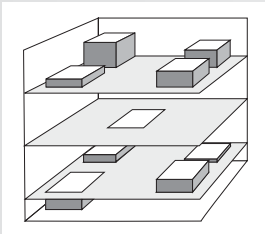# APT.line® drying ovens
What you should know:

▶ **APT.line® – Absolutely precise temperature accuracy from 5 °C above room temperature to 300 °C**
Only BINDER offers this temperature range, as standard, with such precision. That's an unmistakable step up in power reserve for universal use. For use with natural convection or with forced convection.
Offers particularly short heating and recovery times – an inestimable advantage.

ED/FD/FED/FP

▶ **The details that mark precision**
It is the details that especially contribute to state-of-the-art features in drying ovens, such as, for example, significantly reduced energy consumption, good working conditions and high work safety. Engineering quality, however, has a particularly large effect on temperature parameter precision, speed, and constancy.

1. All drying ovens are equipped with above-average heat insulation. There is no loss of temperature in the inner chamber, and virtually no radiation of heat from the outer housing.
2. The specially developed 2-point door-lock mechanism ensures a secure seal. Even at the highest temperatures.

ED/FD/FED/FP

▶ **Standards-compliant work**
The precise, reproducible temperature accuracy alone guarantees GLP/GMP-compliant work, and beyond that, the realization of a multitude of standards-compliant processes. Ever-increasing certification of laboratories worldwide brings with it a comprehensive documentation requirement, which can easily be fulfilled using the APT-COM® DataControlSystem.
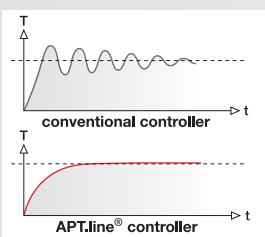
ED/FD/FED/FP

▶ **Validation and calibration**
A professional service that BINDER can perform professionally and quickly in the factory.

ED/FD/FED/FP

▶ **APT.line® control electronics**
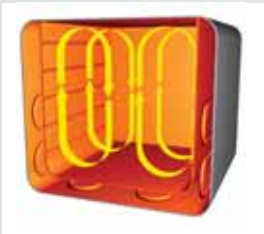There are many electronically-controlled drying ovens. However, it is a fact that two factors significantly affect the quality of thermal processes:

1. The quality of the control technology.
2. The performance capacity of the temperature technology. The electronically controlled APT.line® preheating chamber technology sets absolute standards in terms of precision.
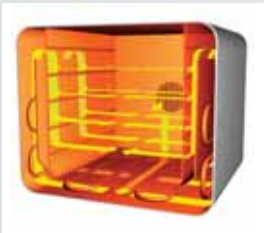
ED/FD/FED/FP

► **Natural convection**

The particularly high air exchange rate (around 1/3 higher than comparable models) substantially increases the efficiency of thermal process, such as the drying process.

ED

► **Forced convection**

Only BINDER offers it. It's a specially developed high-performance fan, offering around 20 % higher performance than comparable models. Combined with the patented APT.line® Airflow Design, particularly high air throughput can be achieved. Air throughput and the air exchange rate can be adjusted continuously, from 0 % to 100 %.

Advantages:

- Faster heating and recovery times compared to natural convection
- Totally homogeneous temperature performance, even in fully loaded chambers
- Substantial time savings through the high drying performance

FD/FED/FP

Product	Controller features	Temperature-time functions

ED series
FD series
	- DS-controller
	- Constant temperature control
	- One ramp function
	- Integrated timer with one time function
	  0 to 99 hours, delayed OFF
	- Adjustable safety device, Class 2 (DIN 12880),
	  with visual alarm
	- Digital temperature setting with degree accuracy
		Constant temperature Ramp function Delayed OFF

FED series	Additional functionality compared to ED/FD series:
	
	- MS-controller
	- Several timer functions, such as
	  0 to 99 h 59 min, delayed OFF
	  0 to 99 h 59 min, delayed ON
	  0 to 99 h 59 min, temperature-dependent delayed OFF
		Constant temperature Ramp function Delayed OFF
		
		Delayed ON Temperature-dependent Delayed OFF

FP series	Additional functionality compared to FED series:
	
	- MP-controller
	- 2 programs with 10 sections each, or 1 program
	  with 20 sections
	- The time intervals of single program sections can be
	  adjusted up to a maximum of 99:59 hours or 999:59 hours
		Constant temperature Ramp function Delayed OFF
		
		Delayed ON Temperature-dependent Program mode
		                    Delayed OFF

FD series:
Drying ovens with forced convection

Drying and sterilization tasks with reduced processing times.

