Inclinometer Selector Guide

Single Axis Inclinometers

	LSO Series	LSOX Series	LSR Series	SMI Series	RMI Series	LCF-100 Series	LCF-300 Series
Features & Benefits	• Extreme High Resolution • Vibration >35grms • Responds to changes in Slope 0.000006°/ft • High Accuracy Closed-loop (Servo) • 1,500g Shock Capability	• Temperature Compensation Available • Connector, Pin Terminals or Wired output types • 0-5, ±5 VDC or 4-20 mA Outputs • ROHS Compliant • CE Certification on 0-5 V Connector	• ± 1° to ± 90° Input Full Range • 1.43° Dia x 1.60" Tall Size • Withstands 20 grms Vibration • Stackable for 2-axis Sensing • Solder Pins Terminations	• Low cost with force-balanced technology • Higher precision than most MEMS sensors • Resolution of 3.5 µradians • Connector or Pin Terminal output types • 0-5, ±5 VDC or 4-20 mA output options • ROHS compliant	• Mounts horizontally or vertically • Low cost with force-balanced technology • Higher precision than most MEMS sensors • Withstands up to 500g shock • 0-5, ±5 VDC or 4-20 mA output options • ROHS compliant	• Direct Bogie Mount • Filtering Available 3-30 Hz Bandwidth • Milli-g Bias & Scale Factor • High level ±5Vdc Output • -40 °C to +80 °C Temp Range	• Connector or Pin Terminal output types • 0-5, ± 5 VDC or 4-20 mA outputs • ±1 to ±90° Input Range • -40 °C to +80 °C Temp Range • High vibration resistance
Applications	• Steel Processing & Casting • Heavy Off-road Construction • Structural Monitoring • Train Automated Controls • Rail Leveling & Grinding	• High Precision Geotech • Oil & Gas/Riser Tilt Monitoring • Pavement Profiling Rigs • Vehicle Wheel Alignment	• Steel Mill Ladle Position • Oil & Gas Well Bore Mapping • Weapons Platform leveling • Geophysical Monitoring • Mobile Antenna Positioning	• Track monitoring & testing • Geotechnical monitoring • Vehicle Wheel Alignment • Educational Research	• Construction Equipment • Antenna Positioning • Industrial and Machining Equipment • Cross Rail Management	• Aircraft Flight Control • Robot Vertical Reference • Auto Mfging Suspension Install • Geophysical Low Range Tilt Testing • Platform Orientation	• Vehicle Wheel Alignment • Robotics • Railroad MOW Equipment • Structural Monitoring
Performance Specs							
Input Range (°)[1]:	±1.0 ±3.0 ±14.5 ±30.0 ±90.0	±1.0 ±3.0 ±14.5 ±30.0 ±60.0 ±90.0	±1.0 ±3.0 ±14.5 ±30.0 ±90.0	±3.0 ±14.5 ±30.0 ±45.0 ±60.0 ±90.0	±3 ±14.5 ±30 ±45 ±60 ±90	±1.0 ±14.5 ±30.0 ±90.0	±1.0 ±3.0 ±14.5 ±30.0 ±60.0 ±90.0
Full Range Output (FRO V± 1.0%)[2]:	±5.0 ±5.0 ±5.0 ±5.0 ±5.0	0-5, ±5 or 4-20 mA	±5.0 ±5.0 ±5.0 ±5.0 ±5.0	0-5, ±5 or 4-20 mA	0-5, ±5 or 4-20 mA	±5.0 ±5.0 ±5.0 ±5.0	0-5, ±5 or 4-20 mA
Non Linearity (%FRO[3], Max.):	0.05 0.05 0.02 0.02 0.05	0.05 0.02 0.02 0.02 0.02 0.05	0.05 0.05 0.02 0.02 0.05	0.05 0.02 0.02 0.02 0.04 0.05	0.05 0.02 0.02 0.02 0.04 0.05	0.05 0.02 0.02 0.05	0.05 0.02 0.02 0.02 0.02 0.05
