

# armfield

## Develop with us

Miniature-scale research & development technology

**TALL FORM SPRAY DRYER**  
**TALL FORM SPRAY CHILLER**

**FT80**  
**FT81**



explorearmfield.com

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ISO 9001:2008  
2YR EXTENDED WARRANTY

### FEATURES

- Accessory sets are available to quickly change from drying to spray chilling
- Available as a Spray Dryer (FT80) or as a Spray Chiller (FT81)
- Drying air temperature up to 250°C
- Maximum flow rate up to 7 l/hr
- Maximum evaporation rate of 3 l/hr
- Tall form chamber straight side to diameter ratio of 3:1, conical discharge section
- Advanced two-fluid nozzle atomisation system
- Supplied with optional nozzle configurations for counter- and co-current atomising
- Individual inlet and exhaust fans with variable-speed control
- Bag filter and trace heating options
- Flexible controls and full instrumentation provided in the IP65 control console
- Easily dismantled for inspection and cleaning purposes
- Compact, mobile design
- Data logging facility for all key operating parameters
- Powder discharges from two points, chamber and cyclone
- Low noise levels
- Control and measurement of relative humidity
- Spark arrester on input and enhanced safety extraction fan

### BENEFITS

- No clogging, no need for de-blocking devices
- Co-current flow for drying heat sensitive products
- Counter-current flow maximises chamber residence time for non-heat sensitive products
- Residence times in the drying cylinder variable up to 9 seconds
- Easy connections to electrical and compressed air utilities
- Data recording to computer for rapid evaluation and comparison

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**The Armfield FT80 Tall Form Spray Dryer and FT81 Tall Form Spray Chiller have been purpose-designed to enable laboratory quantities of products to be processed.**

**Despite the size of the equipment, the powders produced will be comparable to large-scale production dryer capability.**

**Both systems offer unparalleled flexibility with separate, individually controlled inlet and outlet fans, together with variable nozzle positions and selection of co- or counter-current flow configurations. This flexibility is enhanced by an unsurpassed range of options, purpose-designed for laboratory and research use.**

**With the appropriate accessories it is possible to change from spray-drying to spray-chilling configurations in a matter of minutes, thus adding further unique experimental capability.**

### **Process description**

#### **Co-current spray-drying configuration**

**The liquid to be dried is pumped to the top of the drying chamber by a variable-speed progressing cavity pump, which provides a very smooth flow and constant flow rate. It is atomised by a two-fluid nozzle and enters the drying chamber as a fine droplet dispersion.**

**Hot air is blown into the chamber, on to the droplets causing flash evaporation of the surface moisture.**

**The bound moisture in the particles is evaporated in the time that they fall to the discharge point at the base of the cone (the residence time). In this configuration the particle temperature will never exceed the wet bulb temperature of the exhaust air.**

**A variable-speed centrifugal fan provides control over the inlet air flow and a steady inlet temperature is achieved by using a three-term controller in conjunction with an electric heater. A second variable-speed fan draws air from the chamber through a cyclone separator. This 'push-pull' fan system provides flexibility to operate the chamber at variable pressures with variable residence times.**

**Two powder collection points are provided, one at the bottom of the main chamber, and one on the cyclone separator. This enables particles of different sizes to be collected simultaneously and/or separately.**

**Exhaust-air relative humidity can be measured and controlled so as to enable the system to run at the required RH level.**

**The nozzle is an external-mix two-fluid atomising nozzle. Compressed air is directed onto the liquid stream as it leaves the nozzle body and immediately atomises it. With this type of nozzle the orifice is larger than a single fluid type, and so it is possible to atomise more viscous products and even products containing suspended solids.**



The FT81 Tall Form Spray Chiller

#### **Counter-current spray-drying configuration**

**The FT80 Tall Form Spray Dryer is supplied as standard with two nozzles and nozzle hoses, one for co-current and one for counter-current. In counter-current configuration the nozzle is positioned at the bottom of the chamber and sprayed upward into the flow of hot air.**

#### **Spray chiller configuration**

**For spray chilling the flow of air from the inlet fan to the spray chamber is chilled instead of heated. The air is cooled using chilled water and a stainless steel heat exchanger. The FT81 Tall Form Spray Chiller is supplied complete with its own refrigeration unit.**

**Counter-current configuration is normally used for spray chilling.**

**Note: Many spray-chilling applications also require the Trace Heating Accessory, FT81-65.**

### Fluid Bed Cooler Accessory – FT80-60

An optional accessory is available to provide final cooling of the spray-dried powder in a fluidised bed. This feature is particularly useful when drying powders containing fats as the fluid bed helps to crystallise the fat content. Typical applications include infant formulas and whole milk powders.

### Bag Filter Accessory – FT80-70, FT81-70

The Bag Filter Accessory is used on the exhaust air outlet. The five micron filter removes virtually all of the remaining product dust in the airstream, resulting in clean air that can be discharged directly into the working area, without requiring further treatment, ducting or extraction fans.

**Note:** This filter is not designed to extract toxic or hazardous materials.

### Trace Heating Accessory – FT81-65

The Trace Heating Accessory is required when the product must be kept above a certain minimum temperature prior to atomisation in the spray nozzle.

