# Liquid desiccant dehumidification systems

Product guide

KATHABAR

# Advanced dehumidification systems

# Leading liquid desiccant technology

Alfa Laval Kathabar dehumidification systems are engineered solutions for temperature and humidity control for industrial, commercial, educational, institutional and green/LEED facilities. These cost-effective dehumidification and energy recovery systems have been used to clean and dehumidify air for a wide range of industries worldwide – including pharmaceutical, investment casting, healthcare, cold storage, food and beverage, and many more.

These systems help to improve the reliability, economy and efficiency of any manufacturing or processing operation that is humidity, temperature or microorganism-sensitive. Whether your space conditions are 78°F and 20% RH, 45°F and 40% RH, or -20°F and -40°F dew point, the Alfa Laval Kathabar system can provide controlled conditions – resulting in an improved bottom line.

## Benefits of liquid technology:

- Simultaneous dehumidification and direct air cooling
  Simple design provides high energy efficiency
- Microbiological decontamination
  Effective biocide captures and neutralizes airborne pathogens
- Performance reliability
  Non-vaporizing desiccant has infinite life
- Energy savings – 100% modulation capacity
  Less energy is required to operate than dry desiccant or mechanical refrigeration systems
- Precise humidity control (+/-1%RH)
  Fully adjustable humidity level based on liquid desiccant concentration and temperature
- Frost-free cooling
  Temperatures as low as -60°F with no coil to freeze up or defrost
- FRP (fiberglass) non-metallic industrial construction
  Long equipment life, reliability and reduced maintenance
- Design flexibility
  Use of hot water or low pressure steam for regeneration (including waste heat); multiple conditioners with single centralized regenerator; vertical and horizontal airflow orientations available

### Economic value comparison

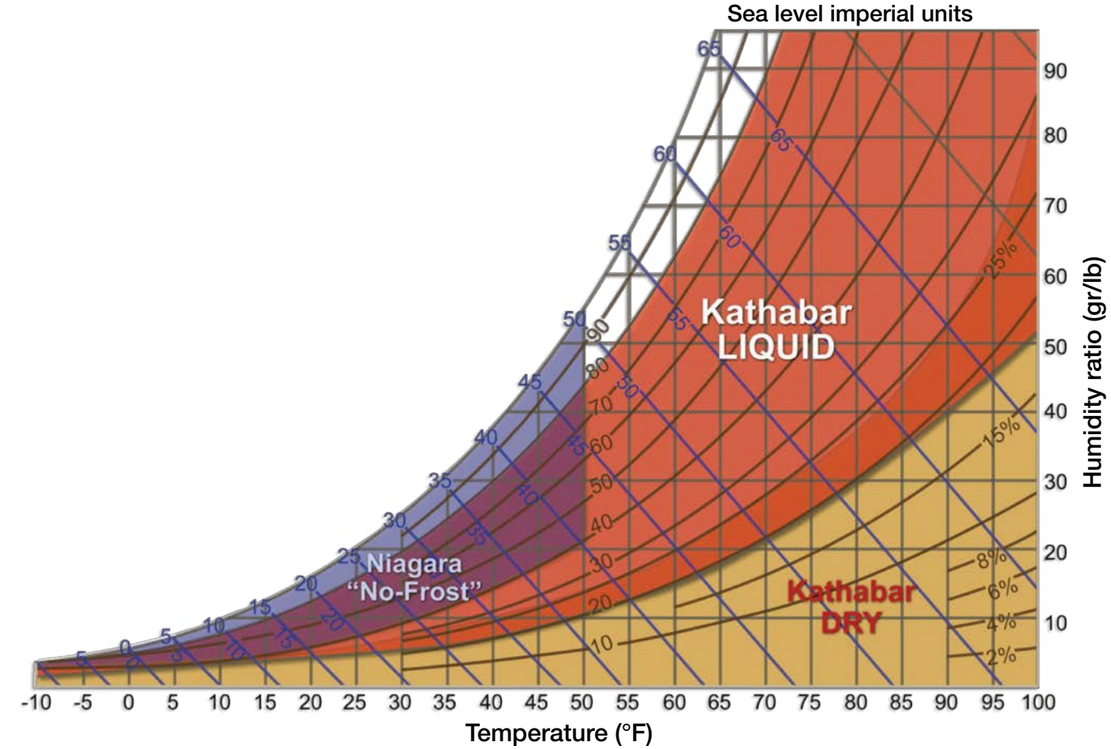
With increased awareness of energy costs, companies evaluate the total cost to own and operate equipment, rather than initial cost alone. An Alfa Laval Kathabar evaluation considers the first cost, installation cost and operating costs for dry and liquid desiccant dehumidification systems. We then calculate the cost for various systems and present the economic value comparison based on specific ASHRAE local weather data, customers' actual energy costs and system operating schedule.