► **Performance features and equipment:**

- Temperature range of 5 °C above ambient temperature up to 300 °C
- Electronically-controlled APT.line® preheating chamber technology with forced convection
- DS-controller with integrated timer 0 to 99 hours
- Digital temperature setting with degree accuracy
- One ramp function
- Adjustable safety device, Class 2 (DIN 12880), with visual temperature alarm
- Adjustable ventilation by means of rear exhaust duct Ø 50 mm with ventilation flap and front ventilation slide
- 2 chrome-plated shelves
- Units up to 115 liters are stackable
- Optional RS 422 interface for communication software APT-COM® DataControlSystem

► Only at BINDER: Precision regardless of size – the 20-liter bench-top units.

Technical data FD series

	FD 23	FD 53	FD 115	FD 240		
▶ **Exterior dimensions**						
Width (mm/inch)	433 / 17.1	634 / 25.0	834 / 32.8	1034 / 40.7		
Height (inclusive feet/castors) (mm/inch)	492 / 19.4	617 / 24.3	702 / 27.6	822 / 32.4		
Depth (mm/inch)	516 / 20.3	575 / 22.6	645 / 25.4	745 / 29.3		
Plus door handle, I-panel and exhaust duct (mm/inch)	85 / 3.4	105 / 4.1	105 / 4.1	105 / 4.1		
Wall clearance rear (mm/inch)	100 / 3.9	100 / 3.9	100 / 3.9	100 / 3.9		
Wall clearance side (mm/inch)	100 / 3.9	160 / 6.3	160 / 6.3	160 / 6.3		
Exhaust duct outer- Ø (mm/inch)	52 / 2.1	52 / 2.1	52 / 2.1	52 / 2.1		
Steam space volume (l/cu.ft.)	36 / 1.3	77 / 2.7	158 / 5.6	308 / 10.9		
Number of doors	1	1	1	2		
▶ **Interior dimensions**						
Width (mm/inch)	222 / 8.7	400 / 15.8	600 / 23.6	800 / 31.5		
Height (mm/inch)	330 / 13.0	400 / 15.8	480 / 18.9	600 / 23.6		
Depth (mm/inch)	277 / 10.9	330 / 13.0	400 / 15.8	500 / 19.7		
Interior volume (l/cu.ft.)	20 / 0.7	53 / 1.9	115 / 4.1	240 / 8.6		
Shelves, chrome-plated (number standard/max.)	2/3	2/5	2/6	2/7		
Load per shelf (kg/lbs.)	12 / 26	15 / 33	20 / 44	30 / 66		
Permitted total load (kg/lbs.)	25 / 55	40 / 88	50 / 110	70 / 155		
Weight of the unit (empty) (kg/lbs.)	33 / 73	44 / 97	62 / 137	96 / 212		
▶ **Temperature data**						
Temperature range, 5°C/41°F above ambient up to (°C/°F)	300 / 572	300 / 572	300 / 572	300 / 572		
Temperature variation [1]						
at 70 °C (± °C)	0.8	0.8	0.7	0.8		
at 150 °C (± °C)	2.2	2	1.8	2		
at 300 °C (± °C)	4.3	3.7	3.9	4.3		
Temperature fluctuation (± °C)	0.3	0.3	0.3	0.3		
Heating-up time [1], [2]						
to 70 °C (Min.)	7	7	7	11		
to 150 °C (Min.)	22	22	28	24		
to 300 °C (Min.)	45	45	49	50		
Recov. time after door was opened for 30 sec. [1], [2]						
at 70 °C (Min.)	2	2	2	2		
at 150 °C (Min.)	4	4	5	6		
at 300 °C (Min.)	9	9	12	13		
Air change						
at 70 °C (x/h)	59	59	29	19		
at 150 °C (x/h)	64	64	32	20		
at 300 °C (x/h)	53	53	26	18		
▶ **Electrical data**						
Housing protection acc. to EN 50529	IP 20	IP 20	IP 20	IP 20		
Nominal voltage (± 10 %) 50/60 Hz (V)	230	230	230	230		
Nominal power (W)	800	1200	1600	2700		
Energy consumption						
at 70 °C (W)	145	145	230	370		
at 150 °C (W)	300	300	544	850		
at 300 °C (W)	720	720	1100	1400		

