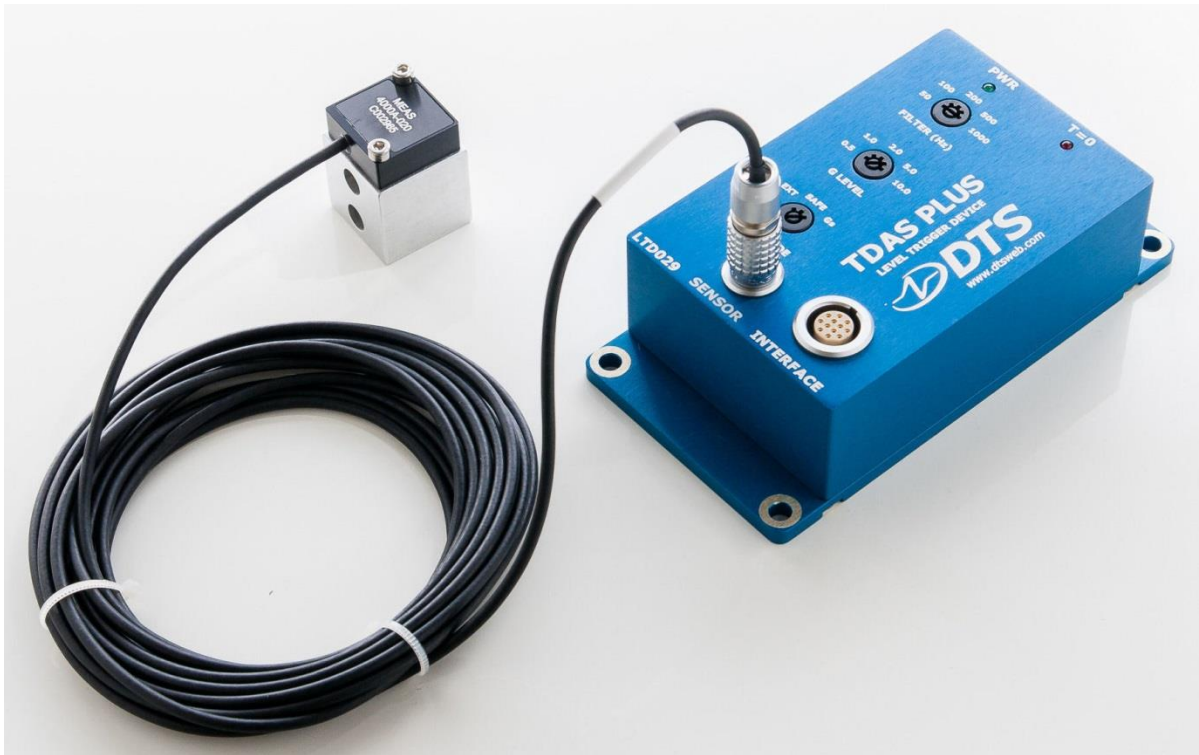




TDAS PLUS Level Trigger Device User's Manual



April 2016

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DTS Support

TDAS systems are designed to be reliable and simple to operate. Should you need assistance, DTS has support engineers worldwide with extensive product knowledge and crash test experience to help via telephone, e-mail or on-site visits.

The best way to contact a DTS support engineer is to submit a request through the DTS Help Center web portal (support.dtsweb.com). You must be registered (support.dtsweb.com/registration) to submit a request (<https://support.dtsweb.com/hc/en-us/requests/new>). Registration also enables access to additional self-help resources and non-public support information.

This manual supports the following products:

- 10100-00011: TDAS PLUS LTD (Level Trigger Device), external accel
- 10100-00020: TDAS PLUS LTD (Level Trigger Device), internal accel
- 10100-00130: TDAS PLUS LTD (Level Trigger Device), internal accel + 3 event outputs