To ensure the evaluation does not leave anything up to question, we then compare both liquid and dry desiccant systems to conventional refrigeration systems, in order to determine the best solution for your specific needs. Simply ask your Alfa Laval Kathabar representative to prepare an economic value comparison for your application.

### Performance guarantee

Like-new dehumidification performance can be achieved through the life of the equipment – regardless of reapplication, relocation or airborne contaminants. Alfa Laval Kathabar provides free Kathene® liquid solution laboratory checks for all installations. To take advantage of this free service, customers are asked to send a small sample of Kathene from their equipment to our laboratory every six months.

Through this process, the Kathene solution can be maintained at maximum dehydrating capacity, which ensures the desired performance of the unit. This free Kathene solution testing service can also identify potential impurities in the systems, allowing for adjustments even while equipment is in operation.

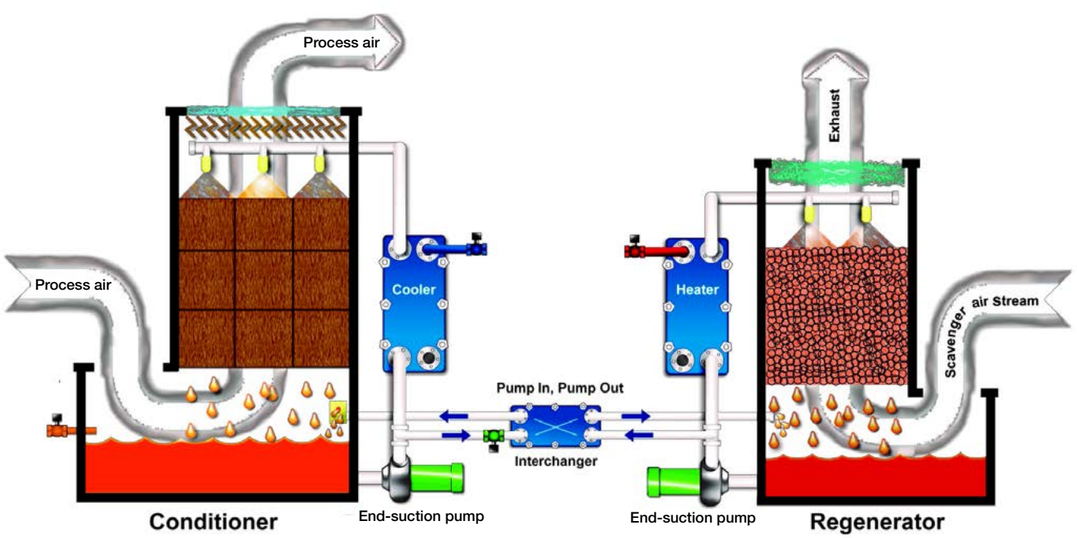


# How it works

Alfa Laval Kathabar liquid desiccant dehumidification systems operate on the principle of chemical absorption of water vapor from air. The absorbent solution, Kathene, is a desiccant solution composed of lithium chloride salt and water. Kathene is non-toxic, will not vaporize, and is not degraded by common airborne contaminants.

The ability of Kathene to remove or add water vapor from the air is determined by the temperature and concentration of the solution. The concentration of Kathene can be adjusted to deliver air at any desired relative humidity between 18% and 90%. For a given Kathene concentration, lower solution temperatures enable the conditioner to deliver cooler, dryer air.

The illustration below shows the basic elements of an Alfa Laval Kathabar system. In operation, air to be conditioned is cooled and dehumidified by contacting Kathene in the conditioner. By continuously circulating the desiccant through a heat exchanger, energy is extracted from the air and transferred to a coolant. The amount of heat extracted by the Alfa Laval Kathabar dehumidifier is modulated to exactly match the load by controlling coolant flow through the heat exchanger.




# Liquid desiccant systems overview

Alfa Laval Kathabar offers a full line of liquid desiccant system series including, FV, FH, FP and SP. There are common features to the systems, along with features unique to each system. Application specifications including air flow capacities, heat sources, space limitations and power requirements determine which liquid desiccant system will provide the best solution.

## Alfa Laval Kathabar FV – Vertical discharge conditioner

Ideal for all applications. The FV design has the greatest latent and sensible performance, lowest unit air pressure drop, smallest footprint and lowest equipment cost. The conditioner can be designed with process fans available in upblast, front or rear air discharge arrangements. Units up to 25,000 CFM are available as packaged units, with pump and heat exchanger factory mounted on an extended skid base with desiccant piping complete.

The vertical unit applies to industrial buildings and production rooms which often have limited floor space and high ceilings. They also have the flexibility to incorporate multiple conditioners and a single regenerator.

## Alfa Laval Kathabar FH – Horizontal discharge conditioner

Ideal for all applications. The FH design is best suited for applications where space height limitations prohibit the use of the FV series. These units also fit well when process air is being delivered to horizontal AHU's and can easily be used in custom air handling units for a total packaged indoor or outdoor installation. Like the FV series, units can be supplied with the pump and heat exchanger factory mounted and piped on an extended skid base.

