

Technical Specification



FIMA Centrifuge Dryer TZT 1300
with Components for closed Gas Loop



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1 Technical Data

1.1 Machine Data

Description		FIMA TZT 1300
Diameter Filter Drum	(mm)	1300
Cake Volume	(L)	400,0
Filter Area	(m ²)	2,4
Max. Filling Weight	(kg)	400,0
Max. Rotation Speed	(min-1)	1100
Max. G - Force	(x g)	600
Motor Power	(kW)	55,0
Weight	(kg)	9500
Length	(mm)	3500
Hight without Frame	(mm)	2000
Width	(mm)	1900
Sound Level	[db(A)]	< 80

1.2 Materials

Description	TZT 1300
Ring Channel	AISI 316L (1.4404 / 1.4435)
Filtrate Housing	AISI 316L (1.4404 / 1.4435)
Other product contacted Parts	AISI 316L (1.4404 / 1.4435)
Mechanical Seal	Product Side: SiC – SiC Atmosphere Side: SiC - SiC
Buffer Fluid	Water
Filling Pipe	AISI 316L (1.4404 / 1.4435) (product contacted parts)
Machine Housing	AISI 316L/ 316 Ti (1.4404 / 1.4435/ 1.4571)
Covers	AISI 316L/ 316 Ti (1.4404 / 1.4435/ 1.4571)
Other internal / external Components	AISI 316L/ 316 Ti/ 321/ 304 (1.4404 / 1.4435/ 1.4571/ 1.4541/ 1.4301) Carbon Steel, painted
Filter Drum	1.4468 Stainless Steel Cast
Filter Basket	AISI 316L (1.4404) with Sintered Metal Mesh
Shaft	AISI 316L (1.4404)
O-Rings and Gaskets	z.B. FEP-/ PFA- encapsulated Silicone
Filter Element	AISI 316L (1.4404) Sintered Metal Mesh, 10 micron

2 Technical Specification of Basic Machine

2.1 Machine Housing

Massive compact construction made of stainless steel / painted carbon steel that minimizes vibrations, with integrated drive systems for full metal drum, filter drum and seal plate.

2.2 Base Plate

Base plate with high proportion of mass to reduce the vibration amplitude in connection with soft spring vibration dampers.

2.3 Filtrate Housing

The design is optimized for residual-free filtrate drainage and designed according to the pressure vessel calculation according to the German AD data sheet and inspection by the German TÜV.

2.4 Seal Plate Housing

Cylinder-clearance-free design with cleaning drainage contains the drive of the seal plate.

Axial movable stainless steel compensator prevents the carryover of product into the drive section of the seal plate and vice versa. Designed using the pressure vessel calculation according to the German AD data sheet and inspection by the German TÜV.

2.5 Full Metal Drum

Drum for holding the filter cage with filtrate and gas openings on the reverse of the face side, flanged on the stiffly mounted drive shaft.

Segmented in different chambers so as to be able to build up efficient gas impulses during blasting, drying and discharging.

2.6 Filter Drum

Conically (3°) shaped filter basket with 7-layer filter mesh with standard machine breadth with homogenous drainage features for optimal washing, centrifugation and drying results.

Nominal mesh size 10 μm , absolute mesh size 18 μm .

2.7 Seal Plate

During rotation in its closed position, synchronized with the filter basket and thus statically sealing.

2.8 Filling Pipe / Main Shaft

The feed pipe is integrated in the drive shaft and rotates synchronously to the drum rotations.

The feed pipe is connected with a wet running double mechanical seal [product side SiC / SiC; atmosphere C / C] to the fixed feed pipe flange. The buffer fluid is water

Where necessary, the feed pipe can be retrofitted with an optimally shaped in-feed nozzle using simple means.

2.9 Bearing

High-quality bearings selected specially for the high precision requirements of rotation and rigidity and constructed for enduring use through spring-pre-stressed installation.

The lifecycle was designed on the basis of an overall load configuration of 20,000 h. Overall, three bearing points are monitored for temperature to ensure that the proper condition of the bearings are monitored on a permanent basis. If the maximum permissible surface category temperature at the outer surface is exceeded, the centrifuge dryer TZT is shut down in a controlled manner in accordance with Directive 94/9 EC (ATEX).

The bearings are lubricated by hydraulic oil. The hydraulic power pack is equipped with a heat exchanger which enables cooling down or heating up the lubricant.

