200150, 200155 and 200157 Accelerometers

Datasheet

Cordant™

164986 Rev. Y



Description

The 20015x Accelerometers are general purpose, wide frequency, case-mounted seismic transducers designed for use with Trendmaster ProTIMs.

The 200150 Accelerometer also operates with the Trendmaster 2000 system. The accelerometer interfaces with the 200100 Dual Acceleration to Velocity flexiTIM Module and the 89130-01 Acceleration-to-Velocity TIM (Transducer Interface Module), as well as the 1900/25 and 1900/27 monitors.

The 20015x Accelerometers feature a hermetically sealed, stainless steel case. This design provides an extremely rugged transducer that is well suited for harsh industrial environments. The transducer's top-mounted, 5-pin connector allows you to easily install and remove the interconnecting signal cable. A 3/8-24 threaded hole on the bottom of the sensor's casing accommodates several mounting options.

The 20015x Accelerometers contain a piezoelectric sensing device that generates a charge when it is subjected to vibration. The accelerometers electronically convert this charge to a differential voltage signal that is proportional to the acceleration that is parallel to the sensitive axis of the transducer.

Baker Hughes

If you use the 200155 and 200157 Accelerometers with 1900 monitors or with TIMs other than those listed in Table 1, or if you operate the transducers outside their specified limits, machine monitoring may fail or the data obtained may not be accurate.

The maximum allowed cable length for use with the 200155 is 15.24 m (50 ft.). You can install 20015x accelerometers in a Class I, Zone 0 application without a barrier, if you use them with the wSIM.

Table 1: 20015x Accelerometer Applications

Accelerometer	Used with ProTIM Option	Type of Application
200150	Standard Acceleration-to-Velocity channel type (-01)	General application
200155	Low Frequency Acceleration-to-Velocity channel type (-05)	Fin-Fan, slow rotating shafts
200157	Standard Acceleration-to-Velocity with Acceleration Enveloping channel type (-06)	Roller element bearing and certain types of cavitation effects

Note that the acceleration-to-velocity circuitry in the 200200 and 200250 ProTIMs attenuates frequencies above 1 kHz . You cannot obtain higher frequency data with the 200155 or 200157.

The wider frequency range of the 200155 and 200157 accelerometers may result in increased noise compared to the 200150. We recommend that you use the 200155 transducer for frequencies of interest below 10 Hz. Use the 200157 only if the application requires acceleration enveloping. Use of the 200155 or the 200157 in place of the 200150 may result in faulty readings. Refer to the ProTIM datasheet for the proper frequency response of the system.

Most common machine malfunctions (unbalance, misalignment, etc.) occur on the rotor and originate as an increase (or at least a change) in rotor vibration. For any individual casing measurement to be effective for overall machine protection, the system must continually transmit a significant amount of rotor vibration to the machine casing, or mounting location of the transducer.

In addition, be careful to install the accelerometer transducer on the bearing housing or machine casing. Improper installation may decrease the transducer amplitude and frequency response and/or generate false signals that do not represent actual vibration. Refer to the appropriate instruction manuals and Application Notes.

Upon request, Bently Nevada provides engineering services that can identify the appropriate machine housing measurements and installation assistance if needed.

Specifications

All specifications are at +25°C (+77°F), unless otherwise specified.

Electrical

Sensitivity @ 80 Hz (± 12%)	10.2 mV/(m/s²) (100 mV/g)

Measurement Range

Accelerometer	Measurement Range in m/s² (g)
200150	±245 (±25)
200155	±196 (±20)
200157	±245 (±25)

Frequency Range Referenced to 80Hz (±10%)

Accelerometer	Frequency Range in Hz (cpm)
200150	10 to 1000 (600 to 60,000)
200155	2.0 to 10,000 (90 to 600,000)
200157	10 to 10,000 (600 to 600,000)

Mounted Resonant Frequency	>20 kHz (>1200 kcpm)
Amplitude Linearity (1 to 10g pk)	±2%
Transverse Sensitivity	≤7%

Settling Time (Within 5% of Bias)

Accelerometer	Settling Time (ms)
200150	≤300
200155(1)	≤2000
200157	≤300

(1) Because of its long settling time, you can use the 200155 only with low frequency acceleration-to-velocity channel types on a ProTIM, DSM, or System 1 system.

Excitation Voltage	4.7 to 5.5 Vdc
Polarity (Acceleration from Base to Connector)	SIG+ positive with respect to SIG-.
Quiescent Current	<800 µA
Output Bias Voltage	+2.5 ± 0.23 Vdc

Broadband Electrical Noise (1 Hz to 15 kHz)

Accelerometer	Measurement Range in mm/s² (mg)
200150	14.7 (1.5)
200155	24.5 (2.5)
200157	14.7 (1.5)

Electrical Isolation	600 Vrms

Environmental

Axial Shock Limit	49,050 m/s² pk (5,000 g pk)
Temperature Range	-40°C to +105°C (-40°F to +221°F)
Sealing (Hermetic)	5X10-8 atm•cc/s (3.1X10-9 atm•in³/s), maximum

Relative Humidity	100% relative, condensing, non-submerged

Physical

Size (Hex x Height)	17.5 mm x 45.7 mm (11/16 in x 1.8 in)
Weight	58 g (2.0 oz), typical
Mounting Thread	3/8-24 female
Mounting Torque	2.7 to 6.8 N•m (2 to 5 ft•lbf)
Sensing Element	Ceramic
Sensing Geometry	Shear
Housing and connector material	
200150	316L stainless steel
200155	316L stainless steel
200157	316L stainless steel

Electrical Connector (Top)	5-pin 1/2-20

Cables

Operating Temperature Range	-20°C to +100°C (-4°F to +212°F) These cables may be used at lower temperatures if the installation prevents the cable from flexing or bending. Flexing these cables at temperatures below –20°C (-4°F) may damage the cables.
Construction	4-conductor, 22 AWG with braided shield and drain wire (85% coverage, minimum), PVC outer jacket. Nickel-plated coupling nuts.
Seal	Connectors provide an IP67 seal to transducers and mating hardware. Connectors are molded to the cable. The addition of DC4 electrical insulating compound in the connectors provides additional protection against moisture during a thermal shock.
Minimum Bend Radius	
200151	63.5 mm (2.5 in)
200152	73.7 mm (2.9 in)
Maximum Cable Length	25 m (82 ft) Custom products may be able to provide longer cable lengths for the 200150 and 200157 accelerometers.

Adhesive (see Mounting Hardware Options)

Temperature Range	-55°C to +121°C (-67°F to +250°F)
Cure Time	24 hours

Compliance and Certifications

China RoHS

Cables associated with the product(s) mentioned in this datasheet have an EFUP designation of 15 years, in accordance with SJ/T 11364-2024.