FH conditioners are commonly applied to commercial buildings or penthouses which do not have the head room required by the FV conditioners. Applications such as hospitals and labs often require the FH approach.

## Alfa Laval Kathabar FP – Fiberglass packed regenerator

Ideal for all applications. The packed tower regenerators are used with all FV and FH conditioners. The range of unit sizes are available in moisture removal capacities from 120#/Hr to 6000#/Hr. The high efficiency contact packing and use of external heat exchangers offers unlimited design flexibility capable of using heat sources as low as 140°F (60°C).

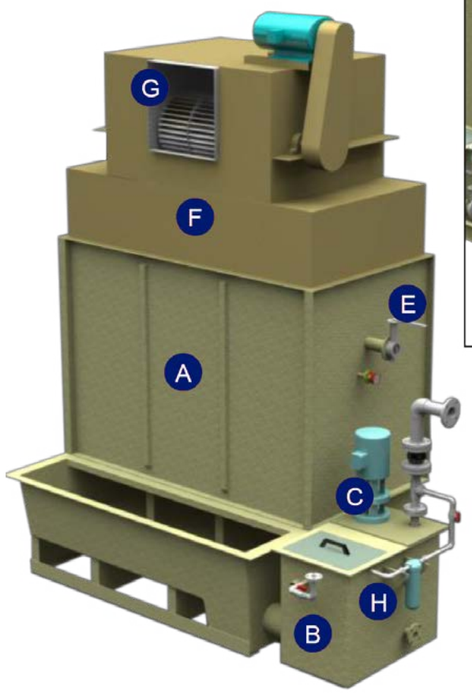
FP regenerator applies for most applications that have a larger moisture load or several conditioners such as breweries, food and candy manufacturing. They come in a large range of sizes and can be remotely located from the conditioner or conditioners.

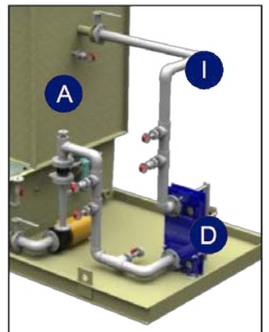
## Alfa Laval Kathabar SP – Small packaged conditioner/regenerator

Ideal for all applications with smaller airflow capacities from 1500 CFM to 7500 CFM. The SP series is also a vertical airflow design for high efficiency. These factory packaged systems are a plug-and-play designed system, requiring only plant utilities and power to a single point.

SP units are ideal for smaller applications such as water works, casting applications, pharmaceutical drying rooms and filling areas. They are compact, ready to go skid mounted and packaged units.

# Alfa Laval Kathabar FV – Vertical discharge conditioner overview




Packaged

**Components:**

A. FRP body/housing
B. FRP pump tank
C. Kathene spray pump
D. Heat exchanger
E. Spray pressure valve
F. Fan adapter plenum
G. Process air fan
H. Bypass filter cartridge
I. Desiccant piping

Optional packaged vertical conditioner denoted FVP configuration is available.

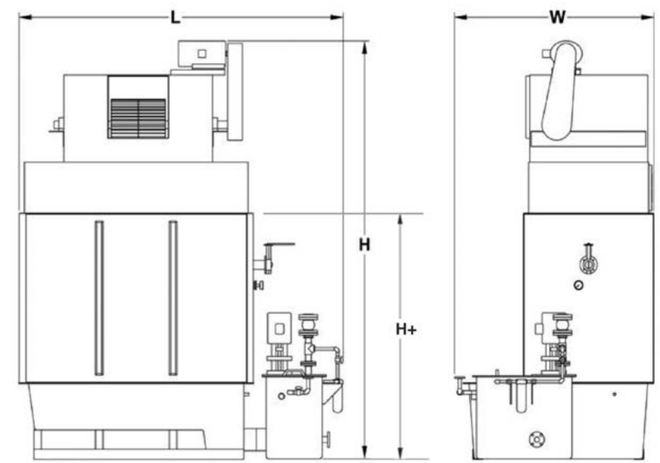
FVP features include:

- Airflows from 1,500 CFM to 25,000 CFM
- Horizontal end-suction Kathene pump with sealless magnetically coupled motor
- Unit base platform of FRP clad construction with pump and heat exchanger factory mounted
- Factory installed Kathene piping from unit-to-pump-to-heat exchanger-to-spray

**Alfa Laval Kathabar FV features:**

- Vertical airflow discharge
- Optional process fan (up to 36,000 CFM)
- Housing of industrial grade fiberglass construction with internal parts of non-metallic engineered plastics
- Free standing pump and pump tank assembly with vertical sealless fiberglass Kathene pump
- Kathene solution filtering
- Modular design to integrate with other air system components
- Inlet air filtration plenums