2.10 Sealing System

2 x cartridge in triple-lip seal design with nitrogen admission and nitrogen flow measurement and monitoring by flow meters for main drive shaft and seal plate shaft.

All parts in direct contact with the product are conform to FDA 21CFR 177.

2.11 Seal Plate Movement

The hydraulic drive of the seal plate is in a completely isolated position outside the sensitive process room.

The advantages of this drive technology are the sensitive feedback of the forces in the process room that have an effect on the seal plate. This is done with pressure transmitters that register the

pressures online and when limits are exceeded and depending on the process sequence, deactivate the corresponding valves (e.g. fill valve) or influence the number of revolutions of the drum.

The seal plate is driven by a centred hydraulic cylinder into the positions open and closed. Both positions are monitored by proximity switches which are integrated into the safety chain of the TZT controls.

2.12 Nozzles for Dislodging and Drying

In order to achieve most efficient dislodging, drying and final discharging of the dry product the TZT is equipped with special designed nozzles. Face plates in front of the nozzles will avoid bypassing of the gas. The gas shot is guided entirely evenly over the whole length of the drum to the product cake. This aspect in particular makes safe functioning possible during dislodging.

2.13 Main Drive

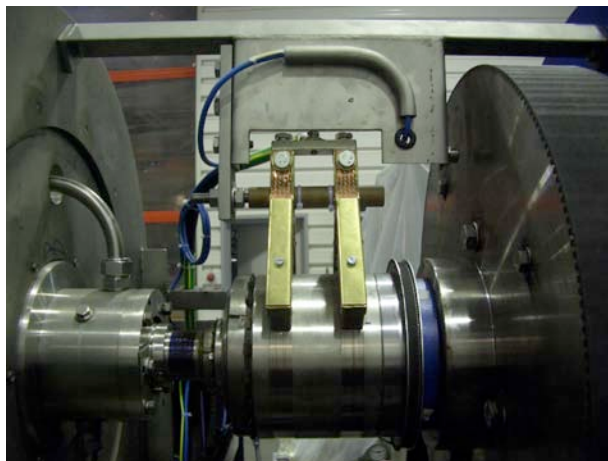
Three-phase AC motor in IP 55, with external fan, installed power 55 kW.

A high-resolution SIN-COS encoder helps the motion controller to ensure smooth running at low revolution speeds and exact positioning. This technology facilitates new paths in the various processes and thus the successful processing of extremely difficult products with a very wide range of grain.

In addition, there is an absolute encoder on the drive shaft. This ensures a very high degree of safety during operation. Even when one of the rotary encoders fails, the faulty rotary encoder is detected immediately as both rotary encoders are constantly compared in accordance with an integrated algorithm.

All drive belts are electrically conducting and therefore anti-static.

To be on the very safe side regarding electrical conducting special brushes are installed directly on the main shaft.



2.14 Utilities

Electricity:	415 V / 50 Hz 230 V / 50 Hz
UPS:	for control system and motion controller for the controlled shutdown of the machine
Control current:	24 V DC (is generated in the control cabinet)
Nitrogen to TZT:	6 bar g (dislodging)
Nitrogen to TZT:	6 bar g; on average 2.500 – 3.000 Nm ³ /h (fixed bed, counter-impulse and fluidized bed drying)
Control air:	6 bar g
Product feed:	0 – 1.5 bar g
P.A.C. (Pressure added centrifugation)	up to 3 bar g
Optional vacuum:	0.125 bar (abs)

2.15 Instrumentation on the TZT

	Qty.
Instruments TZT	
PT 100: Bearing Temperature	3
Proximity: Rotation Speed	1
Proximity: Seal Plate closed	1
Proximity: Seal Plate open	1
Proximity: Seal Plate Housing open / closed	1
Flow Meter: Nitrogen – Lip Seals	2
Flow Meter: Hydraulic Oil – Bearings	3
Pressure Switch: Hydraulic Pressure – Seal Plate open / close	2
Encoder	2
Pressure Switch: Buffer Fluid Tank	1
Temperature Switch: Buffer Fluid	1
Level Switch: Buffer Fluid	1
Vibration Sensor	1

	Qty.
Valves TZT	
Dislodging and Drying	4
Nitrogen for Lip Seals	1

2.16 Surface Finish

Description	TZT 1300
Product contacted Parts	$Ra \leq 0,8 \mu m$
Others	$Ra \leq 2,0 \mu m$

2.17 Explosion Protection

Guidance	94/9 EC (ATEX) (o) 3G/3D IIB T4
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3 Controls

The FIMA control system contains the basic TZT control and will be connected with the customer PLC system via Ethernet. The control of all other components in the control cabinets (e.g. power relays, auxiliary relays) and the control of the instruments and the valves in the centrifuge are hardwired.