ATEX

60079-01

60079-07

60079-11

60079-15

ATEX Directive 2014/34/EU

Hazardous Area Approvals

For the detailed listing of country and product-specific approvals, refer to the *Approvals Quick Reference Guide (108M1756)*.

For additional technical documentation, please log in to bntechsupport.com and access the Bently Nevada Media Library.

cNRTLus

Ex nL IIC T4:
AEx nA IIC T4:
Class I, Div 2, Groups A, B, C, D.

Ex ia IIC T4:
AEx ia IIC T4:
Class I, Div 1, Groups A, B, C, D;
Class II, Div 1, Groups E, F, G;
Class III, Div 1

Install per drawing 177234

T4 @ Ta ≤ 80°C

ATEX/IECEx

177230	II 1 G Ex ia IIC T4 Ga II 3 G Ex na IIC T4 Gc T4@ Ta = -40°C to 80°C
Entity Parameters	See table below

Zone 0/1	Zone 2
Ui= 28 V	Ui= 28 V
Ii= 120 mA	Ii= 120 mA
Pi= 1 W	Pi= 1 W
Ci=0	
Li=121.06 µh	

Hazardous Area Conditions of Safe Use

ATEX/IECEx

Zone 0/1:

Equipment must be connected to equipment, which meets the above listed entity parameters.

The cables type A or B (in compliance with EN 60079-25) must respect the cable parameters listed with the entity parameters.

Zone 2:

The supply electrical parameters shall not exceed the values mentioned in the tables above.

Ordering Information

For the detailed listing of country and product specific approvals, refer to the *Approvals Quick Reference Guide* (108M1756) available from Bently.com.

200150-AA-BB

General Purpose Trendmaster 2000 or Trendmaster Pro Accelerometer

200155-AA-BB

Low Frequency Trendmaster Pro Accelerometer

200157-AA-BB

Enveloping Trendmaster Pro Accelerometer

Refer to Table 6 for detailed specifications.

A: Mounting Stud Option	
00	No mounting stud provided
01	3/8-24 thread, 2 adhesive mount frames with adhesive
02	3/8-24 to 3/8-24 UNF 1-3/8 inch hex plate stud
03	3/8-24 to 1/2-20 UNF 1-3/8 inch hex plate stud
04	3/8-24 to 1/4 NPT 1-3/8 inch hex plate stud
05	3/8-24 to 1/4-28 UNF 1-3/8 inch hex plate stud
06	3/8-24 to 1/4 NPT, 3/4 inch hex stud
07	3/8-24 to 3/8 NPT, 3/4 inch hex stud
08	3/8-24 to 1/2 NPT 1 inch hex stud
09	3/8-24 to 3/4 NPT, 1-1/4 inch hex stud
10	3/8-24 to 1 NPT, 1-3/8 inch hex stud
11	3/8-24 to 1-1/4 NPT, 1-3/4 inch hex stud
12	3/8-24 to 1/4-20 UNC, 3/4 inch hex stud
13	3/8-24 to 5/16-18 UNC, 3/4 inch hex stud
14	3/8-24 to 3/8-24 UNF, 3/4 inch hex stud
15	3/8-24 to 3/8-16 UNC, 3/4 inch hex stud
16	3/8-24 to 1/2-13 UNC, 3/4 inch hex stud
17	3/8-24 to 3/8-16 UNC 1-3/8 inch hex plate stud
18	3/8-24 to M8x1 1-3/8 inch hex plate stud
19	Quick-Set XDCR adapter, 1-inch hex stud
20	3/8-24 thread, 1 magnetic mount base
21	3/8-24 outer diameter to M6x1 inner diameter 1-3/8 inch hex plate stud
22	3/8-24 to M8x1.25 1-3/8 inch hex plate stud
23	3/8-24 to M16x2.0 1-3/8 inch hex plate stud
B: Approvals	
05	Multiple Approvals (CSA, ATEX, and IECEx)

Adhesive studs (Options **0 1** and **2 0**) are sold in kits containing frames to hold the studs to the substrate while the adhesive cures. The kit also contains provides a scouring pad and alcohol wipe to prepare the mounting surface and a packet of acrylic adhesive and materials to mix the two components.

Using adhesives and magnetic mounts attenuates high frequency signals that may be present.

200151-AA-BB-CC

Accelerometer Interface Standard Cable, Connectors on Both Ends

A: Cable Length	
20	2.0 meters
40	4.0 meters
60	6.0 meters
B: Armor Option	
02	Blue cable without armor
03	Blue cable with armor
C: Coupling Nut	
00	Standard coupling nut (see Figure 9)
02	Nylon coupling nut
10	Enhanced coupling nut. This option provides a better grip for tightening the cable to the accelerometer and is provided on both ends of the cable (see Figure 11).

200152-AA-BB

Accelerometer Interface Standard Cable, Connector on Accelerometer End Only

A: Cable Length	
04	4.0 meters
15	15 meters
25	25 meters
B: Coupling Nut	
00	Standard coupling nut (see Figure 10)
10	Enhanced coupling nut. This option provides a better grip for tightening the cable to the accelerometer and is provided on the accelerometer end only (see Figure 12).

Accessories

Part Number	Description
164985	200150, 200155, and 200157 Accelerometers User Guide.
162411	Trendmaster System User Guide
149831	Trendmaster Dynamic Scanning Module datasheet.
163662	200200 ProTIM-R Module datasheet.
163663	200250 ProTIM-C Module datasheet.
126709	Trendmaster 2000 for Windows Installation Guide.
141574-01	200100 Acceleration-to-Velocity flexiTIM Module datasheet.
137230	flexiTIM Operation Manual.
190125	1900/25 Vibration Monitor User Guide
141485	1900/25 Vibration Monitor datasheet.
190127	1900/27 Vibration Monitor User Guide
141486	1900/27 Vibration Monitor datasheet.
141556	89130-01 and 89546-01 Accel-to-Velocity Transducer Interface Module datasheet.
142485-01	Housing cable adapter. See Figure 13.
141887-01	Conduit cable adaptor, single. See Figure 14.
141887-02	Conduit cable adapter, double. See Figure 15.

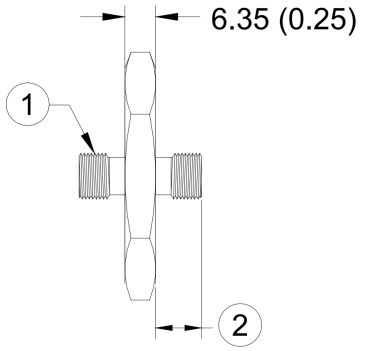
Graphs and Figures

Note: All dimensions shown in millimeters (inches) except as noted.