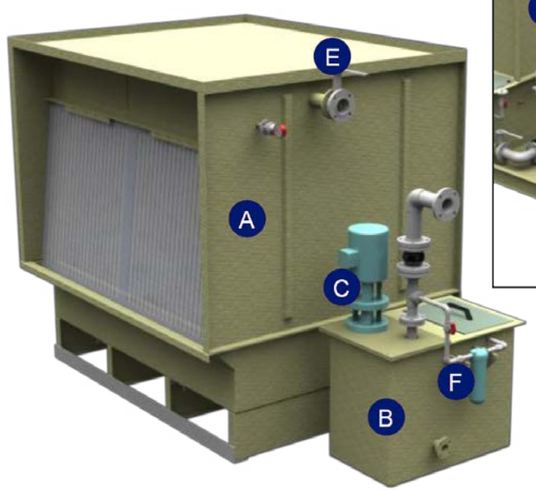
# Alfa Laval Kathabar FV – Vertical discharge conditioner sizing information

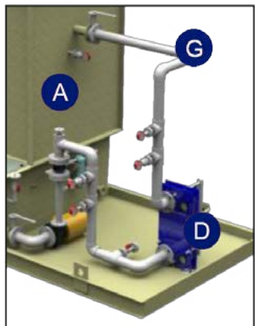



| Unit size | Airflow (maximum) | | Airflow (minimum) | | Approximate dimensions | | | | | | Approximate weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CFM | M3/hr | CFM | M3/hr | Inches | | | Centimeters | | | Lbs | Kg |
| | | | | | L | W | H | L | W | H | | |
| **FV 240*** | **3,000** | 5,100 | **1,500** | 2,550 | 62 | 50 | 77 | 157 | 127 | 196 | 1,950 | 885 |
| **FV 400*** | **5,000** | 8,500 | **2,500** | 4,250 | 74 | 66 | 142 | 188 | 168 | 361 | 2,200 | 998 |
| **FV 600*** | **7,500** | 12,740 | **3,750** | 6,370 | 98 | 66 | 142 | 249 | 168 | 361 | 3,100 | 1,406 |
| **FV 800** | **10,000** | 16,990 | **5,000** | 8,500 | 101 | 80 | 157 | 257 | 203 | 400 | 3,900 | 1,769 |
| **FV 1200** | **15,000** | 25,490 | **7,500** | 12,740 | 131 | 80 | 173 | 333 | 203 | 439 | 4,800 | 2,177 |
| **FV 1600** | **20,000** | 33,980 | **10,000** | 16,990 | 161 | 80 | 173 | 409 | 203 | 439 | 5,700 | 2,585 |
| **SFV 2000** | **25,000** | 42,480 | **15,000** | 25,490 | 191 | 80 | 182 | 485 | 203 | 462 | 9,000 | 4,082 |
| **FV 2000** | **24,000** | 40,780 | **12,000** | 20,390 | 147 | 107 | 210 | 373 | 272 | 533 | 8,500 | 3,856 |
| **FV 2500** | **30,000** | 50,970 | **15,000** | 25,490 | 171 | 107 | 210 | 434 | 272 | 533 | 10,500 | 4,763 |
| **FV 3000** | **36,000** | 61,160 | **18,000** | 30,580 | 195 | 107 | 220 | 495 | 272 | 560 | 12,000 | 5,443 |
| **FV 4000+** | **48,000** | 81,550 | **24,000** | 40,780 | 247 | 107 | 120 | 627 | 272 | 305 | 15,000 | 6,804 |
| **FV 5000+** | **60,000** | 101,940 | **30,000** | 50,970 | 295 | 107 | 120 | 749 | 272 | 305 | 18,000 | 8,165 |
| **FV 6000+** | **72,000** | 122,330 | **36,000** | 61,160 | 343 | 107 | 120 | 871 | 272 | 305 | 21,000 | 9,525 |
| **FV 7000+** | **84,000** | 142,720 | **42,000** | 71,360 | 391 | 107 | 120 | 993 | 272 | 305 | 24,000 | 10,886 |

* Unit sizes FV 240, FV 400 and FV 600 are not exactly as shown above.
+ Fans not provided on unit sizes FV 4000, FV 5000, FV 6000 and FV 7000; refer to H+ dimension on drawing for height.

# Alfa Laval Kathabar FH – Horizontal discharge conditioner overview




Packaged

**Components:**

A. FRP body/housing
B. FRP pump tank
C. Kathene spray pump
D. Heat exchanger
E. Spray pressure valve
F. Bypass filter cartridge
G. Desiccant piping

Optional packaged horizontal conditioner denoted FHP configuration is available.

