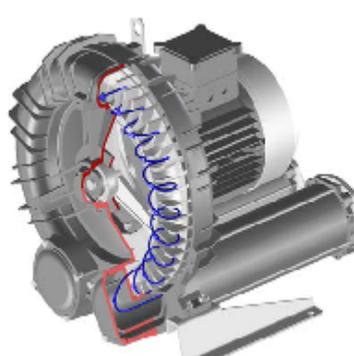


“Therec Corporation Ltd.”

High Pressure Blower for Biogas Handling Process



Side Channel / Ring / Regenerative / Lateral Channel Type Blower

OPERATING PRINCIPLE :

The lateral channel blowers-exhauster (SCL) have been developed on the theory of the regenerative flow. Radial blades on the impeller draw air from the inlet port and drive it outward and forward into channels that return it to the blade's base. The result, based on both impeller/blade design, as well as housing configuration and relationship to the impeller, typically yield greater continuous operating pressure/vacuum than most regenerative blower designs or, conversely, at the same pressure or vacuum, greater air flow.

Due to their unique principle of operation and design, there is no contact between rotating and stationary parts.

The main advantages are the following:

- no wearing parts
- no lubrication required
- minimum maintenance
- silent operation
- smooth air flow.

Exhaust air is clean and pulsation-free, owing to the non-positive displacement, oil-less design. Open flow capabilities range up to 2000 m³/h, with maximum *continuous* (i.e. 24

TECHNICAL DATA:

The data provided refer to the handling of air at 20°C and 1013 mbar (abs) atmospheric pressure absolute pressure of 1013 mbar - at the suction port when operating as a compressor, at the discharge port when operating as a vacuum pump-

- The data can change in accordance with the following factors:
- any variation in absolute outlet pressure of 1013 mbar (suction);
 - any variation in absolute inlet pressure of 1013 mbar (discharge);
 - operation using inlet/outlet simultaneously (back pressure at discharge port and suction at the inlet port)
 - handling of fluid having different density from 1.2 kg/m³;
 - variation in speed of rotation in relation to the basic one (2900 rpm-50 Hz and 3500 rpm-60Hz.).

SPECIAL EXECUTIONS / ACCESSORIES:

FPZ also design and produce special blowers for the handling of gases having high pressure and temperature, or specialty/corrosive composition, by incorporating specific materials including special surface treatments and use of different seal types.

Particularly a dedicated range was developed:

- manufacturing material is the aluminium alloy
- impregnation of all parts in contact with the gas
- sealing of union parts
- overhang mounting with double mechanical seal on the shaft

A complete range of accessories, including inlet filters, vacuum filters, safety valves, non return valves, additional silencers, etc., are available to guarantee the best installation conditions and ensure years of trouble-free service



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20049 Concorezzo (Milan), Italy
Tel +39 039 6041820
Fax +39 039 6041296
info@fpz.com



