



Reference

05001

Up-Grade / Increasing Blower Capacity

TIG HyCo Limited

Condition

Exiting motor power 30 kW, power required 24.4 kW at rated speed 2,970 rpm

Volume air flow	\propto Speed	at Rated = 4.95 m ³ /sec
Pressure	\propto Speed ²	at Rated = 3,970 Pa
Power required	\propto Speed ³	at Rated = 24.326 kW

Want to be increasing Flow rated by increasing speed up to 3,600 rpm at 60 Hz.?

Solution

From the theory at operating point 50 Hz, Motor 2 Pole will have rated speed 2,970 rpm and required power at motor shaft approximate 24.4 kW (select motor at least 30kW)

From the theory of Affinity Laws for centrifugal fan or blower
Speed of induction motor will be following by theory

$$\text{Speed, } n = (1 - \text{Slip}) \frac{120f}{P} \approx \frac{120f}{P}$$

In-case of increasing speed up to 3,600 rpm or increasing frequency to 60 Hz application for increasing volume of air flow according to Affinity Laws, It's can be to done, But power required will increasing up to 43 kW or torque required up to 115 Nm (Should make sure mechanical bearing, Coupling, Fan bladed, torsional Vibration or mechanical resonance not effect to new speed rang)

Speed	-	500	1,000	1,500	2,000	2,500	2,970	3,000	3,500	3,600	rpm
Torque	12	6	9	20	36	56	78	80	109	115	Nm
Power	-	-	-	-	-	15	24	25	40	43	kW

From above data condition assume for load torque curve, if using old motor and old VSDs design at 3,000 rpm 50 Hz increasing speed to 60 Hz the motor should required power according to above data table 43 kW or current will increasing over rated.

Normally VSDs will protect them self and motor damage by over current limited program. When adjust or edit program in VSD to increasing speed, It's will be conflict of maximum current limited of program.

Than small VSD will can not increasing speed to application.

If changed only VSDs for absorb high current, the exiting motor will be burn, cause by increasing power and current and high temperature.

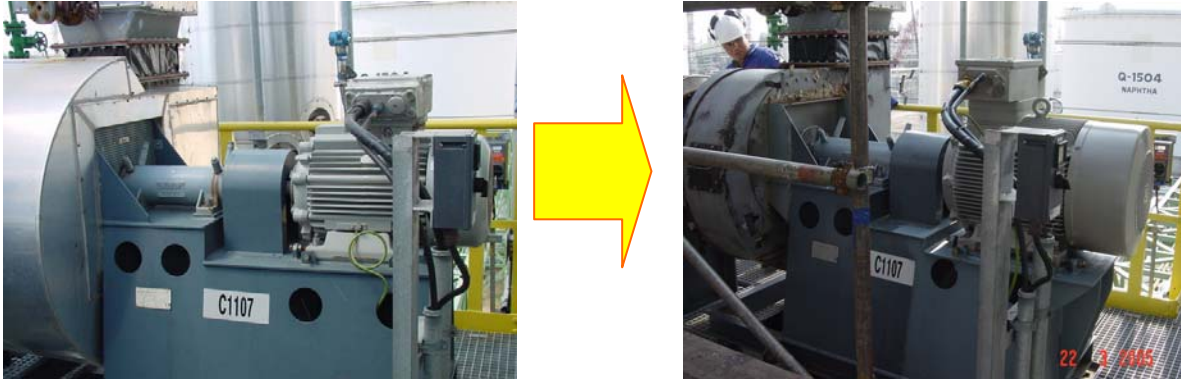
Summary

Recommends to changed both VSDs and Motor to 55 kW at power required 43 kW, Reserve 30%
The motor should be special design and running at 90% of power rated for Drives operation.



Tinamics Scope of work

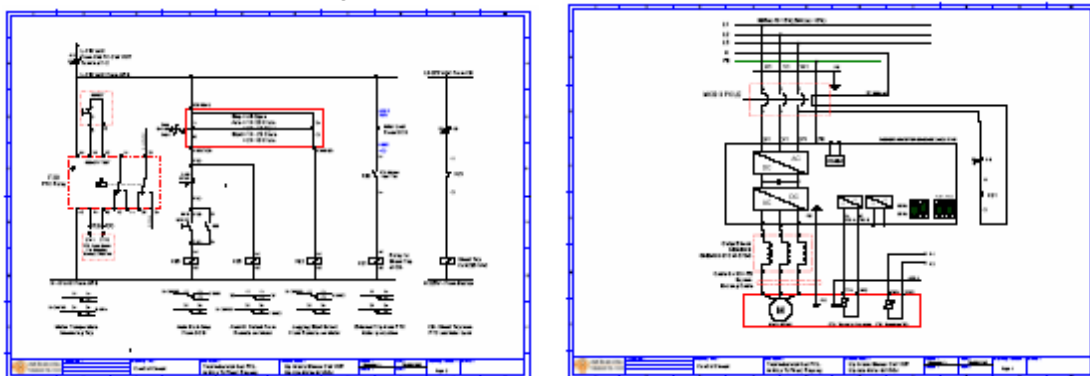
1. Changing the old motor 30 kW to new "SIEMENS" motor 55 kW 2 Pole and Installation with new aliment.