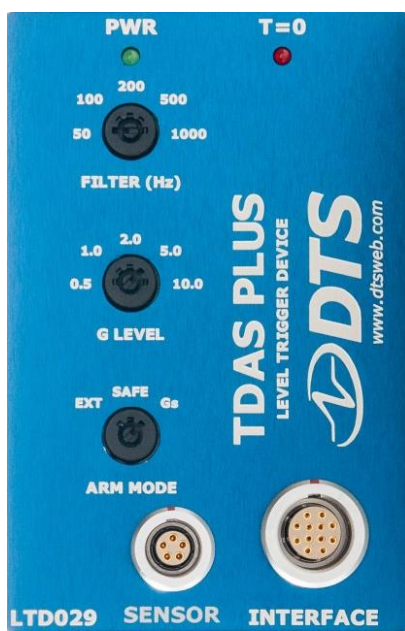
Introducing the TDAS PLUS Level Trigger Device

The TDAS PLUS Level Trigger Device (LTD) is a crashworthy device that provides an opto-isolated, contact-closure event output when a predetermined acceleration threshold is exceeded. The TDAS PLUS LTD will initiate data collection or event trigger when used with TDAS PRO, TDAS G5, TDAS PLUS, or SLICE PRO equipment. The TDAS PLUS LTD can also be used with any other system or device capable of receiving a contact-closure event signal.

This manual discusses the features available with the TDAS PLUS LTD. Connector information and pin assignments can be found in Appendix A. Mechanical specifications are included in Appendix B. Accelerometer specifications are included in Appendix C. An interface cable is typically provided with your unit. Please see your interface cable for the specific features included with your device.

- Built and tested for 100 g dynamic testing environments.
- User-selectable filter values, g levels, and arm mode.
- Use with any device capable of receiving a contact-closure event signal.
- Replaceable external accelerometer.
- Operates on nominal 12 VDC power (10-15 V range).
- Overvoltage protection, overcurrent protection, power input polarity protection and event overvoltage protection.
- Integral mounting flanges.

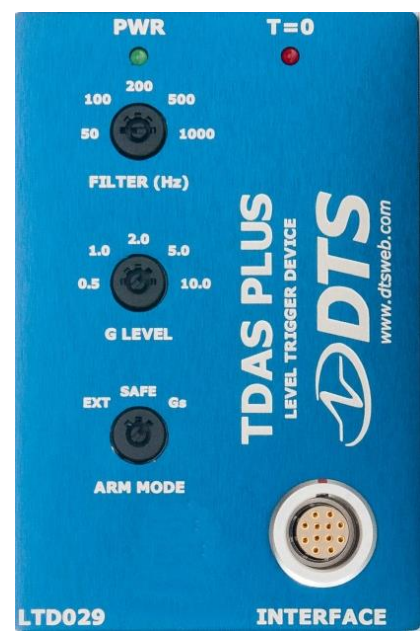
Control Panel



(external accel)




The control panel on the TDAS PLUS LTD allows you to select the operational parameters for the unit. Keys to change switch position are supplied with the unit, however a simple flat-head screwdriver can also be used. The keys must be removed from the unit prior to performing a test.

If your unit has an internal accelerometer, you will not have a SENSOR connector.


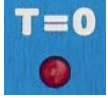


(internal accel)

FILTER, G LEVEL and ARM MODE

 <p>FILTER (Hz)</p>	 <p>G LEVEL</p>	 <p>ARM MODE</p>
<p>Select the highest value appropriate for your application while keeping in mind that:</p> <ul style="list-style-type: none"> • The higher the value, the faster the response time • The lower the value, the less chance of a false trigger 	<p>Select the level appropriate for your application.</p>	<p>EXT (external)</p> <ul style="list-style-type: none"> • Event output signal enabled only when the unit receives an external signal <p>SAFE</p> <ul style="list-style-type: none"> • Event output signal is disabled <p>Gs</p> <ul style="list-style-type: none"> • Event output signal is enabled • The unit waits to sense the acceleration threshold (g level) before sending an event signal

LED Indicators

LED State		 *
Off	No power, insufficient power, or external accelerometer is not connected	Acceleration threshold not reached
On	Power OK	Acceleration threshold reached or exceeded

* Always enabled when unit is powered, regardless of ARM MODE (i.e., non-latching).

WARNING:

If the GREEN power LED on the TDAS PLUS LTD goes dark unexpectedly during the performance of a test, the test should be aborted if this can be done in a safe manner.

INTERFACE Connector



All functions, signals and power input are accessed via this connector. (See Appendix A for connector specifics and pin assignments.) An interface cable appropriate for your application and feature set is typically provided with your unit.

