



WAVE

Technical Description

Wave FD440

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WAVE FD440

Table 1: Performance Table – Summary

#	Notation	Description	Performance
1		Vacuum chamber	
1.1		Maximum extraction capacity	60kg
1.2		Drawer loading volume	192 L
1.3		Chamber diameter	600 mm
		Material of chamber	Extruded aluminium 7mm
2		Shelves	
2.1		Number of shelves	4-12
2.2		Tray dimension (2 trays in each drawer)	600 mm x 400 mm
2.3		Total usable tray area (basic version with 8 shelves)	3.85m²
2.4		Distance between shelves (basic version with 8 shelves)	48 mm
3		Vacuum system	
3.1		Vacuum pump type	Two-stage rotary-vane or scroll pump (new or refurbished)
3.2		Pump down time to 0.1 mbar	20 minutes
3.3		Maximum system vacuum	50 mTorr
3.4		System leak rate	10⁻⁴ mTorr/sec
4		Heating system	
4.1		Maximum shelf temperature	+80°C
4.2		Minimum shelf temperature	-40°C
4.3		Shelf cool down time (+20 to -30°C)	20 min (unloaded)
4.4		Heating capacity	Up to 400 Watt/tray
4.5		Defrost mechanism	electrical
4.6		Defrost time	20 – 60 min
5		Refrigeration system	
5.1		Number of compressors	2
5.2		Compressor Type	Piston Type

5.3	Maximum cooling capacity	-40°C
5.4	Compressor energy consumption	3 kW
6	Size of freezedryer	89 cm x 140 cm x 130 cm
7	Weight of freezedryer	430 kg
8	Control of freezedryer	Siemens simatic

Table 2: Utility Requirements

#	Notation	Description	Performance
1		Electricity	400 V, 50Hz / 60Hz, 3 phases, Neutral, Ground, 5 wires
1.1		Maximum electrical load	9 kW
2		Water	Only needed for cleaning trays, shelves etc
3		Internet connection	CAT6 Ethernet for software updates
4		Ambient temperature	< 23°C




Table 3: Detailed Technical Specifications

#	Notation	Description	Performance
1		General Information	
1.1		Model	FD440
1.2		Control	Siemens Simatic PLC + touchscreen
1.3		Dimensions of unit (as well refer to drawing) (L x W x H)	89 cm x 140 cm x 130 cm
1.4		Floor space with maintenance area	Extra 1 m at each side
1.5		Weight (approx..)	430 kg
1.6		Noise	Sound pressure level less than 65 db (A) measured from a distance of 1 meter from the machine
2		Chamber	
2.1		Chamber form	Tube
2.2		Internal finish	Hard anodized 25u
2.3		Outside finish	Hard anodized 25u

2.4	Material	Extruded aluminium 7mm
2.5	Vacuum nanometer for chamber vacuum measurement	Pirani vacuum sensor
3	Door	
3.1	Material	40 mm acrylic
3.2	Door closing mechanism	Mechanical
3.3	Chamber door open direction	Hinge on left side
3.4	Open angle	170°
3.5	Gasket	Silicone rubber
3.6	Locking arrangement	Manual door lock
4	Shelves	
4.1	Temperature range	-40 to +80°C
4.2	Temperature sensors	PT100 "A"
4.3	Number of shelves	4-12
4.4	Total usable area (4-12 trays)	1,9m² - 5.76m²
4.5	Tray dimension (2 trays in each drawer)	600 mm x 400 mm x 20 mm
4.6	Spacing 6 shelves	64 mm
4.7	Spacing 8 shelves	48 mm
4.8	Spacing 12 shelves	32 mm
4.9	Material	Anodized aluminium or stainless steel
4.10	Shelf cooling down time (+20 to -30°C)	20 min (empty)
4.11	Shelf heating time (-30 - +20°C)	3 min (empty)
4.12	Shelf temperature precision	+/- 1°C
5	Refrigeration System	
5.1	Compressor	Embraco
5.2	Compressor current load	3 kW
5.3	Refrigerant depending on local regulations	R449A or R404A
5.4	Defrost/De-icing	50 min (ice can be removed before that)
6	Heating System	
6.1	Heating method	Heating mat
6.2	Heating capacity	Up to 400 Watt/tray

6.3	Maximum heating mat temperature	+80°C
7	Vacuum System	<30 min
7.1	Vacuum pump	Two-stage rotary-vane or scroll pump (new or refurbished)
7.2	Pump isolation valve on main vacuum pipeline	Butterfly or ballvalve
7.3	Anti-suck valve	Inside vacuum pump
7.4	Vacuum manometer for vacuum pipeline vacuum measurement	Pirani sensor
7.5	Final vacuum	<0.07 mbar
7.6	Time to build up final vacuum	<30 min
7.7	Leakage rate of system	10⁻⁴-4 mTorr/sec
8	Control system	
8.1	PLC	Siemens simatic
8.2	Touchscreen	Kinco
8.3	Software	Inherent software, automatic control as well as manual control of all control options possible. Control points are shown on screen, advanced statistics of drying cycle are shown and can be saved. Individual programmes can be created and saved.
9	Documentation	
9.1		Operation manual
9.2		Layout drawing
9.3		Electrical wiring drawing
9.4		Loose parts list

Table 4: Loose Parts List

#	Notation	 System	 Description	 Quantity
1		Vacuum System		
	1.1		Vacuum pump oil	4 L
2		Electrical System		
	2.1		Relays	2
3		Valves		
	3.1		Vacuum valve for pump	1
	3.2		KF25 clamp	2
	3.3		KF25 seal	2
4		Control		
	4.1		CAT6 Ethernet cable	1
5		Tool		
	5.1		Phase screwdriver	1
6		Extras		
	6.1		Thermo gloves	1
	6.2		USB Stick	2