Table 1: Mounting Stud Specifications

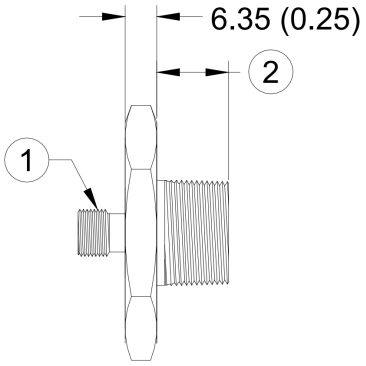
Option "A"	Stud Length in mm (in)	Recommended Torque in N•m (in•lbf)	Maximum Torque in N•m (in•lbf)	Replacement Part Number	Notes
0 1	N/A	N/A	N/A	04284020	2 adhesive mount frames with adhesive
0 2	6.0 (0.235)	N/A	22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface	107756-01	See Figure 1
0 3	12.1 (0.475)	N/A	22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface	107755-01	See Figure 1
0 4	16.5 (0.650)	N/A	22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface	107754-01	See Figure 2
0 5	8.3 (0.325)	N/A	7.3 (65) for curved mounting surface, 14.6 (130) for flat mounting surface	128038-01	See Figure 1
0 6	18.2 (0.715)	16.9 to 22.6 (150 to 200)	22.6 (200)	131563-01	See Figure 3
0 7	18.4 (0.725)	16.9 to 22.6 (150 to 200)	22.6 (200)	131563-02	See Figure 3
0 8	23.0 (0.905)	16.9 to 22.6 (150 to 200)	22.6 (200)	131563-03	See Figure 3
0 9	23.2 (0.915)	16.9 to 22.6 (150 to 200)	22.6 (200)	131563-04	See Figure 3
10	28.1 (1.105)	16.9 to 22.6 (150 to 200)	22.6 (200)	131563-05	See Figure 3
11	28.8 (1.135)	16.9 to 22.6 (150 to 200)	22.6 (200)	131563-06	See Figure 3
12	11.6 (0.457)	16.9 to 22.6 (150 to 200)	22.6 (200)	131562-01	See Figure 4
13	13.0 (0.512)	16.9 to 22.6 (150 to 200)	22.6 (200)	131562-02	See Figure 4

Option "A"	Stud Length in mm (in)	Recommended Torque in N•m (in•lbf)	Maximum Torque in N•m (in•lbf)	Replacement Part Number	Notes
14	6.1 (0.240)	16.9 to 22.6 (150 to 200)	22.6 (200)	131562-03	See Figure 4
15	13.7 (0.540)	16.9 to 22.6 (150 to 200)	22.6 (200)	131563-04	See Figure 4
16	16.8 (0.660)	16.9 to 22.6 (150 to 200)	22.6 (200)	131562-05	See Figure 4
17	10.2 (0.400)	N/A	22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface	161961-01	See Figure 4
18	8.3 (0.325)	N/A	10.2 (90) for curved mounting surface, 20.4 (180) for flat mounting surface	125094-01	See Figure 1
19	6.4 (0.250)	3.9 (35)	3.9 (35)	138648-01	See Figure 5
20	N/A	N/A	N/A	139153-01	See Figure 6
21	N/A	N/A	N/A	87055-01	See Figure 7
22	8.3 (0.325)	N/A	10.2 (90)	125094-02	See Figure 8
23	16.8 (0.66)	N/A	22.6 (200) for curved mounting surface, 45.2 (400) for flat mounting surface	107755-02	See Figure 1



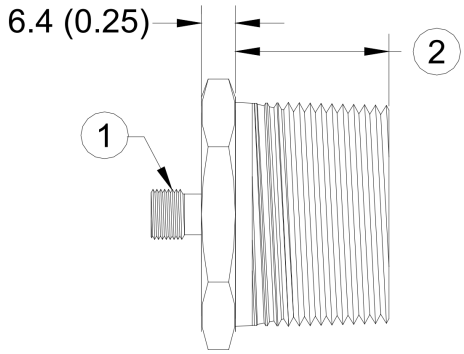
1. 3/8-24 UNF 2A
2. Stud length

Figure 1: Hex Plate Stud for "A" Options 02, 03, 05, 17, 18, and 23.



