

# TECHNO COMMERCIAL PROPOSAL OF THE FLUID BED PROCESSOR

**M/s THERMAX LABORATORIES**

Model Town, Ambala City

HARYANA

India

 MaximizeCPQ



#### Applications...

A premier production fluid bed system capable of handling a wide variety of process applications simply through the incorporation of the appropriate features. Possible processes as following:

Drying of products produced by conventional wet granulation processes e.g. high shear mixer.

Top spray granulation of powders which are suitable in their characteristics for the use in a fluid bed process.

#### Key features...

Our solution for YOU...

With pleasure we are providing you the following offer. Our custom made solution consists:

#### **1.1.1 Electrical 3 phases :**

520 Volts :

The supplied system will be designed for the use with a 520 Volts, 3 Phase power supply

#### **1.1.2 Electrical 3 phases :**

415 Volts :

The supplied system will be designed for the use with 415 Volts, 3 Phase power supply

#### **1.1.3 Electrical 1 phase :**

220 Volts :

The supplied system will be designed for the use with a 220 Volts, single phase power supply.

#### **1.1.4 Electrical frequency :**

50 Hertz :

The supplied system will be designed for the use with an electrical frequency of 50 Hertz

#### **1.1.5 Compressed air :**

Compressed air pressure at site 6.0 bar :

The supplied system will be designed for the use with a 6 bar(g) compressed air supply.

#### **1.1.6 Steam (heating media) :**

Heating steam pressure at site = 3.5 bar(g) :

The supplied system will be designed for the use with a heating steam pressure of 3.5 bar(g).

#### **1.1.7 Pure steam :**

Pure steam pressure at site = 2 bar(g) :

The supplied system will be designed for the use with a pure steam pressure of = 2.0 bar(g), {max 4 bar (g)}

#### **1.1.8 Chilled water (cooling media) :**

Chilled water temp inlet 8°C :

The supplied system will be designed for a chilled water supply at the inlet of the dehumidification coil of 8°C, at 2 bar pressure

#### **1.1.9 Raw water :**

Raw water pressure 2.0 bar(g) :

The supplied system will be designed for a raw water supply pressure of 2 bar(g) at the inlet of the WIP skid, with rated flow rate.

#### **1.1.10 Demineralized water :**

Demineralized water pressure = 2bar(g) :

The supplied system will be designed for a Demineralized water supply pressure of 2 bar(g) at the inlet of the WIP skid, with rated flow rate.

#### **1.1.11 Ambient conditions technical area :**

Temp between 5°C to 40°C :

The supplied control panel will be designed for installation in a technical area with an environmental temperature of between 5° and 40°

#### **1.2.1 Basic air handler unit :**

The inlet air handling unit is used to condition the process air. Depending on the customer's requirements the following process air parameters can be controlled:

- Process inlet air temperature
- Process inlet air humidity
- Quality of process inlet air filtration

The basic execution consists of:

- AHU housing according to DIN standard, single-walled, fabricated in SS304 (1.4301), all external weld joints ground, polished and passivated.
- Base frame in painted carbon steel, up to 200mm high.
- Service doors for easy filter and maintenance access can be hinged on either the left or right site of the inlet air handling unit (orientation dependant on layout).
- Transportation eyebolts.
- Inlet air transition cone, single-walled, with flange and mating flange to connect the inlet air handling unit to the inlet air ductwork made from 304 (1.4301) stainless steel.
- Pre-filter stage: EU4 filter, according to EN 779, max. temperature resistance 80°C, including local differential pressure indication (0-250 Pa).

- Face and bypass temperature control system. A pneumatically operated jalousie style face and bypass system is used to control the process inlet air temperature. The jalousie flaps modulate the incoming process air either over the heating coil or allows it to bypass. The face and bypass system allows a fast and precise control of this process parameter.
- Final filter stage: EU7 filter according to EN 779, max. temperature resistance 120°C, including local differential pressure indication (0-1kPa).
- Outlet air transition cone, single-walled, with flange and mating flange to connect to the inlet air ductwork made from 304 (1.4301) stainless steel.

NOTE: The inlet air ducting and insulation to be supplied by customer.

#### **1.2.2 Credit-non supply of basic AHU :**

No

#### **1.2.4 AHU design :**

Standard single piece :

The inlet air handling unit will be in one single piece construction as a standard.

#### **1.2.5 F6 in place of G4 filter :**

No

#### **1.2.6 Differential pressure measurement for filter 1 :**

Local :

Consists of:

- A local display of differential pressure on a magnehelic gauge, mounted on the air handler.

