CENTRIFUGAL PUMP & MOTOR

FITTED WITH SLEEVE BEARINGS AND NOT INSTRUMENTED WITH NON-CONTACT PICKUPS

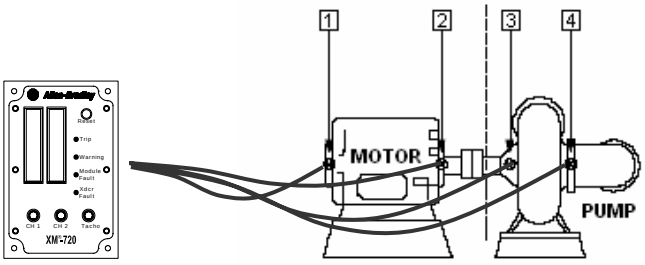
XM-720 MACHINE VIBRATION MONITOR OVERVIEW

The Allen-Bradley XM® 720 family of Machine Vibration Monitors provides users everything that they need in a compact, easy to install, operate and maintain package. The XM-720 Machine Monitor includes:

- One XM Measurement Module:
- XM® 441 Expansion Relay Module (Three relays – Transducer Fault, Warning & Trip – are available for field use.)
- Front panel display
- DC Power Supply

INDUSTRIES

- Automotive
- Discrete Manufacturing
- Food Processing
- Metals
- Mining
- Marine
- Oil & Gas
- Paper
- Power
- Water/ Waste Water



Accelerometers: 1 per bearing location; 1 & 2 installed in the horizontal direction, 3 & 4 installed in line with the discharge.

This document provides a general guidance in how to apply an XM Series condition monitoring system to the specified class of equipment. The objective is to implement a monitoring solution that will identify the majority of faults common to this class of machinery at the earliest indication of the fault and to do this for the lowest possible total cost. Contact your local Rockwell Automation service group to customize a system more specific to your application.

VIBRATION CHARACTERISTICS				
	Fault	Amplitude	Frequency	Remarks
1	Unbalance	Proportional to unbalance (in radial direction).	1 x RPM	Most Common cause of vibration. Correct by balancing rotating parts before assembly. Trim balance after assembly.
2	Misalignment of couplings or bearings. Bent Shaft.	Large in axial direction, 50% or more of radial vibration.	1 & 2 x RPM usual, 3 x RPM sometimes.	Best found by appearance of large axial vibration. Use dial indicators or other method for positive diagnosis.
3	Bad bearings anti-friction type	Unsteady	Non-synchronous with harmonics	Bearing responsible most likely the one nearest the point of largest high frequency vibration.
4	Shaft looseness	Usually in radial direction.	Many RPM harmonics	Usually accompanied by unbalance and/or misalignment.
5	Hydraulic forces, Vane Pass Frequency (VPF) e.g. Cavitation	Unsteady	Number of blades on impeller x RPM	Normally indicates insufficient suction pressure (starvation). Can be destructive to pump internals if left uncorrected. Can particularly erode impeller vanes. When present, often sounds as if "gravel" is passing thru pump.
6	Rubbing	Unsteady large erratic increases	1 x Pump RPM and higher orders with subharmonics	Likely to occur if shaft is bent or bearings worn.

TYPICAL OPERATING SPEEDS 48 - 600 RPM

YOU WILL NEED: *		
Catalog #	Description	QTY
1440-PK02-05M1	XM-720 Machine Monitor; Low Frequency Dynamic Vibration	2
EK-43794l	Model 9100L Low Frequency Accelerometer	4
EK-46801l	32' Accelerometer Cable (splash proof)	4

** Additional requirements may include enclosure, junction boxes, sensor adhesives / mounting tools, etc.*

STANDARD CHANNEL SETTINGS			
Parameter	Setting	Parameter	Setting
Input Unit	g's	HP Filter	0.8 Hz
Fault Low	4	Sampling Mode	Asynchronous
Fault High	16	FMAX	10 x RPM or 3 x Vane Pass Frequency, whichever is higher
Full Scale	2*	Sensitivity	500 mV/g
Output Unit	ips	Num Lines	400
Signal Detection	Calc. Peak	Num Averages	4

