

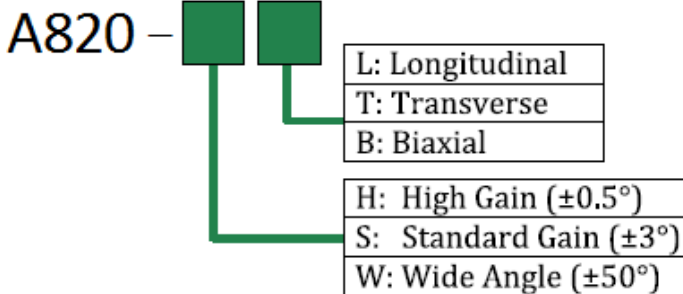
The model A820 Shallow Water is a high-precision submersible tiltmeter for use in fresh and salt water applications. Using an absolute gravity referenced electrolytic sensor, the A820 delivers superior measurement accuracy with virtually no long-term drift. High-gain units are sensitive to <math><0.0017\text{ mm/m}</math> or better. Output is a stable ± 5 DC voltage, which can be read with any VDC input data recorder. All units are rated to 200 meters (656.2 ft) waterproof for advanced protection from the elements. Use the A820 "Shallow Water" for structural monitoring, angle measurement and control, platform leveling and more.



	High-Gain	Standard	Wide-Angle
Angular Range	$\pm 0.5^\circ$	$\pm 3.0^\circ$	$\pm 50^\circ$
Resolution	$<0.0001^\circ$	0.0006°	0.01°
Repeatability	$<0.0002^\circ$	0.001°	0.02°
Non-Linearity	1%	2%	0.5%
Scale Factor	$0.1^\circ/\text{V}$	$0.6^\circ/\text{V}$	$10^\circ/\text{V}$
Time Constant	1.75 sec (2-pole Butterworth low-pass filter)		0.15 sec
Kz Temp Coefficient	$\pm 0.0002^\circ/\text{C}$ (typical)		$\pm 0.002^\circ/\text{C}$ (typical)
Ks Temp Coefficient	$0.04\%/^\circ\text{C}$ (typical)		$<0.1\%/^\circ\text{C}$ (typical)
Output	$\pm 5\text{VDC}$ (single ended)		
Channels	Tilt, Temperature		
Output Impedance	270 ohms		
Temperature Output	$0.1^\circ\text{C}/\text{mV}$ typical (single ended; $0^\circ\text{C} = 0\text{mV}$)		
Power	8-18 VDC @ 8mA, 250 mV ripple max, reverse polarity protected		
Environmental	-4 to $+60^\circ\text{C}$ operation; -30 to $+100^\circ\text{C}$ storage. Submersible to 200 meters (656.2 ft)		
Mounting	Two no. 10 stainless steel mounting screws.		
Dimensions & Weight	92.1 x 112.4 x 61 mm; 1.6 kg		
Materials	316 SS		
Housing Connector	6-pin bulkhead, male plug		
Mating Cable	6-conductor unshielded, 20AWG female receptacle with locking sleeve, neoprene jacket, 24"		

Specifications subject to change without notice on account of continued product development