#### **1.2.7 Differential pressure measurement for filter 2 :**

Local :

Consists of:

- A local display of differential pressure on a magnehelic gauge, mounted on the air handler.

#### **1.2.8 Type of heating unit :**

Steam heating :

Steam coil integrated into the face and bypass temperature control system made from 304 (1.4301) stainless steel tubing with aluminum fins consisting of:

- Steam heating coil for saturated steam (maximum  $\Delta t$  110°C).
- Steam control valve (OPEN / CLOSE) along with strainer complete with mating flanges for installation by customer.

NOTE: Manual shut-off valves, steam trap and drain, piping and insulation by customer.

#### **1.2.9 HEPA filter with DOP & delta pressure measurement :**

The standard configuration of the inlet air handling unit will be upgraded with:

- A final H13 HEPA filter according to EN 1822, max. temperature resistance 120°C,
- Service door for easy filter access.
- Local indication of differential pressure (0-2kPa).
- Two (2) 1" Tri-Clover ports located before and after the H13 final filter for DOP testing.

Note: - In case of imported AHU, the EU9 filter is replaced with H13 filter. An additional F7 filter according to EN 779, max. temperature resistance 80°C, including local differential pressure indication (0-250 Pa) is added to the pre-filter stage to improve the lifetime of the final H13 HEPA filters.

Note: Test instruments/media and testing service for DOP test by customer

#### **1.2.10 Dehumidification :**

Standard chilled water coil :

The dehumidification system is designed for an ambient air condition of 32°C (89.6°F) and 40% RH. Dew point of 10 deg C is achieved subject to an inlet temperature of 6 °C (42.8 °F) (Dew point achieved will be 4 °C (39.2 °F) plus (inlet water temperature) and a maximum process air humidity level of 8 gm/kg. Require cold water supply temperature +6°C (42.8 °F) / return temperature +12°C (53.6 °F).

Consists of:

- Dehumidification coil for locally supplied cooling medium (chilled water or brine) made from copper tubing with aluminum fins.
- Droplet separator made from Polypropylene or stainless steel 304.
- Condensate pan made of 304 (1.4301) stainless steel, including drain and siphon.
- Control valve (3/2-way valve) with temperature sensor. Self-regulating without ancillary energy or controlled by the PLC.

Note: Manual shut-off valves, piping and piping insulation by customer. (Optional supply of Manifolds possible. See Options list for manifolds).

### 1.3.1 Hardware make :

Mitsubishi :

CPU:FX3U

Program Memory:64000 steps

### 1.3.2 Operator interface terminal :

Basic one :

Operating Control panel made of SS304, in non-ex proof design fitted on either support column, consisting of:

- 7" Color touch screen HMI
- An Emergency push button, key operated, for emergency stopping of the machine and for locking the machine in OFF position. In flameproof construction the panic push button is mounted separately on the lateral support.
- Operating air pressure displayed on the HMI.
- Inflatable gasket sealing pressure displayed on the HMI.
- Differential pressure on HMI across.
  - o Product / bottom screen.
  - o Exhaust air filter bags.
- Functions operated through the HMI are as follows:
  - o Machine Setting:
    - o Inflate / Deflate filter sealing
    - o Inflate / Deflate container sealing
    - o Filter Change – Filter Up / Down
  - o Process Setting:
    - o Process on/off and Heater on/off
    - o Inlet air temperature – set and actual with PID control
    - o Exhaust air temperature – set and actual

- o Air Flow Measurement
- o Filter shaking interval and duration of filter shaking
- o Manual or automatic shaking of the filter bag
- o Spray on/off with atomization air control through PID
- o Different safety alarms
- o Blowout automatic cleaning of Magnehelic piping for product / bottom screen & exhaust air filter.
- The electro-pneumatic panel is remotely installed, including the following parts:
  - o Main switch
  - o PLC with I/O cards
  - o Control transformer
  - o Motor starters
  - o Overload switches
  - o Fuses
  - o Terminals
  - o Pneumatic Components (Control Instrument)

#### 1.4.1 Basic machine tower :

The machine tower is supported by columns. They will be delivered with brackets and mounting material for installation and are equipped with grounding connections. Rod less cylinders for the filter lifting and lowering will be housed inside those columns.

The machine tower is a pneumatically sealed, 2 bar pressure-shock resistant system.

