

# Clinometer Pak 420

## 4-20mA Uniaxial Clinometer

The Clinometer Pak 420 is an economical uniaxial clinometer with 4-20 mA output, a rugged weatherproof enclosure and a wide range of applications. Its internal electrolytic

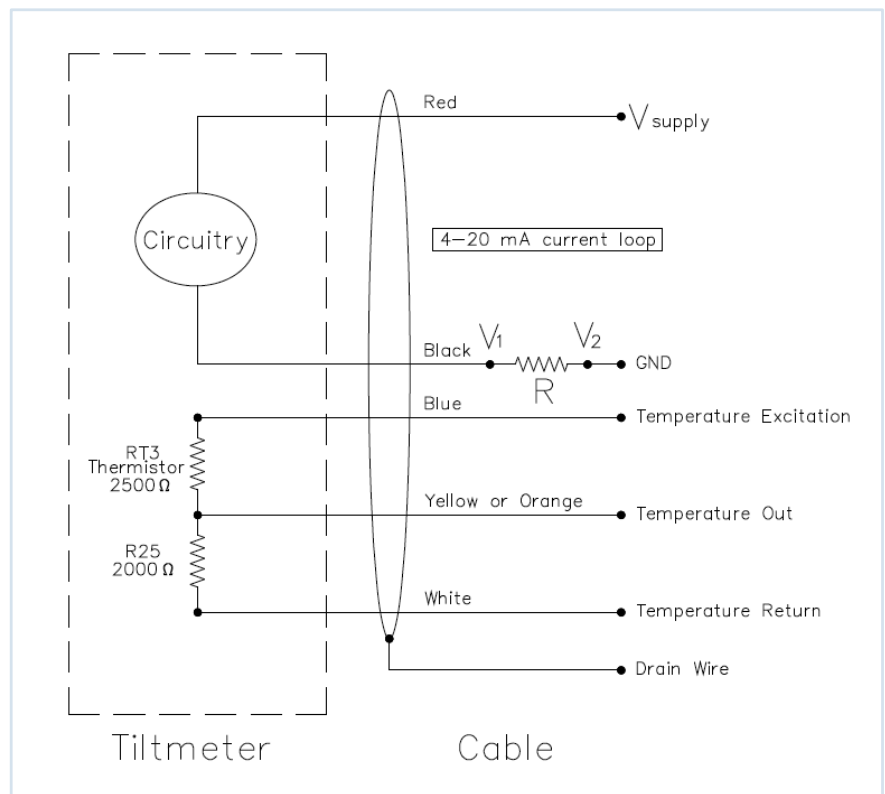
tilt sensor is gravity referenced and has no mechanical moving parts to break or wear out. You can install your clinometer anywhere without complicated levers or fixturing.



### ECONOMICAL UNIAXIAL CLINOMETER

The Clinometer Pak 420 is current loop powered, so measurements can be made over long cables using an economical 2-wire pair. As an added bonus, it measures temperature using a built-in thermistor. Some typical applications include:

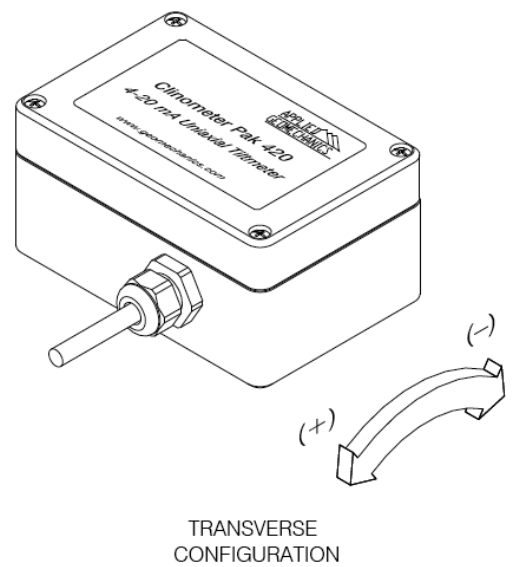
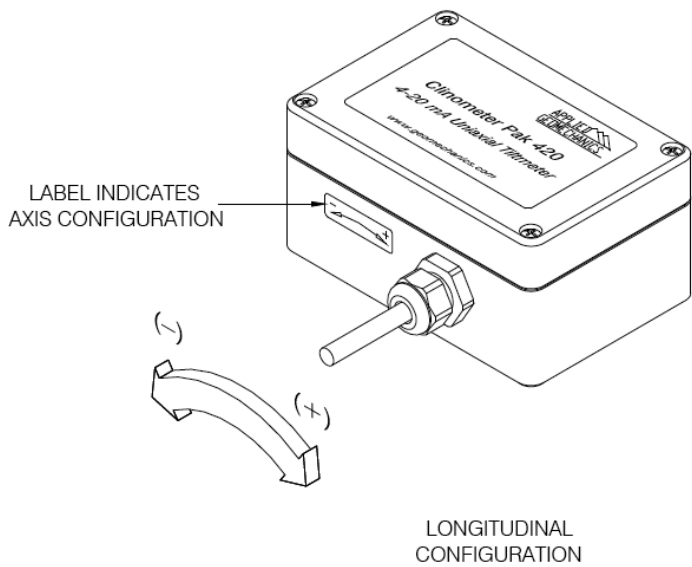
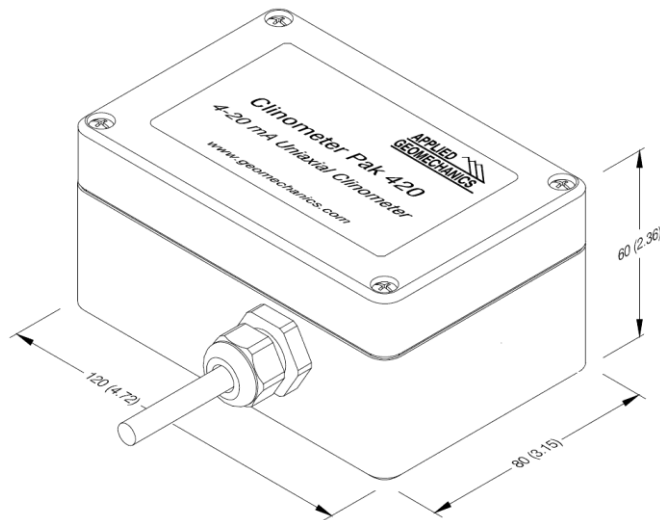
- Measuring the angular position of conveyers, booms, ramps and machinery (wide-angle version)
- Determining antenna tilt for error correction (high-gain version)
- Tracking pitch and roll of ships, buoys, ROVs and towfish (standard and wide-angle versions).



The Clinometer Pak 420 current signal is measured indirectly using a shunt resistor,  $R$ . Ohm's Law states that  $V1$

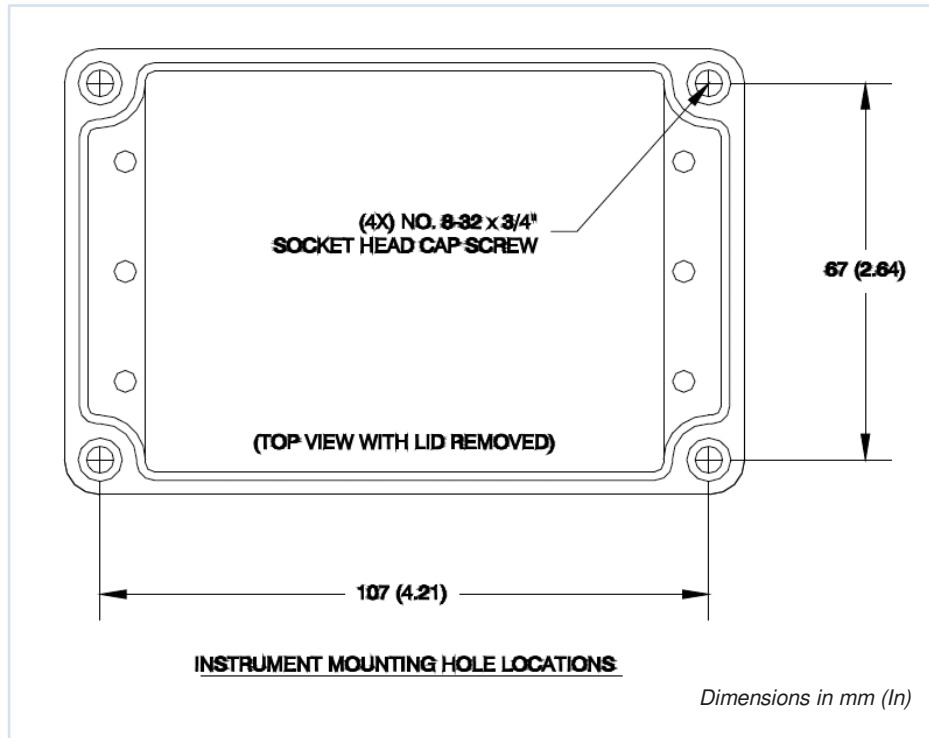
–  $V2 = IR$ , where  $I$  is current in Amperes,  $R$  resistance in Ohms, and  $V1$  and  $V2$  the voltages measured on opposite

sides of the shunt resistor. Temperature measurement using the onboard thermistor is diagrammed below.