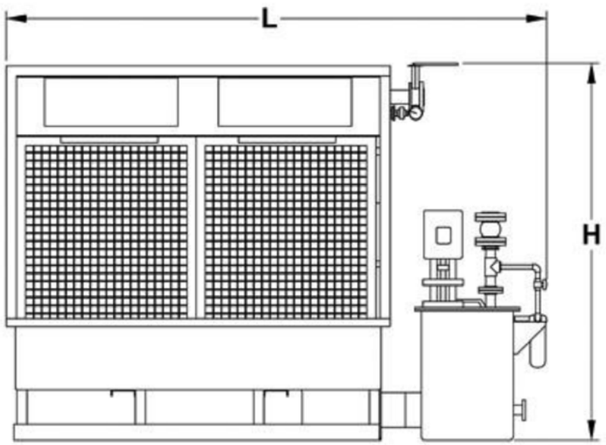
FHP features include:

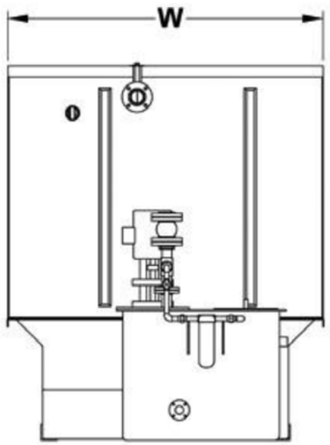
- Airflows from 5,000 CFM to 20,000 CFM
- Horizontal end-suction Kathene pump with sealless magnetically coupled motor
- Unit base platform of FRP clad construction with pump and heat exchanger factory mounted
- Factory installed Kathene piping from unit-to-pump-to-heat exchanger-to-spray

**Alfa Laval Kathabar FH features:**

- Horizontal inlet and discharge airflow
- Desiccant is distributed without sprays
- Housing of industrial grade fiberglass construction with internal parts of non-metallic engineered plastics
- Free standing pump and pump tank assembly with vertical sealless fiberglass Kathene pump
- Kathene solution filtering
- Modular design to integrate with other air system components

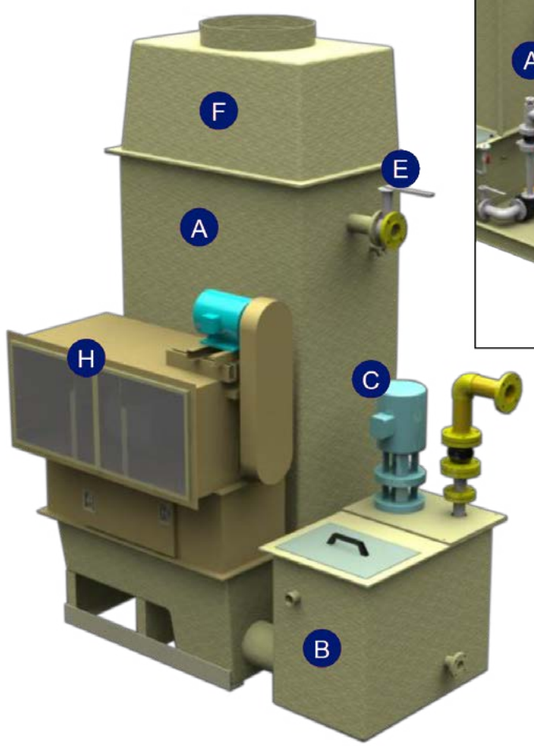
# Alfa Laval Kathabar FH – Horizontal discharge conditioner sizing information

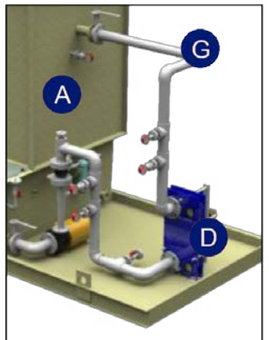



| Unit size | Airflow (maximum) | | Airflow (minimum) | | Approximate dimensions | | | | | | Approximate weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CFM | M3/hr | CFM | M3/hr | Inches | | | Centimeters | | | Lbs | Kg |
| | | | | | L | W | H | L | W | H | | |
| **FH 800** | **10,000** | 16,990 | **5,000** | 8,500 | 102 | 78 | 93 | 259 | 198 | 236 | 4,400 | 1,996 |
| **FH 1200** | **15,000** | 25,490 | **7,500** | 12,740 | 132 | 78 | 93 | 335 | 198 | 236 | 5,400 | 2,449 |
| **FH 1600** | **20,000** | 33,980 | **10,000** | 16,990 | 162 | 78 | 93 | 411 | 198 | 236 | 6,400 | 2,903 |
| **FH 2000** | **24,000** | 40,780 | **12,000** | 20,390 | 138 | 96 | 117 | 350 | 244 | 297 | 10,000 | 4,536 |
| **FH 2500** | **30,000** | 50,970 | **15,000** | 25,490 | 162 | 96 | 117 | 411 | 244 | 297 | 11,700 | 5,307 |
| **FH 3000** | **36,000** | 61,160 | **18,000** | 30,580 | 196 | 96 | 117 | 498 | 244 | 297 | 13,700 | 6,214 |
| **FH 4000** | **48,000** | 81,550 | **24,000** | 40,780 | 244 | 96 | 117 | 620 | 244 | 297 | 17,200 | 7,802 |
| **FH 5000** | **60,000** | 101,940 | **30,000** | 50,970 | 296 | 96 | 117 | 752 | 244 | 297 | 19,800 | 8,981 |
| **FH 6000** | **72,000** | 122,330 | **36,000** | 61,160 | 345 | 96 | 117 | 876 | 244 | 297 | 23,300 | 10,569 |
| **FH 7000** | **84,000** | 142,720 | **42,000** | 71,360 | 392 | 96 | 117 | 996 | 244 | 297 | 27,300 | 12,383 |