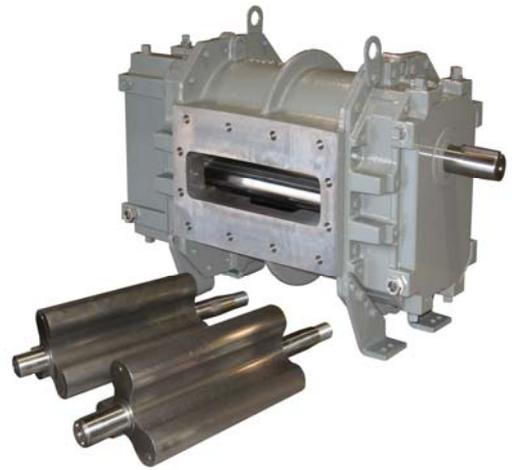
Direct Drive Package



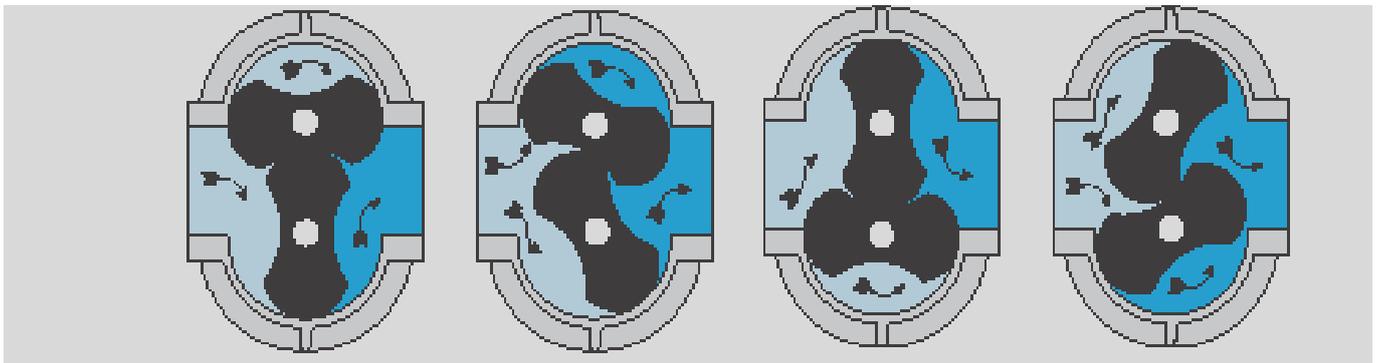
Direct Couple Package



Belt Drive Package



Roots / Positive Displacement (PD) / Rotary Type Blower



Rotary Positive Blower Principle of Operation

Two figure-eight lobe impellers mounted on parallel shafts rotate in opposite directions. As each impeller passes the blower inlet, it traps a finite volume of air and carries it around the case to the blower outlet, where

the air is discharged. With constant speed operation the displaced volume is essentially the same regardless of pressure, temperature or barometric pressure. Timing gears control the relative position of the impellers to each

other and maintain small, but defined, clearances. This allows operation without lubrication being required inside the air casing.

Belt Drive Package for small Blower

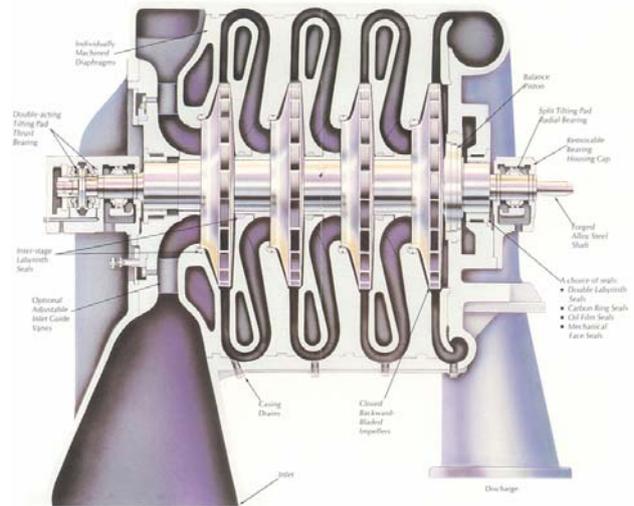
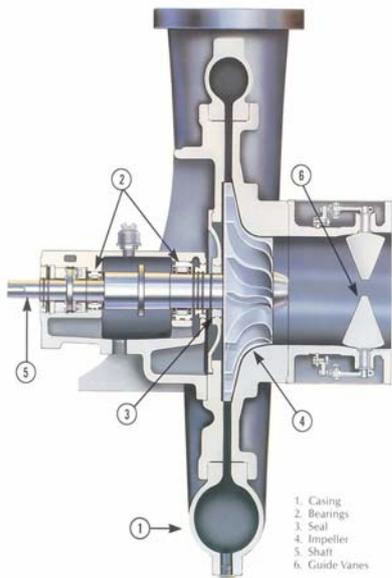


Direct Couple Package For big Blower



Headquarters
 16240 Port Northwest Drive
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 Toll Free (US): 1-877-363-7668
 Ph: 832-590-2305
 Toll Free (US) Fax: 1-877-357-7238
 Fx: 832-590-2326

