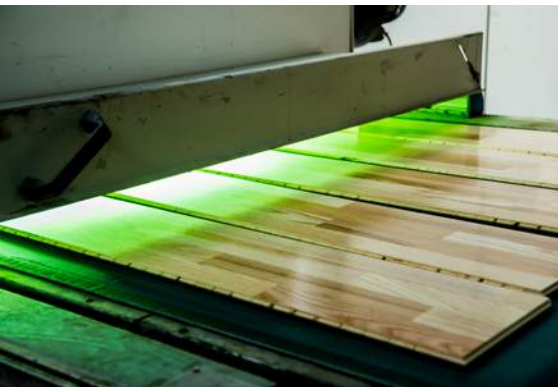
## FLEXFLOW™ PRECISION SPRAY CONTROL ENGINEERED WOOD PRODUCTION BENEFITS

BETE's FlexFlow Spray Systems provide solution confidence for precise applications of resin, wax, water, and release agents during engineered wood production. Addresses problems involving overspray or underspray to ensure production efficiency for chips, mats, cauls, or belts.

- Ensure precise application and reduce waste
- Integrate tonnage or line speed to maintain uniform coverage when variables change
- Reduce the use of expensive resins, waxes, or release agents by applying the exact volume required
- Apply the optimal amount of surface moisture to increase production by decreasing time in the press
- Confidently transition to running full polymeric MDI (methylene diphenyl diisocyanate) products with non-stick press protection
- Eliminate compressed air from most pre-press and wax operations

### USE AS A PRECISION SPRAY SYSTEM FOR A WIDE VARIETY OF ENGINEERED WOOD PRODUCTION OPERATIONS:

- Apply PMDI or LPF (lignin-phenol-formaldehyde) resin in the blender
- Apply slack wax, tallow wax or e-wax in the blender
- Add surface moisture before pressing boards
- Apply mixed release agent on mats, cauls, or press belts when using PMDI resins
- Mark nail lines on OSB (oriented strand board)



# BETE® HYDROPULSE® AUTOMATIC SPRAY NOZZLES FOR PRECISION FOOD PROCESSING & INDUSTRIAL APPLICATIONS

## BENEFITS

- Precision volume sprays directly on the target
- Reduced waste and minimal overspray maintain a clean, safe environment
- Uniform coverage and drip-free performance
- Each nozzle produces a wide range of flow rates and spray patterns with interchangeable tips

## ELECTRIC HYDROPULSE® AUTOMATIC SPRAY NOZZLES

BETE's electric-actuated HydroPulse Spray Nozzles assure precision volumes of expensive ingredients, and compounds are sprayed directly onto your processing target, with overspray waste virtually eliminated. Pair with the BETE® FlexFlow™ Precision Spray Control System to achieve uniform coverage, even if you adjust your conveyor speed.

Electric HydroPulse (EHP and EHPI) spray nozzles do not require a compressed air source and are capable of cycling on/off up to 150 cycles per second. These features afford the option of using high-frequency cycling known as Pulse Width Modulation (PWM) to vary the liquid spray flow rate at constant supply pressure with little change in spray performance by adjusting the duty cycle. When the spray cycles at high frequencies, coverage uniformity is maintained because the duration between pulses of spray is short enough to ensure there are no gaps in the spray coverage. Utilize these advanced intermittent spraying features to save valuable spray media while enhancing product quality. Visit [www.bete.com/hydropulse-ehp](http://www.bete.com/hydropulse-ehp) and [www.bete.com/hydropulse-ehpi](http://www.bete.com/hydropulse-ehpi) for in-depth datasheets, spray pattern videos, and additional information.



## HYDROPULSE® - ELECTRIC - EHP - FOOD GRADE HYGIENIC DESIGN

|                                                             |                                                                                   |
|-------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>Liquid inlet connection</b>                              | ⅜", NPT or BSPP; or ½" Tri-Clamp                                                  |
| <b>Maximum liquid flow rate</b>                             | 1.0 GPM / 3.8 LPM                                                                 |
| <b>Maximum rated pressure</b>                               | 250 PSI / 17 bar                                                                  |
| <b>Thermal insulation class</b>                             | F (311°F / 155°C)                                                                 |
| <b>Power</b>                                                | 9.4W @ 24VDC                                                                      |
| <b>Electrical Connector</b>                                 | M8 3-pin                                                                          |
| <b>Maximum cycle frequency</b>                              | 150 cycles/sec                                                                    |
| <b>Nozzle construction</b>                                  | Stainless steel wetted components, Food grade Viton® (FKM) seals, hygienic design |
| <b>Interchangeable BJ, BJH, and CW nozzle tip options.*</b> |                                                                                   |



