

Plant Name: OFR
Coordinator: MALONE
File name: C:\USA32\3 - PHASE AC MOTOR\P1PUMP
Date: 09/14/2001 10:58:40

Equipment : P1PUMP
Analyst : analyst FERREE

Empath 2000 4.3 Analysis Results

PERFORMANCE SUMMARY

Bottom Line

- This motor is operating normally, no action is required.
 This motor exhibits suspicious operation, trending of the motor is warranted.
 This motor exhibits abnormal indications, action is warranted, NOW.

Power Factor Commentary

- Power factor exceeds 0.85.
 Power factor is below 0.85, see detailed report.

Current Commentary

- Current variation is within normal limits.
 Current variation is beyond normal limits, see detailed report.

Voltage Commentary

- Voltage variation is within normal limits.
 Voltage variation is beyond normal limits, see detailed report.
 RMS voltage differs from nameplate by more than 5%.

Load Commentary

- Load on the motor is consistent with nameplate values.
 Load on the motor exceeds nameplate values, see detailed report.
 Load on the motor is less than 25%.

Phase Connection Commentary

- Connections are normal.
 Voltage ground reference is NOT neutral.
 Loose connection.

Rotor Commentary

- Rotor bar health is normal.
 Rotor bar health is questionable, see detailed report.
 Load is insufficient to determine rotor bar health, at this time.

Stator Commentary

- Stator health is normal.
 Stator electrical health is questionable.
 Stator mechanical health is questionable.
 Turn to turn short.

Rotor/Stator Air-gap Characteristics

- Dynamic or static eccentricity indications do not exist.
 Indications of static eccentricity exist.
 Indications of dynamic eccentricity exist.

Harmonic Distortion Commentary

- There is no evidence of harmonic distortion.
 There is evidence of harmonic distortion, see detailed report.

Misalignment Indications

- There are no indications of mechanical problems like misalignment or unbalance.
 There are indications of mechanical problems like misalignment or unbalance. Perform vibration survey to identify and correct the cause.

Bearing Commentary

- There is no evidence of bearing problem.
 Indications of potential bearing problems, perform vibration survey to verify.

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INPUT SUMMARY

NAMEPLATE INFORMATION

		Units
Manufacturer	A-C	
Serial Number	****	
Model Number	587US 500 2	
Motor type	Induction	
Power	75.00	HP
RPM	1770	Rpm
AC/DC	AC	
Poles	4	
Phases:	3	
Voltage	460.0	Volt
Full Load Current	92.00	Amp
Number Stator Slots	48	
Rotor Bars	52	
Torque (ft-lbs):	222.5	Ft.Lb
CT Ratio	1.000	
PT Ratio	1.000	
Duty Cycle	****	
Service Factor	1.15	
Frame Size	587US	
Insulation Type	****	
Ambient Temperature	40.0	F°
Motor efficiency	0.000	
Power factor	0.000	

Detailed Calculations

LEGENDS:

Impedance = Complex Impedance = v_i/c_i
CF = Crest Factor = (waveform peak)/(waveform rms)
CFC = Carrier Frequency Content = $10^{(x/20)}/\text{frms}$, %
THDF = Transformer Harmonic De-rating Factor = $\text{sqrt}(2)/\text{CF}$, %
VDF = Voltage De-rating Factor = $100 - (\text{voltage unbalance, \%})^2$, %
Se, fund = Location of pole pass frequency fundamental, Hz
Se, harm = Number of pole pass frequency harmonics
Level = Sum of spectral amplitudes of pole pass frequency fundamentals and harmonics
Slip % = SRSS sum of slip and harmonic "levels" divided by RMS level of RMS DEMOD spectra between 0 and 65 Hz.
Upper sb = dB level of upper slip sideband of power line peak
Lower sb = dB level of lower slip sideband of power line peak
Rotor bar health = Estimate of the percent of broken or cracked rotor bars
Thd = Total harmonic distortion
+Ve = Positive sequence harmonic
-Ve = Negative sequence harmonic
Zero = Zero sequence harmonic

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Running Speed = 29.624 Hz / 1777 Rpm
 Pole pass frequency = 1.258 Hz
 Load = 96.4 %

Time			
	RMS	Peak	CF
Current 1	82.974	117.090	1.411
Current 2	78.800	112.060	1.422
Current 3	81.927	117.330	1.432
Average	81.233	115.490	1.422
% dev	3.0	3.0	0.7

THDF = 99.5

Time			
	RMS	Peak	CF
Voltage 1	475.880	673.210	1.415
Voltage 2	477.140	672.280	1.409
Voltage 3	482.550	685.850	1.421
Average	478.520	677.110	1.415
% dev	0.8	1.3	0.4

VDF = 99.3

			App. Power	Real Power	Reac. Power
	Power factor	Impedance	kVA	kW	kVARS
Phase 1	0.870	5.735	23.013	20.026	11.339
Phase 2	0.880	6.055	21.716	19.115	10.306
Phase 3	0.862	5.890	22.610	19.499	11.444
Avg/Total	0.871	5.893	67.339	58.640	33.089
% dev	1.1	2.7			