2. Changing the old VSD 30 kW to new "SIEMENS" MM430 VSD 55 kW and Installation with new control Panel.



3. Design / Installation / Commissioning "SIEMENS" VSD 55 kW and Installation with new control Panel.

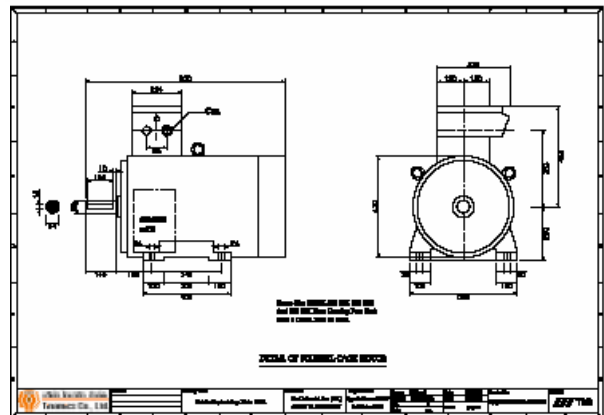
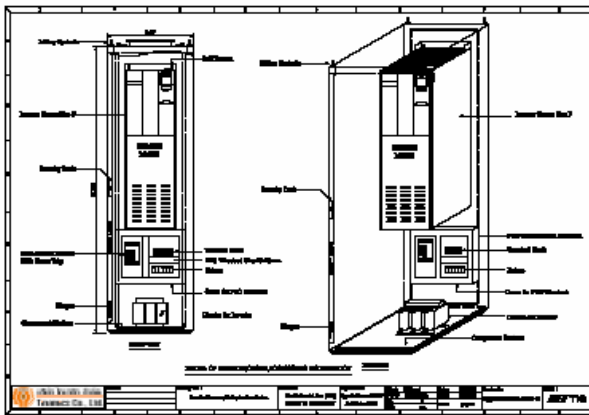
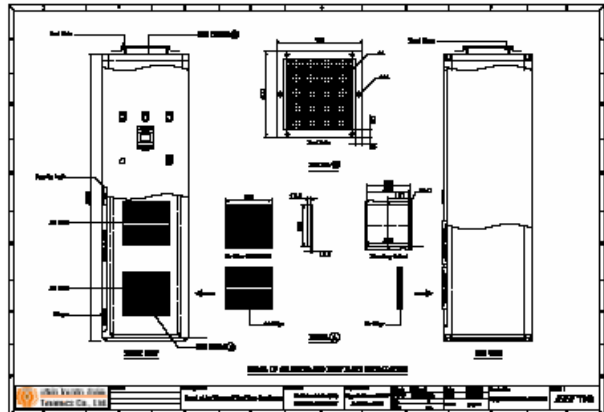
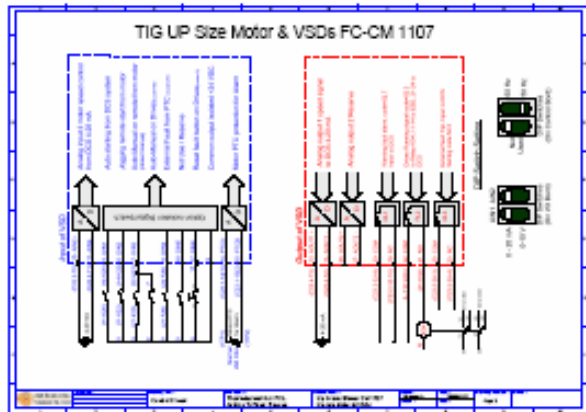




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3. Test result and Setup after commissioning with fully document manual.

DATA SHEET
VARIABLE FREQUENCY DRIVES SYSTEM (VSD)
CM 1107
Fluo Gas Blower

Test Result CM1107

No.	DCS Setting		Value from VSDs			Actual Measurement		Note / Remark
	Unit	Feed Back	Frequency (Hz)	Speed (rpm)	Current (Amps)	Speed (rpm)	Current (Amps)	
1	5.0%		3.0	179	88	179	42	0.0024 = Actual motor speed (rpm)
2	12.0%		5.3	322	37	320	38	0.0024 = Actual motor speed (rpm)
3	15.0%	14.0%	8.3	505	28	530	25	0.0024 = Actual Output Voltage (V)
4	20.0%	19.0%	11.3	685	25	690	22	0.0027 = Actual Output Voltage (V)
5	25.0%	24.0%	14.3	863	24	858	22	0.0027 = Actual Output Voltage (V)
6	34.0%			1243	24	1230		0.0025 = Actual motor temperature (°C)
7	35.2%	35.0%	21.0	1260	25	1238	24	
8	41.4%	40.0%	25.0	1419	29	1415	27	
9	48.2%	48.0%	29.0	1729	34	1720	32	
10	55.0%	54.0%	33.0	1960	40	1945	40	
11	60.2%	60.0%	38.0	2160	48	2155	48	
12	68.1%	68.0%	39.0	2350	56	2340	55	
13	71.1%	71.0%	42.0	2543	64	2520	64	
14	76.4%	76.0%	45.0	2720	72	2690	72	
15	81.2%	81.0%	48.4	2900	82	2870	82	
16	83.7%	83.0%	53.1	3000	87	2940	88	
17	84.7%	84.1%	53.3	3017	88		88	
			780.4	1810.2	780.1			

Setting rpm	5%	10%	15%	20%	% of speed
Current from DCS	4.80	12.67	18.70	26.73	100%
Current from VSD	6.00	15.85	23.00	32.21	100%
Setting output	5%	10%	15%	20%	% of speed
Current to DCS	4.80	12.63	18.20	26.00	100%
Current from VSD	6.00	15.80	22.70	31.70	100%

Motor vibration average 1.3.3 mm/sec at 1.485 rpm

Note:
 0-Change External Fault Trip when switch "Selected" (withhold) Close to Open up of stage until Pressure sensor restore Low Pressure (alarm) Close Fault & Restore switch "Stop Lock" (suspend) until alarm manual Close Contact until full run sector 50

