

**FT  
SERIES**

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 a selection of co-current 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.

**Tall Form Spray Dryer – FT80  
Tall Form Spray Chiller – FT81**

**RESULTS LOGGED VIA EASY TO USE CONTROL SOFTWARE  
HUGE RANGE OF TEST CAPABILITIES  
CAN DRY LESS THAN 1l OF PRODUCT  
MANY ADD ON OPTIONS AVAILABLE INCLUDING CHILLER**



**Features / 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
- ▶ Data recording to computer for rapid evaluation and comparison
- ▶ Accessory sets are available to quickly change from drying to spray chilling
- ▶ 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
- ▶ 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

## 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.

### 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.



**The FT80-60 Fluid Bed Cooler Accessory**

## Product hopper



## Powder collection at two separate points



### 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.

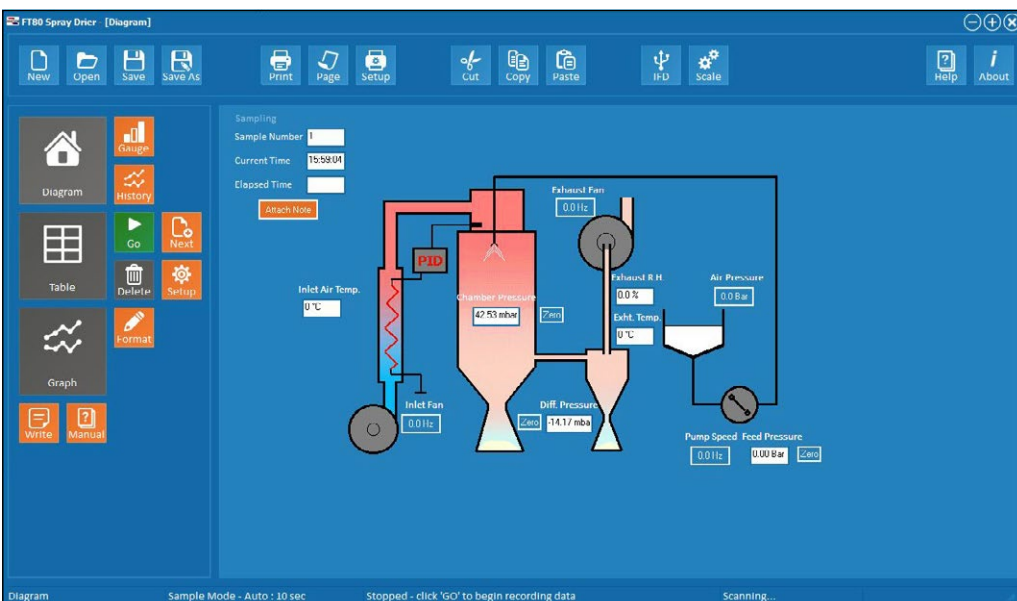


## The FT81 Tall Form Spray Chiller



## FT81 process line

FT81 Tall Form Spray chiller operates in conjunction with the FT63 laboratory chiller. This unit uses counter current spray to chill the liquid particles for an extended residence time.



## Software

The Armfield FT80 Tall Form Spray Dryer is supplied with full data logging capabilities.

The armSOFT software enables the operator to view measured variables via a mimic diagram within the graphical user interface.

Results are saved in a generic spreadsheet format and can be opened either directly from the armSOFT software or a wide range of 3rd party packages for further analysis.

## Example of software

## Requirements

## Scale



- ▶ 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).

## Applications

- ▶ Dairy
- ▶ Liquid Foods
- ▶ Pharmaceuticals
- ▶ Nutraceuticals
- ▶ Flavours & Fragrances

## Technical specifications

### 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
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(Note: not all parameters are necessarily achievable simultaneously)

## Overall dimensions

Model	FT80	FT81
Length	1.30m	1.30m
Width	0.62	0.80m (not including FT63 chiller)
Height	2.0m	2.0m

### Packed and crated shipping specifications

Volume	2.23m <sup>3</sup>	2.23m <sup>3</sup>
Gross weight	333Kg	343Kg

## 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.



Product is atomised by a two-fluid nozzle and enters the drying chamber as a fine droplet dispersion

## 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.

## Knowledge base

- > 28 years expertise in research & development technology
- > 50 years providing engaging engineering teaching equipment

Benefit from our experience, just call or email to discuss your laboratory needs, latest project or application.

An ISO 9001:2015 Company



armfield.co.uk

## Aftercare

Installation  
Commissioning  
Training  
Service and maintenance  
Support: [armfieldassist.com](http://armfieldassist.com)