

APPLICATION GUIDE

CONDITION MONITORING

XM-120 & XM-121 MACHINE VIBRATION MONITOR

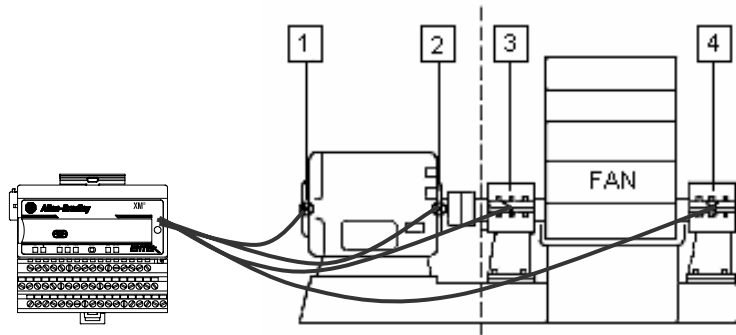


The XM-120 (Standard) and the XM-121 (Low Frequency) Dynamic Measurement Modules are intelligent 2-channel general-purpose monitors that support the measurement of dynamic inputs such as vibration, pressure and strain. The modules also have a third channel for tachometer inputs. They are well suited 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

FAN/BLOWER & MOTOR FITTED WITH SLEEVE (FLUID-FILM) BEARINGS *



Accelerometers: 1 per bearing location. 1, 2, 3, & 4 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 local authorized Allen-Bradley distributor to customize a system more specific to your application.

**NOT instrumented with non-contact pickups. If instrumented with non-contact pickups – contact your local authorized Allen-Bradley distributor or Rockwell Automation sales office for assistance.*

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	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.
4	Bad bearings fluid film type	radial	Many times RPM harmonics	Advanced bearing wear results in multiple harmonics of running speed.
5	Shaft looseness		Many RPM harmonics	Usually accompanied by unbalance and/or misalignment. Poor fit or excessive clearances.
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.
THINK.
SOLVE.™

TYPICAL OPERATING SPEEDS 48-600 RPM

YOU WILL NEED: *		
Catalog #	Description	QTY
1440-VLF02-01RA	XM-121 Low Frequency Vibration Module	2
1440-TB-A	Terminal Base for XM-120 / XM-121/ XM-122	2
EK-43794I	Model 9100L Low Frequency Accelerometer	4
EK468011	32' Accelerometer Cable (splash proof)	4
1440-SCDB9-FXM2	Programming 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	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
FAN					
1, 2, 4, 6	Band 1	0.3 x RPM	1.2 x RPM	0.113	0.169
2, 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

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

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

*** 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.

TYPICAL OPERATING SPEEDS 600-6000 RPM

YOU WILL NEED: *		
Catalog #	Description	QTY
1440-VST02-01RA	XM-120 Standard 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' Accelerometer Cable (splash proof)	4
1440-SCDB9-FXM2	Programming 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	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
FAN					
1, 2, 4, 6	Band 1	0.3 x RPM	1.2 x RPM	0.225	0.338
2, 4	Band 2	1.2 x RPM	3.2 x RPM	0.088	0.131
3, 5	Band 3*	BPF** - (1x RPM)	BPF + (1 x RPM)	0.150	0.225
3	Band 4	10.8 x RPM	FMAX***	0.070	0.105
	Overall			0.250	0.375

* If BPF is unknown, use 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.

www.rockwellautomation.com

Power, Control and Information Solutions

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation SA/NV, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846