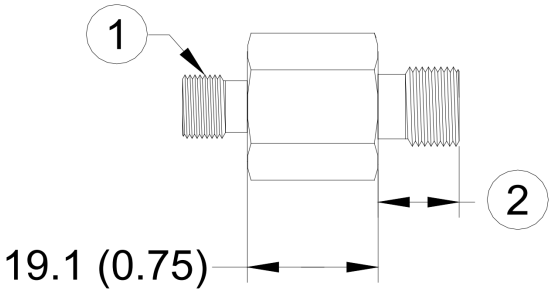
1. 3/8-24 UNF A
2. Stud length

Figure 2: Hex Plate Stud for "A" Option 04



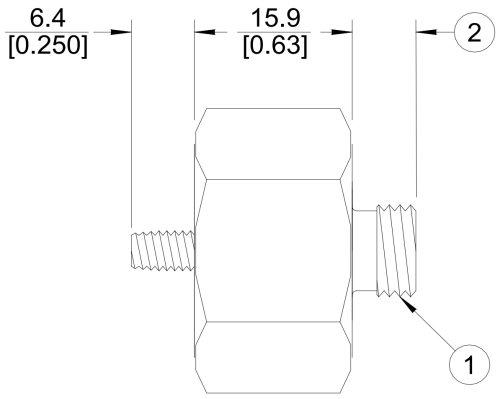
1. 3/8-24 UNF 2A
2. Stud length

Figure 3: Hex Stud for "A" Options 06 Through 11



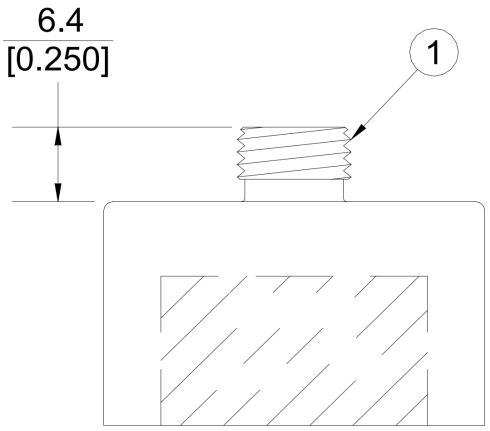
1. 3/8-24 UNF 2A
2. Stud length

Figure 4: Hex Stud for "A" Options 12 Through 17



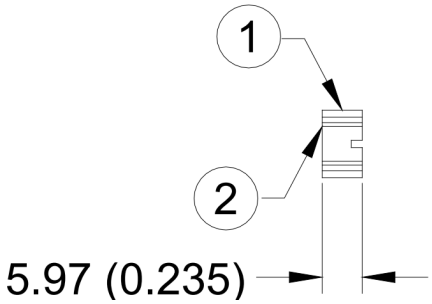
1. 3/8-24 UNF 2A
2. Stud length

Figure 5: Quick-Set XDCR Adapter



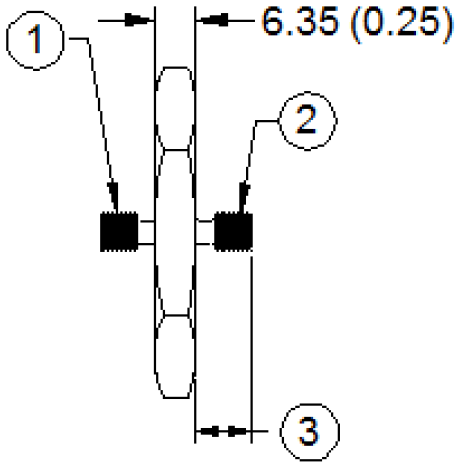
1. 3/8-24 UNF 2A

Figure 6: Magnetic Mount Base



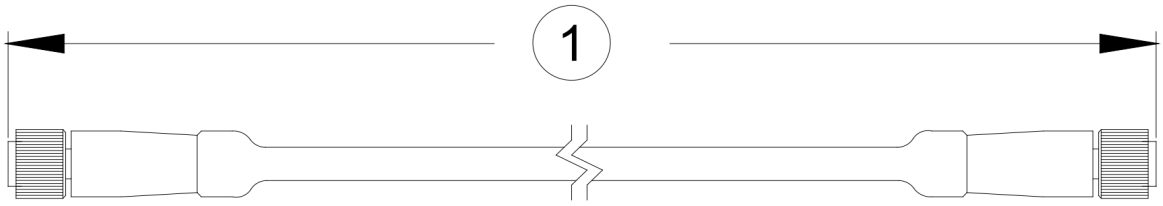
1. 4UNF 2A outer diameter
2. M6 x 1 inner diameter

Figure 7: Hex Plate Stud for "A" Option 21



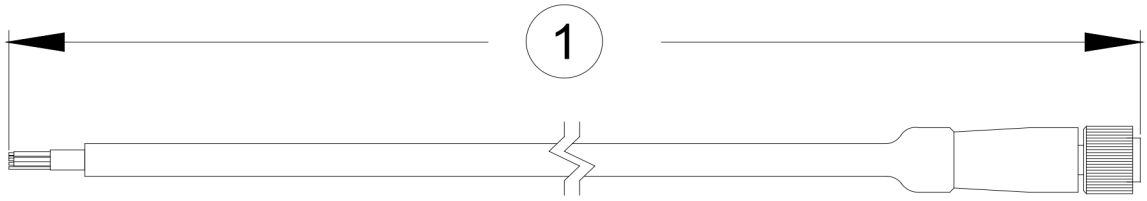
1. 3/8-24 UNF 2A
2. M8 x 1,25
3. Stud length

Figure 8: Hex Plate Stud for "A" Option 22



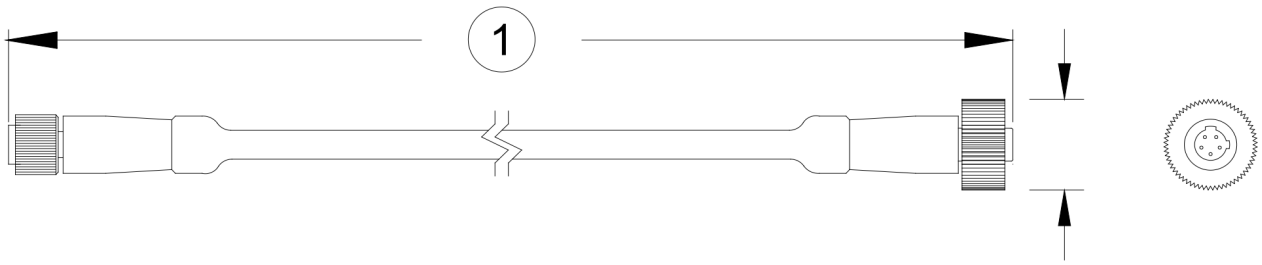
1. Cable length (Option "A")

Figure 9: 200151 With Standard Coupling Nut and No Armor



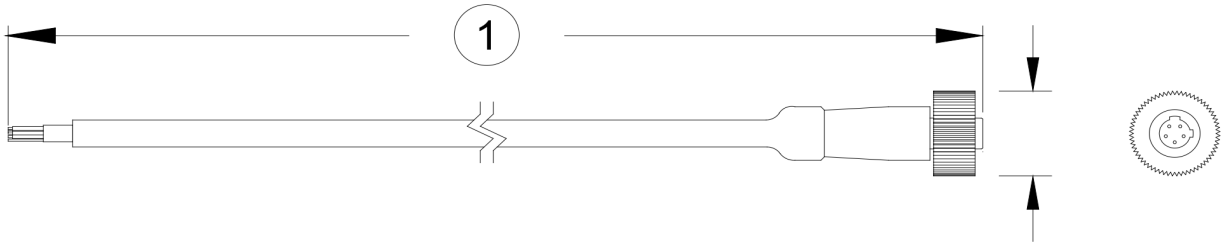
1. Cable length (Option "A")

Figure 10: 200152 With Standard Coupling Nut and No Armor



1. Cable Length (Option "A")

Figure 11: 200151 With Enhanced Coupling Nut and No Armor



1. Cable length (Option "A")

Figure 12: 200152 With Enhanced Coupling Nut and No Armor

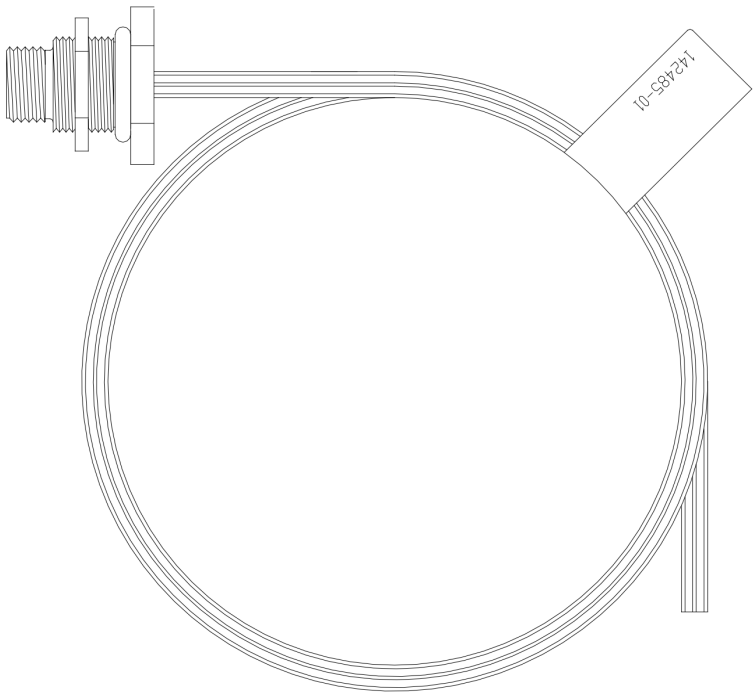


Figure 13: Housing Cable Adapter (Part Number 142485-01)

