

FEATURES AND BENEFITS

FEATURES	BENEFITS
Plug and Play design of VFD, Transmitter & Controller.	Easy Installation & Commissioning
Rugged design of VFD	Lower Failure rates & Better Reliability
Detailed Status Information and Integrated Message functions	Easy Trouble Shooting
Load Torque Sensing	Belt Failure and Trip Detection
Bypass of VFD (in case of Failure)	Redundancy is Inbuilt
Over-voltage, Under-voltage, Over-temperature & Short-circuit protection	Protect Motor and VFD from various Electrical Hazard Conditions
Parallel Damper (existing inlet damper) availability for ID Fan Control	Good control at very low loads
Reliable & Proven Transmitter & Controller System Engineering by Thermax Ltd - Experience and know-how of years	Ease of operation Reliable Service & Support at all corners of India.
Excellent performance of system reduces mechanical wear and tear of mechanical equipment.	Reduces maintenance and downtime and hence increases life of equipment.

TECHNICAL SPECIFICATIONS

SNo.	Parameters	Units	Range
1.	Main Incoming Power Supply (AC)	V	3-Phase, 420 ± 10%
2.	Incoming Power Frequency	Hz	50 ± 3%
3.	Ambient Temperature for Inverter	°C	40
4.	Power Factor Maintained by VFD		> 0.95 (Leading)
5.	Range of Motor RPM offered by System	RPM	500 – 1440 (Typical)
6.	Analog Output	mA	4-20
7.	Analog Input	mA	4-20



THERMAX

Sustainable Solutions in Energy & Environment

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Thermax Business Portfolio

Boilers & Heaters

Absorption Cooling

Air Pollution Control

Captive Power

Chemicals

Water & Waste Solutions



THERMAX

Cooling & Heating Division



FURNACE DRAFT CONTROL SYSTEM

Improving your business is our business

Thermax offers products, systems and solutions in energy and environment engineering to industrial and commercial establishments around the world. Its business expertise covers heating, cooling, waste heat recovery, captive power, water treatment & recycling, air pollution control & waste management and performance chemicals.

Thermax brings to customers extensive experience in industrial applications and expertise through technology partnerships and strategic alliances.

Operating from its Head Quarters in Pune (Western India), Thermax has built an international sales & service network spread over South East Asia, Middle East Africa, Russia, UK and the US. It has a full-fledged ISO 9001, 2000 and ISO 14000 accredited manufacturing setup.

Cooling & Heating Division

Offers a wide range of steam boilers, thermal oil heaters and hot water generators. It has expertise in a wide range of fuels - oil, gas, solid and agro - waste/biomass fuels. Supporting a broad array of industries to generate, transfer and conserve heat for a host of applications, the divisions products are exported to South East Asia, Middle East, Africa, Europe, CIS and SAARC.

WHY DRAFT CONTROL?

Most Solid Fuel Boilers are designed to operate under a negative furnace draft to the extent of -2 to -5 mmWC. This draft is critical both from the maintenance of proper combustion and ensuring safe and efficient operation of the boiler.

In Solid Fuel Boilers, it is essential to maintain furnace draft to the minimum possible levels to limit excess air and simultaneously avoid back firing which may be because of improper combustion.

Generally, the refractory work in a typical solid fuel boiler develops a lot of leakages and this leads to ingress of unnecessary air into the furnace. This tends to increase the overall draft in the furnace. Such minor variations, if left unattended, can lead to pressurizing of the furnace and can cause backfiring in the unit.

A solution for the above problem is to maintain an increased setting of the ID Fan Damper opening. This would result in a carry over of fuel, increased ingress of air into the furnace and therefore reduced operating efficiency of the unit.

Proper control of Draft would ensure that the above two situations are avoided by real time monitoring and controlling of the actual draft in the furnace to yield better operating efficiency for the unit.

In a typical Solid Fuel Boiler, ID Fan is the largest point of electricity consumption. Control over the ID Fan energy consumption can reduce the overall electrical cost of a Boiler.

The above two points are the prime drivers of the forthcoming discussion.

SAVE ENERGY

ID Fans are volumetric machines, i.e. They draw a constant volume of gases for every rotation. This does not change with any change in load in conventional systems. We only throttle the ID Fan dampers and kill the pressure generated by the ID Fan.

This is an energy wasting process.