The Basic machine tower is consisting of three (3) sections:

1. The lower plenum connects the process air inlet ductwork to the product container and is mounted to the Supporting - Columns. The lower plenum is equipped with:

- Inflatable seal with controls for monitoring the seal pressure with alarm display on the HMI. Pneumatically actuated inlet air flap including limit switch for position monitoring (CLOSED), complete with flange and mating flange to be mounted to the lower plenum of the machine tower. This flap also defines the WIP limits.
- Differential pressure measurement system across the lower plenum is installed to measure the  $\Delta p$  across



the product bed. Display of measured  $\Delta p$  on the HMI, including upper alarm set point and alarm display on the HMI.

- Water drains port with Tri-Clover flange at the lowest point of the lower plenum.

2. The product container is inserted between the lower plenum and the expansion chamber. Depending on the required process the customer can choose from the following product container options:

- Granulation product container used for top spray granulation and drying.
- WURSTER bottom spray product container used for coating applications.

3. The combined expansion chamber / twin chamber filter housing is cylindrically shaped, constructed of 316L stainless steel and supported by the Supporting-Columns. Equipped with:

- Expansion chamber including four (4) fixed round observation sight glasses with flat silicone gasket (One (1) located in the front, one (1) located in the back allowing illumination and two (2) in the filter housing). Nozzle port for three (3) different height positions including blind flanges. Mechanical lock and "in place" sensor for product container.

- Twin chamber filter housing providing continuous fluidization. Including automatic shaking device for twin chamber filters with each one (1) pneumatically operated shaking cylinder for the purpose of cleaning the product retention filters during production without process interruptions. During the shaking phase it removes fine material from the product retention filter and returns it back to the product container. The shaking cylinders are mounted on the upper portion of the filter housing.

- One set of PC Satin filter bag (2NOS) for startup and training purpose only and one set (2NOS) of Anti-static Conductive T104 filter bag for actual product production.

- Two (2) filter assemblies for the twin chamber filter system, each with a D-shaped bag type product retention filter and a pneumatically operated filter assembly disconnect. The upper support rings are connected with kevlar ropes to the lower support rings. Lower support rings with inflatable seals. Two Filter safety Catch devices mounted above, next to the shaking cylinders to arrest the free fall of the filter assembly.

- The filter housing is equipped with pressure relief flaps (vertical or horizontal execution). Two limit switches are mounted which operate in parallel. It provides control signal to the system.

- Lifting and lowering of product filters by means of pneumatically driven rod less cylinders.

- Two (2) inertial reel safety catch devices to prevent the filter assembly from falling in the event of an accidental disconnect of the filter mounting connection are standard for FBE 500 Combo and larger machine sizes.

- Differential pressure measurement through pneumatic tubing connected to pressure transmitter is provided as a standard.

- Optionally two (2) flush mounted differential pressure sensors mounted in the expansion chamber and filter housing ("Y-duct" connection). These sensors are used to measure the differential pressure across the

product retention filters. Indications of differential pressure are displayed on the HMI. Indication of alarms in case of set upper limit is reached.

- Two (2) exhaust air ducts each with a pneumatically operated chamber flap including limit switch for position monitoring (CLOSED). The flaps define the WIP cleaning limits. Each duct is connected to the exhaust air ductwork by a "Y-duct" connection.

#### **1.4.2 Top spray product container :**

Standard capacity product container with perforated plate and side discharge port :

Granulation product container, conically shaped made from 316L stainless steel, consisting of:

- Pneumatically inflatable silicone sealing system using to ensure a leak proof and 2 bar pressure-shock resistant sealing between the lower plenum, product container and the expansion chamber.
- One (1) round observation sight glass with flat silicone gasket.
- Product sample port with internally flush surface, Tri-Clover connection and removable sample collection container (5 pieces), allowing product sampling from the product container during the process. Operator friendly one hand "push & sample" operation.
- Product bed temperature measurement. Including Tri-Clover port with blind plug (flush to inner product container surface), temperature sensor (PT 100) "Plug in" design with Tri-Clover connection. Indication of measured values on HMI with alarm limits set points and alarm display.
- Side port with Tri-Clover connection and blind plug (flush to inner product container surface), fully welded which may be used for draining after WIP or an optional side discharge system.
- Perforated bottom plate and two (2) mounting grips for easy disassembly of the bottom plate.
- 100 µm Dutch weave (PZ) sieve.
- Trolley to provide mobility for the product container. The trolley is supplied PU castors. Four (4) horizontal guiding rollers mounted on the trolley ensure a smooth insertion of the product container.

NOTE: Other sieve mesh sizes are available as options.