Scale Factor (V/g, Nom), %:	286.5 95.5 20.0 10.0 5.0	Output dependent, see datasheet	286.5 95.5 20.0 10.0 5.0	Output dependent, see datasheet	Output dependent, see datasheet	286.5 20.0 10.0 5.0	Output dependent, see datasheet
Scale Factor Temp Sens (PPM, %/°C, Max.):	400 300 100 60 60	350 300 100 60 60 60	400 300 100 60 60	100 100 100 100 100 100	100 100 100 100 100 100	100 100 100 100	350 300 100 60 60 60
Natural Frequency (Hz, Nom.[4]):	0.5 2.0 15.0 20.0 40.0	0.5 2.0 15 20 30 30	0.5 2.0 15.0 20.0 40.0	5.0 5.0 5.0 5.0 5.0 5.0	5.0 5.0 5.0 5.0 5.0 5.0	3.0 30.0 30.0 30.0	0.5 2.0 15 20 30 30
Bandwidth (-3db) (Hz, Nom.):	0.5 2.0 15.0 20.0 40.0	0.5 2.0 15 20 30 30	0.5 2.0 15.0 20.0 40.0	5.0 5.0 5.0 5.0 0.5 5.0	5.0 5.0 5.0 5.0 5.0 5.0	3.0 30.0 30.0 30.0	0.5 2.0 15 20 30 30
Transverse Axis Misalignment (° Max.):	±0.10 ±0.15 ±0.25 ±0.50 ±1.00	±0.25 ±0.25 ±0.5 ±0.5 ±0.5	±0.10 ±0.15 ±0.25 ±0.50 ±1.00	±0.25 ±0.50 ±0.50 ±0.50 ±0.50 ±0.50	±0.25 ±0.50 ±0.50 ±0.50 ±0.50 ±0.50	±0.15 ±0.34 ±0.71 ±0.71	±0.25 ±0.25 ±0.50 ±0.50 ±0.50 ±0.50
Output @ 0 ° Tilt (Bias) (V, Max), %/°C, m°/°C:	0.10 0.04 0.02 0.02 0.02	Output dependent, see datasheet	0.10 0.04 0.02 0.02 0.02	Output dependent, see datasheet	Output dependent, see datasheet	0.500 0.100 0.100 0.050	Output dependent, see datasheet
0 ° Output Temp Sensitivity (V/ °C, Max.):	.005 .003 .001 .0005 .0003	Output dependent, see datasheet	.005 .003 .001 .0005 .0003	Output dependent, see datasheet	Output dependent, see datasheet	.015 .001 .0005 .0003	Output dependent, see datasheet
Resolution and Threshold (µrad, Max.):	1.0 1.0 1.0 1.0 1.0	1.0 1.0 1.0 1.0 1.0 1.0	1.0 1.0 1.0 1.0 1.0	3.5 3.5 3.5 3.5 3.5 3.5	3.5 3.5 3.5 3.5 3.5 3.5	1.0 1.0 1.0 1.0	1.0 1.0 1.0 1.0 1.0
Electrical							
Number of Axes	1	1	1	1	1	1	1
Input Voltage (Vdc)	±12 to ±18	+9 to +18 , ±12 to ±18 or +20 to +30	±12 to ±18	+15 to +30, ±12 to ±18 or ±12 to ±28	+15 to +30, ±12 to ±18 or +12 to +28	±12 to ±18	+9 to +18 , ±12 to ±18 or +20 to +30
Input Current (mA, Nom.)	±15	40	±15	40 or 55	40 or 55	±15	40
Output Impedance (Ohms, Nom.)	100	1	15000	10	10	100	1
Noise (Vrms, µArms, Max.)	0.0020	0.002	0.0020	0.002 or 0.006	0.002 or 0.006	0.0020	0.002
Environmental							
Operating Temperature Range	-18°C to +71°C	-40°C to +80°C	-18°C to +71°C	-55°C to +85°C	-55°C to +85°C	-40°C to +80°C	-40°C to +80°C
Survival Temperature Range	-40°C to +71°C	-60°C to +90°C	-60°C to +90°C	-60°C to +90°C	-60°C to +90°C	-60°C to +90°C	-60°C to +90°C
Vibration	20 g	-	20 g	-	-	20 g	-
Shock	1500g, 0.5 msec, 1/2 sine	1500g, 0.5 msec, 1/2 sine	1500g, 0.5 msec, 1/2 sine	500g, 1 msec, 1/2 sine	500g, 1 msec, ½ sine	1000g, 1 msec, 1/2 sine	1500g, 0.5 msec, ½ sine
Seal	MIL-STD-202, Method 112	IP66	MIL-STD-202, Method 112	IP65	IP65	MIL-STD-202, Method 112	IP65
Mechanical							
Weight	13.0 oz.	13 oz.	4.0 oz.	4.0 oz.	4.2 oz	4.0 oz.	8.1 oz.
Dimensions	1.60" W x 2.94" L x 1.70" H	1.60" W x 3.64" L x 1.68" H	1.43" Dia. x 1.60" H	1.55" W x 3.10" L x 2.04" H	2.27" Dia. x 1.72" H	1.50" W x 3.10" L x 1.50" H	1.38" W x 3.10" L x 2.18" H
Custom Ability	Yes	Yes	No	Yes	Yes	Yes	Yes