## HYDROPULSE® - ELECTRIC - EHPI - INDUSTRIAL DESIGN

|                                                             |                                                       |
|-------------------------------------------------------------|-------------------------------------------------------|
| <b>Liquid inlet connection</b>                              | ⅜", NPT or BSPP                                       |
| <b>Maximum liquid flow rate</b>                             | 1.0 GPM / 3.8 LPM                                     |
| <b>Maximum rated pressure</b>                               | 300 PSI / 20 bar                                      |
| <b>Thermal insulation class</b>                             | F (311°F / 155°C)                                     |
| <b>Power</b>                                                | 10.4W @ 24VDC                                         |
| <b>Electrical Connector</b>                                 | DIN 11 mm                                             |
| <b>Maximum cycle frequency</b>                              | 50 cycles/sec                                         |
| <b>Nozzle construction</b>                                  | Stainless steel wetted components, Viton® (FKM) seals |
| <b>Interchangeable BJ, BJH, and CW nozzle tip options.*</b> |                                                       |



## HYDROPULSE® - PNEUMATIC - PHP - IMPROVED DESIGN

Pneumatically actuated for crisp on/off precision spray performance. Provides a controlled intermittent spray using only liquid pressure as the force for atomization.

|                                                                |                                                                         |
|----------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>Inlet connection</b>                                        | ¼" NPT or BSPP, liquid; ⅜" NPT or BSPP, cylinder air; or DN10 tri-clamp |
| <b>Maximum flow rate</b>                                       | 12.6 GPM / 57.7 LPM                                                     |
| <b>Maximum rated liquid pressure</b>                           | 600 PSI / 42 bar                                                        |
| <b>Operating temperature range</b>                             | -15°F to 400°F / -26°C to 204°C                                         |
| <b>Air cylinder pressure</b>                                   | 30 PSI to 250 PSI / 2 bar to 17 bar                                     |
| <b>Air cylinder operation</b>                                  | Single acting (spring return) or double acting                          |
| <b>Maximum cycle frequency</b>                                 | 3 cycles/sec                                                            |
| <b>Nozzle construction</b>                                     | Stainless steel wetted components, Viton® (FKM) seals                   |
| <b>Interchangeable BJ, BJH, CW, and ST nozzle tip options.</b> |                                                                         |



*\*Due to pressure loss through the Electric HydroPulse body, the nozzle tip flow rate is different than the standard for each tip. Please reference the HydroPulse Electric Datasheet PDFs available at [www.bete.com](http://www.bete.com) for a resolved flow rate range.*

# BETE® AIR ATOMIZING AUTOMATIC NOZZLES FOR PRECISION SPRAY APPLICATIONS

Air atomizing nozzles use the energy in compressed air or gas to produce finely atomized liquid sprays at relatively low operating pressures.

- If you are working with a low pressure and desire a smaller drop size than can be achieved with a single-fluid hydraulic nozzle, a two-fluid air atomizing nozzle is the perfect choice.
- When a viscous fluid needs to be sprayed/atomized and cannot be sprayed with a hydraulic single-fluid nozzle, a two-fluid air atomizing design is often the best option.

## XA 10 & 11 LOW FLOW AIR ATOMIZING SPRAY NOZZLES

The XA nozzle system has many interchangeable components that can be assembled to achieve a variety of air atomizing spraying objectives, with a choice of internal or external mix set-ups. For more information on the XA nozzle series components and options, please visit [www.bete.com/products/xa-dir](http://www.bete.com/products/xa-dir).



|                                                                                                           |                                                                                                 |
|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <b>Inlet connection</b>                                                                                   | 1/8" or 1/4" NPT or BSPP, liquid and air                                                        |
| <b>Maximum liquid flow rate</b>                                                                           | 72 GPH / 272.5 LPH                                                                              |
| <b>Maximum rated liquid pressure</b>                                                                      | 40 PSI / 2.8 bar                                                                                |
| <b>Operating temperature range</b>                                                                        | -15°F to 400°F / -26°C to 204°C                                                                 |
| <b>Air cylinder pressure</b>                                                                              | 30 PSI to 250 PSI / 2 bar to 17.2 bar                                                           |
| <b>Maximum cycle frequency</b>                                                                            | 3 cycles/sec                                                                                    |
| <b>Nozzle construction</b>                                                                                | Nickel plated brass or stainless steel wetted components, Blue-Gard® gasket, Viton® (FKM) seals |
| <b>Compatible with XAAD, XAEF (pictured), XAER, XAFF, XAPF, XAPR, XASF, XASR, and XAXW spray set-ups.</b> |                                                                                                 |

## SAM EXTERNAL MIX AIR ATOMIZING SPRAY NOZZLES

Design Features of the SAM Flat Fan and Narrow Round Automatic Nozzle  
For more information, please visit [www.bete.com/products/sam](http://www.bete.com/products/sam).