#### **1.4.3 Bottom spray product container :**

Bottom spray product container with center bottom discharge :

WURSTER bottom spray product container, conically shaped, in 2 bar explosion-pressure shock resistant construction. Made from 316L stainless steel, consisting of:

- Pneumatically inflatable silicone sealing system using to ensure a leak proof and 2 bar pressure-shock resistant sealing between the lower plenum, product container and the expansion chamber.
- WURSTER inner column(s) located within the product container, with external manual column height

adjustment and position indicator (for number of WURSTER column(s) please refer to the Technical data sheet).

- Bottom sieve 150 µm plain weave. Other screen sizes are available as options.
- Product sample port with internally flush surface, Tri-Clover connection and removable sample collection container (5 pieces) allowing product sampling from the product container during the process. Operator friendly one hand "push & sample" operation.
- Round observation sight glasse(s) with flat silicone gasket (for number of sight glasses please refer to the Technical data sheet).
- Product bed temperature measurement. Including Tri-Clover port with blind plug (flush to inner product container surface), temperature sensor (PT 100) "Plug in" design with Tri-Clover connection. Indication of measured values on HMI with alarm limits set points and alarm display.
- Centre discharge system providing a closed loop direct discharge of the fluid bed without removal of the WURSTER bottom spray product container. The discharge port, located at the centre of the bottom plate, is provided with conical discharge cover / valve. The discharge cover / valve are operated by pneumatic cylinders located below the bottom plate with final position monitoring (OPENED / CLOSED). When lifted, the product flows through the product transfer pipe to the discharge port outlet located on the lower section of the WURSTER bottom spray product container. The discharging is assisted by a pneumatic conveying system (PCS). The PCS can be provided as an option or by the customer.
- Trolley to provide mobility for the product container. The trolley is supplied with four (4) horizontal guiding rollers mounted on the trolley ensure a smooth insertion of the product container.

Note: The Pneumatic Conveying System (PCS) is not included.

#### **1.4.6 Blower assembly :**

#REF!

#### **1.4.7 Exhaust blower assembly :**

#REF!

#### **1.4.8 Exhaust motor construction :**

#REF!

#### **1.4.9 Top spray assembly :**

Top spray assembly non FLP :

Top spray nozzle assembly, three headed design, consisting of a spray arm with holding flange and a three headed binary top spray nozzle assembly made exclusively by SCHLICK Germany.

- Robust and easy to handle weight optimized design.
- All media are directed through a single spray arm.

- Special central lock to connect spray nozzle head and spray arm.
- Exclusive high performance SCHLICK sprays nozzles, pneumatically actuated nozzle needles and exchangeable spray nozzle inserts.
- Aseptic connection for spray liquid supply line. Atomizing and control air with quick connectors.
- Including one (1) set (three nos) of spray nozzle liquid inserts 1.8 mm.

Single Head Single Drive Non-FLP – Flowtech make

Peristaltic pump for the supply of spray liquid to the top spray nozzle assembly including:

- Pump head design: Single head with spring-loaded liquid tube rollers.
- Drive set up: Single drive in non-flame proof design with variable speed control.
- Remote control allowing the speed of the pump to be adjusted on the HMI.
- Display of alarms on HMI.
- One (1) set of Silicon tubes for: Spray liquid (including suction line), atomizing air and control air.

Note: For aqueous liquids only.

#### **1.4.10 Control flap assembly for inlet :**

Control flap actuator SS304 :

Pneumatically actuated inlet air flap including limit switch for position monitoring (open / closed), complete with flange and mating flange to be mounted to the lower plenum of the machine tower. This flap also defines the WIP limits.

#### **1.5.1 Suction charge port :**

Suction charge port with flap :

The vacuum feed charge port allows charging of the fluid bed from a drum or other container (by customer). Consisting of:

- Vacuum feed charge port suitable for the pneumatic transfer of products.
- Flap fitted on the charge port, pneumatically actuated with mating flange.

- One additional pneumatically actuated but non gas tight modulating flap, complete with flange and mating flange to be installed into the inlet air ductwork (customer supplied).

Note: For dry and free-flowing products with a Minimum Ignition Energy (MIE) of  $>10$  mJ. For MIEs  $>3$  mJ and  $<10$  mJ, special options are available. The use of the vacuum charge port with moist products is dependent upon the flow characteristics of the specific product and must be evaluated accordingly.

### **1.5.2 Broken bag detector assembly :**

Standard :

Broken bag detector (BBD) designed to automatically stop the exhaust air fan in the event that the dust concentration in the outlet air exceeds a defined limit. The BBD is based on triboelectric principle, provided with sensor and data processing unit. Includes display of alarms on the HMI.