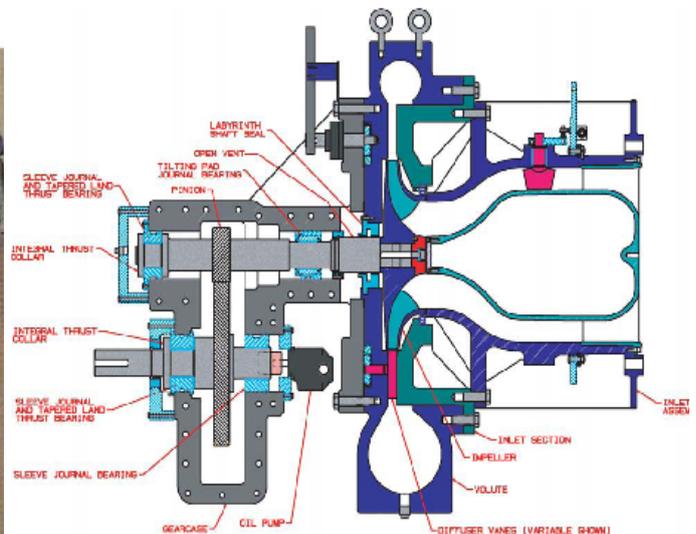
S-Multi-Stage
 June 2006
 website: www.rootsblower.com • US e
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Single Stage and Multi Stage Centrifugal Type Blower



Belt Drive Package for small Blower



Gear Drive Package for big Blower

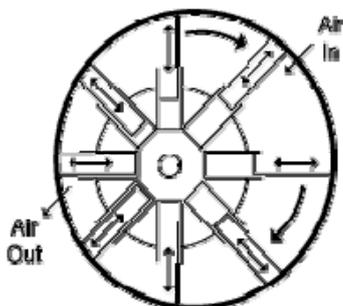
SAVIO S.p.A.

VENTILATORI - FILTRI - TURBOSOFFIANTI - CONDIZIONATORI



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16240 Port Northwest Drive
Houston, TX 77041
Toll Free (US): 1-877-363-7688

As the center shaft rotates, so to does the Vane housing. The vanes slide in and out of the housing, keeping contact with the wall of the cylinder. Air enters at the largest opening and exits at the smallest, Reducing volume and compressing the air.

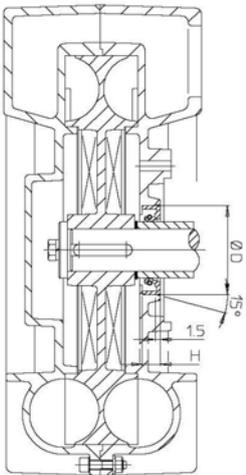


Rotary Vane / Slide Vane Type Compressor

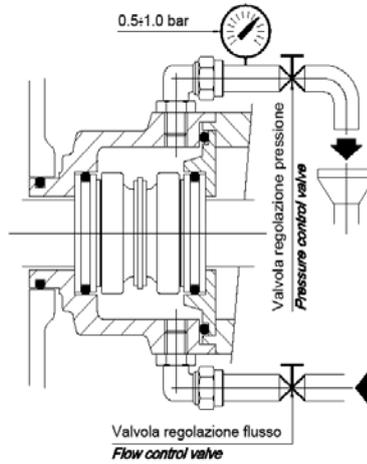
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Various Types of Mechanical Seal For Gas Boosting Blower

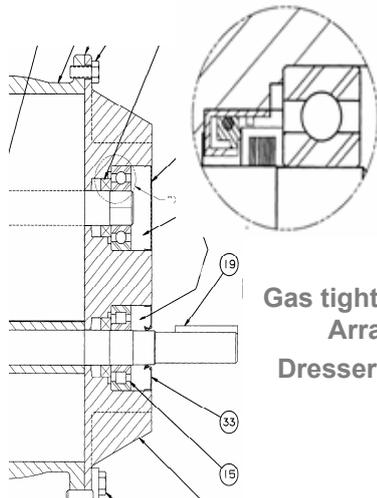
To save the lost of Expensive Gas and
To minimized the Leakage of the Explosive, Corrosive & Toxic gas