Power Input

The TDAS PLUS LTD does not contain an internal power source but has a dedicated connector on the interface cable for primary input power. An interface cable with the appropriate connector for your application is typically provided with your unit.

Event Outputs

Two opto-isolated, contact-closure event outputs are available via the INTERFACE connector. The first event output is always used with the G Level switch so that when the acceleration threshold is exceeded, a contact-closure event signal is sent to any attached equipment that can receive such a signal. The duration of the signal depends upon the length of time that the acceleration threshold is exceeded (i.e., as long as the T=0 LED is on). One or both of these outputs may be included in the interface cable provided with your unit.

Note: 10100-00130 includes a hardware modification to support three event outputs.

External Arm Input

An external arm input is available via the INTERFACE connector. This input may be included in the interface cable provided with your unit.

Accelerometer Data

Filtered and unfiltered accelerometer data are available for recording via the INTERFACE connector. (Filtered data is accomplished via a 2-pole Bessel filter.) One or both of these outputs may be included in the interface cable provided with your unit.

SENSOR Connector



This connector is dedicated for use with the accelerometer provided with the unit. (See Appendix A for connector specifics and pin assignments.) If your unit has an internal accelerometer, you will not have this connector.

Accelerometer

A mounting block is provided with your unit and is used to attach the external accelerometer to the test fixture. For proper operation, be sure to mount the accelerometer in the sensitive axis. See page 8 for information on mounting orientation. A simple check-out procedure is included on page 9.

If the external accelerometer becomes damaged, it can be replaced by the user or purchased from DTS. See Appendix C for accelerometer specifics and sourcing information.



Basic Care and Handling

The TDAS PLUS LTD is a precision device designed to operate reliably in dynamic testing environments. Though resistant to many environmental conditions, care should be taken not to subject the unit to harsh chemicals, submerge it in water, or drop it onto any hard surface.

WARNING:

Electronic equipment dropped from desk height onto a solid floor may experience as much as 10,000 g. Under these conditions, damage to the unit is likely.

When transporting the unit, treat it as you might a laptop computer and you should have no problems. When not in use or if shipping is required, we suggest that you always place the unit in the padded carrying case originally provided with your system.

The TDAS PLUS LTD is not user-serviceable and should be returned to the factory for service or repair. The external accelerometer, however, can be purchased separately and replaced by the user. See Appendix C for accelerometer specifics and sourcing information.

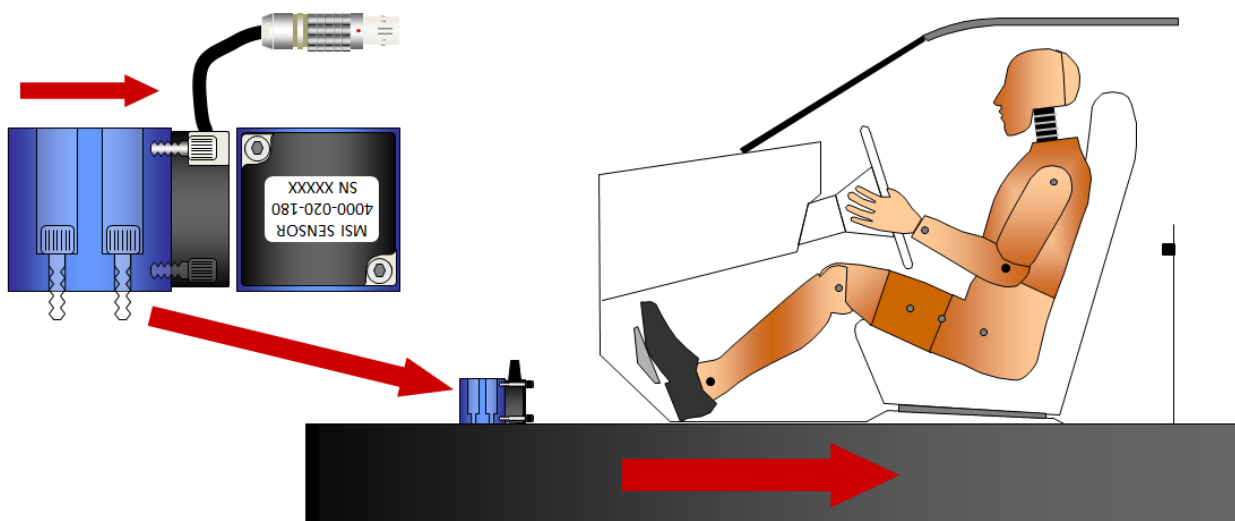
Shock Rating

The TDAS PLUS LTD is rated for and fully tested to 100 g, 12 ms duration, in all axes.