# Alfa Laval Kathabar FP – Fiberglass packed regenerator overview




**Packaged**

**Components:**

A. FRP body/housing
B. FRP pump tank
C. Kathene spray pump
D. Heat exchanger
E. Spray pressure valve
F. Exhaust plenum
G. Desiccant piping
H. Regenerator fan

Optional packaged regenerator configuration is available in all sizes.

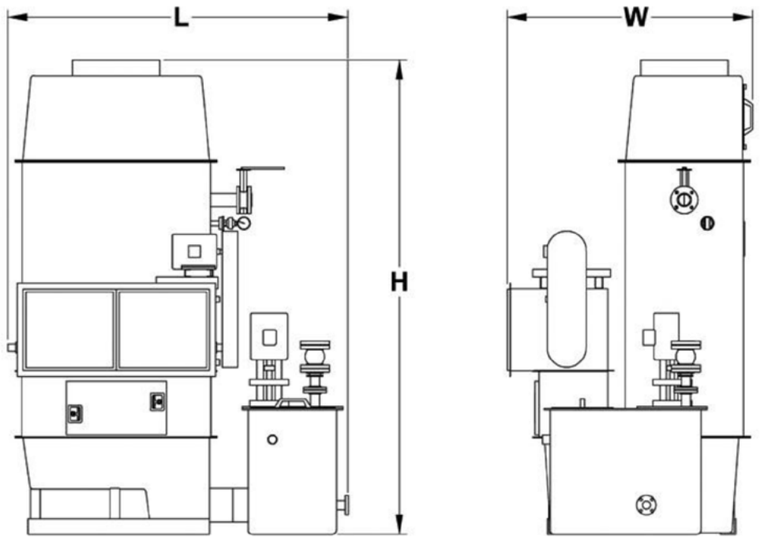
FP features include:

- Horizontal end-suction Kathene pump with sealless magnetically coupled motor
- Unit base platform of FRP clad construction with pump and heat exchanger factory mounted
- Factory installed Kathene piping from unit-to-pump-to-heat exchanger-to-spray in fiberglass

**Alfa Laval Kathabar FP features:**

- Vertical airflow discharge
- Optional interchanger for energy savings
- Housing of industrial grade fiberglass construction with internal parts of non-metallic engineered plastics
- Free standing pump and pump tank assembly with vertical sealless fiberglass Kathene pump
- Inlet air filtration

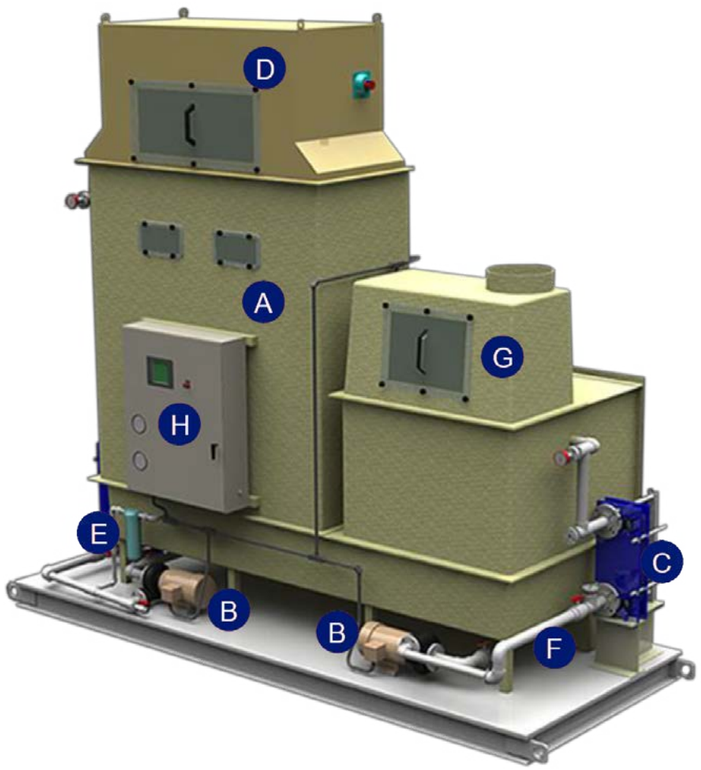
# Alfa Laval Kathabar FP – Fiberglass packed regenerator sizing information




