APPLICATION GUIDE
CONDITION MONITORING

XM-120 & XM-121 MACHINE VIBRATION MONITOR

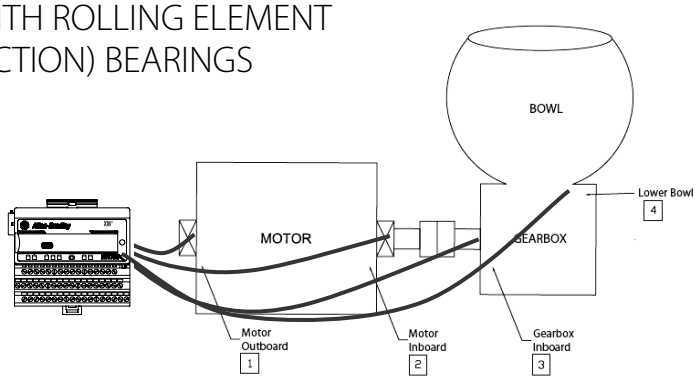
The XM-120 (Standard) and the XM-121 (Low Frequency) Dynamic Measurement Modules are intelligent 2-channel general-purpose monitors that support the measurement of dynamic inputs such as vibration, pressure and strain. The modules also have a third channel for tachometer inputs. They are well suited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

CENTRIFUGES WITH GEARBOX

FITTED WITH ROLLING ELEMENT (ANTI-FRICTION) 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.

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 Looseness	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. Distoration of the frame or base referred to as soft foot.
4	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.
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
7	Gear Misalign		1 x GMF	Degrades quickly into wear and backlash
8	Gear backlash/ wear		2 x GMF	Is usually is accompanied by multiple sidebands
9	Gear wear		2 & 3 x GMF	Is usually accompanied by multiple sidebands

LISTEN. THINK. SOLVE.℠

TYPICAL OPERATING SPEEDS > 600 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 [0.5]	Sensitivity	100 mV/g
Output Unit	ips [mm/s]	Num Lines	400
Signal Detection	Calc. Peak [RMS]	Num Averages	4

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

*** For Motor and Gearbox Inboard measurements set FMAX to 120,000 CPM [2,000 Hz]. For Lower Bowl measurements set FMAX to 120,000 CPM [2,000 Hz] or 3.25 x GMF, whichever is higher.*

STANDARD BAND SETTINGS				LIMITS*	
Fault	**Parameter**	**Min. Freq (CPM)**	**Max. Freq (CPM)**	**Alert**	**Danger**
MOTOR AND GEARBOX INBOARD (Locations 1, 2 & 3)					
1, 2, 4	Band 1	0.3 x RPM	1.2 x RPM	0.200 [5.1]	0.300 [7.6]
2, 4, 5**	Band 2	1.2 x RPM	3.2 x RPM	0.158 [4.0]	0.123 [3.1]
3, 4, 5**	Band 3	3.2 x RPM	12.2 x RPM	0.113 [2.9]	0.175 [4.4]
3, 6, 7, 8	Band 4	12.2 x RPM	FMAX***	0.090 [2.3]	0.140 [3.6]
	Overall			0.225 [5.7]	0.350 [8.9]
LOWER BOWL (Location 4)					
1, 2, 3, 4, 6	Band 1	0.25 x GMF****	0.75 x GMF	0.056[1.4]	0.088 [2.2]
2, 3, 4, 6	Band 2	0.75 x GMF	1.75 x GMF	0.158 [4.0]	0.123 [3.1]
3, 6, 7, 8	Band 3	1.75 x GMF	2.75 x GMF	0.113 [2.9]	0.175 [4.4]
3, 8	Band 4	2.75 x GMF	FMAX***	0.090 [2.3]	0.140 [3.6]
	Overall			0.225 [5.7]	0.350 [8.9]

** Whichever band the gear mesh frequency is in, set the limits to 70% of the overall.*

*** Whichever band 7200 CPM [120 Hz] is in, electrical (fault 5) will appear.*

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

***** GMF = the number of teeth or flutes on a gear or worm x RPM of that gear or shaft.*

Note: *Square brackets ([ ]) indicate the International System of Units.*

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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