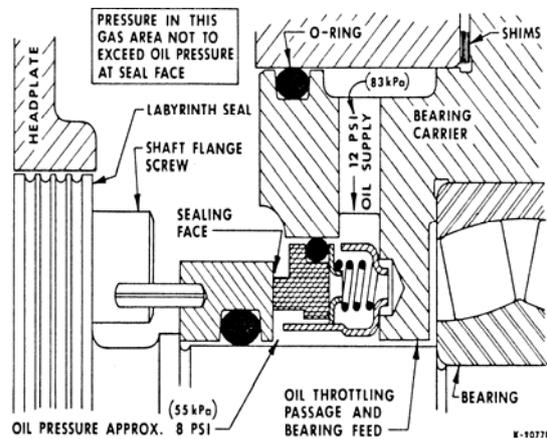
Gas tight MIM Seal Arrangement of FPZ , SCL XX SH COR TMS Series



Gas tight Mechanical Seal Arrangement of FPZ , SCL XX SH COR TMD Series

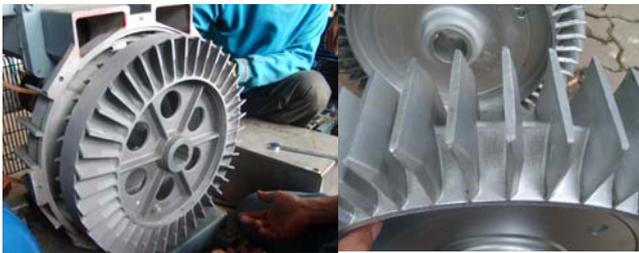


Gas tight Mechanical Seal Arrangement of Dresser Roots , URAI-G Series



Gas tight Mechanical Seal Arrangement of Dresser Roots ,big blower, RGS-J Series

Gas Stream Contact Part Protection For Corrosive Bio Gas



Hard Anodized Coated Surface for The Gas Contact Parts of Cast Aluminium Ring Blower