** Start with default value - use Auto Scale Function to set once machinery is operating.*

STANDARD BAND SETTINGS				LIMITS	
Fault	Parameter	Min. Freq (CPM)	Max. Freq (CPM)	Alert	Danger
MOTOR					
1, 2, 4, 6	Band 1	0.3 x RPM	1.2 x RPM	0.090	0.135
2, 4	Band 2	1.2 x RPM	3.2 x RPM	0.035	0.053
3	Band 3	3.2 x RPM	12.2 x RPM	0.025	0.038
3	Band 4	12.2 x RPM	FMAX	0.015	0.023
	Overall			0.100	0.150
PUMP					
1, 2, 4, 6	Band 1	0.3 x RPM	1.2 x RPM	0.090	0.135
2, 4	Band 2	1.2 x RPM	3.2 x RPM	0.035	0.053
3, 5	Band 3**	VPF* – (1 x RPM)	VPF + (1 x RPM)	0.060	0.090
3	Band 4	10.8 x RPM	FMAX	0.028	0.042
	Overall			0.100	0.150

** Vane Pass Frequency (VPF) = Running Speed x Number of vanes*

*** If VPF is unknown use: Min Freq = 3.2 x RPM, Max Freq = 10.8 x RPM*

IMPORTANT

When determining frequencies that should be monitored and alarm levels, the recommendations provided should only be used as general guidelines. Measurement parameters and alarm levels should be determined by the equipment OEM, industry standards such as ISO, and the actual operating characteristics of your equipment.

TYPICAL OPERATING SPEEDS 500–6000 RPM

YOU WILL NEED: *		
Catalog #	Description	QTY
1440-PK02-05M0	XM-720 Machine Monitor; Standard Dynamic Vibration	2
EK-43781I	Model 9000A General Purpose Accelerometer	4
EK-46801I	32' Accelerometer Cable (splash proof)	4

** Additional requirements may include enclosure, junction boxes, sensor adhesives / mounting tools, etc.*

STANDARD CHANNEL SETTINGS			
Parameter	Setting	Parameter	Setting
Input Unit	g's	HP Filter	5 Hz
Fault Low	4	Sampling Mode	Asynchronous
Fault High	16	FMAX	10 x RPM or 3 x Vane Pass Frequency, whichever is higher
Full Scale	2*	Sensitivity	100 mV/g
Output Unit	ips	Num Lines	400
Signal Detection	Calc. Peak	Num Averages	4

** Start with default value - use Auto Scale Function to set once machinery is operating.*

STANDARD BAND SETTINGS				LIMITS	
Fault	Parameter	Min. Freq (CPM)	Max. Freq (CPM)	Alert	Danger
MOTOR					
1, 2, 4, 6	Band 1	0.3 x RPM	1.2 x RPM	0.180	0.270
2, 4	Band 2	1.2 x RPM	3.2 x RPM	0.070	0.105
3	Band 3	3.2 x RPM	12.2 x RPM	0.050	0.075
3	Band 4	12.2 x RPM	FMAX	0.030	0.045
	Overall			0.200	0.300
PUMP					
1, 2, 4, 6	Band 1	0.3 x RPM	1.2 x RPM	0.180	0.270
2, 4	Band 2	1.2 x RPM	3.2 x RPM	0.070	0.105
3, 5	Band 3**	VPF* – (1 x RPM)	VPF + (1 x RPM)	0.120	0.180
3	Band 4	10.8 x RPM	FMAX	0.056	0.084
	Overall			0.200	0.300

** Vane Pass Frequency (VPF) = Running Speed x Number of vanes*

*** If VPF is unknown use: Min Freq = 3.2 x RPM, Max Freq = 10.8 x RPM*

IMPORTANT

When determining frequencies that should be monitored and alarm levels, the recommendations provided should only be used as general guidelines. Measurement parameters and alarm levels should be determined by the equipment OEM, industry standards such as ISO, and the actual operating characteristics of your equipment

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