Demand Pwr = 78.61 HP [Load:96.4 %, Motor Eff.:92.0 %, Output Pow.:53.9 KW, Output Trq.:213.6 Ft.Lb]

Summary of Rotor Bar Health				Power line dB diff.		Rotor bar Health index
	Se, fund	Se, harm	Level %	Upper SB	Lower SB	
Measured	1.258	0	-	-56.0	-62.5	0.2496
Severity level	Rotor Condition Assessment			Recommended Corrective Action		
3	Slight indication of rotor problems			Continue surveys, trend only		

Harmonic Distortion Results:

Voltage input, from 59.889 Hz harmonics

	THD Odd %	THD Even %	+ve%	-ve %	Zero %	THD All %
Current 1	2.414	0.070	0.197	2.255	0.844	2.415
Current 2	2.099	0.018	0.374	2.033	0.365	2.099
Current 3	1.840	0.071	0.360	1.653	0.727	1.842
Voltage 1	1.648	0.022	0.311	1.217	1.067	1.648
Voltage 2	1.702	0.046	0.708	1.051	1.138	1.703
Voltage 3	1.451	0.072	0.337	0.866	1.117	1.453

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Figure- 1: Current Harmonic distortion graph

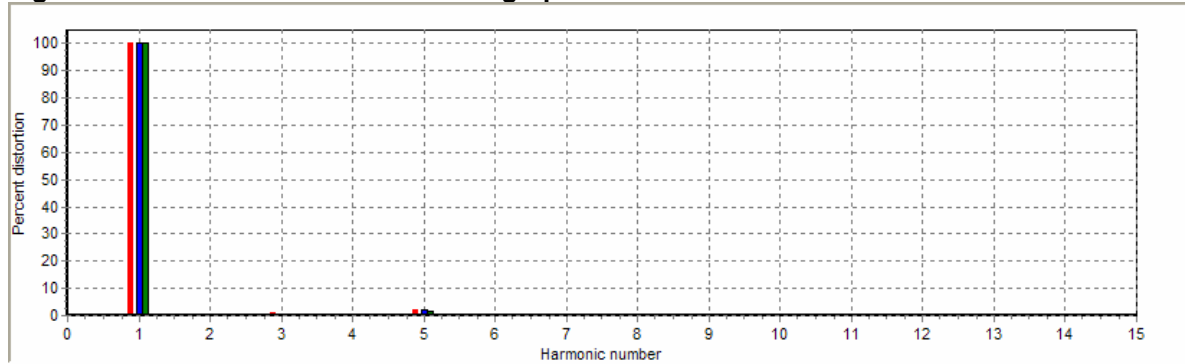
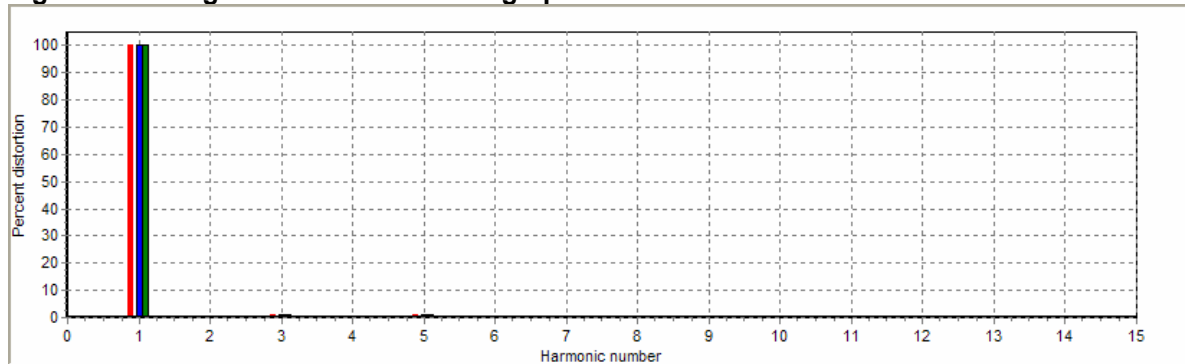


Figure- 2: Voltage Harmonic distortion graph



Harmonic distortion table						
Hz	Cur1	Vlt1	Cur2	Vlt2	Cur3	Vlt3
60	82.4	478	78.3	475	81.5	476
120	0.1	0	0.0	0	0.1	0
180	0.7	4	0.3	5	0.6	5
240	0.0	0	0.0	0	0.0	0
300	1.9	6	1.6	5	1.4	4
360	0.0	0	0.0	0	0.0	0
420	0.1	1	0.3	3	0.3	1
480	0.0	0	0.0	0	0.0	0
540	0.1	1	0.1	0	0.0	0
600	0.0	0	0.0	0	0.0	0
660	0.2	1	0.2	1	0.1	1
720	0.0	0	0.0	0	0.0	0
780	0.1	0	0.1	0	0.1	0

Description:
 No comments entered