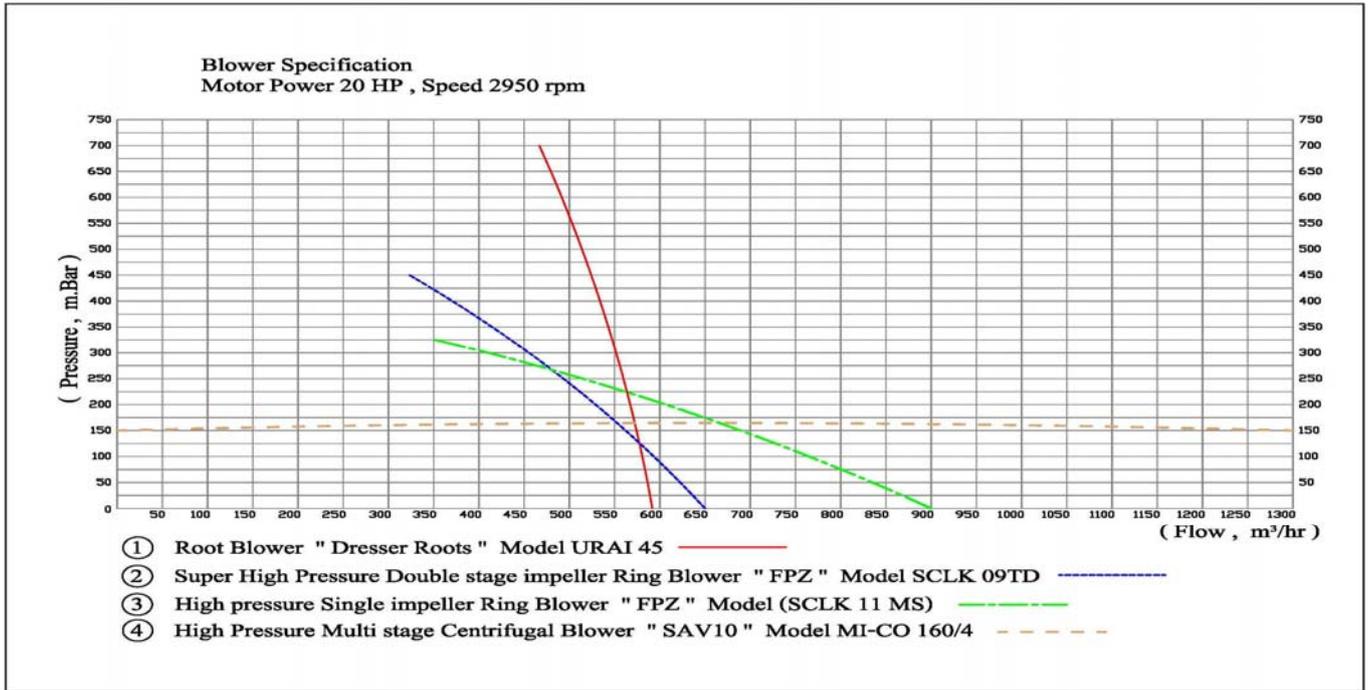


Hard Chromed Coating for Carbon steel check valve



Header / Silencer / Filter / Check valve and all other accessories in Stainless Steel

The Comparison Characteristic Graph between 3 Types of Blower



Guide line table for air & gas compression machine selection

Aircompressionmachine (เครื่องอัดลม)	Compressed method	Max Pressure (mm.H ₂ O)	Max.speed (rpm)	Flow control equipment	Zero Flow operating
High press.centrifugal	Centrifuse	+1000	4000	Valve	Allow
Extra high press. centrifugal	Centrifuse	+15000(1.5 bar)	10000	Valve	Allow
Multi-stage centrifugal	Centrifuse	+20000(2 bar)	5000	Valve	Allow
Ring (Side chanel)	Regenerative	+8000	5000	Valve & FrequencyInverter	Not allow
Roots (Rotary)	Positive Displacement	+20000(2 bar)	5000	Frequency Inverter	Not allow/ Verry dangerous
Rotary Vane	Positive Displacement	(10 bar)	3000	Frequency Inverter	Not allow/ Verry dangerous

*Max values in this table are asuumed from the common available items in market

*Please check wit your supplier before making any decision.

Volume & Pressure Conversion table

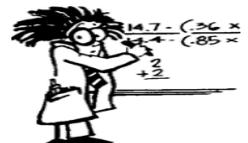
Volume (rate of flow)		Gas condition			
m ³ /hr x 0.5886 = cfm	cfm x 1.699 = m ³ /hr	Standard	S	68 F	14.7 PSI
m ³ /hr x 35.31 = cfm	cfm x 0.0283 = m ³ /min	Normal	N	0 C	1013 mbar
l/min x 0.06 = m ³ /hr	m ³ /hr x 16.67 = l/min	Actual	A	Ambient	Ambient
l/min x 0.03532 = cfm	cfm x 28.31 = l/min				

$$ACFM = SCFM \times \frac{P_s - (RH_s \times P_{Vs})}{P_b - (RH_a \times P_{Va})} \times \frac{T_a}{T_s} \times \frac{P_b}{P_a}$$

Where

- P_s = Standard pressure (PSIA)
- P_b = Atmospheric pressure – barometer (PSIA)
- P_a = Actual pressure (PSIA)
- RH_s = Standard relative humidity
- RH_a = Actual relative humidity
- P_{Vs} = Saturated vapor pressure of water at standard temperature (PSI)*
- P_{Va} = Saturated vapor pressure of water at actual temperature (PSI)*
- T_s = Standard temperature (R) NOTE: R = F+460
- T_a = Actual temperature (R)