| Unit size | Inlet airflow (minimum) | | Approximate dimensions | | | | | | Approximate weight | |
|---|---|---|---|---|---|---|---|---|---|---|
| | CFM | M3/hr | Inches | | | Centimeters | | | Lbs | Kg |
| | | | L | W | H | L | W | H | | |
| **FP 1.5*** | **475** | 810 | 42 | 47 | 99 | 107 | 119 | 251 | 3,300 | 1,497 |
| **FP 3*** | **950** | 1,610 | 57 | 47 | 99 | 145 | 119 | 251 | 4,400 | 1,996 |
| **FP 6*** | **1,900** | 3,230 | 63 | 60 | 99 | 160 | 152 | 251 | 5,800 | 2,631 |
| **FP 10** | **3,160** | 5,370 | 86 | 62 | 123 | 218 | 157 | 312 | 3,300 | 1,497 |
| **FP 15** | **4,700** | 7,990 | 111 | 62 | 123 | 282 | 157 | 312 | 4,400 | 1,996 |
| **FP 20** | **6,300** | 10,700 | 97 | 82 | 127 | 246 | 208 | 323 | 5,800 | 2,631 |
| **FP 30** | **9,500** | 16,140 | 127 | 82 | 127 | 323 | 208 | 323 | 3,300 | 1,497 |
| **FP 40** | **12,600** | 21,410 | 167 | 82 | 127 | 424 | 208 | 323 | 4,400 | 1,996 |

*Unit sizes FP 1.5, FP 3 and FP 6 do not come with pump tank and are not exactly as shown above.

# Alfa Laval Kathabar SP – Small packaged conditioner/regenerator overview



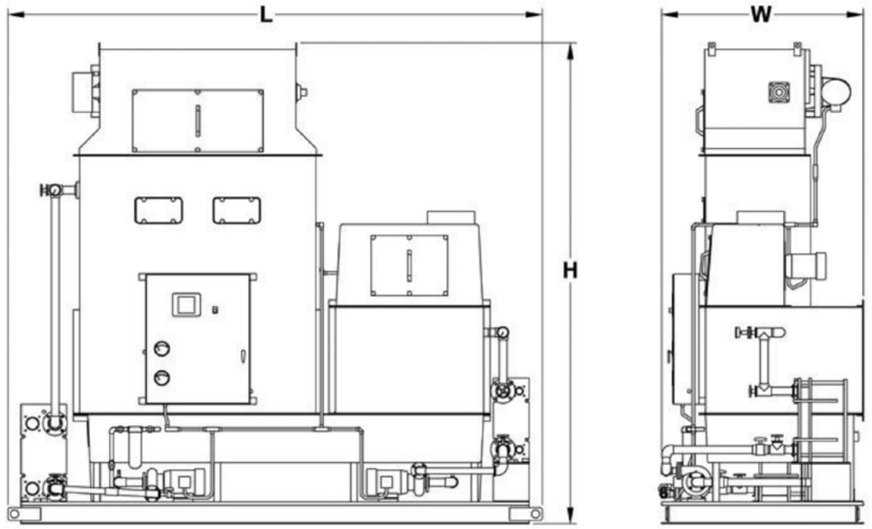

**Components:**

A. FRP body/housing
B. Kathene spray pump(s)
C. Heat exchanger
D. Process air fan
E. Bypass filter cartridge
F. Desiccant piping
G. Regenerator fan
H. PLC control panel

**Alfa Laval Kathabar SP features:**

- SP units combine both the conditioner and regenerator into a single component for easy installation with all wiring, controls and Kathene piping factory complete and tested
- Sizes are available in airflows ranging from 1,500 CFM to 7,500 CFM
- Vertical airflow discharge
- Horizontal end-suction conditioner and regenerator Kathene pump with sealless magnetically coupled motor
- Unit base platform of FRP clad construction with Kathene pumps and heat exchangers factory mounted and piped

# Alfa Laval Kathabar SP – Small packaged conditioner/regenerator sizing information




| Unit size | Airflow (maximum) | | Airflow (minimum) | | Approximate dimensions | | | | | | Approximate weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CFM | M3/hr | CFM | M3/hr | Inches | | | Centimeters | | | Lbs | Kg |
| | | | | | L | W | H | L | W | H | | |
| **SP 240** | **3,000** | 5,100 | **1,500** | 2,550 | 111 | 59 | 123 | 282 | 150 | 312 | 3,300 | 1,497 |
| **SP 400** | **5,000** | 8,500 | **2,500** | 4,250 | 128 | 66 | 125 | 325 | 168 | 318 | 4,400 | 1,996 |
| **SP 600** | **7,500** | 12,740 | **3,750** | 6,370 | 177 | 66 | 132 | 450 | 168 | 335 | 5,800 | 2,631 |

# Dehumidification system liquid application questionnaire

## Customer data

Project name: _____

Name: _____

Company: _____

Address: _____

City, State, Zip: _____

Country: _____

Phone: _____

E-Mail: _____

## Outside air requirements

Airflow: _____ ACFM

OSA temp: _____ °F

OSA humidity: _____ Gr/lb.

and

## Desired space conditions

Space temp: _____ °F

Space humidity: _____ Gr/lb.