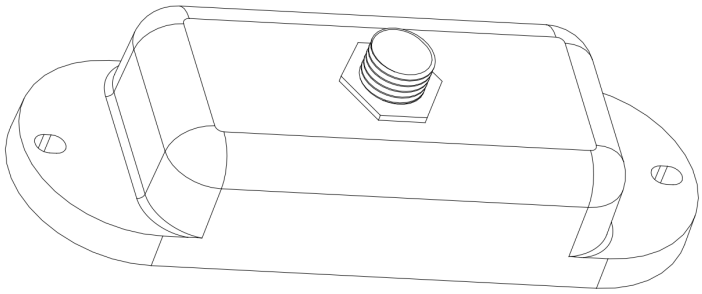


Figure 14: Conduit Cable Adapter, Single (Part Number 141887-01)

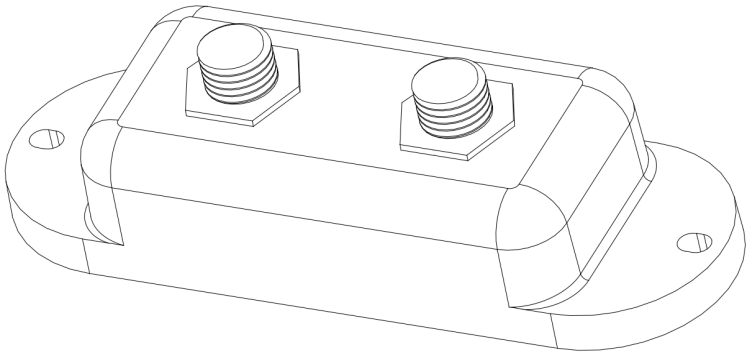
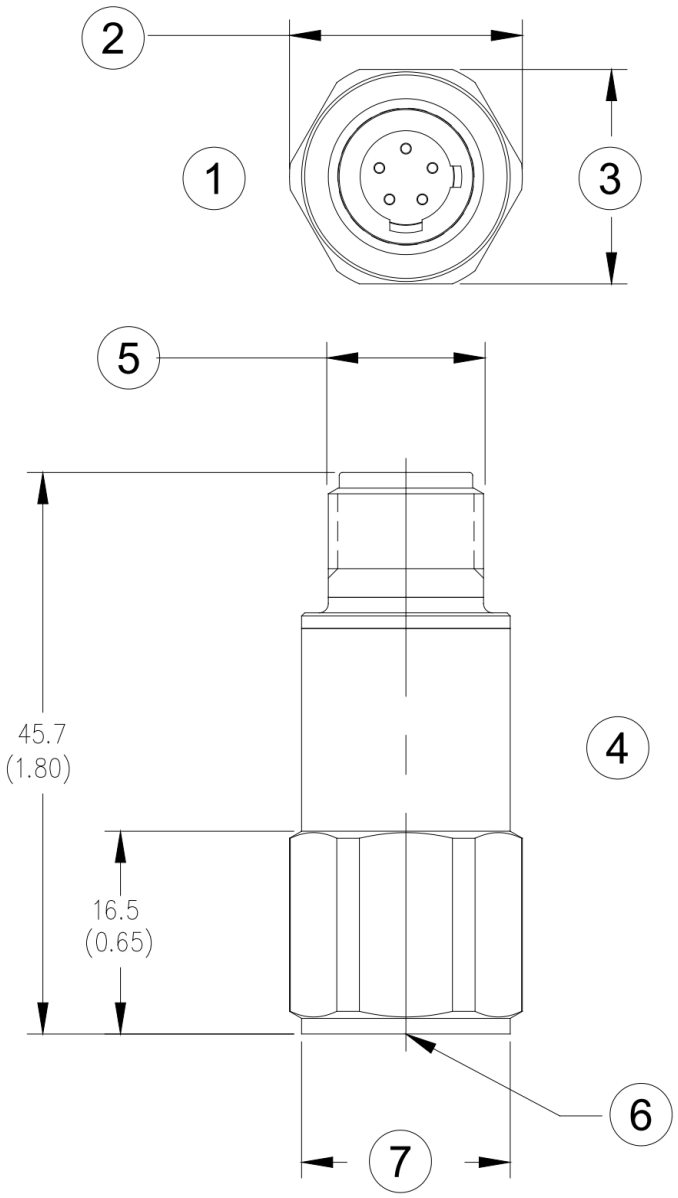


Figure 15: Conduit Cable Adapter, Double (Part Number 141887-02)



1. Top view
2. 19.1 mm (0.750 in) across corners
3. 11/16-inch hexagonal
4. Side view
5. 1/2-20 UNC-2A 5-pin connector
6. 3/8-24 UNF-2B threads, 7.1 mm (0.28 in) deep, minimum
7. 17.0 mm (0.67 in) diameter, typical