[1] value without window   [2] up to 98 % of the set value

All technical data are specified for units with standard equipment at an ambient temperature of + 25 °C and a voltage fluctuation of ± 10 %. The temperature data are determinated in accordance to DIN 12880, part 2 respecting the recommended wall clearances of 10 % of the height, width and depth of the inner chamber. All indications are average values, typical for units produced in series. We reserve the right to alter technical specifications at all times.

► **Printer hybrid**
For printing temperature logs. Connects to RS 232 printer interface. Includes set of connection cables for RS 422 interface and interface converter RS 232/RS 422.

FED/FP

► **Increased air exchange rate**
through stronger fan.

FP

	ED						FD				FED					FP				
	23	53	115	240	400	720	23	53	115	240	53	115	240	400	720	53	115	240	400	720
Access port with silicone plug	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Shelf, chrome-plated or stainless steel	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Shelf, perforated, stainless steel	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Reinforced shelf, stainless steel, with 1 set of shelf securings (max. 70kg/154lbs.)	–	–	–	–	–	–	–	–	–	O	–	–	O	O	O	–	–	O	O	O
Reinforced inner chamber, including 2 reinforced shelfs (max. total load 250kg/552lbs. Load per rack 70kg/154lbs.)	–	–	–	–	–	–	–	–	–	–	–	–	O	O	O	–	–	O	O	O
Shelf securings for additional fastening of racks (1 set of 4)	–	–	–	–	–	–	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Adjustable safety device, Class 3.1 (DIN 12880) for 230/400 V only	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Door with window and interior lighting	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Door, lockable	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Door gasket, viton (temperature-resistant up to 220 °C)	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Over-temperature alarm, acoustic, can be switched off	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	–	–	–	–	–
Analogue temperature output, 4–20mA, with DIN bushing 6 poles	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Additional measuring channel for digital display of specimen temperature	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	O	O	O	O	O
Largely gas-tight constructed chamber	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	O	O	–	–	–
Inert gas connection (gas inlet and outlet)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	O	O	–	–	–
Temperature measurement according to DIN 12880-2 or with 9 measuring points with measurement protocol and certificate	–	–	–	–	–	–	–	–	–	–	O	O	O	O	O	O	O	O	O	O
Fresh-air filter, Class EU 14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	O	O	O	O	O
Increased air exchange rate through stronger fan	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	O	O	O	O	O
Air-exchange rate measurement according to ASTM D5374 with definition and measurement protocol	–	–	–	–	–	–	–	–	–	–	O	O	O	O	O	O	O	O	O	O
Printer hybrid for printing temperature logs. Connects to RS 232 printer interface. Includes set of connection cables for RS 422 interface and RS 232/RS 422 interface converter, 230 V	–	–	–	–	–	–	–	–	–	–	O	O	O	O	O	O	O	O	O	O
Potential-free switching outputs accessible with DIN bushing 6 poles	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	O	O	O	O	O
RS 422 interface	O	O	O	O	O	O	–	–	–	–	√	√	√	√	√	√	√	√	√	√
Calibration certificate	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Calibration certificate, extension	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Stable table on wheels with locking brakes	–	O	O	O	O	–	–	O	O	O	O	O	O	O	–	O	O	O	O	–
Evaporating dish with rim	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Rubber pads for safe stacking	O	O	O	O	–	–	O	O	O	–	O	O	O	–	–	O	O	O	–	–

○ option   – not available   √ standard