



83162
Bench-top Signal Conditioner



The model 781 is a precision, two-channel bench-top signal conditioner for use with all Jewell miniature tilt sensors. Powerful electronics generate balanced AC sensor excitation for up to two tilt channels (X and Y), then amplify, rectify and filter sensor response to produce a high-level DC output signal. Output is ± 8 VDC single-ended (± 16 VDC differential).

Units conveniently come with two switchable gain and filter settings (high/low; on/off) for added signal processing flexibility. The 781 also includes an amplifier for one LM35 temperature sensor, and will drive tilt and temperature signals over 1000m cable lengths. All units include calibration when ordered with Jewell Instruments miniature tilt sensors. Rugged and reliable, the 781 is an ideal choice for any laboratory application.

Input Channels:	Two Tilt Channels (X and Y tilt), One LM35 Temp. Sensor			
Output Signal:	± 8 VDC Single-ended (± 16 VDC differential)			
Gain Settings:	Two switchable gains, 10:1 ratio			
Standard Calibration:	Sensor Type	High-gain	Low-gain	Range
	755-Series	0.1 μ radian/mV	1.0 μ radian/mV	± 8000 μ radian
	756-Series	0.1 $^{\circ}$ /V	1.0 $^{\circ}$ /V	$\pm 8.0^{\circ}$
Output Filters:	Filter "On" = 7.5 sec; Filter "Off" = 0.05 sec; Roll-off = 6 dB/octave			
Temperature Output:	0.10C/mV (single-ended)			
Output Impedance:	270 Ohms			
Power Requirements:	± 11 to ± 15 VDC @ +11 and -6 mA, 250 mV ripple max., reverse polarity protected			
Connections:	Sensor: Au-plated 100 mil header pins; Power/signal: 3-ft tinned pigtail			
Environmental:	-25 $^{\circ}$ to +70 $^{\circ}$ C Operation, -30 $^{\circ}$ C to +100 $^{\circ}$ C Storage, 0-90% humidity non-condensing			
Materials:	Fiberglass PCB, thru-holed soldered components			
Dimensions and Weight:	3.85-inch (98 mm) dia. x 1.12 inches (28 mm) high (includes switches), 30 g			

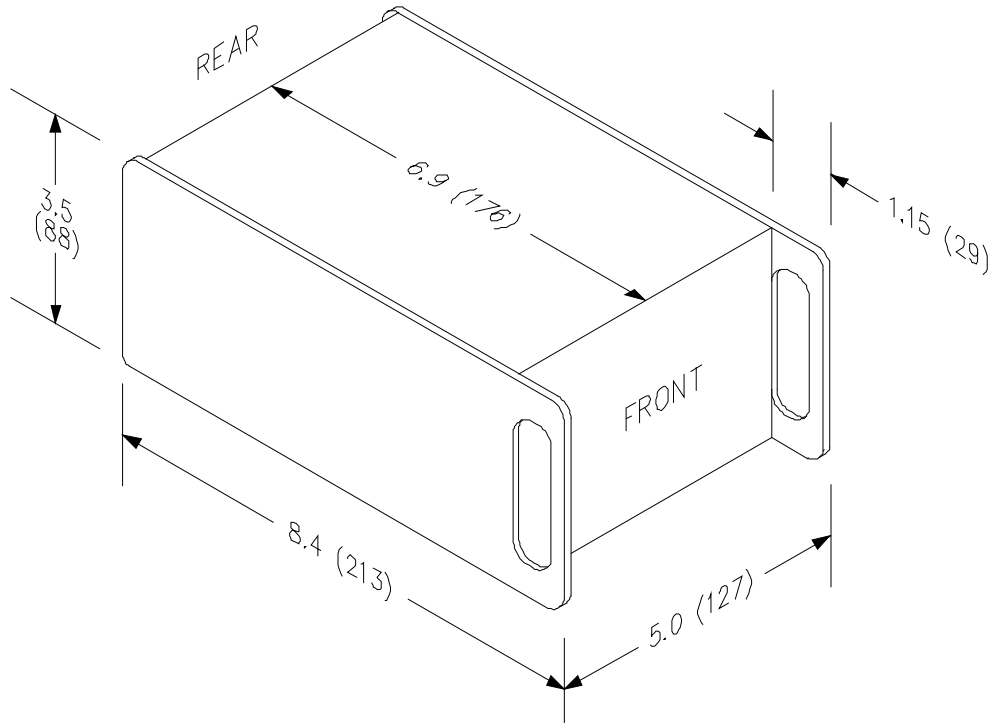
Specifications subject to change without notice on account of continued product development

