



XL403D Digital Triaxial Accelerometer

SPECIFICATIONS

- Triaxial MEMS DC Accelerometer
- Smart Digital Sensor with Onboard Processing
- $\pm 2g$ to $\pm 15g$ Measurement Ranges
- RS485 Interface, User Configurable
- Temperature Output Included

FEATURES AND BENEFITS

Built-in Analyses

The XL403D includes an on-board microcontroller to reduce the need for post-processing time and equipment, plus shrink data file sizes. Simply request minimum values, maximum values, peak-to-peak, magnitude, tilt, or threshold.

Dynamic Customer Interface

Set and query the XL403D with SCPI-like commands such as CONFigure or MEASure. Users may select the scan rates needed and set threshold detection and actions as required. Employ start-up scripts and run multiple sensors with data synchronization.

Flexible Output

Readouts at specified intervals can include one, two or three axes plus temperature. Choose engineering units (g, °C), or raw ADC counts at RS232 or RS485 baud rates.

Built-in Calibration

Calibration data for each sensor is maintained in the accelerometer. All data output is fully calibrated in accordance with NIST standards.

The model XL403D is the first accelerometer to support SCPI-like commands, return data in engineering units, and work with an ASCII terminal emulator. It also performs basic functions such as evaluating minimum, maximum, magnitude, peak-to-peak, and tilt computations. The output is configurable by the customer and the accelerometer can be programmed to perform the unique tasks required for each measurement application.

The sensor also contains a temperature sensor, microcontroller, and analog outputs in a small, easy-to-install package. The microcontroller takes 10-bit samples and performs temperature compensation and additional functions as programmed for output via the RS-485 interface.

The triaxial accelerometer is available in four ranges from $\pm 2g$ to $\pm 15g$ and has a user configurable 5-pole LP filter setting between 1Hz and 800Hz.

Each sensor output is fully temperature compensated, improving accuracy by minimizing variations due to temperature and aging effects. Each axial sensor has been tested over the -40°C to $+85^{\circ}\text{C}$ temperature range.

An on-board self-test option can simulate an acceleration to be injected into all sensor channels to verify channel integrity prior to start of test.

PERFORMANCE SPECIFICATIONS

All values are typical at +24°C and 12Vdc excitation unless otherwise stated. TE Connectivity reserves the right to update and change these specifications without notice.

Parameters

DYNAMIC

	-R002	-R005	-R010	-R015
Dash Number	-R002	-R005	-R010	-R015
Range (g)	±2	±5	±10	±15
Sensitivity (mV/g)	1000	400	200	133;
Frequency Response, 5-pole LP (Hz)	0-800	0-800	0-800	0-800
Non-Linearity (%FSO)	±0.25	±0.25	±0.25	±0.25
Transverse Sensitivity (%)	<2	<2	<2	<2
Alignment Error (degrees)	±0.25	±0.25	±0.25	±0.25
Shock Limit (g)	±5000	±5000	±5000	±5000
Resolution B010 filter option (mg)	0.32	0.32	0.32	0.32
Resolution B100 filter option (mg)	1.01	1.01	1.01	1.01
Resolution B200 filter option (mg)	1.43	1.43	1.43	1.43
Resolution B800 filter option (mg)	2.86	2.86	2.86	2.86
Spectral Noise (µg/√Hz)	100	100	100	100

Notes

See Ordering Info
 Exact value on cal cert
 -3dB cutoff per BYYY option
 BFSL
 <1% typical
 Exact value on cal cert
 0.5msec pulse
 10Hz -3dB cutoff
 100Hz -3dB cutoff
 200Hz -3dB cutoff
 800Hz -3dB cutoff

ELECTRICAL

Zero Acceleration Output (V)	±2.50 ±0.010	Single ended
Excitation Voltage (Vdc)	8.5 to 36	
Excitation Current (mA)	25	No load, quiescent
Rejection Ratio (dB)	>120	DC
Full Scale Output Limit (single-ended)	0.05 to 4.95Vpk	>1MΩ load
Capacitive Drive Capability (pF)	1000	
Insulation Resistance (MΩ)	>100	@100Vdc
Turn On Time (msec)	<50	
Ground Isolation	Isolated from Mounting Surface	

