

[Patent Pending]

XL403D

SPECIFICATIONS

- **Advanced Digital Accelerometer**
- **Built-in Analyses, Dynamic Interface, ± 1 g to ± 15 g**

The **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. The output is configurable by the customer - choose number of axes, units returned, bandwidth, sample rates, function specifics, and analysis results.

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.

Order the range option best suited for your application to measure from ± 1 g to ± 15 g, and set your own low pass filter for bandwidths from 1 to 800 Hz.

FEATURES

- **Built-in Analyses** 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.
- **High Accuracy and Linearity over Wide Temperature Range** - 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° to $+85^{\circ}$ C temperature range.
- **Built-in Calibration** - Calibration data for each sensor is maintained in the accelerometer. All data output is fully calibrated in accordance with NIST standards.

- **Self-Test** - Self-test signal and commands help verify channel integrity and wiring connections.
- **Rugged for Harsh Environments** - The XL403D is robust and can be used in harsh environments. The unit will survive 5000 g powered or unpowered.
- **-Built-In Power Supply Regulation** - Unregulated DC power from +8.5 to +36 Volts is all that is required to measure acceleration and temperature. Reverse power voltages of up to -80 V can be withstood indefinitely. Transients of +80 V for 550 ms compatible with MIL-STD-704A can be withstood with full operation.
- **Small Size** - Completely conditioned triaxial accelerometer in less than one cubic inch.
- **Earth Friendly Design** - Lead-free design makes the XL403D environmentally safe while Measurement Specialties' assembly process ensures reliable functionality. Fully-potted electronics eliminates the possibility of tin whiskers-related failures.
- **Three-Year Warranty** - This Measurement Specialties digital accelerometer comes with a three-year factory warranty.

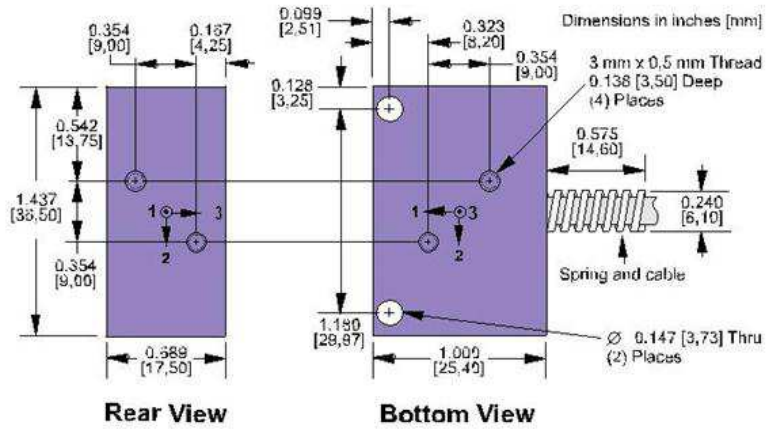
SPECIFICATIONS FOR XL403D - *improved specifications available upon request*

TA = TMIN to TMAX; Acceleration = 0 g, unless otherwise noted; within one year of calibration.

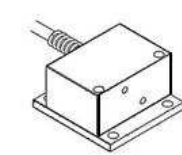
Parameter	Min	Typical	Max	Units	Conditions/Notes
Range - Measurement Full Scale	±1		±15	g	On each axis. Must specify via Option Rnnn
Sensitivity At 25°C, Option R005 Drift T _{MIN} to T _{MAX}		400* ±0.65	±3	mV/g %	Precise values on calibration certificate Percent of sensitivity at 25°C
Zero g Bias Level At 25°C Drift T _{MIN} to T _{MAX}		2.50 ±0.01 10	20	V mg	Precise values on calibration certificate At 1.25°C/min. temperature rate of change
Alignment Deviation from ideal axes		±1.0	±2.0	degrees	Precise values on calibration certificate Can be compensated if required
Transverse Sensitivity		±0.25		%	Inherent sensor error, excluding misalignment
Nonlinearity		0.1	0.25	% FSR	Best fit straight line
Frequency Response	0		800	Hz	Upper cutoff per Option Bnnn, -3 dB pt ±10% 5-pole Butterworth filter
Noise Density		100		µg/√Hz	10 Hz to 400 HZ
Self Test Pull-up Resistor	5			kΩ	Logic "1" ≥ 3.5 V, Logic "0" ≤ 1.5 V, "0" causes self test
Temperature Sensor			±0.2	°C	Accuracy ±1 °C
Scan Rate	0.0007		2500	scans/sec	Default scan list (A1,A2,A3,T1)
ADC Resolution Absolute accuracy		10 ±2		bits LSB	
Outputs Output Voltage Swing Capacitive Drive Capability	0.5	1000	4.5	V pF	I _{OUT} = ±0.5 mA
Power Supply (Vs) Input Voltage Limits Input Voltage - Operating Input Current Rejection Ratio	-80 +8.5	25 >120	+80 +36	V V mA dB	-80 V continuous, >38 V if ≤550 ms, duty <1% Continuous DC
Temperature Range (T _A)	-40		+85	°C	
Mass		38		grams	Precise values on calibration certificate
Shock Survival	-5000		+5000	g	Any axis for 0.5 ms, powered or unpowered