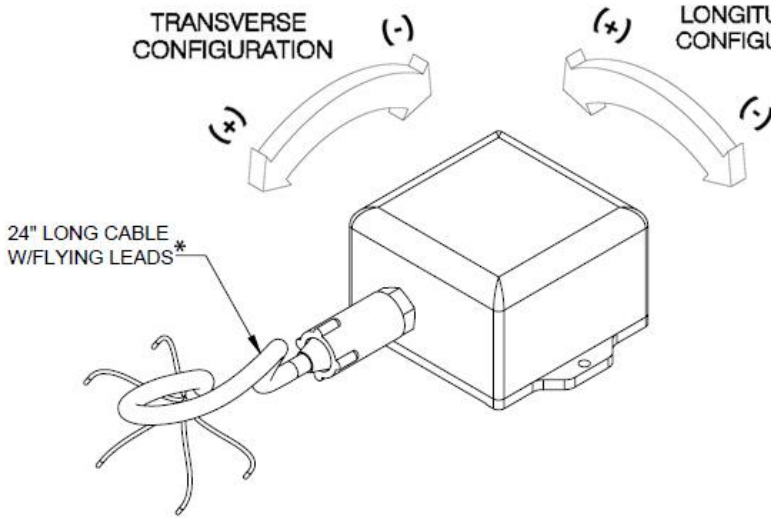
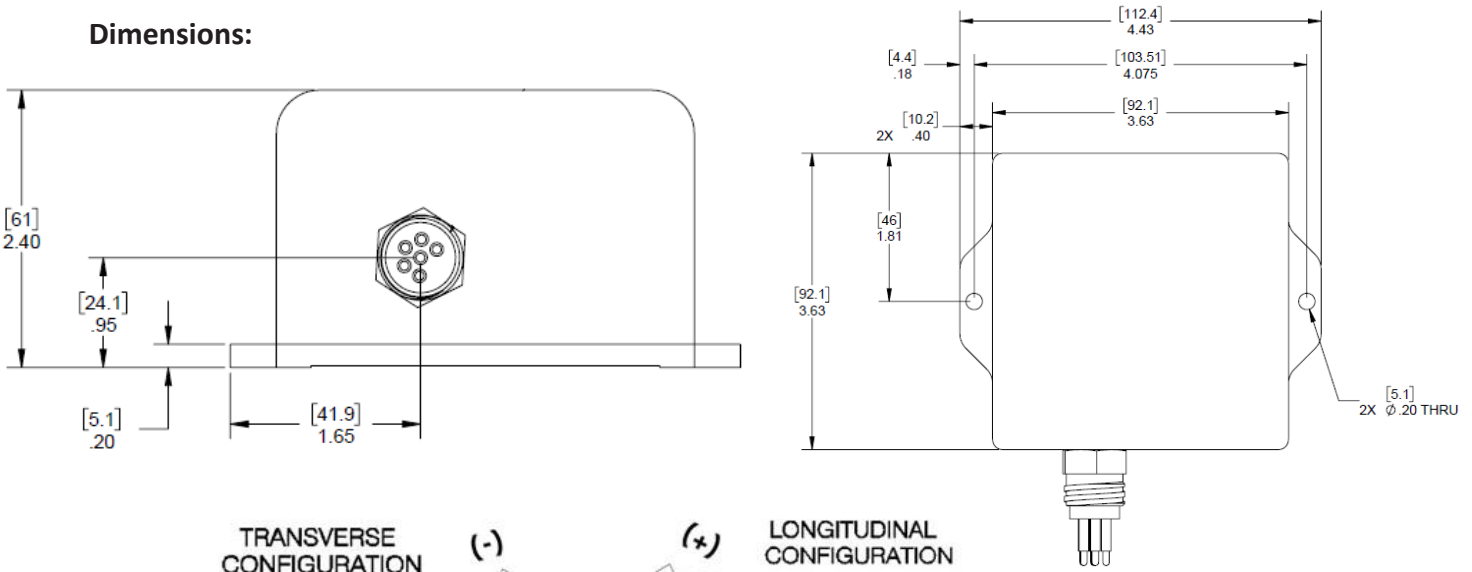
How to Order:



Wiring/Pin-out:

Pin	Wire Color	Function
1	Black	Power Ground
2	White	Signal Ground
3	Red	Power
4	Green	X - Tilt
5	Orange	Temperature
6	Blue	Y - Tilt

Dimensions:



**UNITS: [mm]
IN**

*Custom cable lengths available on request

Part Numbers:

Part Number	Model Long Description
98823-01	A820-HB, $\pm 0.5^\circ$ Shallow Water, High Gain, Biaxial Analog Tiltmeter
98823-02	A820-SB, $\pm 3^\circ$ Shallow Water, Standard-Angle, Biaxial Analog Tiltmeter
98823-03	A820-WB, $\pm 50^\circ$ Shallow Water, Wide-Angle, Biaxial Analog Tiltmeter
98823-04	A820-HT, $\pm 0.5^\circ$ Shallow Water, High Gain, Transverse (Uniaxial) Analog Tiltmeter
98823-05	A820-ST, $\pm 3^\circ$ Shallow Water, Standard-Angle, Transverse (Uniaxial) Analog Tiltmeter
98823-06	A820-WT, $\pm 50^\circ$ Shallow Water, Wide-Angle, Transverse (Uniaxial) Analog Tiltmeter
98823-07	A820-HL, $\pm 0.5^\circ$ Shallow Water, High Gain, Longitudinal (Uniaxial) Analog Tiltmeter
98823-08	A820-SL, $\pm 3^\circ$ Shallow Water, Standard-Angle, Longitudinal (Uniaxial) Analog Tiltmeter
98823-09	A820-WL, $\pm 50^\circ$ Shallow Water, Wide-Angle, Longitudinal (Uniaxial) Analog Tiltmeter