All field control is outside the FIMA scope of supply.

3.1 Protection

Ex Classification

The control cabinets are located in no ex-proof area. The FIMA TZT is operated in an explosion proof classified area. The TZT itself mechanically is specified to II 3D T=135°C. The electrical equipment is classified to II 3D Eex d,e,i,m T=135°C.

Protection Classes

-Control Cabinet IP 54
-Inverter Cabinet IP43
-Junction Boxes IP 65

3.2 Junction Boxes

The following junction boxes are placed at the TZT:

- 1 Junction Box Eexe type for the shaft encoder
- 1 Junction Box Eexe type for the valves inside the TZT
- 1 Junction Box Eexi type for the measurements inside the TZT

The following junction box is placed at the hydraulic unit:

- 1 Junction box for the valve and measurements at the hydraulic unit without Ex-protection (is installed in a separate room!)

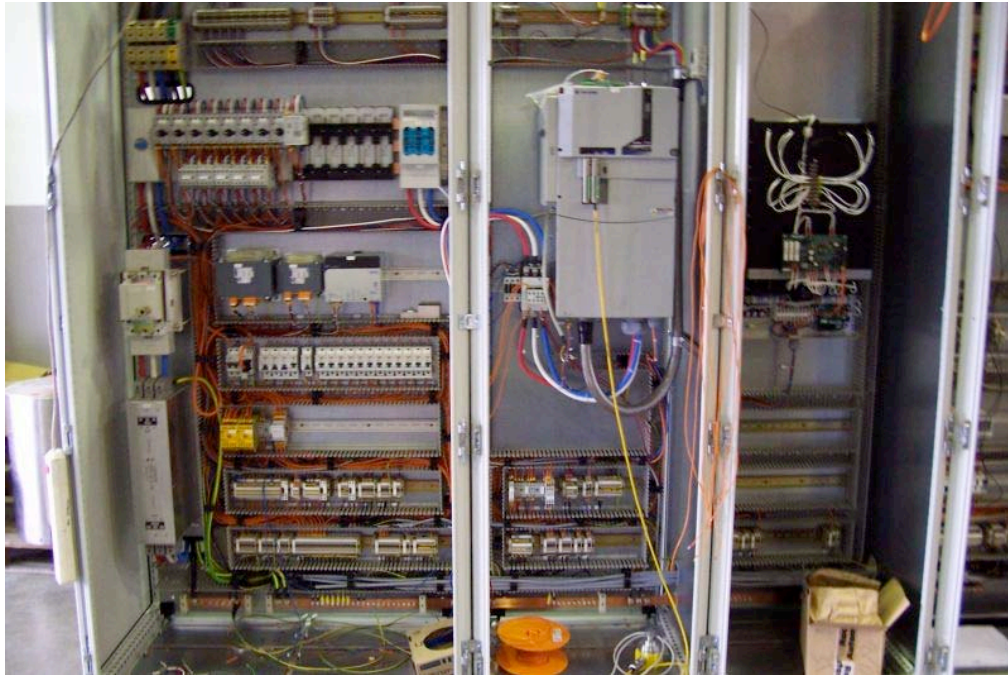
3.3 Contacts and Relays

Contacts and relays are equipped with status indicators where possible.

3.4 Electric Cabinets

3.4.1 Ambient Conditions

Temperature 0-40 °C, relative humidity 10-95 % not condensing, non explosion proof classified.
The electric cabinets are build according to EN 60 204-1.