*Scale linearly with Range option Rnnn - see Ordering Information

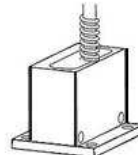
MECHANICAL



Mounting adapters
(sold separately)



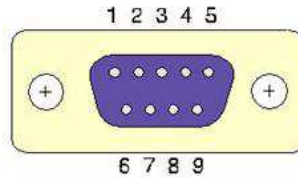
35173A Horizontal



35172A Vertical

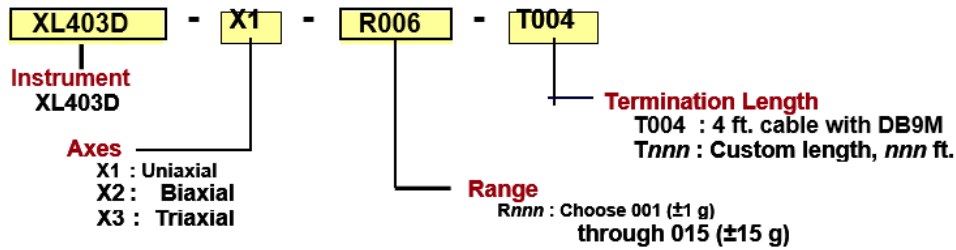
CONNECTIONS

**T004
Male D-Shell
Connector**



Pin	1	2	3	4	5	6	7	8	9
Signal	Analog1+	Analog2+	Analog3+	Signal -	RS485-	RS485+	ST/Aux	+Vs	Gnd
Wire	Brown	Red	Orange	Yellow	Green	Blue	Violet	Grey	White

ORDERING INFORMATION



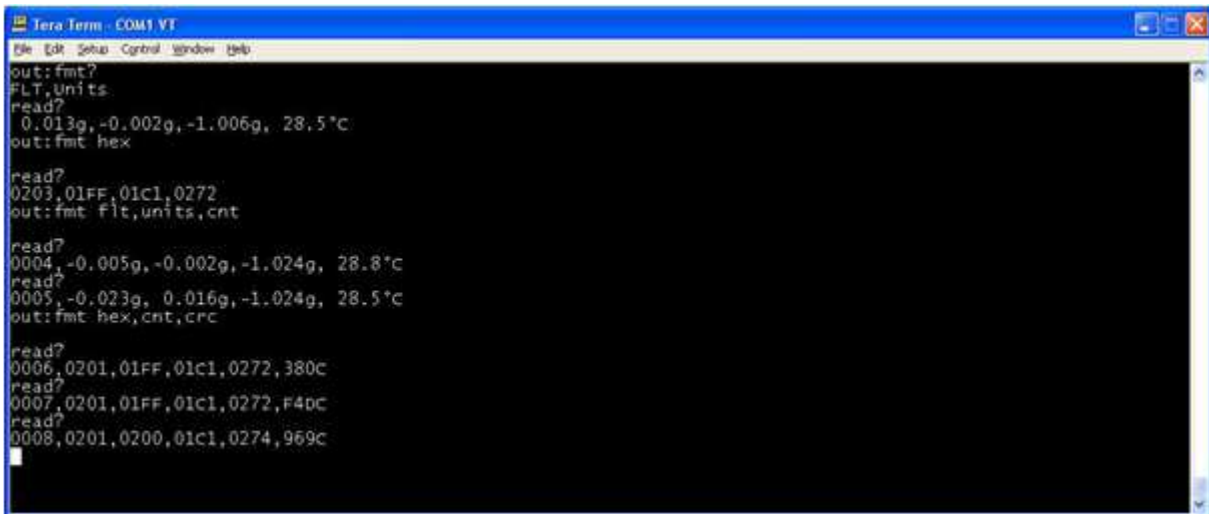
Please note: PC Interface Kit is required for digital sensor use (sold separately).

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

Set commands		Query Commands	
		*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



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.

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