*See Chart on page 12



$$Nm^3/hr = SCFM \times 1.583$$

Therec's Scope of Supply for Biogas Boosting System



Service and Repair Work



Installation Work Piping work



Electrical control work / PLC / SCADA system

Therec Corporation Ltd. / Job Reference



**VP Starch Co.,Ltd.
Nakornratchasima**



**General Starch Co.,Ltd.
Nakornratchasima**



**Bangna Starch Co.,Ltd.
Roied**



**Eiam Burapa Starch Co.,Ltd.
Srakeaw**



**Eaim Heng Starch Co.,Ltd.
Nakornratchasima**



**Thai Citric Co.,Ltd.
Samuthsakorn**



**Quang Ngai Acid Co.,Ltd.
Vietnam**



**Chaokhun Kaset Co.,Ltd.
Saraburi**



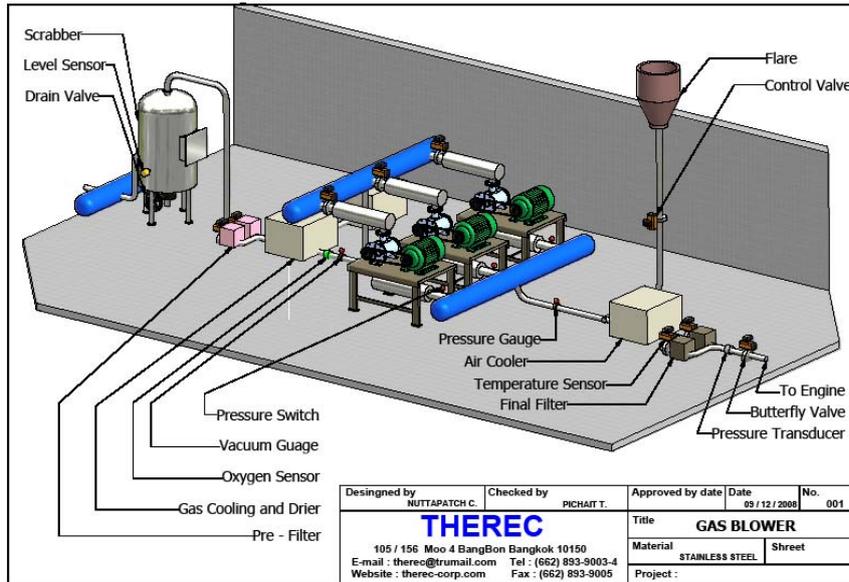
**Rachaburi Sugar Mill Co.,Ltd.
Rachaburi**



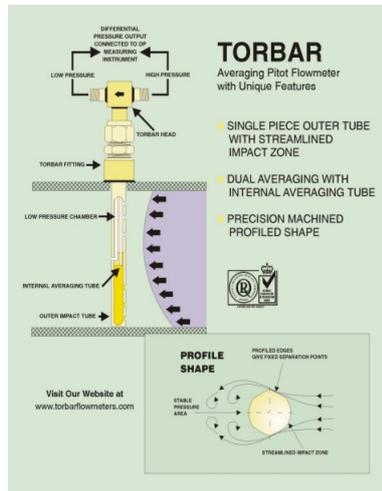
PT Budi Acid Jaya Co.,Ltd. / Lampung Sumatra Indonesia

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Standard Bio-Gas Boosting Station



Air and Gas Measuring Equipment



TOTAL METER PACKAGE

The **TRIBAR** Flowmeter comprises an integral 3 valve manifold and Differential Pressure Transmitter fitted to a **TORBAR** averaging Pitot Flow Sensor.

The **TRIBAR** is suitable for the flow measurement of liquids and gases. It is also suitable for the measurement of saturated steam flow with the transmitter mounted vertically below the pipeline axis (see specifications below).

The **TRIBAR** concept provides several direct advantages.

- SIMPLE INSTALLATION
- COMPACT CONSTRUCTION
- REDUCED TRANSMISSION LAGS
- BALANCED LEGS
- SINGLE SOURCING
- COMPETITIVE PRICING

The **TRIBAR** is available without the DP transmitter. This can then be supplied and fitted by the customer (or TFL agent). For this optional arrangement, please specify a standard **TORBAR** with the DM3V head option. Also specify which type of DP transmitter will be fitted.

TORBAR FLOWMETERS LTD

Multi ports Self Averaging Flow Meter



AMI 300 PRO and AMI 300 PRF



Measuring of, Air Velocity, Air Flow, Pressure, Temperature, Humidity, Temperature

Manometer



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