ORDERING CODE

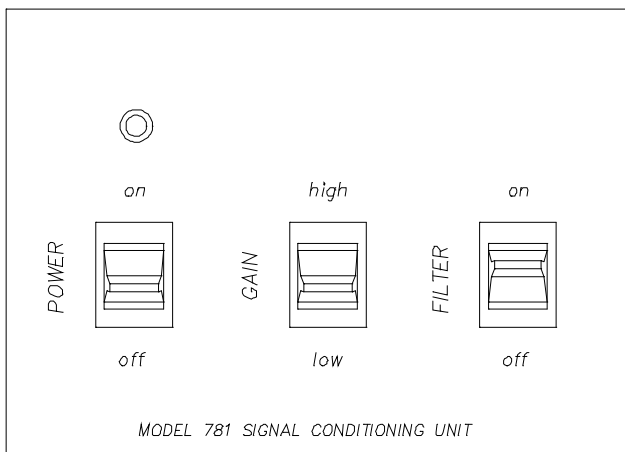
Model No.	Description
83162	Dual Channel Signal Conditioning Card, Round, 2 Gains, 2 Filters, ± 8 VDC Output (Single-ended)



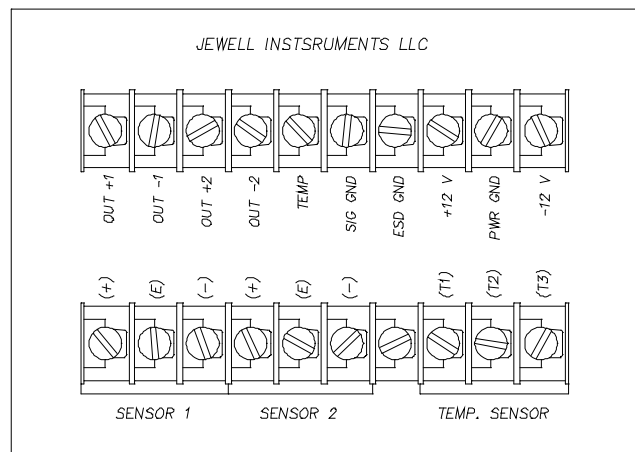
DIMENSIONS



PANEL CONFIGURATION



FRONT

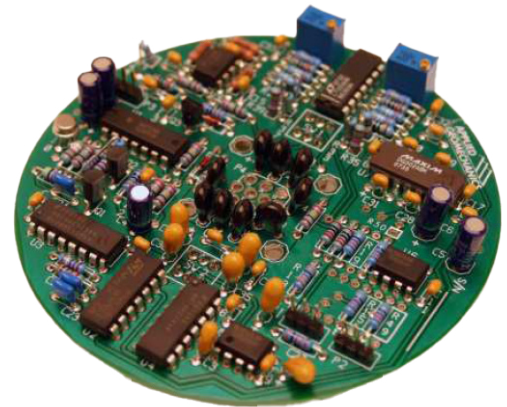


REAR



83162 Dual-channel Signal Conditioning Card

The model 83162 is a precision, two-channel signal conditioning card for use with all Jewell miniature tilt sensors. Powerful electronics generate balanced AC sensor excitation for up to two tilt channels (X and Y), then amplify, rectify and filter sensor response to produce a high-level DC output signal. Output is ± 8 VDC single-ended (± 16 VDC differential).



Units conveniently come with two switchable gain and filter settings (high/low; on/off) for added signal processing flexibility. The 83162 also includes an amplifier for one LM35 temperature sensor, and will drive tilt and temperature signals over 1000m cable lengths. All units include calibration when ordered with Jewell Instruments miniature tilt sensors. Use the model 83162 for peak performance from our 755-, 756-, or ceramic tilt sensor packages.

Input Channels:	Two Tilt Channels (X and Y tilt), One LM35 Temp. Sensor			
Output Signal:	± 8 VDC Single-ended (± 16 VDC differential)			
Gain Settings:	Two switchable gains, 10:1 ratio			
Standard Calibration:	Sensor Type	High-gain	Low-gain	Range
	755-Series	0.1 μ radian/mV	1.0 μ radian/mV	± 8000 μ radian
	756-Series	0.1 $^{\circ}$ /V	1.0 $^{\circ}$ /V	$\pm 8.0^{\circ}$
Output Filters:	Filter "On" = 7.5 sec; Filter "Off" = 0.05 sec; Roll-off = 6 dB/octave			
Temperature Output:	0.10C/mV (single-ended)			
Output Impedance:	270 Ohms			
Power Requirements:	± 11 to ± 15 VDC @ +11 and -6 mA, 250 mV ripple max., reverse polarity protected			
Connections:	Sensor: Au-plated 100 mil header pins; Power/signal: 3-ft tinned pigtail			
Environmental:	-25 $^{\circ}$ to +70 $^{\circ}$ C Operation, -30 $^{\circ}$ C to +100 $^{\circ}$ C Storage, 0-90% humidity non-condensing			
Materials:	Fiberglass PCB, thru-holed soldered components			
Dimensions and Weight:	3.85-inch (98 mm) dia. x 1.12 inches (28 mm) high (includes switches), 30 g			