Mounting Considerations

The unit should be securely bolted to the vehicle, sled or other dynamic testing device to provide the best shock protection and facilitate proper grounding. Mounting methods and mounting bolt selection should be carefully calculated so as to withstand expected shock loading. (See Appendix B for the unit's mechanical specifications.)

The external accelerometer should be mounted on the test fixture in the sensitive axis as shown below.



The LTD control box may be mounted in any orientation. If your unit contains an internal accelerometer, mount the unit with the IMPACT arrow in the proper orientation.

Thermal Considerations

It is extremely unlikely that excessive heating will ever be an issue in real-world testing applications using the TDAS PLUS LTD. Should you have any questions about its use in your environment, please contact DTS.

Power Management

The TDAS PLUS LTD does not contain an internal power source but has a dedicated primary power input on the interface cable. Power up and power down is immediate upon application or removal of the power source.

A good power source is of great importance. Each TDAS PLUS LTD should be powered from a fully-charged 12 V battery or high-quality power supply with a nominal output voltage of 12 V (10-15 V range) and a capacity of ≥ 50 mA. When assessing power requirements, please consider any voltage drops that may occur due to cables, connectors, etc.

A DAS channel from TDAS PRO SIM that supports 10 V excitation can also be used to operate the TDAS PLUS LTD. Contact DTS if you have any questions about using a TDAS PRO SIM to power your TDAS PLUS LTD.

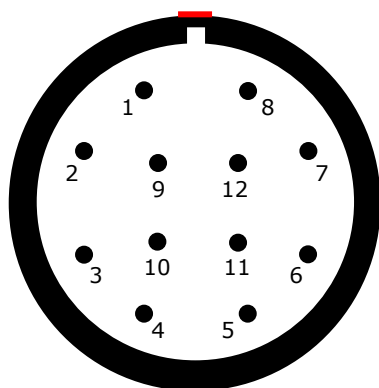
Accelerometer Trigger Check

Use the following procedure to perform a bench-top check-out of the unit.

1. Set switches.
 - FILTER: Place in any position. (50 Hz will provide most stable setting for bench checks.)
 - G LEVEL: Perform test at 0.5 and 1.0 g.
 - ARM MODE: LED will indicate regardless of setting. Set to Gs to verify trigger to rack.
2. Rotate block >30 deg at 0.5 g setting.
 - LED will indicate when level is exceeded.
3. Rotate block 90 deg at 1.0 g setting.
 - LED will indicate when level is exceeded.
 - LED may not indicate a trigger at 90 deg (1 g) without additional stimulus in the sensitive axis.

Appendix A: Connector Information

12-pin INTERFACE connector
(EGG.2B.312.CLL)

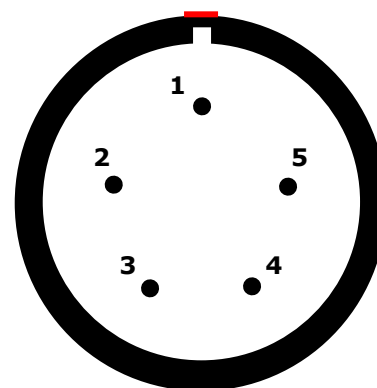


(panel view)

Suggested cable connector P/N:
FGG.2B.312.CLADxx*

Pin	Function
1	+ Power in (10-15 VDC)
2	- Power in
3	+ Event out 1
4	- Event out 1
5	+ Event out 2
6	- Event out 2
7	External arm input (+5 VDC)
8	Common
9	+ Sensor output, unfiltered (100 mV/g)
10	+ Sensor output, filtered (100 mV/g)
11, 12**	Reserved

5-pin G SENSOR connector
(EGG.1B.305.CLL)



(panel view)

Suggested cable connector P/N:
FGG.1B.305.CLADxx*

Pin	Function
1	+ Power out (VDC)
2	- Power out (VDC)
3	Sensor input (100 mV/g)
4	Sensor reference (2.5 V)
5	Shield (case)

* xx denotes diameter of cable to be used; e.g., 52 = 5.2 mm. See www.lemo.com for more information.