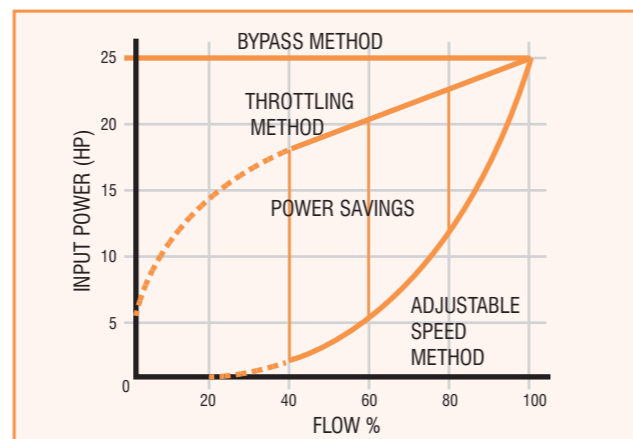
Equations of Operation of Centrifugal Machines

(Q is the Volumetric Flow of the Fan; N is the RPM of Operation & HP is the Power consumption of the Fan.)

The main equations of concern from the viewpoint of energy savings are:

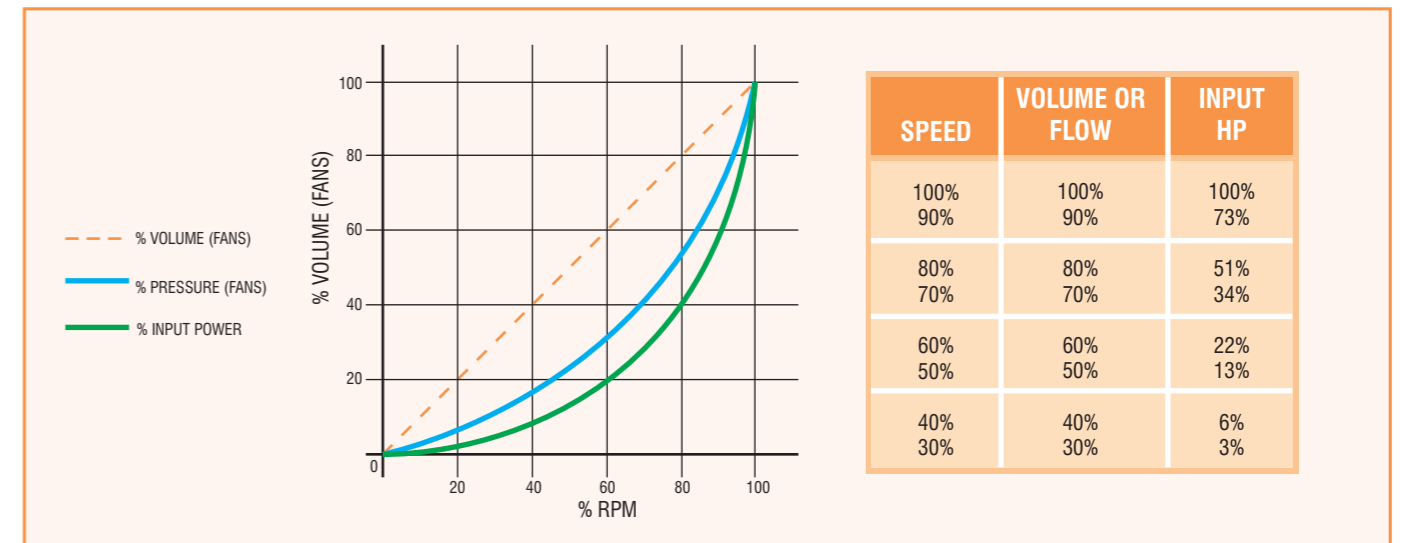
$$\frac{Q_2}{Q_1} = \frac{N_2}{N_1}$$

$$\frac{HP_2}{HP_1} = \left(\frac{N_2}{N_1}\right)^3$$



OUR PROPOSITION

Thermax Ltd proposes to achieve the above two purposes by putting an automated Furnace Draft Control System (EcoDraft). A suitable draft measurement sensor shall continuously send readings of the furnace draft to the controller which in turn will govern the VFD operation. Now, VFD shall vary the ID Fan motor speed which is the actual draft measurement.



Typical RPM - Power variation curves for ID Fans.

With EcoDraft, we can reduce the ID Fan Power Consumption by 50% for a 20% reduced operating load of the unit.

This system also offer an additional benefit of increased equipment life. Like fan bearings and belts drives. This is due to lower RPM leading to lesser wear and tear.

The result is

- Better and safer operation at the unit.
- Energy saving due to overall lower RPM of ID Fan.

P & I DIAGRAM