3.4.2 Cabinet Types

Cabinet 1	Rittal TS8
Catalogue no.	TS8606.500
Dimensions W x H x D (in mm)	600 x 2000 x 600
Weight	104Kg
Colour	RAL 7035 grey
Catalogue no. socket	TS8602.600 / TS8602.060
Socket dim. W x H x D (in mm)	600 x 200 x 600
Socket colour	RAL 7022 dark grey

Cabinet 2	Rittal TS8
Catalogue no.	TS8806.500
Dimensions W x H x D (in mm)	800 x 2000 x 600
Weight	130,5Kg
Colour	RAL 7035 grey
Catalogue no. socket	TS8602.800 / TS8602.060
Socket dim. W x H x D (in mm)	800 x 200 x 600
Socket colour	RAL 7022 dark grey
Universal light	PS 4155.100 230 V ,50Hz
Outletfilter EMV	SK3323.267
Filter fan EMV	SK3327.607
Door position switch	ZS 4127.000
Temperature controller	SK3110.00

3.4.3 Internal Design of Cabinets

- The cable entry into the cabinets for the power supply will be from top and the output voltage also will be in the top of the cabinets.
- Cables will be fixed on cable glands.
- Terminal strips for power and control circuits are separated.
- Ventilation of the cabinets will be done through a filter in the door of each cabinet. The blow out manifold will be in the upper part of the frontdoor.
- All Terminal clips will be arranged horizontally. They are placed respectively in the lower and upper part of the cabinets. The terminal strips are build up with Weidmüller clamps. There are different sizes of the clamps depending on the needed current and wire gauge.
- The clips are marked with an undetachable number.
- Each wire in the internal wiring is tagged with the same id number in each end. The ID-number is different from the terminal number.

3.4.4 Cabinet 1: Power supply and auxiliary drives / Power supply frequency inverter / Power supply brake unit

W x H x D 600 x 2200 x 600 mm with socket

- Power inlet 415 V AC 50 Hz, 3 phase / PE, TN-S net
- 24 V control voltage
- 230V control voltage
- 120V control voltage

3.4.5 Cabinet 2: Frequency Inverter

W x H x D 800 x 2200 x 600 mm with socket

The cabinet is equipped with a temperature controlled fan to cool the internal components.

Frequency inverter with braking chopper for main motor	Allen-Bradley
Catalogue no.	20D C140 A0
Dimensions W x H x D (in mm)	644x300x286
Weight	38,0Kg
Supply voltage	342...480VAC, 3 phase
Rated motor power	55 kW
Phase max. current	96A
Control input voltage	300VDC
Control input current	1,3A
Communication module	SYNCH LINK fibre optic bus, Drive Logix module
Full numeric display	20-HIM-A3
Control voltage	24VDC

Synch link communication module	Allen-Bradley
Catalogue no.	20D-P2-SLB0
Dimensions W x H x D (in mm)	Included in Power Flex 700S

Drive Logix module Ethernet	Allen-Bradley
Catalogue no.	5730
Dimensions W x H x D (in mm)	Included in Power Flex 700S

Line filter main motor	Allen-Bradley
Catalogue no.	2090-XXLF-TC3100
Dimensions W x H x D (in mm)	Included in Kinetix 7000
Supply voltage	400VAC, 3 phase

3.4.6 Cabinet 3: Brake Unit

W x H x D 600 x 2200 x 600 mm with socket

The cabinet is equipped with a temperature controlled fan to cool the internal components. A brake unit for the main motor is necessary.

Brake unit	Allen-Bradley
Catalogue no.	1336-MOD-KB050
Voltage range	380-480V
Power	37KW
Protection class	IP20

3.4.7 Cabinet 4: Automation System

W x H x D 800 x 2200 x 600 mm with socket

The FIMA Automation system is based on Allen-Bradley Control Logix components

Unit	Type	Description
Rack system	1756-A13	Control Logix rack system
CPU	1756-L62	Control Logix PLC for motion control
Communication to DCS and remote I/O	1756-ENBT	Communication processor for Industrial Ethernet
Central I/O	1756-IB32 1756-OB16I 1756-OB16IS 1756-IF6CIS 1756-M03SE	Digital input, 24V/DC Digital output, 24V/DC Digital output, 24V/DC fast outputs Analog input, potential free 3 Axis controller
Remote I/O	1734-AENT	24V Ethernet adapter
Encoder interface	1734-SSI	Point I/O absolute encoder interface for SSI

Memory card	Allen-Bradley
Catalogue no.	1784-CF64
Memory	64Mbyte

3.4.8 Cabinet 5: EEx i Cabinet

W x H x D 600 x 2200 x 600 mm with socket

Safety Barriers for ASA-062	Brüel u. Kjaer Vibro
Catalogue no.	AC-297
Nominal Supply	24V DC

Interface module (EExi)