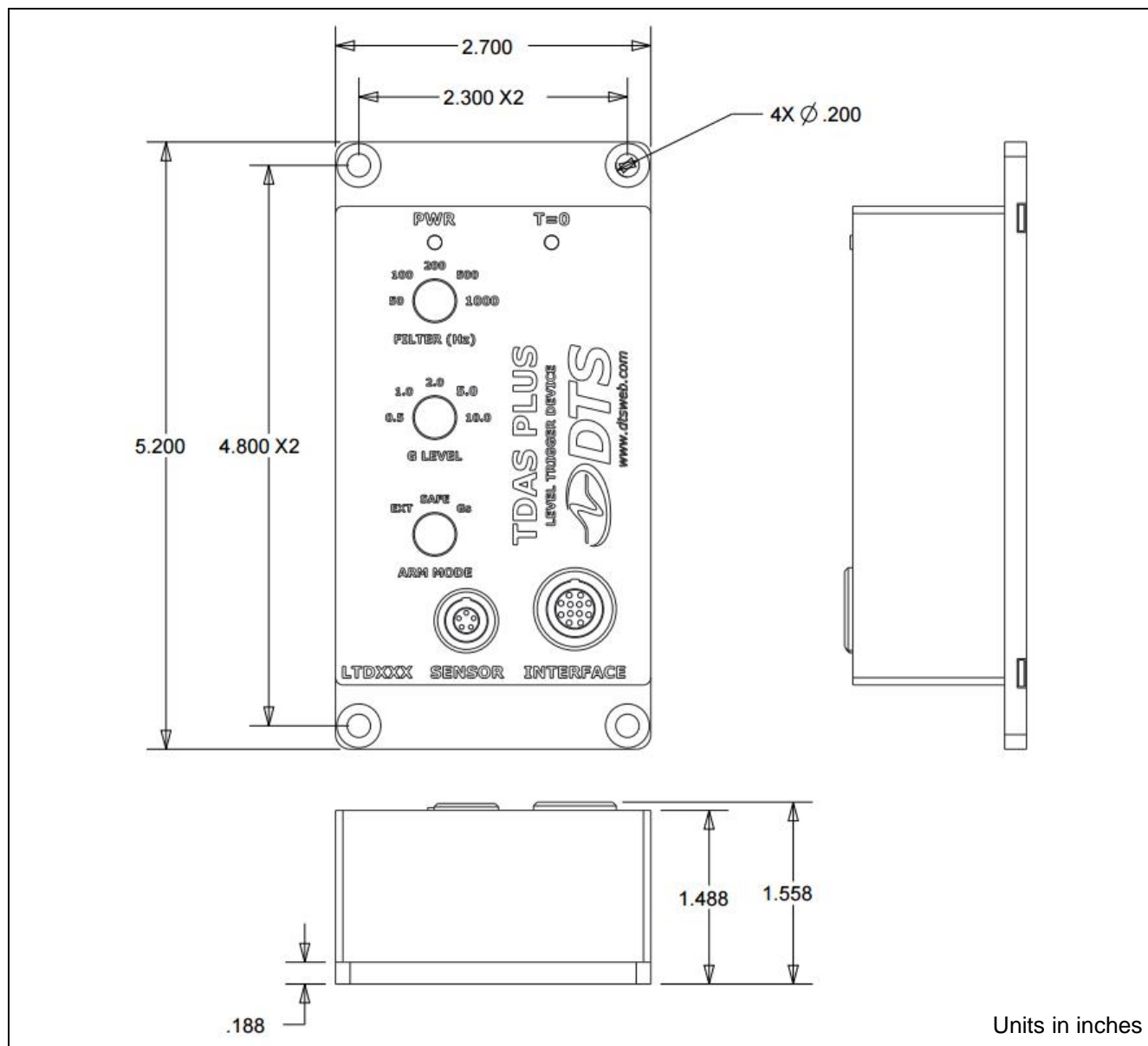
** 10100-00130 supports a third event output via pins 11 (+ Event out 3) and 12 (- Event out 3).