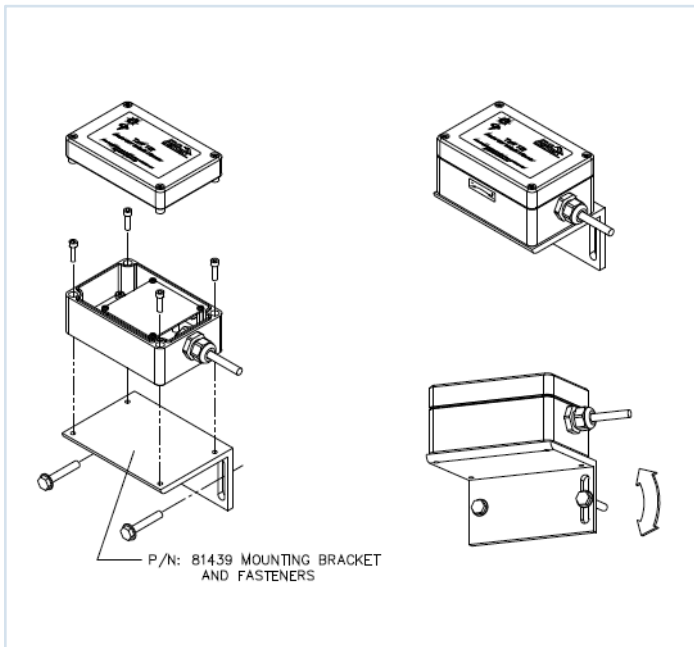


Clinometer is available with either longitudinal or transverse tilt configuration.

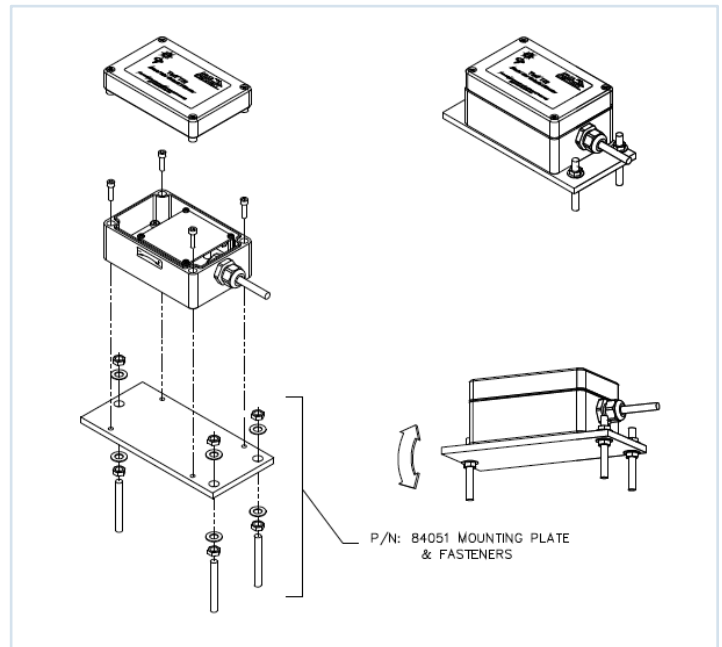
WIRE COLOR	FUNCTION
Red	Loop Power (Vsupply)
Black	Loop Return (Ground)
Blue	Temperature Excitation (up to 12V)
Yellow	Temperature Out
White	Temperature Return
Bare (Clear)	Drain Wire (Shield)



Mounting holes are accessed by removing lid of clinometer. Use 8-32 or 4 mm screws.