DIGITAL

Scan Rate (scans/sec)	0.0007 to 2500	Default for A1, A2, A3, T1
ADC Resolution	10 bits	
Absolute Accuracy	±2 LSB	

SELF TEST FUNCTION

Response with self-test pin grounded	See operating manual for instructions
Self Test Resistance to Ground (kΩ)	5

TEMPERATURE SENSOR

Sensitivity (mV/°C)	6.45
+25°C Bias Level (mV)	500

ENVIRONMENTAL

Thermal Zero Shift (mg/°C)	±0.16	-40 to +85°C
Thermal Sensitivity Shift (%)	±1.0 typ (±3.0 max)	-40 to +85°C
Operating Temperature (°C)	-40°C to +85°C	
Humidity (Active Element & Electronics)	Hermetically Solder Seal	
Humidity (Housing)	Epoxy Sealed, IP65	

PHYSICAL

Case Material	Anodized Aluminum
Cable	9x, #30 AWG Conductors, PFA Insulated, Tin Plated Shield, PFA Jacket
Connector	9-pin DB9 Male Connector Installed at End of Cable
Weight (cable not included)	38 grams
Mounting	2x M3-0.5 Machine Screws
Mounting Torque	5 lbf-in (0.56 N-m)

Calibration supplied: CS-FREQ-0100 NIST Traceable Calibration with Sensitivity and Offset

Optional accessories: 35172A Vertical Mounting Flange
 35173A Horizontal Mounting Flange

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XL403D SET UP

Use the 35250AK0/AK1 interface kit (sold separately) to connect the XL403D to a computer with a serial port and supply power (USB adapters available if needed). Use an ASCII terminal emulator of your choice to interface with the sensor (Tera Term Pro is recommended).

XL403D SAMPLE COMMANDS

<i>Set commands</i>		<i>Query Commands</i>	
		*IDN?	device identification
ROUT:SCAN	set channels to be scanned	ROUT:SCAN?	channels being scanned
		READ?	show single scan
INP:FILT:FREQ	set cutoff frequency	INP:FILT:FREQ?	current cutoff filter setting
TRIG:SOUR:TIM	set time-based scan	TRIG:SOUR?	current trigger source
TRIG:COUNT	set maximum number of triggers	TRIG:COUNT?	current max number of triggers
INIT	begin scanning as configured	SYST:ERR?	current error status
OUT:FMT	format output	OUT:FMT?	current formatting
CONF:FNC <name>	configure function	CONF:FNC?	current function definitions

```

Tera Term - COM1 Y1
File Edit Setup Control Window Help
out:fmt?
FLT,units
read?
0.013g,-0.002g,-1.006g, 28.5°C
out:fmt hex
read?
0203,01FF,01c1,0272
out:fmt flt,units,cnt
read?
0004,-0.005g,-0.002g,-1.024g, 28.8°C
read?
0005,-0.023g, 0.016g,-1.024g, 28.5°C
out:fmt hex,cnt,crc
read?
0006,0201,01FF,01c1,0272,380c
read?
0007,0201,01FF,01c1,0272,F40c
read?
0008,0201,0200,01c1,0274,969c
    
```

Display engineering units (FLT), HEX values; add a scan count or CRC to each scan

XL403D FUNCTIONS

Configure XL403D's built-in functions to execute as needed. Each unique function is performed on the scan measurements, with results maintained internally within the sensor.