Suggested Connector Sources

DTS uses LEMO connectors on the TDAS PLUS LTD. If you need to purchase connectors, we suggest first going to LEMO directly (<http://www.lemo.com/index.html>). Their web site and worldwide sales team are very helpful. Should you have difficulty obtaining a specific part number, they can suggest connector variations or alternates and explain options that may be useful for your particular application. Another U.S. source is Alpine Electronics (www.alpine-electronics.com) in San Jose, California. They are a stocking distributor for LEMO and LEMO-compatible connectors.

Appendix B: Mechanical Specifications

Weight: ~325 grams (without accelerometer assembly and cable)



Accessories/support equipment:

- 10100-00030: TDAS PLUS LTD External Accel (15 ft, pigtail termination)
- 10100-00040: TDAS PLUS LTD External Accel (15 ft, LEMO termination)
- 10100-00050: Cable, TDAS LTD interface (2 event outputs; 3 m, pigtail termination)
- 10100-00140: Cable, TDAS LTD interface (3 event outputs; 3 m; pigtail termination)*
- 89100-11240: TDAS LTD accelerometer mounting block

* LTD hardware must support third event output

Model 4000A Accelerometer

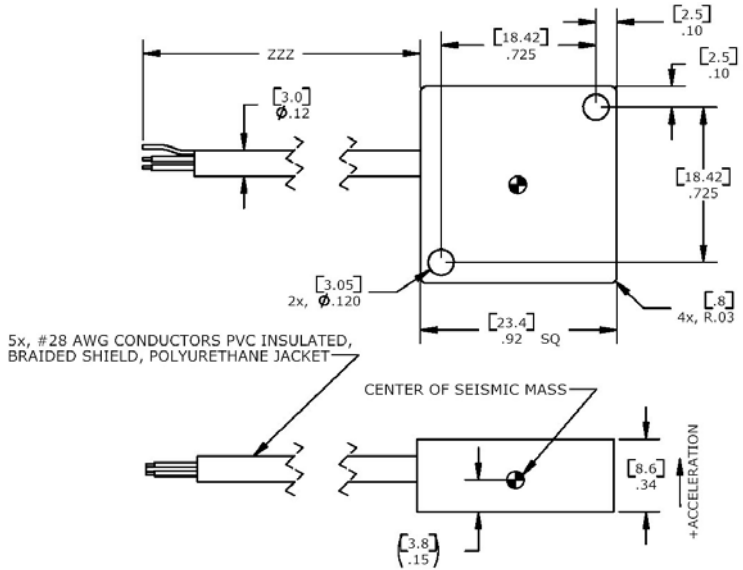


Silicone MEMS Accelerometer
Signal Conditioned Output
Temperature Calibrated
Low Cost, Lightweight



The **Model 4000A** is an economical signal conditioned accelerometer with integral temperature compensation. The accelerometer incorporates a 3rd generation silicon MEMS sensor providing outstanding performance. The accelerometer is packaged in a rugged aluminum housing ideal for transportation and instrumentation testing. The signal conditioned output incorporates a 2.5V reference that offers the user a differential or single-ended output.

dimensions

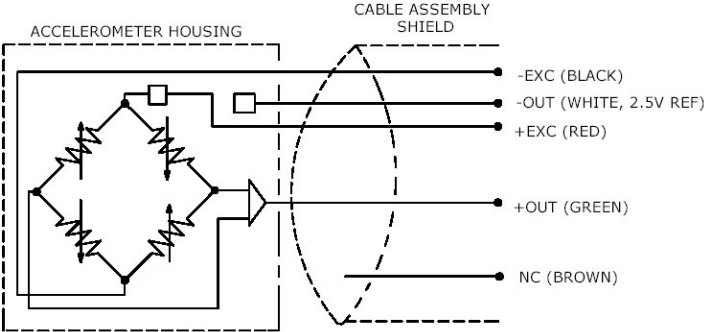


FEATURES

- $\pm 2g$ to $\pm 200g$ Dynamic Range
- High Over-Range Protection
- Signal Conditioned Output
- Low Power Consumption
- Lightweight
- Gas Damping
- 8 to 36Vdc Excitation Voltage

APPLICATIONS

- Low Frequency Monitoring
- Transportation
- Vibration Sensing
- Test & Instrumentation
- Machine Control
- Motion Analysis
- Tilt



Model 4000A Accelerometer

performance specifications

All values are typical at +24°C, 100Hz and 12Vdc excitation unless otherwise stated. Measurement Specialties reserves the right to update and change these specifications without notice.

