

Tulip 420

Uniaxial Clinometer

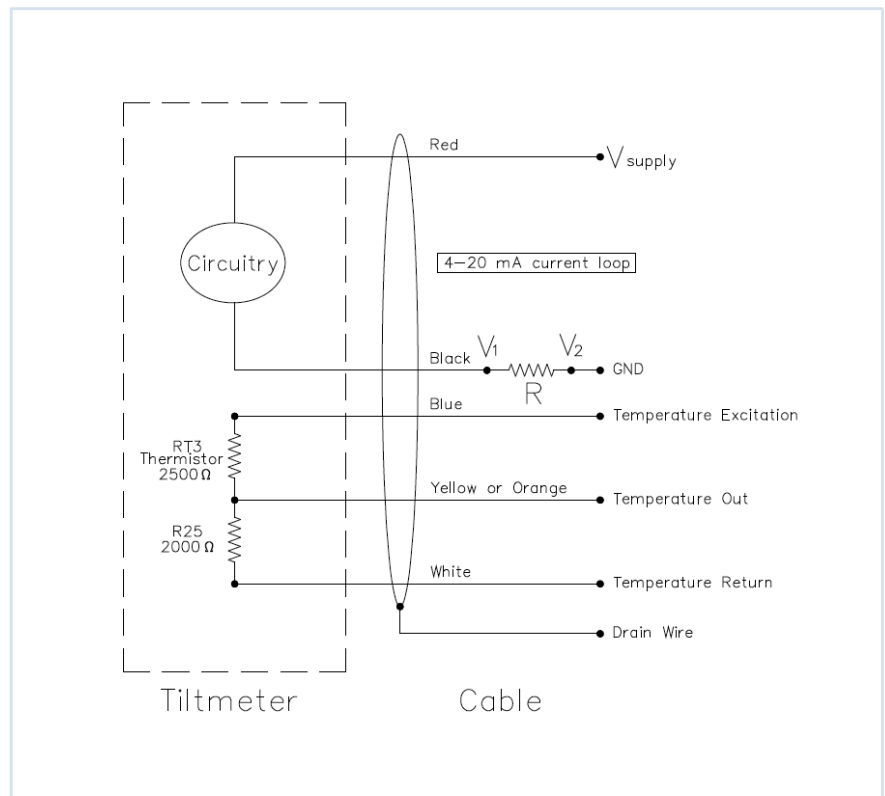
Tulip 4-20mA Uniaxial Clinometers are compact and accurate instruments for measuring angular position where space

is limited. Use them in pressure housings, well logging tools or on any machine or structure.



PRECISION, STABILITY AND DURABILITY

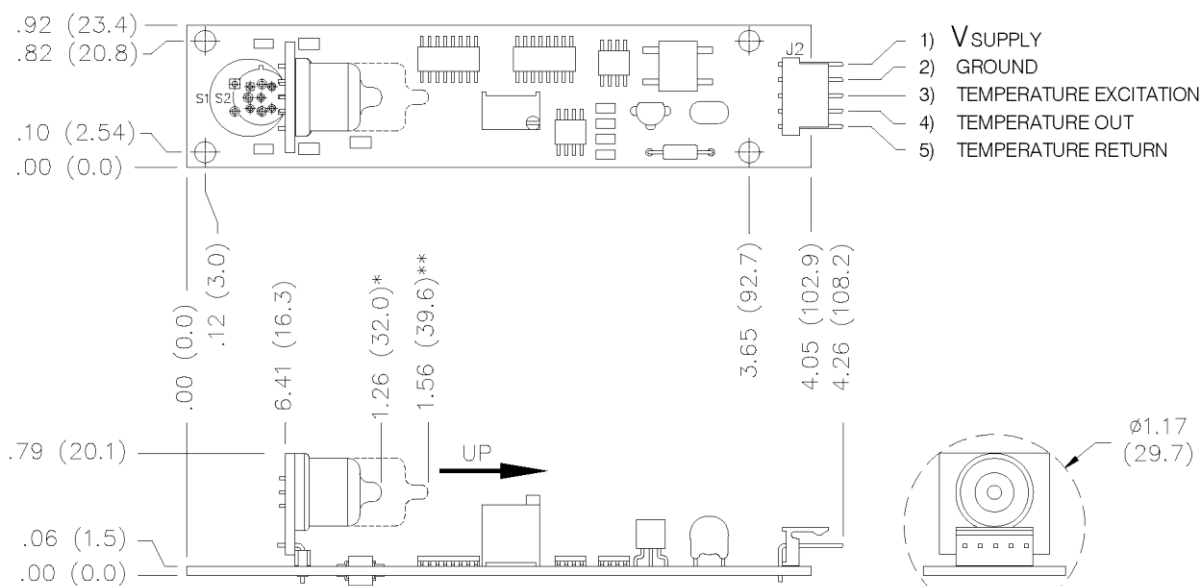
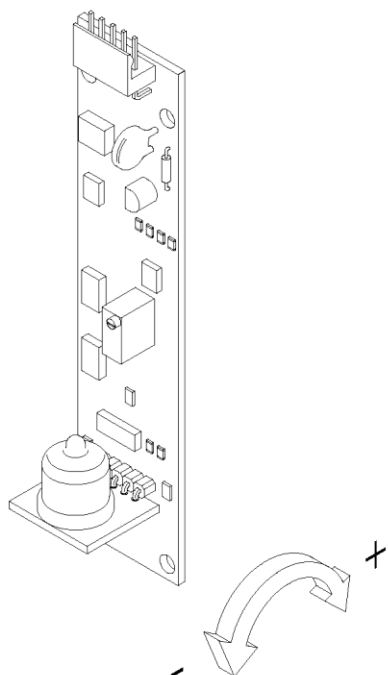
Tulip's electrolytic tilt sensor has no mechanical moving parts to break or wear out, and it's gravity referenced. You can install your clinometer anywhere, without the need for complicated levers or fixtures. Tulip is current loop powered, so measurements can be made over long cable lengths using an economical 2-wire pair. Vertical and horizontal versions are both available, and the horizontal version measures either longitudinal or transverse rotation (see drawing) to give you maximum flexibility when designing it into your system. As an added bonus, Tulip measures temperature using a built-in thermistor.



