

APPLICATION GUIDE

CONDITION MONITORING

XM-120 & XM-121 MACHINE VIBRATION MONITOR

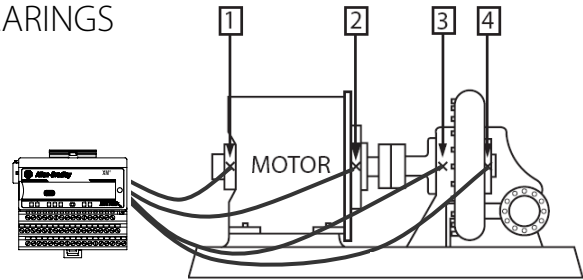


The XM-120 (Standard) and the XM-121 (Low Frequency) Dynamic Measurement Modules are intelligent 2-channel general-purpose monitors that support the measurement of dynamic inputs such as vibration, pressure and strain. The modules also have a third channel for tachometer inputs. They are well suited for monitoring shaft, casing and pedestal vibration in almost all rotating equipment applications. The two modules are identical except for their high pass filter selections. The XM-120 supports shaft eccentricity monitoring when its alternate XM-120E firmware is loaded, and the XM-121 supports absolute shaft measurements when its alternate XM-121A firmware is loaded.

INDUSTRIES

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

LOW PRESSURE CENTRIFUGAL BLOWER/VACUUM PUMP FITTED WITH ROLLING ELEMENT (ANTI-FRICTION) BEARINGS



Accelerometers: 1 per bearing location. Installed in the horizontal direction

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 authorized Allen-Bradley distributor or Rockwell Automation sales office 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.
2	Misalignment of couplings or bearings. Bent Shaft.	Large in axial direction, 50% or more of radial vibration.	1 x RPM usual, 2 & 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 – use velocity measurement if possible	Very high several times RPM	Bearing responsible most likely the one nearest the point of largest high frequency vibration.
4	Mechanical Loosenes	Large in radial direction. 1 x rpm usually largest peak	1 x RPM and sometimes multiples	Looseness between machine and plates or foundation and poor grouting. Look for loose pillow block bolts or cracks. Distortion of the frame or base referred to as soft foot.
5	Shaft looseness		Many RPM harmonics	Usually accompanied by unbalance and/or misalignment.
6	Electrical	Disappears when power is turned off	1 x RPM or 1 or 2 x synchronous frequency	If vibration amplitude drops of instantly when power is turned off cause is electrical

LISTEN.
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TYPICAL OPERATING SPEEDS 600 – 3600 RPM

YOU WILL NEED: *		
Catalog #	Description	QTY
1440-VST02-01RA	XM-120 Vibration Module	2
1440-TB-A	Terminal Base for XM-120 / XM-121 / XM-122	2
EK-43784I	Model 9100 General Purpose Accelerometer	4
EK-46801I	32' [9.75 m] Accelerometer Cable (splash proof)	4
1440-SCDB9-FXM2	XM Serial Communications Cable	1

* Additional requirements may include power supply, enclosure, power or DeviceNet cables, 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**	120,000 CPM [2,000 Hz]
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.

** For a 2 or 4 pole (3600 or 1800 RPM [60 or 30 Hz]) machine, set FMAX to 120,000 CPM [2,000 Hz]. For a 6 pole or slower (< 1200RPM [< 20 Hz]) machine, set FMAX to 90,000 CPM [1,500 Hz].

STANDARD BAND SETTINGS				LIMITS*	
Fault	Parameter	Min. Freq (CPM) [Hz]	Max. Freq (CPM) [Hz]	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
BLOWER					
1, 2, 4, 6	Band 1	0.3 x RPM	1.2 x RPM	0.113	0.169
3, 4	Band 2	1.2 x RPM	3.2 x RPM	0.044	0.066
3, 5	Band 3*	BPF** - (1 x RPM)	BPF + (1 x RPM)	0.075	0/113
3	Band 4	10.8 x RPM	FMAX***	0.035	0.053
	Overall			0.125	0.188

* If BPF is unknown, see Min Freq - 3.2 x RPM, Max Freq = 10.8 x RPM

** Blade Pass Frequency (BPF) = Running Speed x Number of blades.

*** See Standard Channel Settings for correct setting of FMAX.

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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