Dual Axis Inclinometers

	LCF-196 Series	LCF-2330 Series	LCF-2000 Series
Features & Benefits	• Less > 0.02% Non-linearity • Bias Temp Sens >50µg/°C • Only 0.875" Dia Housing • IP65 Sealed Housing • 500g Shock Capability	• ±1° to ±90° Input Full Range • Micro Radian Resolution • Available Internal Temp Sensor • High level ± 5Vdc Output • Low Impedance Output • Fluid Damped	• ±1° to ±90° Input Full Range • Dual Axis • Shock Survival of 1000g • High level ± 5Vdc Output • Fluid Damped for High Shock and Vibration Applications
Applications	• Strg Motion Data Logging • Oil & Gas Well Logging • Construction Monitoring • Deviation Studies • Test Platform Orientation	• 2-Axis Machine Tool Leveling • Bridge Structural Monitoring • Submersible Control Feedback • Offshore Platform Stability • Antenna Leveling & Orientation	• Antenna Leveling • Weapons Platforms • Barge & Offshore Platform Leveling & Control • Data Buoy Measurement • Missile Launchers
Performance Specs			
Input Range (°)[1]:	±14.5 ±30.0 ±90.0	±1.0 ±3.0 ±14.5 ±30.0 ±90.0	±1.0 ±3.0 ±14.5 ±30.0 ±90.0
Full Range Output (FRO V± 1.0%)[2]:	±5.0 ±5.0 ±5.0	±5.0 ±5.0 ±5.0 ±5.0 ±5.0	±5.0 ±5.0 ±5.0 ±5.0 ±5.0
Non Linearity (%FRO[3], Max.):	0.02 0.02 0.10	0.05 0.05 0.02 0.02 0.02	0.05 0.05 0.02 0.02 0.10
Scale Factor (V/g, Nom), %:	20.0 10.0 5.0	286.5 95.5 20.0 10.0 5.0	286.5 95.5 20.0 10.0 5.0
Scale Factor Temp Sens (PPM, %/°C, Max.):	100 100 100	300 300 100 60 100	200 100 100 100 100
Natural Frequency (Hz, Nom.[4]):	30.0 30.0 30.0	2.0 3.0 30.0 30.0 30.0	3.0 3.0 30.0 30.0 30.0
Bandwidth (-3db) (Hz, Nom.):	30.0 30.0 30.0	2.0 3.0 30.0 30.0 30.0	3.0 3.0 30.0 30.0 30.0
Transverse Axis Misalignment (° Max.):	±1.00 ±1.00 ±1.00	±0.25 ±0.50 ±0.50 ±1.00 ±1.00	±0.25 ±0.35 ±0.35 ±0.71 ±0.71
Output @ 0 ° Tilt (Bias) (V, Max), %/°C, m°/°C:	0.040 0.020 0.020	0.1 0.04 0.02 0.02 0.02	0.750 0.250 0.075 0.050 0.050
0 ° Output Temp Sensitivity (V/ °C, Max.):	.0010 .0005 .0003	.0150 .0050 .001 .0005 .0003	.0150 .005 .0010 .0005 .0003
Resolution and Threshold (µrad, Max.):	3.0 3.0 3.0	1.0 1.0 1.0 1.0 1.0	1.0 1.0 1.0 1.0 1.0
Electrical			
Number of Axes	2	2	2
Input Voltage (Vdc)	±12 to ±19	±12 to ±18	±12 to ±18
Input Current (mA, Nom.)	±15	±30	±30
Output Impedance (Ohms, Nom.)	100	100	100
Noise (Vrms, µArms, Max.)	0.002 0.001 0.001	0.0020	0.0020
Environmental			
Operating Temperature Range	-40°C to +80°C	-40°C to +80°C	-40°C to +80°C
Survival Temperature Range	-60°C to +90°C	-60°C to +90°C	-40°C to +90°C
Vibration	10 g	20 g	20 g
Shock	500g, 1 msec, 1/2 sine	1000g, 1 msec, 1/2 sine	1000g, 0.001 msec, 1/2 sine
Seal	MIL-STD-202, Method 112	MIL-STD-202, Method 112	MIL-STD-202, Method 112
Mechanical			
Weight	11 oz.	8.0 oz.	16 oz.
Dimensions	0.875" Dia x 9.420" Lg, Tube	1.61" W x 3.609" L x 1.83" H	2.88" W x 3.75" L x 2.75" H
Custom Ability	Yes	Yes	Yes