Note: To be installed in the customer supplied outlet air ducting before the QASV explosion isolation valves by the customer

### **OPTIONAL CHARACTERISTICS :**



Quotation No : MPT-204/R1

Quotation Date: 05/09/2019

## Commercial offer for FBE 1300C

### Quotation

Sr. No.	Description	Value	Qty.	Base Price (INR)	Sub Total (INR)
1	FBE 1300 COMBO 2 bar basic machine		1 No.	4000000	4000000
1.1	Site details				
1.1.1	Electrical 3 phases	520 Volts	1 No.	0	0
1.1.2	Electrical 3 phases	415 Volts	1 No.	0	0
1.1.3	Electrical 1 phase	220 Volts	1 No.	0	0
1.1.4	Electrical frequency	50 Hertz	1 No.	0	0
1.1.5	Compressed air	Compressed air pressure at site 6.0 bar	1 No.	0	0
1.1.6	Steam (heating media)	Heating steam pressure at site = 3.5 bar(g)	1 No.	0	0
1.1.7	Pure steam	Pure steam pressure at site = 2 bar(g)	1 No.	0	0
1.1.8	Chilled water (cooling media)	Chilled water temp inlet 8°C	1 No.	0	0
1.1.9	Raw water	Raw water pressure 2.0 bar(g)	1 No.	0	0
1.1.10	Demineralized water	Demineralized water pressure = 2bar(g)	1 No.	0	0
1.1.11	Ambient conditions technical area	Temp between 5°C to 40°C	1 No.	0	0
1.2	AHU				
1.2.1	Basic air handler unit	Yes	1 No.	0	0
1.2.2	Credit-non supply of basic AHU	No	1 No.	0	0
1.2.3	AHU body construction	SS single walled fabricated	1 No.	0	0
1.2.4	AHU design	Standard single piece	1 No.	0	0
1.2.5	F6 in place of G4 filter	No	1 No.	0	0
1.2.6	Differential pressure measurement for filter 1	Local	1 No.	0	0
1.2.7	Differential pressure measurement for filter 2	Local	1 No.	0	0
1.2.8	Type of heating unit	Steam heating	1 No.	0	0
1.2.9	HEPA filter with DOP & delta pressure measurement	Yes	1 No.	345000	345000
1.2.10	Dehumidification	Standard chilled water coil	1 No.	739000	739000
1.3	Controls				
1.3.1	Hardware make	Mitsubishi	1 No.	0	0
1.3.2	Operator interface terminal	Basic one	1 No.	0	0
1.4	Machine configuration				

Sr. No.	Description	Value	Qty.	Base Price (INR)	Sub Total (INR)
1.4.1	Basic machine tower	Yes	1 No.	0	0
1.4.2	Top spray product container	Standard capacity product container with perforated plate and side discharge port	1 No.	0	0
1.4.3	Bottom spray product container	Bottom spray product container with center bottom discharge	1 No.	174000	174000
1.4.4	Sample collecting bottle	Borosil	1 No.	0	0
1.4.5	Lower plenum assembly	Lower plenum standard	1 No.	0	0
1.4.6	Blower assembly	Non FRP	1 No.	0	0
1.4.7	Exhaust blower assembly	Local	1 No.	0	0
1.4.8	Exhaust motor construction	Non flameproof	1 No.	0	0
1.4.9	Top spray assembly	Top spray assembly non FLP	1 No.	0	0
1.4.10	Control flap assembly for inlet	Control flap with actuator SS304	1 No.	0	0
1.5	Options				
1.5.1	Suction charge port	Suction charge port with flap	1 No.	103000	103000
1.5.2	Broken bag detector assembly	Standard	1 No.	187000	187000
Sub Total :					5548000
Total Price :					5548000

NOTE - \* All line items with 0(zero) price are part of basic machine.

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**Expiry period and place :**

Offer valid for 30 days from the date of issue.

**Warranty :**

12 months from the date of commissioning or 18 months from the date of dispatch whichever is earlier.

**FAT :**

Only physical verification of machine will be offered during Factory Acceptance Test (FAT).

**Supervision of Installation :**

Free of cost by APT

**Terms and Conditions (Export) :**

1. Full integration test of the system as per internal QA guidelines will be executed to guarantee that the equipment is compliant to design documents, internal quality standards and manufactured according to the established SOP's.

**Packing and Freight :**

Included

**Sales tax and surcharges :**

CST 2% Against C form.

**Insurance :**

Included for Domestic

**Delivery Period :**

16 weeks from the date of receipt of PO , advance & drawing approval which ever is later.

**Payment Terms :**

20% advance along with PO, 80% including taxes and duties against Proforma Invoice before dispatch with 10% PBG. PBG will be valid for 12months from the date of dispatch.