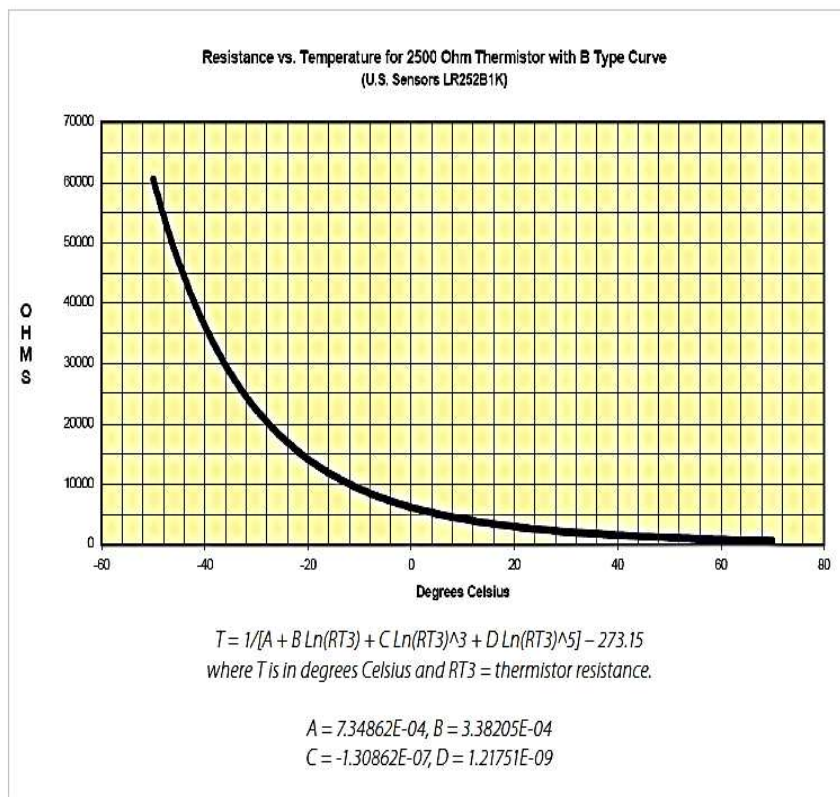
For mounting on vertical surfaces: Order the 81439 Mounting Bracket Assembly, which includes complete hardware.



For mounting on horizontal surfaces: Screw the clinometer directly to the surface, or order the 84051 Mounting Plate Assembly, which includes complete hardware.

	HIGH-GAIN VERSION	STANDARD VERSION	WIDE-ANGLE VERSION
ANGULAR RANGE	±10 degrees (20 degree span)	±25 degrees (50 degree span)	±50 degrees* (100 deg. span)
SCALE FACTOR	1.25°/ mA typical	3.125°/ mA typical	6.25°/ mA typical
LINEARITY	1% of full span	1% of half span, 2.5% of full span	1.2% of half span, 7.5% of full span
RESOLUTION	0.005 degree	0.01 degree	0.02 degree
REPEATABILITY	0.01 degree.	0.02 degree	< 0.04 degree
HYSTERESIS	< 0.02 degree	< 0.02 degree	< 0.04 degree
TILT OUTPUT	4–20 mA two-wire current loop		
TIME CONSTANT, T	150 msec; output is proportional to $1 - e^{-t/T}$ where t = time in seconds		
NATURAL FREQUENCY	10 Hz; available with viscous sensor to damp vibrations		
TEMPERATURE COEF.	Span: +0.03%/ oC, Zero: 10-20 arc sec/ oC typical		
POWER REQUIREMENT, VS	$(0.02 \text{ Ampere} \times R + 10 \text{ VDC}) < V_s < 29 \text{ VDC}$ where R is the resistance of the shunt resistor and loop wiring in Ohms		
TEMPERATURE OUTPUT	Temperature is measured with a 2500 Ohm thermistor, -50 to +150°C range		
ENVIRONMENTAL	-40° to +85°C operating and storage		
ENCLOSURE & MOUNTING	Painted, die-cast aluminum box, 120 x 80 x 60 mm. Remove lid to access four mounting holes.		
CABLE	3m (10 ft), 5-conductor + one overall shield, PVC jacket, tinned ends		
WEIGHT	1 lb (0.4 kg)		

\* greater range available



#### ORDER CODES:

	TRANSVERSE TILT	LONGITUDINAL TILT
HIGH GAIN	98016-01	98016-04
STANDARD	98016-02	98016-05
WIDE ANGLE	98016-03	98016-06

#### USEFUL ACCESSORIES:

81439	Vertical mounting bracket
84051	Horizontal mounting plate
70369	Additional cable, specify length
62204	6-pin in-line receptacle
62202	6-socket in-line plug
VISCODAMP	Critically damped viscous sensor to filter vibrations