Tulip's 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



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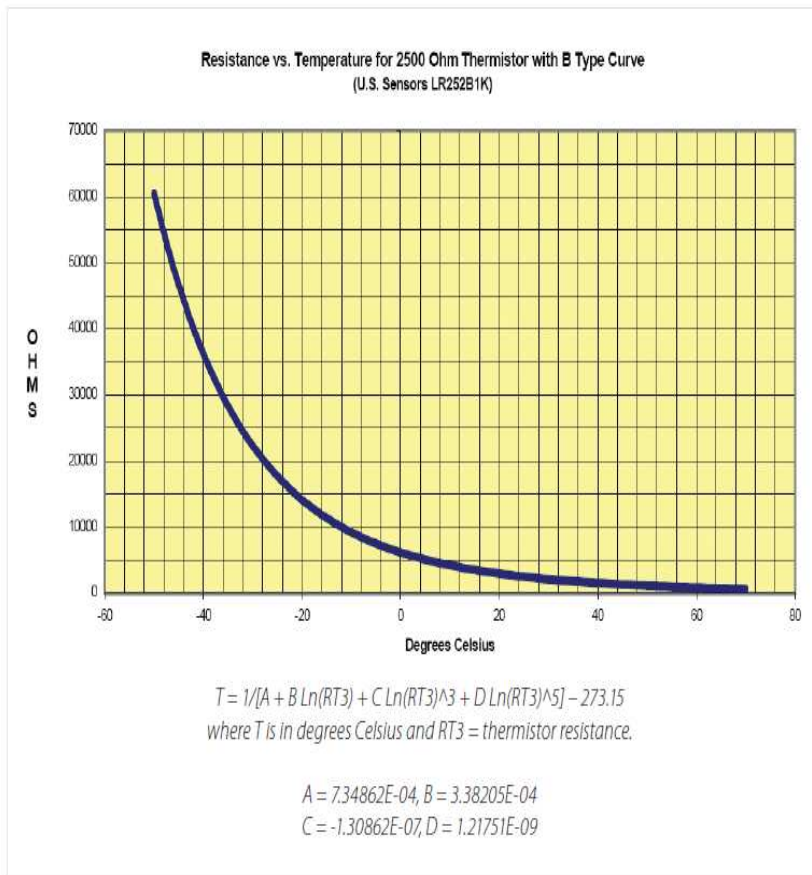
* STANDARD & HIGH-GAIN OPTIONS
 ** WIDE-ANGLE OPTION

Dimensions are in inches (mm)

Tulip 4-20mA Uniaxial Clinometer Vertical Version

	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%/ °C, Zero: 10-20 arc sec/ °C 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		
DIMENSIONS	See drawing. An 18-inch (45 cm) cable is supplied with each Tulip.		
WEIGHT	0.5 oz (15 g)		
MATERIALS	Liquid-filled glass or metal sensor, fiberglass PC board		

* greater range available



ORDER CODES:

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