- Separate atomizing and fan air lines provide variable coverage and fine control of drop size without affecting liquid flow rates. Higher atomizing air pressure yields finer drop size; higher fan air pressure yields broader patterns.
- Removable plug provided for liquid recirculation port
- External mix; allows spraying of viscous materials
- Liquid flow rates are independent of air
- Precise metering of the liquid flow rate
- Pneumatically-controlled shut-off and clean-out built in



|                                      |                                                                          |
|--------------------------------------|--------------------------------------------------------------------------|
| <b>Inlet connection</b>              | 1/8" NPT or BSPP; air and liquid                                         |
| <b>Maximum liquid flow rate</b>      | 47 GPH / 178 LPH                                                         |
| <b>Maximum rated liquid pressure</b> | 20 PSI / 1.4 bar                                                         |
| <b>Operating temperature range</b>   | 15°F to 400°F / -9°C to 204°C                                            |
| <b>Air cylinder pressure</b>         | 30 PSI to 250 PSI / 2 bar to 17.2 bar                                    |
| <b>Maximum cycle frequency</b>       | 3 cycles/sec                                                             |
| <b>Nozzle Construction</b>           | Stainless steel wetted components, Blue-Gard® gasket, Viton® (FKM) seals |

# CUSTOM SPRAY HEADERS & MANIFOLDS

Everything needed to scope, order, design and produce your custom spray fabrication – all under one roof. Our departments work seamlessly together to ensure the products you receive are of the highest quality.

## SPRAY BARS, HEADERS, & MANIFOLDS

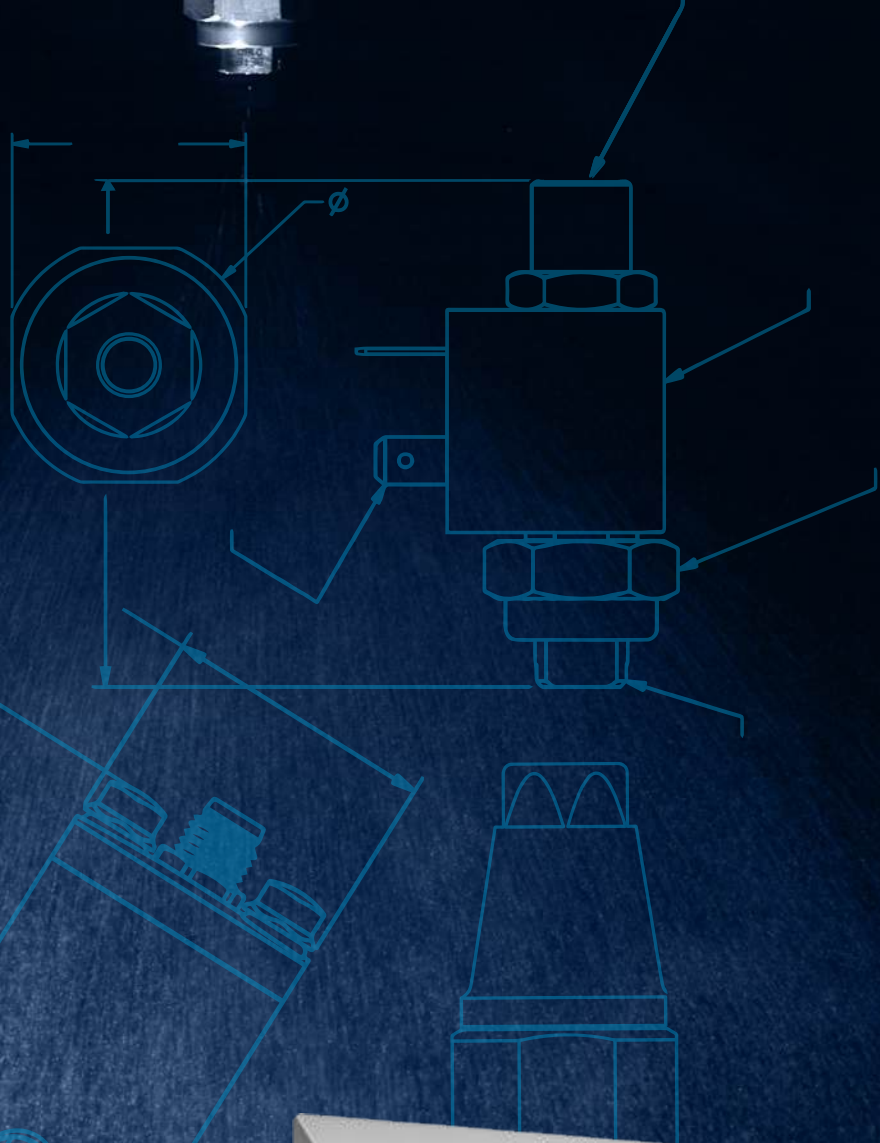
- Uniform spray coverage across wide areas
- Common for conveyor coating
- Optimize liquid/air flow and nozzle placement



## QUALIFIED FOR THE TASK

- Working with BETE as your primary fabricator ensures all components are designed to fit and work together
- Reduced need for coordinating between multiple suppliers streamlines projects
- Non-Destructive Examination (NDE) Qualifications
  - PMI, PT, RT, UT, VT, Hydrostatic Testing, Hardness Testing
- As a global leader and innovator in the nozzle industry for over 70 years, BETE provides personalized service and experience to guarantee solution confidence





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Applications  
Engineering



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Research