Figure 16: Accelerometer Dimensional Drawing

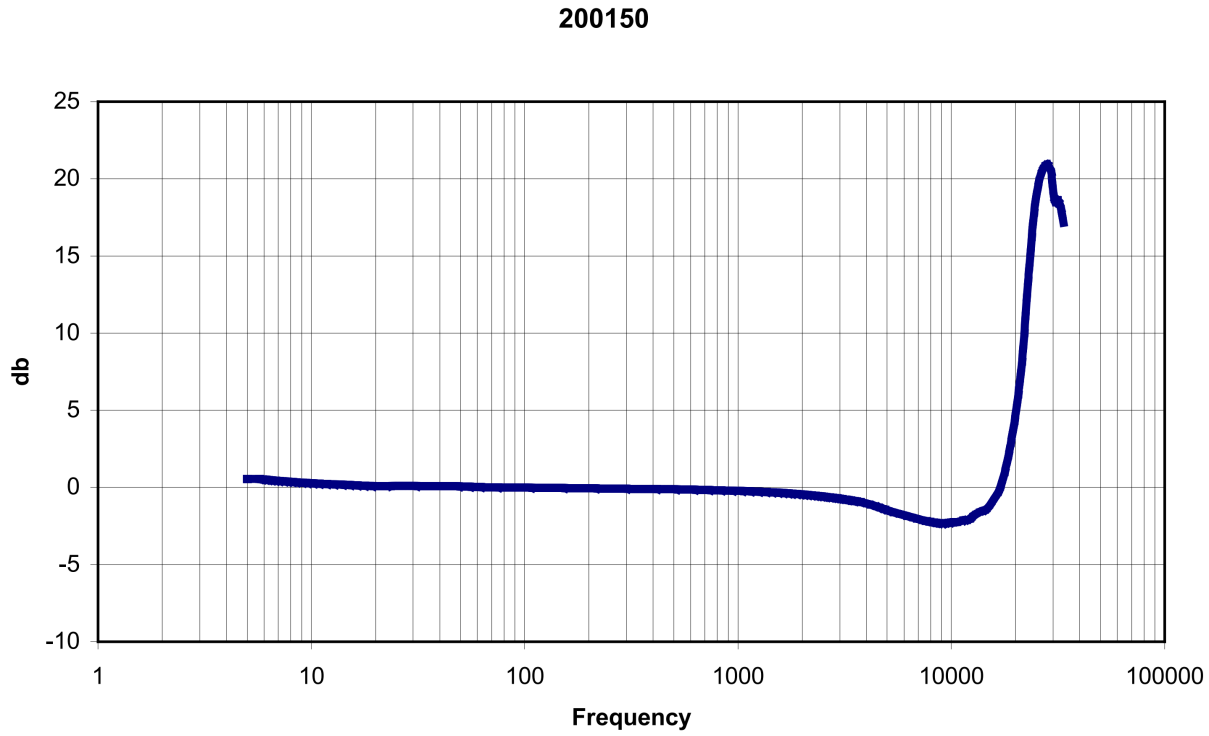


Figure 17: 200150 Amplitude Frequency Response (Typical)

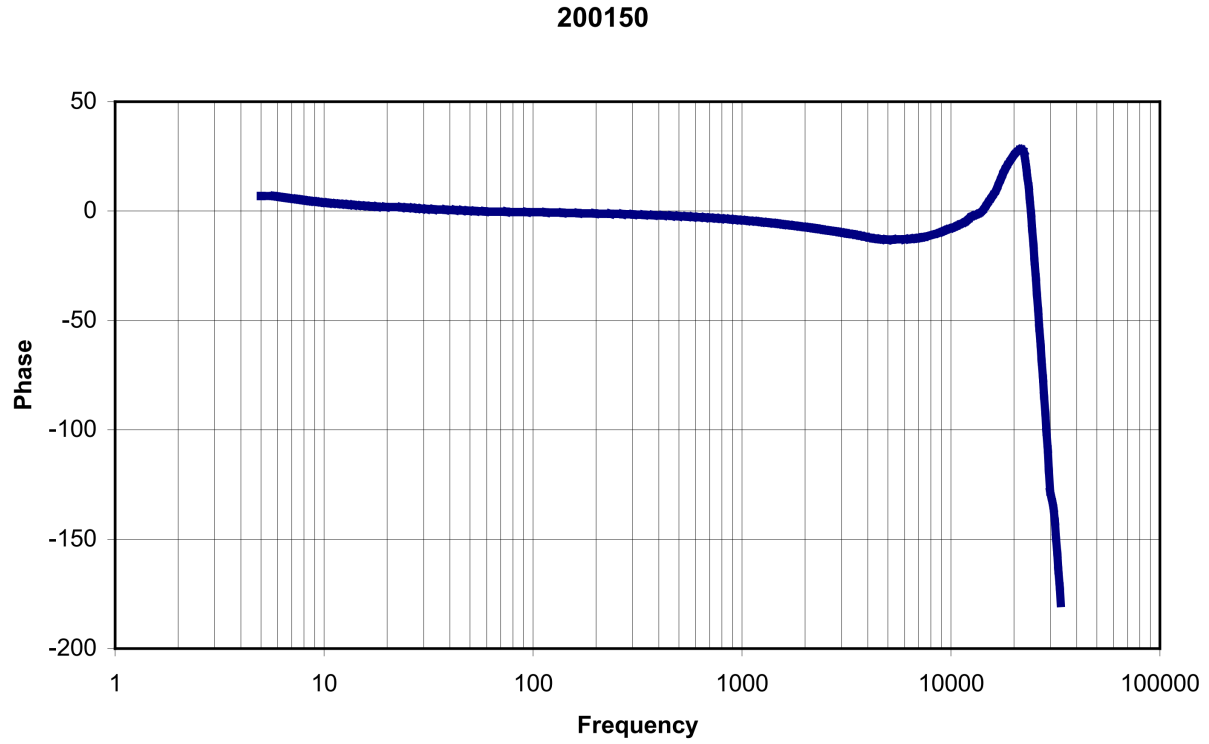


Figure 18: 200150 Phase Frequency Response (Typical)