Triple Axis Inclinometer

	LCF-3000 Series
Features & Benefits	• ±1° to ±90° Input Full Range • Tri-axis Applications • Micro Radian Resolution • High level ± 5Vdc Output • Low Impedance Output • Fluid Damped
Applications	• 3-Axis Machine Tool Leveling • Bridge Structural Monitoring • Antenna Leveling & Orientation • Platform Orientation • Geophysical Low Range Tilt Testing
Performance Specs	
Input Range (°)[1]:	±3.0 ±14.5 ±30.0 ±90.0
Full Range Output (FRO V± 1.0%)[2]:	±5.0 ±5.0 ±5.0 ±5.0
Non Linearity (%FRO[3], Max.):	0.02 0.02 0.02 0.10
Scale Factor (V/g, Nom), %:	95.54 20.0 10.0 5.0
Scale Factor Temp Sens (PPM, %/°C, Max.):	100 100 100 100
Natural Frequency (Hz, Nom.[4]):	3.0 30.0 30.0 30.0
Bandwidth (-3db) (Hz, Nom.):	3.0 30.0 30.0 30.0
Transverse Axis Misalignment (° Max.):	±0.50 ±0.50 ±1.00 ±1.00
Output @ 0 ° Tilt (Bias) (V, Max), %/°C, m°/°C:	0.25 0.075 0.050 0.050
0 ° Output Temp Sensitivity (V/ °C, Max.):	.005 .001 .0005 .0003
Resolution and Threshold (µrad, Max.):	1.0 1.0 1.0 1.0
Electrical	
Number of Axes	3
Input Voltage (Vdc)	±12 to ±18
Input Current (mA, Nom.)	±30
Output Impedance (Ohms, Nom.)	100
Noise (Vrms, µArms, Max.)	0.0020
Environmental	
Operating Temperature Range	-40°C to +80°C
Survival Temperature Range	-40°C to +90°C
Vibration	20 g
Shock	1000g, 1msec, 1/2 sine
Seal	MIL-STD-202, Mtd 112
Mechanical	
Weight	16.0 oz.
Dimensions	2.88" W x 3.75" L x 2.75" H
Custom Ability	Yes