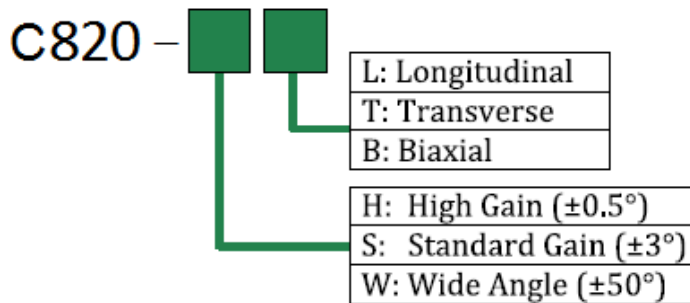
The model C820 Shallow Water is a high-precision submersible tiltmeter for use in fresh and salt water applications with 4-20mA output. Using an absolute gravity referenced electrolytic sensor, the C820 delivers superior measurement accuracy with virtually no long-term drift. High-gain units are sensitive to <0.0017 mm/m or better. All units are rated to 200 meters (656.2 ft) waterproof for advanced protection from the elements. Use the C820 "Shallow Water" for structural monitoring, angle measurement and control, platform leveling, and more.



	High-Gain	Standard	Wide-Angle
Angular Range	±0.5°	±3.0°	±50°
Resolution	<0.0001°	0.0006°	0.01°
Repeatability	<0.0002°	0.001°	0.02°
Non-Linearity	1%	2%	0.5%
Scale Factor	0.0625°/mA	0.375°/mA	6.25°/mA
Time Constant	0.15 sec		
Kz Temp Coefficient	±0.0002 °/°C (typical)		±0.002 °/°C (typical)
Ks Temp Coefficient	<0.04%/°C (typical)		<0.1%/°C (typical)
Output	4-20mA Two-wire current loop (per axis)		
Channels	Tilt, Temperature		
Output Impedance	270 ohms		
Temperature Output	0.1°C/mV typical (single ended; 0°C = 0mV)		
Power	(0.02 Ampere x R + 10 VDC) < Vs < 29 VDC		
Environmental	-4 to +60° C operation; -30 to +100° C storage. Submersible to 200 meters (656.2 ft)		
Mounting	Two no. 10 stainless steel mounting screws.		
Dimensions & Weight	92.1 x 112.4 x 61 mm; 1.6 kg		
Materials	316 SS		
Housing Connector	6-pin bulkhead, male plug		
Mating Cable	6-conductor unshielded, 20AWG female receptacle with locking sleeve, neoprene jacket, 24"		

Specifications subject to change without notice on account of continued product development

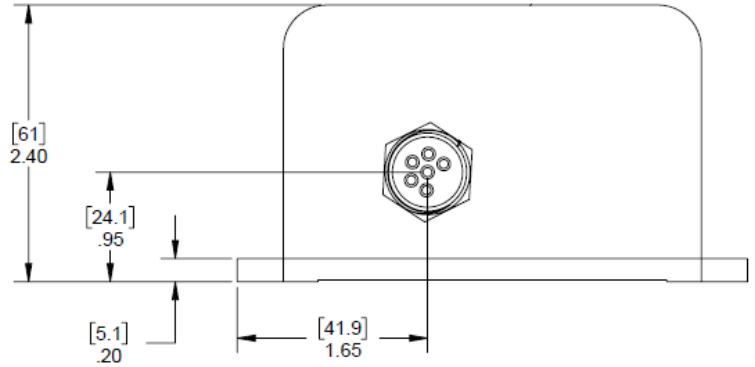
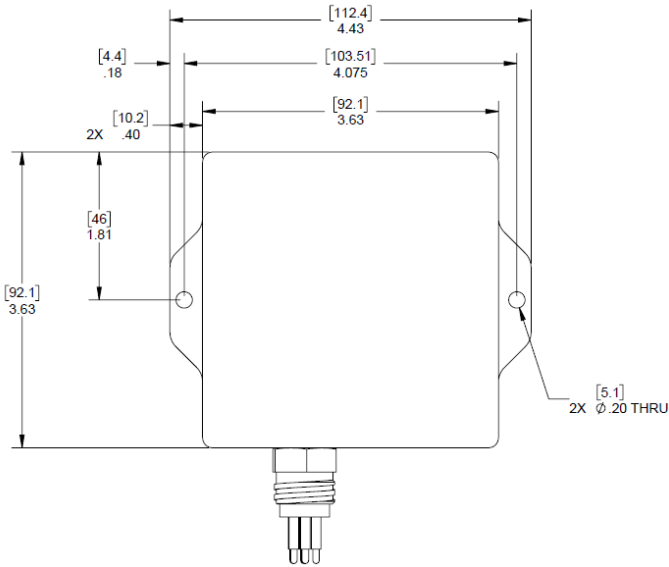
How to Order:



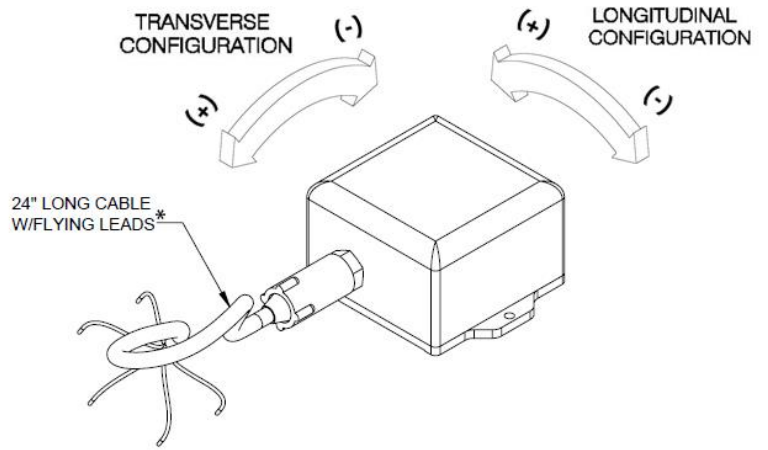
Wiring/Pin-out:

Pin	Wire Color	Function
1	Black	X - Return
2	White	Y - Return
3	Red	X - Power
4	Green	Y - Power
5	Orange	Temp Return
6	Blue	Temp Exc

Dimensions:



**UNITS: [mm]
IN**



*Custom cable lengths available on request

Part Numbers:

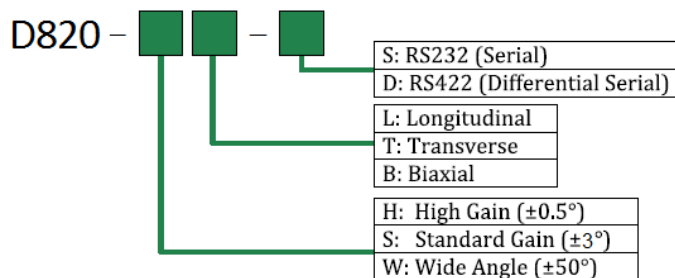
Part Number	Model Long Description
98820-01	C820-HB, ±0.5° Shallow Water, High Gain, Biaxial 4-20mA Tiltmeter
98820-02	C820-SB, ±3° Shallow Water, Standard-Angle, Biaxial 4-20mA Tiltmeter
98820-03	C820-WB, ±50° Shallow Water, Wide-Angle, Biaxial 4-20mA Tiltmeter
98820-04	C820-HT, ±0.5° Shallow Water, High Gain, Transverse (Uniaxial) 4-20mA Tiltmeter
98820-05	C820-ST, ±3° Shallow Water, Standard-Angle, Transverse (Uniaxial) 4-20mA Tiltmeter
98820-06	C820-WT, ±50° Shallow Water, Wide-Angle, Transverse (Uniaxial) 4-20mA Tiltmeter
98820-07	C820-HL, ±0.5° Shallow Water, High Gain, Longitudinal (Uniaxial) 4-20mA Tiltmeter
98820-08	C820-SL, ±3° Shallow Water, Standard-Angle, Longitudinal (Uniaxial) 4-20mA Tiltmeter
98820-09	C820-WL, ±50° Shallow Water, Wide-Angle, Longitudinal (Uniaxial) 4-20mA Tiltmeter

The model D820 Shallow Water is a high-precision submersible tiltmeter for use in fresh and salt water applications with RS232 or RS422 digital output. Using an absolute gravity referenced electrolytic sensor, the D820 delivers superior measurement accuracy with virtually no long-term drift. High-gain units are sensitive to <0.0017 mm/m or better. All units are rated to 200 meters (656.2 ft) waterproof for advanced protection from the elements. Use the D820 "Shallow Water" for structural monitoring, angle measurement and control, platform leveling and more.