## Space loads

Sensible load: _____ Btu/Hr

Latent load: _____ Bru/Hr

Winter humidification required?: ☐ Yes ☐ No

or

## Delivered conditions to space

Airflow: _____ ACFM

Delivered temp: _____ °F

Delivered humidity: _____ Gr/lb.

## Utilities

Coolant source: _____

Coolant temp: _____ °F

Heating source: _____

Hot water temp/steam pressure: _____ °F / PSIG

## Electrical characteristics

Voltage: (Volts) _____

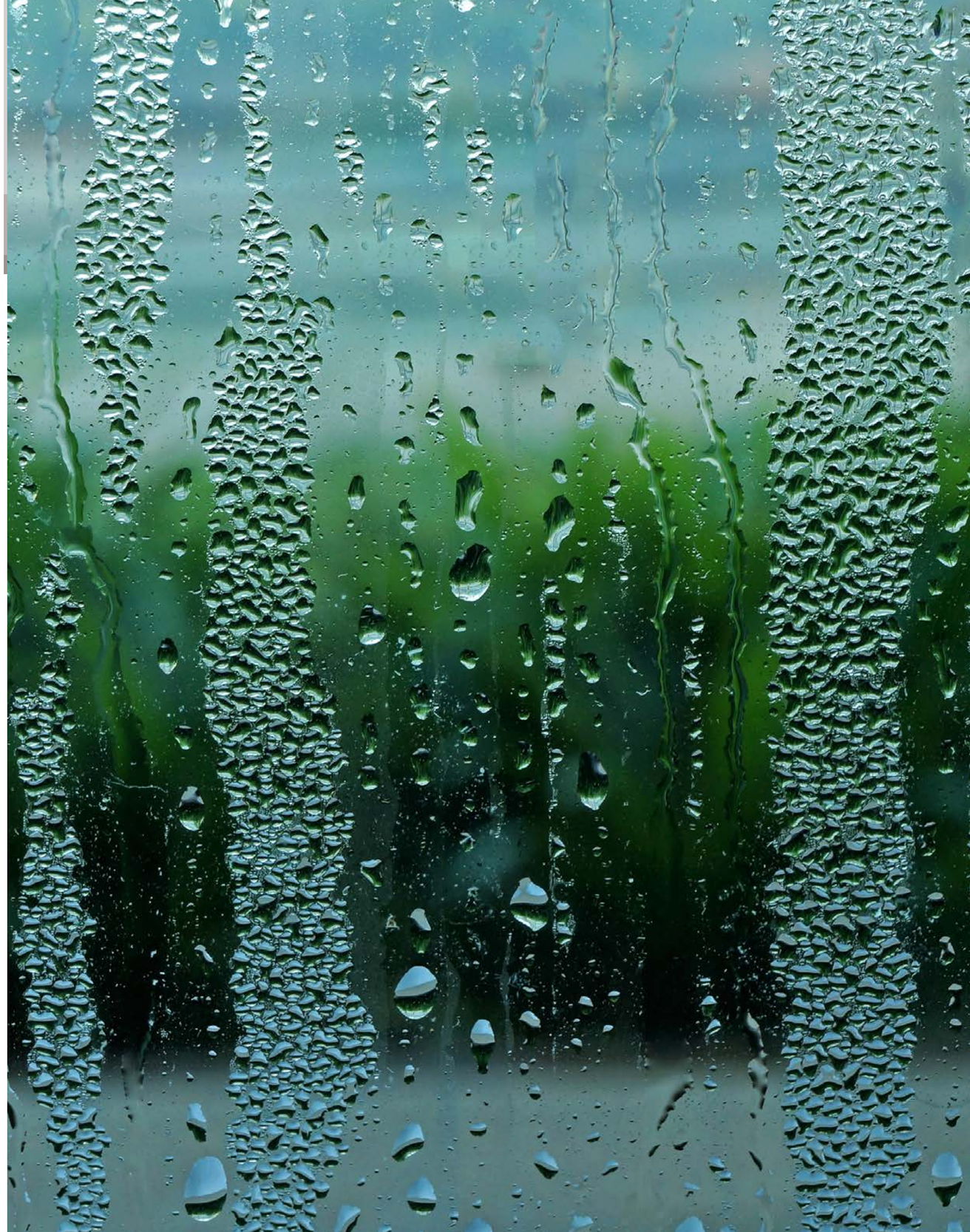
Phase: _____

Frequency (Hz): _____

Please describe the location for the equipment installation. Provide room sketches with doors, slots, etc.

Alfa Laval Kathabar, Phone +1 716-875-2000, Email: sales.kathabar@alfalaval.com, Web: www.kathabar.com

KATHABAR



## Alfa Laval in brief

Alfa Laval is a leading global provider of specialized products and engineered solutions.

Our equipment, systems and services are dedicated to helping customers to optimize the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

## How to contact Alfa Laval

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