Digital Inclinometer

	DXI-100/200 Series
Features & Benefits	• Digital Output • Resolution 0.001° • Mechanical Shock 1500g 1msec ½ sine • Industry Standard RS485 & RS422 Outputs • High Precision and Performance • Low Noise
Applications	• Radar/Antenna Control • Structural Monitoring • Linear Acceleration/Deceleration Measuring • Automatic Train Position Control • Seismic Monitoring • Track Leveling
Performance Specs	
Input Range (°)[1]:	±1.0 ±3.0 ±14.5 ±30.0 ±60.0
Full Range Output (FRO V± 1.0%)[2]:	±0.25 ±0.50 ±.87 ±1.00 ±2.00
Non Linearity (%FRO[3], Max.):	0.02 0.015 0.02 0.02 0.03
Scale Factor (V/g, Nom), %:	0.05 0.05 0.05 0.05 0.05
Scale Factor Temp Sens (PPM, %/°C, Max.):	0.01 0.01 0.01 0.01 0.01
Natural Frequency (Hz, Nom.[4]):	- - - - -
Bandwidth (-3db) (Hz, Nom.):	3.0 6.0 30.0 30.0 30.0
Transverse Axis Misalignment (° Max.):	±30.0 ±30.0 ±30.0 ±30.0 ±30.0
Output @ 0 ° Tilt (Bias) (V, Max), %/°C, m°/°C:	0.01 0.01 0.05 0.05 0.05
0 ° Output Temp Sensitivity (V/ °C, Max.):	5.0 5.0 5.0 5.0 5.0
Resolution and Threshold (µrad, Max.):	17.5 17.5 17.5 17.5 17.5
Electrical	
Number of Axes	1 or 2
Input Voltage (Vdc)	±10 to ±30
Input Current (mA, Nom.)	DXI-100 ±80 mA/DXI-200 ±100 mA
Output Impedance (Ohms, Nom.)	-
Noise (Vrms, µArms, Max.)	0.005
Environmental	
Operating Temperature Range	-40°C to +70°C
Survival Temperature Range	-40°C to +70°C
Vibration	20 g
Shock	1500g, 1msec, 1/2 sine
Seal	MIL-STD-202, Mtd 112
Mechanical	
Weight	DXI-100 8.0 oz./DXI-200 10.0 oz.
Dimensions	1.62" W x 3.609" L x 1.83" H
Custom Ability	Yes

Ethernet Inclinometer

	eDXI Series
Features & Benefits	• Digital output • Resolution 0.001° • Mechanical Shock 1500g 1msec 1/2 sine • Industry Standard Ethernet 10BaseT or 100 Base TX (Auto-sensing) • For use in high shock & vibration environments
Applications	• Radar/Antenna Control • Structural Monitoring • Linear Acceleration/Deceleration Measuring • Automatic Train Control (ATC, ATP)
Performance Specs	
Input Range (°)[1]:	±1.0 ±3.0 ±14.5 ±30.0 ±60.0
Full Range Output (FRO V± 1.0%)[2]:	Ethernet 10Base-T or 100Base-TX (Auto-sensing)
Non Linearity (%FRO[3], Max.):	0.02 0.015 0.02 0.02 0.03
Scale Factor (V/g, Nom), %:	0.05 0.05 0.05 0.05 0.05
Scale Factor Temp Sens (PPM, %/°C, Max.):	0.01 0.01 0.01 0.01 0.01
Natural Frequency (Hz, Nom.[4]):	- - - - -
Bandwidth (-3db) (Hz, Nom.):	3.0 6.0 30.0 30.0 30.0
Transverse Axis Misalignment (° Max.):	0.15 0.15 0.5 0.5 0.5
Output @ 0 ° Tilt (Bias) (V, Max), %/°C, m°/°C:	0.01 0.01 0.05 0.05 0.05
0 ° Output Temp Sensitivity (V/ °C, Max.):	0.001 0.001 0.005 0.005 0.005
Resolution and Threshold (µrad, Max.):	17.5 17.5 17.5 17.5 17.5
Electrical	
Number of Axes	1 or 2
Input Voltage (Vdc)	36 to 57
Input Current (mA, Nom.)	250
Output Impedance (Ohms, Nom.)	-
Noise (Vrms, µArms, Max.)	0.005
Environmental	
Operating Temperature Range	-40°C to +85°C
Survival Temperature Range	-40°C to +90°C
Vibration	20 g
Shock	1500g, 1 msec, ½ sine
Seal	MILD-STD-202 Method 112
Mechanical	
Weight	4.2 oz
Dimensions	3.75" W x 2.88" L x 3.63" H
Custom Ability	Yes

Notes: 1 - Other ranges available upon request 2 - Full range is defined as "from negative full input angle to positive full input angle." The inclinometer output is proportional to the sine of the tilt angle., 3 - Referenced to theoretical sine value independent of misalignment,, 4 - Output phase angle = -90°