	High Gain	Standard Gain	Wide Angle
Angular Range	±0.5°	±3°	±50°
Resolution	<0.0001°	0.0001°	0.002°
Repeatability	0.0003°	0.0003°	0.004°
Non-Linearity	0.1%	0.1%	0.1%
Kz Temp Coefficient	±0.0002 °/°C (typical)		±0.002 °/°C (typical)
Ks Temp Coefficient	0.04%/°C (typical)		<0.1 %/°C (typical)
Channels	Tilt, Temperature, Serial No.		
Time Constant	0.15 sec		
Output	RS232, RS422		
Output Format	NMEA XDR, Trimble TCM, Ashtec compatible, Simple (default: X, Y, Temp., S/N)		
Baud Rate	9600 (default), 19200, 28800, 57600, 115200, 130400		
Power	7-28 VDC @ 30mA, 250 mV ripple max, reverse polarity protected		
Environmental	-4° to +60°C operational, -30° to +100°C storage. Submersible to 200 meters (656.2 ft)		
Mounting	Two no. 10 stainless steel mounting screws.		
Materials	316 SS		
Dimensions & Weight	92.1 x 112.4 x 61 mm, 1.6 kg		
Housing Connector	6-pin bulkhead, male plug		
Mating Cable	6-conductor unshielded, 20AWG female receptacle with locking sleeve, neoprene jacket, 24"		

How to Order:



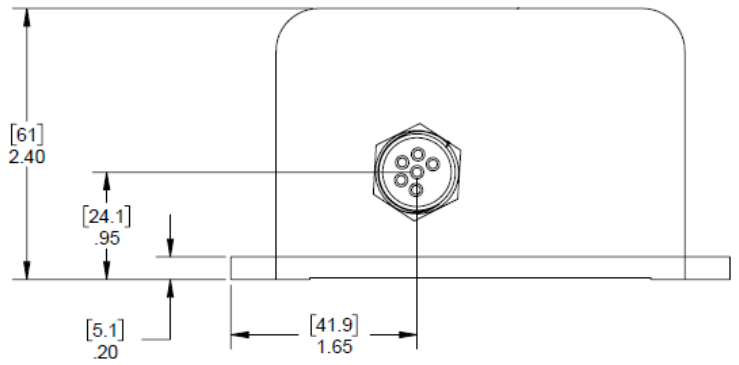
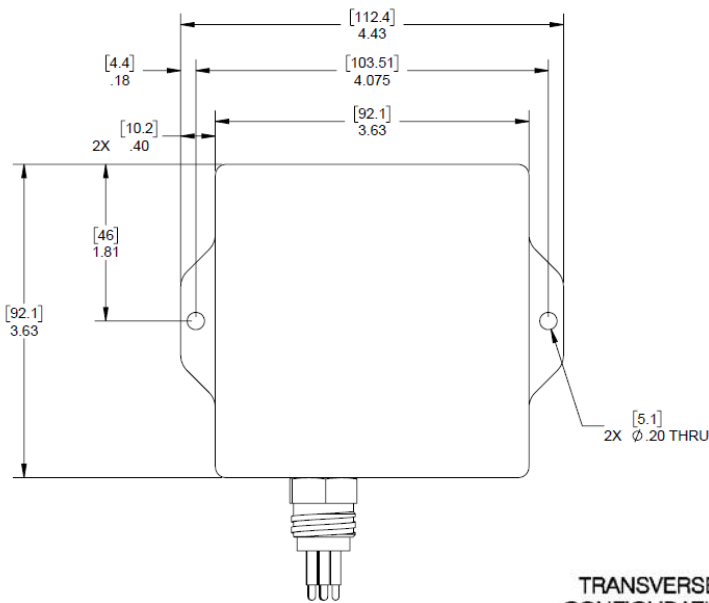
Wiring/Pin Out – RS232

Pin	Assignment	Color
1	Pwr Gnd	Black
2	N/C	White
3	Pwr	Red
4	RxD	Green
5	N/C	Orange
6	TxD	Blue