It comprises a heater band on the feed vessel, a heater on the pump body and a further heater on each of the spray nozzles. The trace heating controls are enclosed in a separate mains powered stainless steel box, which can be positioned on the main control unit.

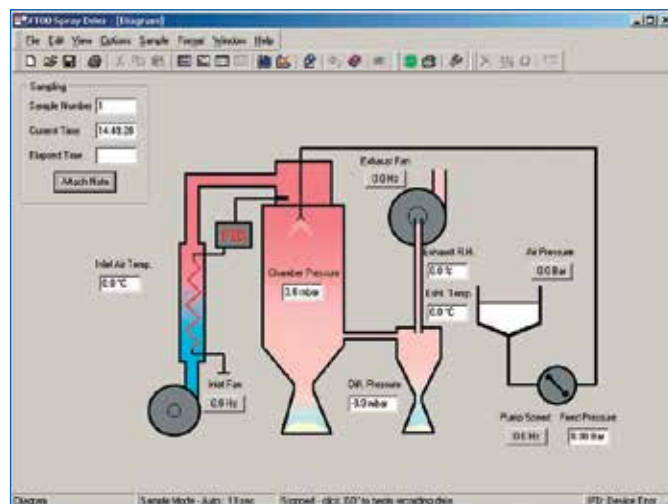
Two independent temperature controllers are used for the feed vessel wall temperature and the nozzle body temperature.

Although primarily required for spray chilling, this accessory can also be used with the spray dryer.

**Note:** The trace heating is not designed to heat the product, but to maintain the product at an elevated temperature.



The FT80-60 Fluid Bed Cooler Accessory



Example of software

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Armfield R&D products include:

316 Stainless steel ✓

CE certification ✓

Extended warranty as standard ✓



armfield  
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## Ordering codes

### FT80 Tall Form Spray Dryer

FT80-A: Tall Form Spray Dryer: 220-240V/1ph/50Hz\*

FT80-G: Tall Form Spray Dryer: 220-240V/1ph/60Hz\*

(\* Max 35A)

### Optional accessories

FT80-25-A: Spray Chilling Accessory: 220-240V/1ph/50Hz

FT80-25-G: Spray Chilling Accessory: 220-240V/1ph/60Hz

(Containing all items required to convert an FT80 Spray Dryer into an FT81 Spray Chiller)

FT80-60: Fluid Bed Cooler Accessory

FT80-70: Bag Filter Accessory

FT80-DTA-ALITE: Data Logging System\*

FT81-65-A: Trace Heating Accessory: 220-240V/1ph/50Hz

FT81-65-G: Trace Heating Accessory: 220-240V/1ph/60Hz

### FT81 Tall Form Spray Chiller

FT81-A: Tall Form Spray Chiller: 220-240V/1ph/50Hz

FT81-G: Tall Form Spray Chiller: 220-240V/1ph/60Hz

### Optional accessories

FT81-35: Spray Drying Accessory

(Containing all items required to convert an FT81 Spray Chiller into an FT80 Spray Dryer)

FT81-70: Bag Filter Accessory

FT81-DTA-ALITE: Data Logging System\*

FT81-65-A: Trace Heating Accessory: 220-240V/1ph/50Hz

FT81-65-G: Trace Heating Accessory: 220-240V/1ph/60Hz

### Optional GMP compliance

The FT80 can be produced to full GMP compliance standards. Contact Armfield for further details.

### \*Windows™ Data Logging Systems

A unique benefit of the Armfield miniature-scale food processing range is that the measured data may be captured and stored to disk.

An Armfield FT80-DTA-ALITE Data Logging Accessory transfers results to a PC. Temperatures, pressures and relative humidity can be monitored in real-time.

The data can be displayed in graphical and tabular forms and printed.

A PC with a USB port, and running Windows XP or later is required.

## Unit specification

### General

Liquid feed: 2-7 l/hr from variable-speed progressive cavity pump

Air flow: Up to 30scfm, using variable-speed fans in 'push-pull' configuration

Chamber residence times: Variable up to 9 seconds

Powder collection points: Separate chamber and cyclone discharge points

Atomisation nozzles: 2-fluid type

### Spray drying

Electric air heater: 4.5kW

Drying air temperature: 50-250°C

Evaporation rates: 1.5-3 l/hr

Typical particle size range: 20-120 microns

### Spray chilling

Air temperature: 2°C minimum

(Note: not all parameters are necessarily achievable simultaneously)

## Requirements

Single-phase electrical supply (see ordering codes)

Compressed air: 1-5 bar pressure, 0.05 m<sup>3</sup>/min

\*PC: Optional (if using the optional Data Logging System a PC with a USB port, and running Windows XP or later is required).

### Shipping specification

	FT80	FT81
Volume:	3.2m <sup>3</sup>	4.0m <sup>3</sup>
Gross weight:	300kg	450kg

### Overall dimensions

Height:	1.70m	1.70m
Width:	1.30m	1.80m
Depth:	0.62m	0.80m

The Armfield range includes HTST/UHT/aseptic systems, carbonator/filler/cappers, spray dryers/chillers, multifunction batch processors, ice-cream freezers, margarine crystallisers, extractors, edible oils processors and more. For further information about our products and services, or to book a trial at one of our trials facilities, please contact us.