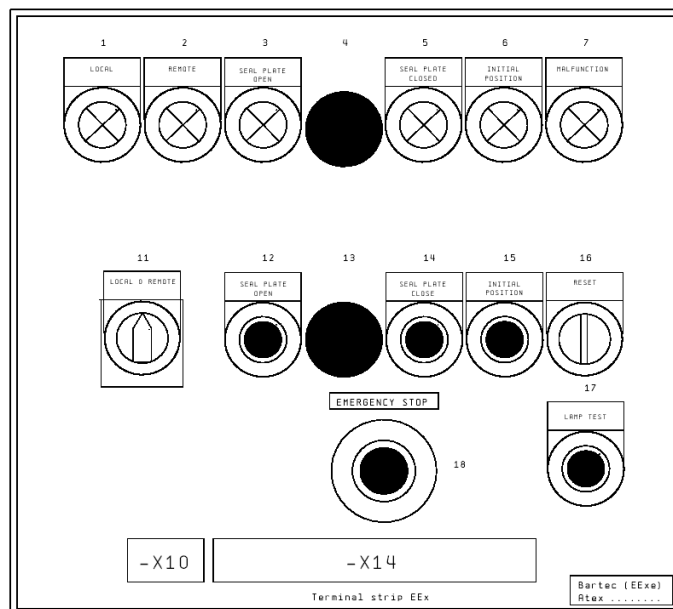
Power Feed	Pepperl & Fuchs
Catalogue no.	KFD2-EB2
Supply voltage	24V DC
Supply current	< 4A

3.5 Control Signals

Temperature transmitters	4-20 mA
Pressure transmitters.....	4-20 mA
Flow transmitters.....	4-20 mA
Switches.....	24 V DC
Solenoid valves.....	Eex i and Eex m 24V DC

3.6 Local Operator Panel

W x H x D 380 x 380 x 210 mm



4 Gas Loop System for Drying

The thermal drying of the product will be achieved by shooting in hot nitrogen or air into the several segments of the filter drum. The gas pressure has to be at least 6 bar (ü).

In the closed gas loop system the requested nitrogen will be supplied once from the main nitrogen supply of the production site, compressed by the compressor and circulated within the TZT system. Any losses of nitrogen will be automatically supplied by the main supply.

The inlet temperature of the drying gas will be controlled by a heated gas heater. Pressure fluctuations will be eliminated by installing a nitrogen buffer vessel in the fresh gas line.

The humid exhaust gas which is leaving the TZT during product drying will be filtered, condensed, demisted and will enter again the suction nozzle of the compressor.

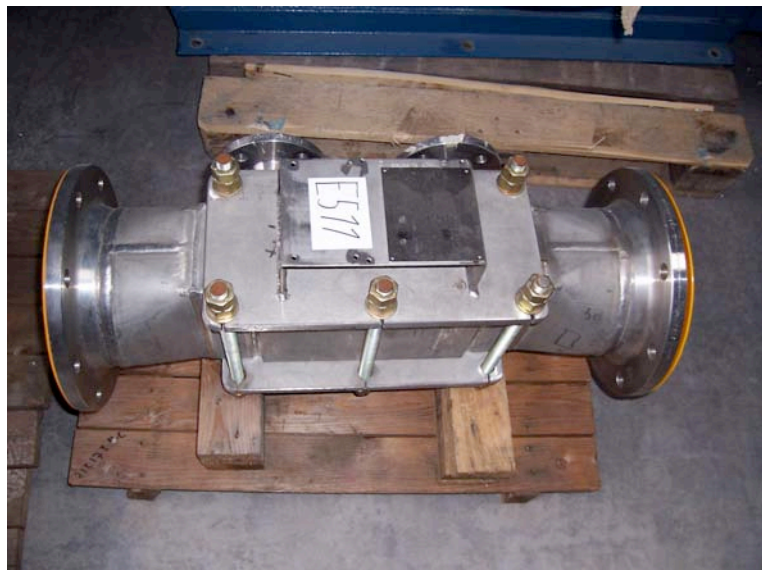
4.1 Buffer Vessel



4.2 Filter (Fresh Gas / Exhaust Gas)



4.3 Condenser



4.4 Demister



4.5 Compressor





5 **Contacts**

<u>Name</u>	<u>Function</u>	<u>Phone</u>	<u>Fax</u>	<u>e-mail</u>
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