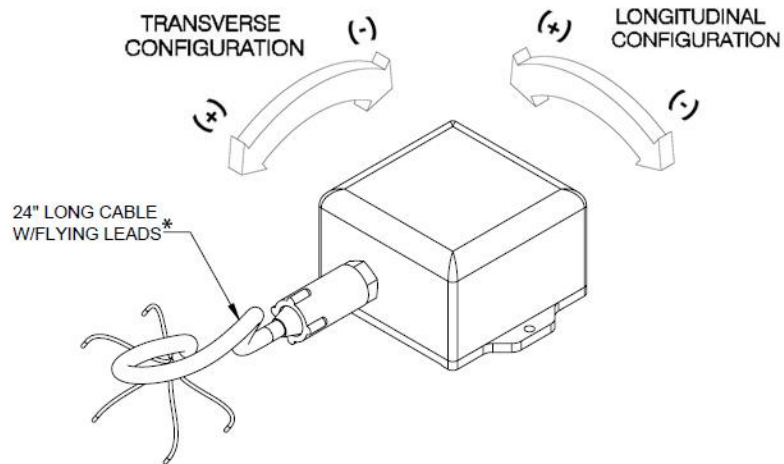
Wiring/Pin Out – RS422

Pin	Assignment	Color
1	Pwr Gnd	Black
2	Tx-	White
3	Pwr	Red
4	TX+	Green
5	RX-	Orange
6	RX+	Blue

Dimensions:



UNITS: [mm]
IN



*Custom cable lengths available on request

Part Numbers:

D820 with RS232 Output	
Part Number	Model Long Description
98821-01	D820-HB-S, $\pm 0.5^\circ$ Shallow Water, High Gain, Biaxial, RS232 Digital Tiltmeter
98821-02	D820-SB-S, $\pm 3^\circ$ Shallow Water, Standard-Angle, Biaxial, RS232 Digital Tiltmeter
98821-03	D820-WB-S, $\pm 50^\circ$ Shallow Water, Wide-Angle, Biaxial, RS232 Digital Tiltmeter
98821-04	D820-HT-S, $\pm 0.5^\circ$ Shallow Water, High Gain, Transverse (Uniaxial), RS232 Digital Tiltmeter
98821-05	D820-ST-S, $\pm 3^\circ$ Shallow Water, Standard-Angle, Transverse (Uniaxial), RS232 Digital Tiltmeter
98821-06	D820-WT-S, $\pm 50^\circ$ Shallow Water, Wide-Angle, Transverse (Uniaxial), RS232 Digital Tiltmeter
98821-07	D820-HL-S, $\pm 0.5^\circ$ Shallow Water, High Gain, Longitudinal (Uniaxial), RS232 Digital Tiltmeter
98821-08	D820-SL-S, $\pm 3^\circ$ Shallow Water, Standard-Angle, Longitudinal (Uniaxial), RS232 Digital Tiltmeter
98821-09	D820-WL-S, $\pm 50^\circ$ Shallow Water, Wide-Angle, Longitudinal (Uniaxial), RS232 Digital Tiltmeter

D820 with RS422 Output	
Part Number	Model Long Description
98822-01	D820-HB-D, $\pm 0.5^\circ$ Shallow Water, High Gain, Biaxial, RS422 Digital Tiltmeter
98822-02	D820-SB-D, $\pm 3^\circ$ Shallow Water, Standard-Angle, Biaxial, RS422 Digital Tiltmeter
98822-03	D820-WB-D, $\pm 50^\circ$ Shallow Water, Wide-Angle, Biaxial, RS422 Digital Tiltmeter
98822-04	D820-HT-D, $\pm 0.5^\circ$ Shallow Water, High Gain, Transverse (Uniaxial), RS422 Digital Tiltmeter
98822-05	D820-ST-D, $\pm 3^\circ$ Shallow Water, Standard-Angle, Transverse (Uniaxial), RS422 Digital Tiltmeter
98822-06	D820-WT-D, $\pm 50^\circ$ Shallow Water, Wide-Angle, Transverse (Uniaxial), RS422 Digital Tiltmeter
98822-07	D820-HL-D, $\pm 0.5^\circ$ Shallow Water, High Gain, Longitudinal (Uniaxial), RS422 Digital Tiltmeter
98822-08	D820-SL-D, $\pm 3^\circ$ Shallow Water, Standard-Angle, Longitudinal (Uniaxial), RS422 Digital Tiltmeter
98822-09	D820-WL-D, $\pm 50^\circ$ Shallow Water, Wide-Angle, Longitudinal (Uniaxial), RS422 Digital Tiltmeter