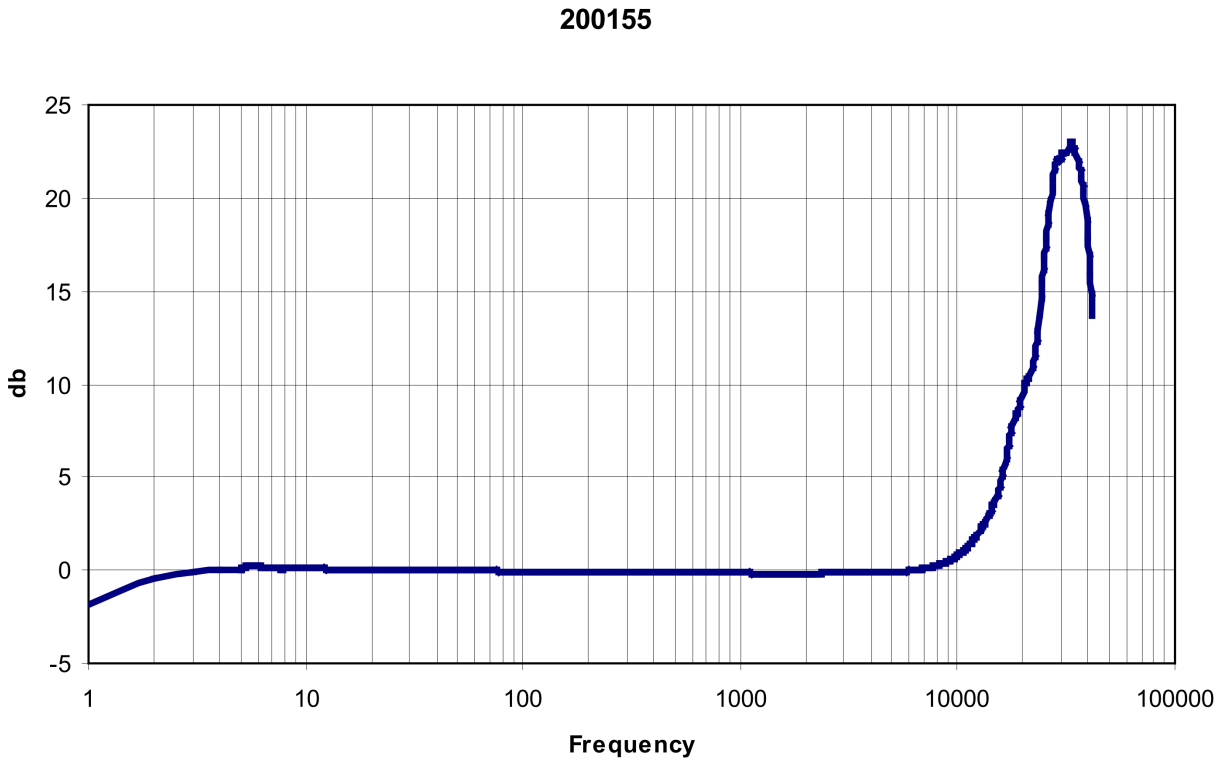


Figure 19: 200155 Amplitude Frequency Response (Typical)

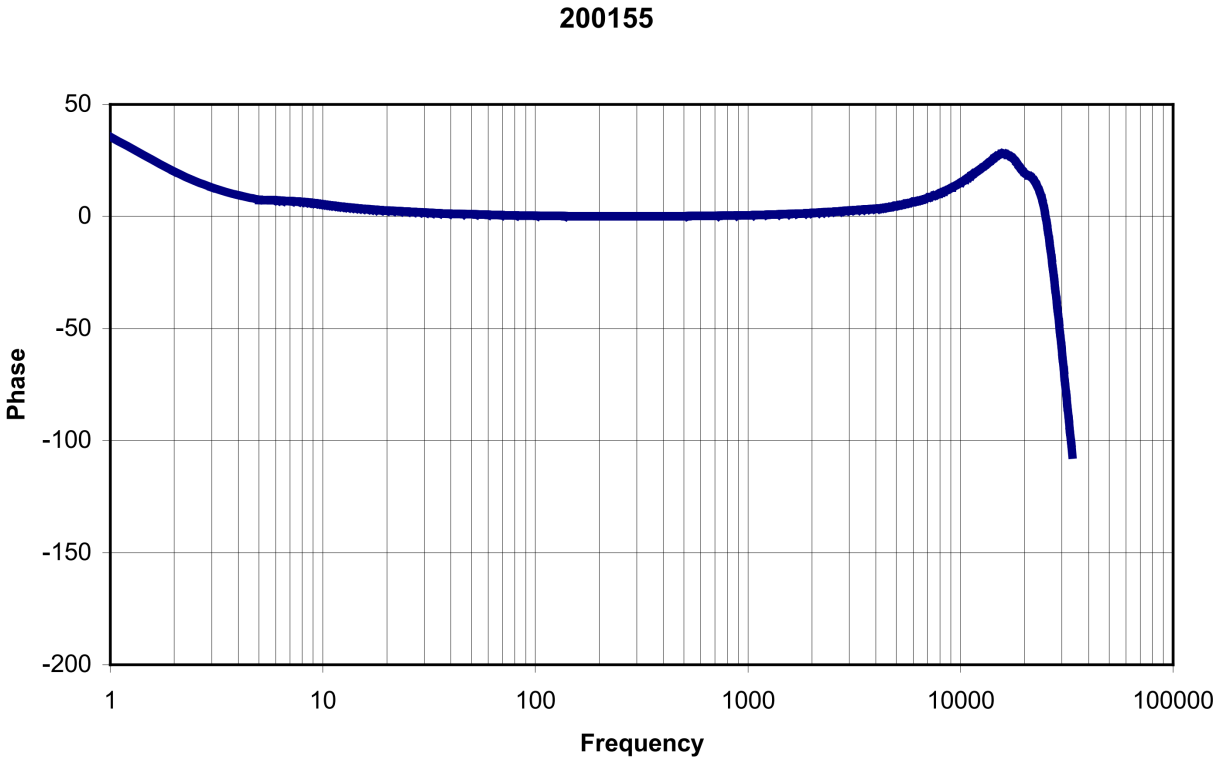


Figure 20: 200155 Phase Frequency Response (Typical)

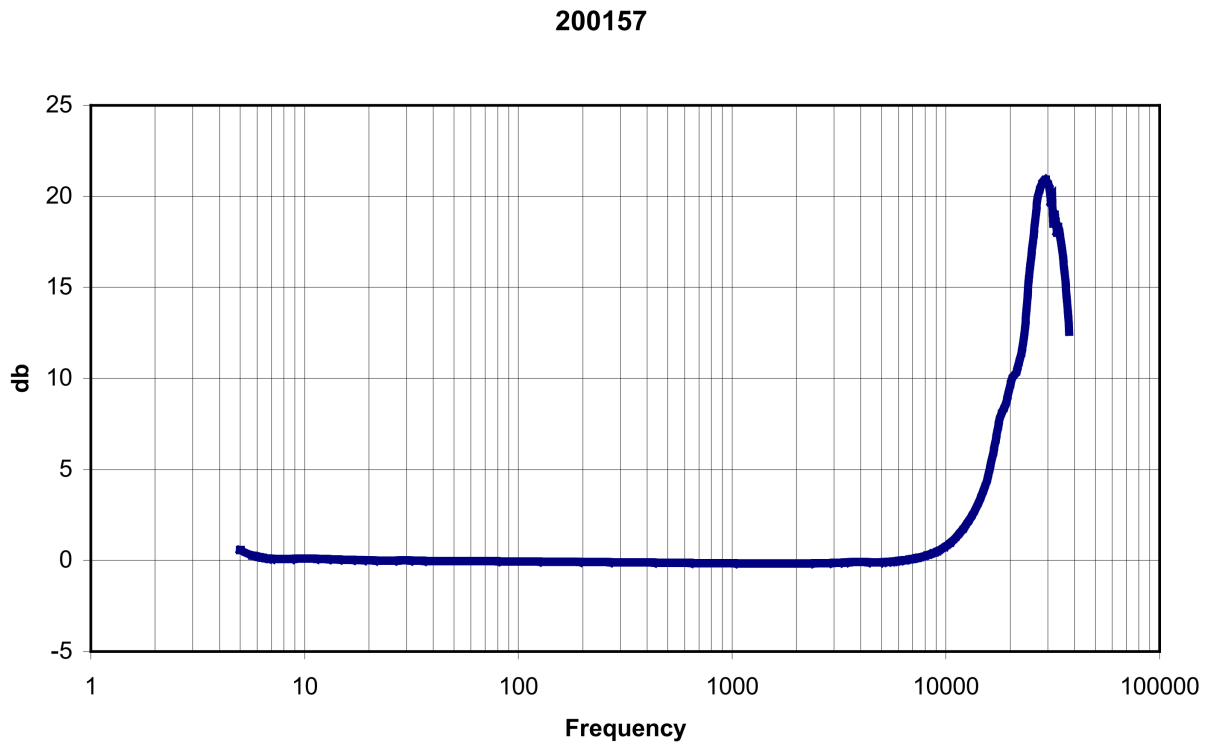


Figure 21: 200157 Amplitude Frequency Response (Typical)