MIN – tracks the minimum reading on each channel since the function was configured

MAX – tracks the maximum reading on each channel since the function was configured

MAG – calculates the magnitude of the vector sum of axes A1, A2 and A3

PTP – tracks the peak-to-peak value for each channel since the function was configured. This is equal to MAX – MIN for each channel

TLT – calculates the 2-axis tilt angle for any 2 axes that are in scan

TH1 – tracks channels readings against individual channel threshold values

TH2 – tracks MAG or TLT values against a threshold

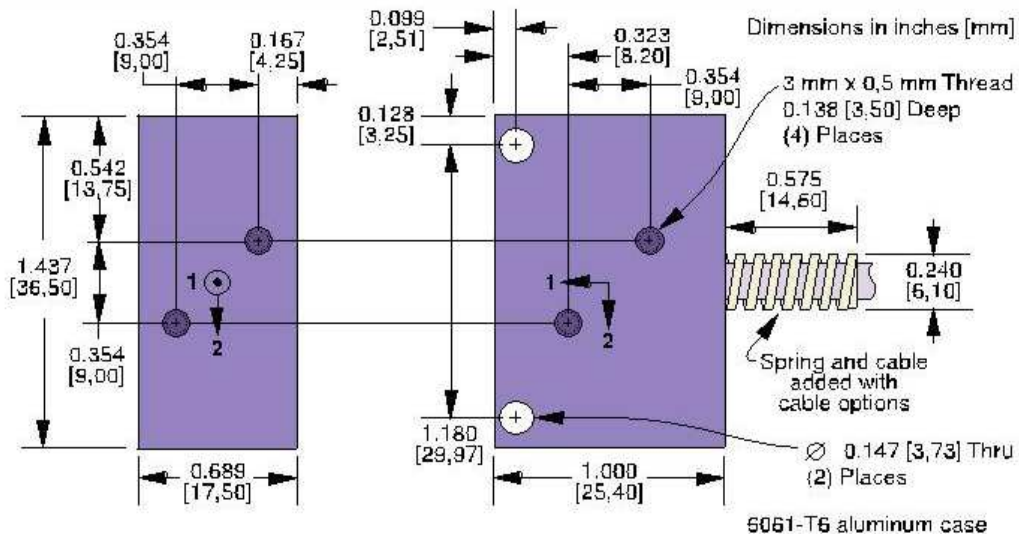
OU1/OU2/OU3 – output functions that print the values of functions on a configurable periodic basis

When the XL403D threshold function is set, external controls can be triggered when the threshold is reached.

Receive a warning, flip a switch, apply a brake - take action immediately when limits are exceeded.

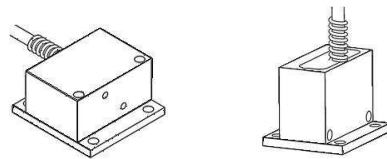
For more details, download the XL403D operating manual from TE website.

DIMENSIONS



Two through holes and four 3 mm x 0.5 mm threaded holes are provided for mounting.

Mounting adapters
(sold separately)

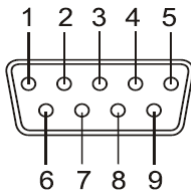


35173A Horizontal

35172A Vertical

SCHEMATIC

T004: DB9 Male Connector



- Pin 1: +ANALOG OUT AXIS 1 (BROWN)
- Pin 2: -ANALOG OUT AXIS 2 (RED)
- Pin 3: +ANALOG OUT AXIS 3 (ORANGE)
- Pin 4: -SIGNAL OUT (YELLOW)
- Pin 5: -RS485 (GREEN)
- Pin 6: +RS485 (BLUE)
- Pin 7: SELF TEST/AUX (VIOLET)
- Pin 8: +EXC VOLTAGE (GREY)
- Pin 9: -EXC VOLTAGE/GND (WHITE)

ORDERING INFORMATION

XL403D-X3	RXXX	TZZZ
Range R002 = ±2g R005 = ±5g R010 = ±10g R015 = ±15g		
Cable Length T004 = 4ft cable with DB9M connector (standard option) TZZZ = Contact factory for custom length (ZZZ in feet)		

Example; XL403D-X3-R005-T004

Triaxial model XL403D-X3, ±5g range, 4ft cable with DB9M connector

Note: PC Interface Kit, PN 35250AK0/AK1, is required for digital sensor usage. Sold separately.

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