Parameters								Notes
DYNAMIC								
Range (g)	±2	±5	±10	±20	±50	±100	±200	
Sensitivity (mV/g)	1000	400	200	100	40	20	10	
Frequency Response (Hz)	0-200	0-300	0-350	0-600	0-800	0-1300	0-1500	±5%
Natural Frequency (Hz)	700	800	1000	1500	4000	6000	8000	
Non-Linearity (%FSO)	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	±0.5	
Transverse Sensitivity (%)	<3	<3	<3	<3	<3	<3	<3	<1 Typical
Damping Ratio	0.7	0.7	0.7	0.7	0.7	0.7	0.6	
Shock Limit (g)	5000	5000	5000	5000	5000	5000	5000	
ELECTRICAL								
Zero Acceleration Output (mV)	±100	±100	±100	±100	±100	±100	±100	Differential
Excitation Voltage (Vdc)	8 to 36	8 to 36	8 to 36	8 to 36	8 to 36	8 to 36	8 to 36	
Excitation Current (mA)	<5	<5	<5	<5	<5	<5	<5	
Bias Voltage (Vdc)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
Output Resistance (Ω)	<100	<100	<100	<100	<100	<100	<100	
Insulation Resistance (MΩ)	>100	>100	>100	>100	>100	>100	>100	@100Vdc
Turn On Time (msec)	<100	<100	<100	<100	<100	<100	<100	
Residual Noise (µV RMS)	500	300	300	350	400	350	400	Passband
Ground Isolation	Isolated from Mounting Surface							
ENVIRONMENTAL								
Thermal Zero Shift (%FSO/°C)	±0.014	±0.014	±0.014	±0.014	±0.014	±0.014	±0.014	Typical
Thermal Sensitivity Shift (%/°C)	±0.028	±0.028	±0.028	±0.028	±0.028	±0.028	±0.028	Typical
Operating Temperature (°C)	-20 to 85							
Compensated Temperature (°C)	-20 to 85							
Storage Temperature (°C)	-40 to 90							
PHYSICAL								
Case Material	Anodized Aluminum							
Cable	PVC Insulated Leads, Braided Shield, PU Jacket							
Weight (grams)	7							
Mounting	2x #4 or M3 Screws							
Mounting Torque	3 lb-in (0.3 N-m)							
AWG	#28							
Wiring color code:	+Excitation = Red; -Excitation = Black; +Output = Green; -Output = White; Programming = Brown (brown wire is used for programming and is not to be connected)							
Optional accessories:	AC-D02652	Triaxial Mounting Block						
	101	Three Channel DC Signal Conditioner Amplifier						

The information in this sheet has been carefully reviewed and is believed to be accurate; however, no responsibility is assumed for inaccuracies. Furthermore, this information does not convey to the purchaser of such devices any license under the patent rights to the manufacturer. Measurement Specialties, Inc. reserves the right to make changes without further notice to any product herein. Measurement Specialties, Inc. makes no warranty, representation or guarantee regarding the suitability of its product for any particular purpose, nor does Measurement Specialties, Inc. assume any liability arising out of the application or use of any product or circuit and specifically disclaims any and all liability, including without limitation consequential or incidental damages. Typical parameters can and do vary in different applications. All operating parameters must be validated for each customer application by customer's technical experts. Measurement Specialties, Inc. does not convey any license under its patent rights nor the rights of others.

ordering info

PART NUMBERING Model Number+Range+ Cable Length

4000A-GGG-CCC
 | |
 | | Cable (060 is 60 inches)
 | Range (020 is 20g)

Example: 4000A-020-060
 Model 4000A, 20g, 60" (5ft) Cable

Revision History

Date	By	Description
13 Apr 2016	EK	Added unit of measure to mechanical drawing (Appendix B). (Rev 1)
4 Apr 2016	EK	Copied 10100-00010 rev 1 and revised for initial release. (Rev 0)