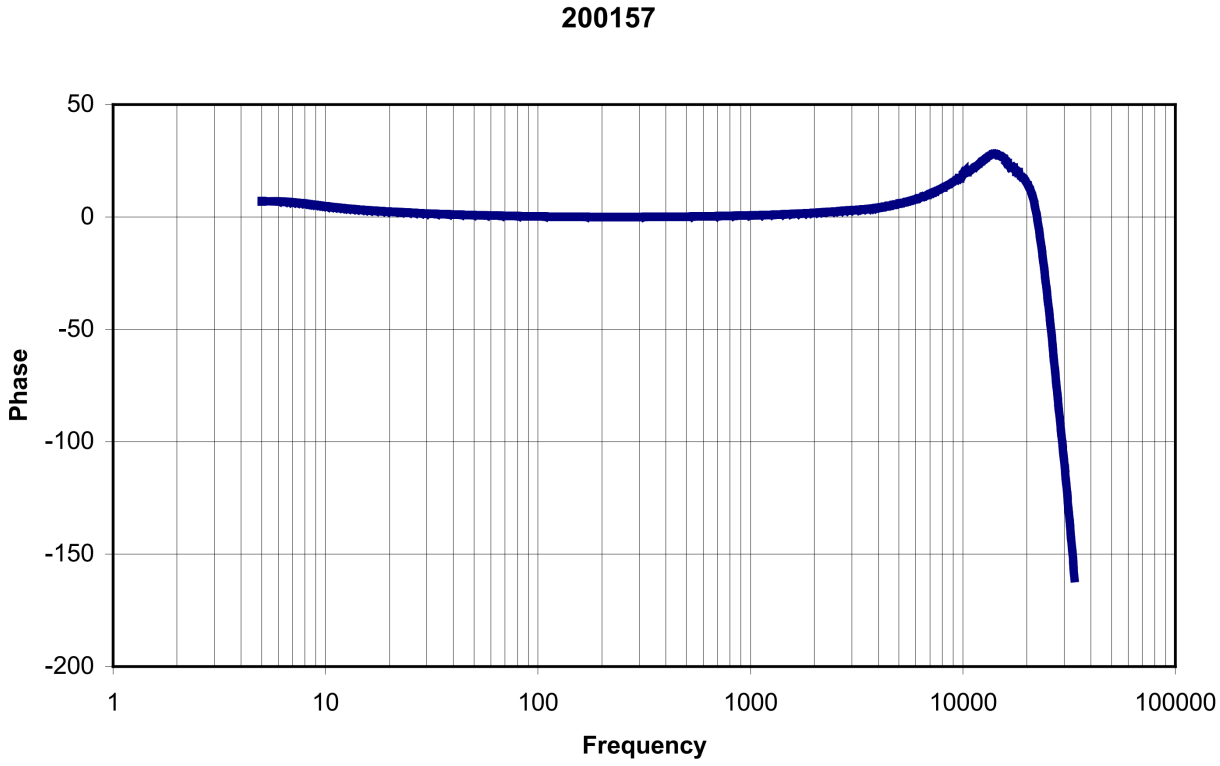


Figure 22: 200157 Phase Frequency Response (Typical)

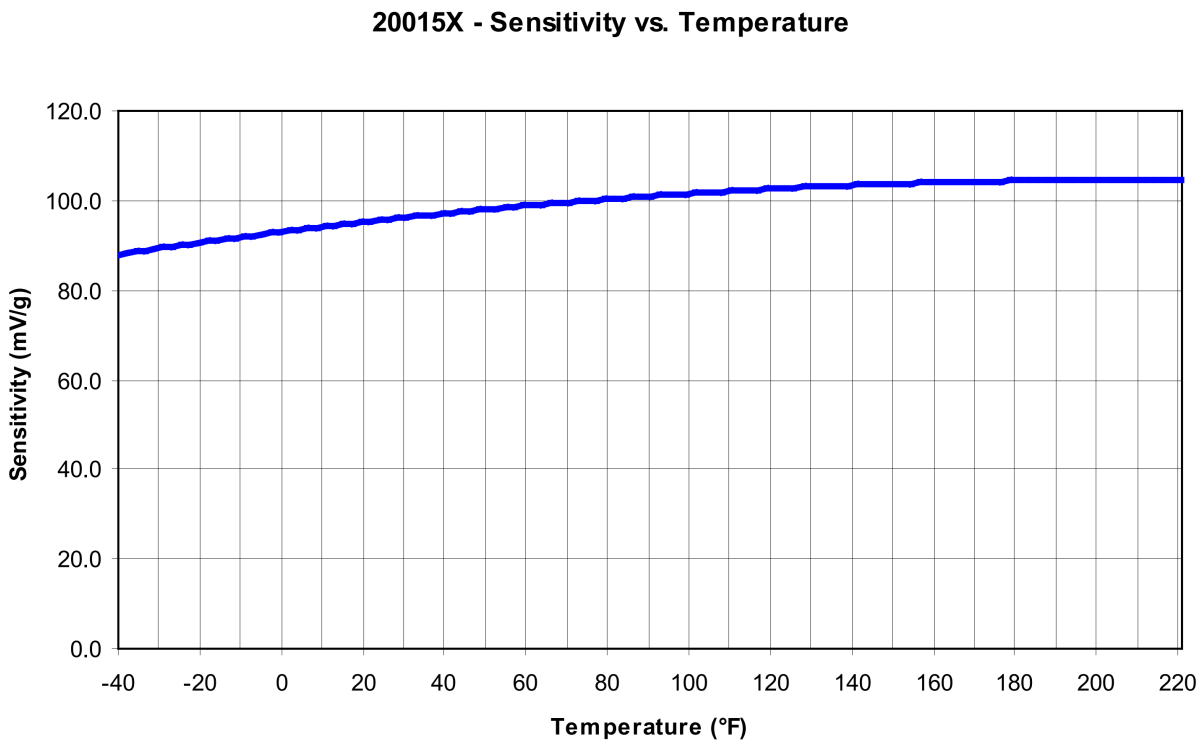


Figure 23: 20015x Accelerometer Temperature Sensitivity (Typical)

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