

Application Note

AccuStar® Serial Electronic Clinometer communications interface



Introduction

The AccuStar I features a model with a 'Serial' output format. The serial model is a signal conditioned sensor which resolves the angle of tilt to 17 bits of data. The first data bit represents the polarity of the angle (plus or minus), while the next 16 bits resolve the angle. Scale factor is set for 1000 counts per degree, thereby allowing a direct indication of the measured angle when applying a three place decimal to the reading (ie; 1000 counts = 1.000 degree).

Theory of operation

The serial clinometer has incorporated the measurement of the angle internally, which eliminates the errors associated with external measurement devices such as multi-meters, oscilloscopes, and counters. The actual measurement is accomplished on board by a capacitive tilt sensor, a 16 MHz clock, and a sixteen bit counter. The data is stored in three registers and is transmitted upon request. A complete handshaking routine is used to eliminate timing and transmission problems, and provides the delay times required (due to capacitance) when transmitting through cables, connectors, or multiplexers.

Interface

The serial clinometer is designed to transmit its data to a microcontroller, or to an I/O card of a PC via a three wire interface. When connected to a microcontroller running at 1 μ s cycle speed, the conversion times were 10 milliseconds nominal. When connected to a PC through an I/O card, conversion times were 50 milliseconds nominal. It will work at both CMOS and TTL logic levels, and the data line is monitored internally to insure the correct logic level. Power requirement is +5.0vdc +/-5% regulated, at 15ma.

Specifications

The serial clinometer features the same performance, environmental, and EMI/ESD protection specifications as the rest of the AccuStar I family.

Applications

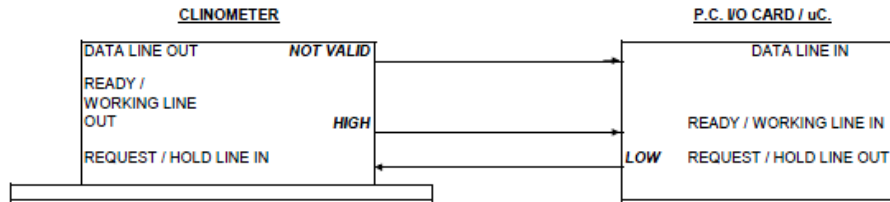
Designed to transmit data to a microcontroller, or to a PC through an I/O card, it is ideal for applications in noisy environments and/or where long cable lengths are required.

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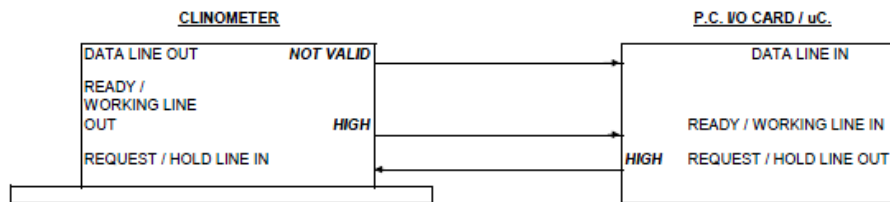
Communications interface

STEP #	CLINOMETER STATUS	P.C. / MICRO-CONTROLLER STATUS	ACTION OCCURRING
1	READY	HOLD	POWER-UP, CLIN. READY AFTER 25 MILLISECONDS

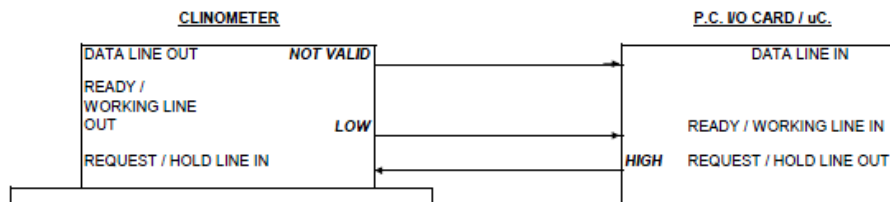


START OF MEASUREMENT AND DATA RETRIEVAL

STEP #	CLINOMETER STATUS	P.C. / MICRO-CONTROLLER STATUS	ACTION OCCURRING
2	READY	REQUEST	CONTROLLER REQUESTS DATA



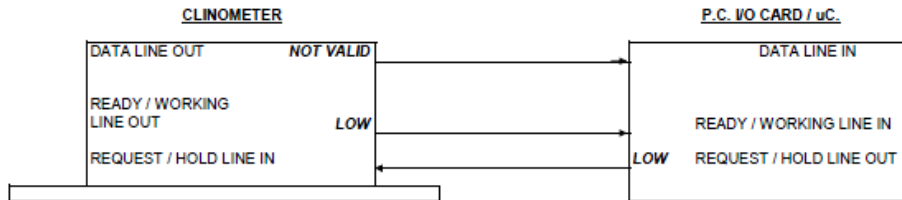
STEP #	CLINOMETER STATUS	P.C. / MICRO-CONTROLLER STATUS	ACTION OCCURRING
3	WORKING	REQUEST	CLINOMETER TELLS CONTROLLER IT IS ABOUT TO GO TO WORK.



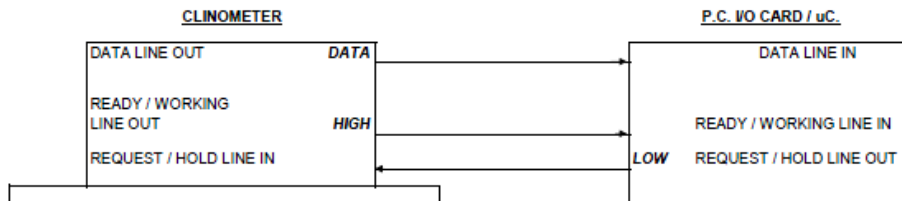
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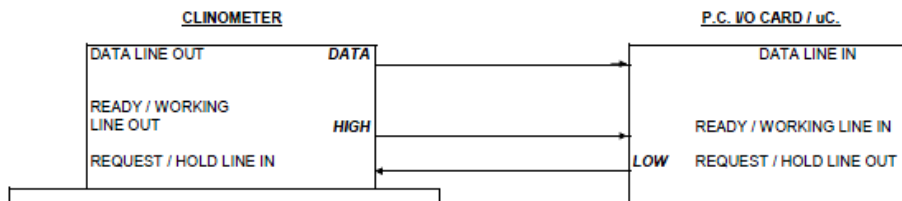
STEP #	CLINOMETER STATUS	P.C. / MICRO-CONTROLLER STATUS	ACTION OCCURRING
4	WORKING	HOLD	CONTROLLER GOES TO HOLD AND CLINOMETER GOES TO WORK.



STEP #	CLINOMETER STATUS	P.C. / MICRO-CONTROLLER STATUS	ACTION OCCURRING
5	READY	HOLD	CLINOMETER TELLS CONTROLLER WORK IS FINISHED, DATA IS READY.



STEP #	CLINOMETER STATUS	P.C. / MICRO-CONTROLLER STATUS	ACTION OCCURRING
6	READY	HOLD	CONTROLLER READS DATA BIT.



GO TO STEP NUMBER 2 AND REPEAT 16 TIMES FOR A TOTAL OF 17 BITS OF DATA

Measurement Specialties, Inc. (NASDAQ MEAS) offers many other types of sensors. Data sheets can be downloaded from our web site at: <http://www.meas-spec.com/datasheets.aspx>

MEAS acquired Schaevitz Sensors and the **Schaevitz®** trademark in 2000.

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Technical contact information

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