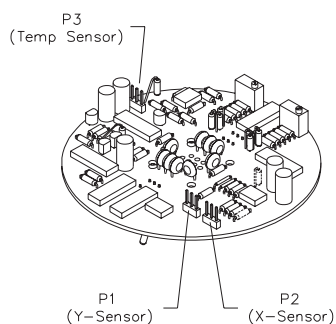
Specifications subject to change without notice on account of continued product development

ORDERING CODE

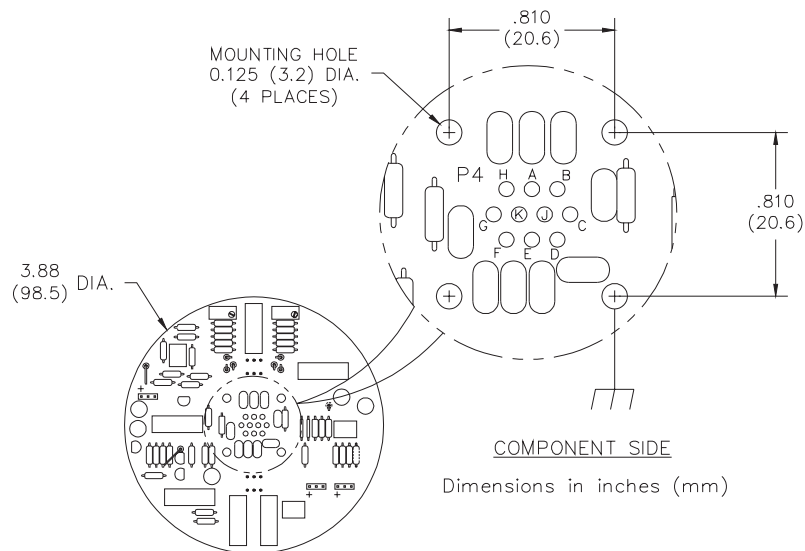
Model No.	Description
83162	Dual Channel Signal Conditioning Card, Round, 2 Gains, 2 Filters, ± 8 VDC Output (Single-ended)



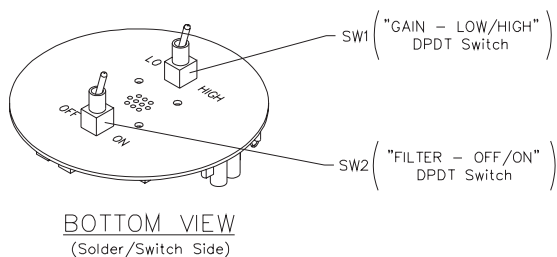
DIMENSIONS AND PIN-OUTS:



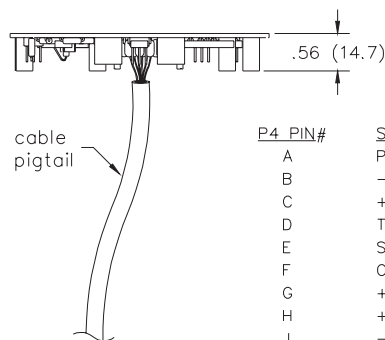
TOP VIEW
(Component Side)



COMPONENT SIDE
Dimensions in inches (mm)



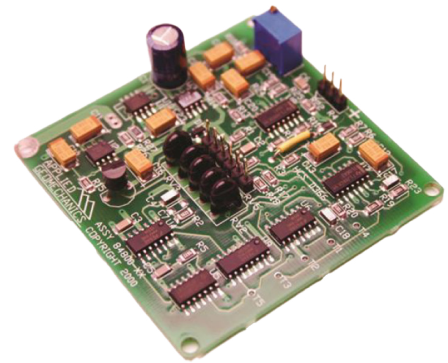
BOTTOM VIEW
(Solder/Switch Side)



P4 PIN#	SIGNAL/FUNCTION	WIRE COLOR
A	Power Ground	BLACK
B	-12 VDC in	PURPLE
C	+X out	GREEN
D	Temperature out	YELLOW
E	Signal ground	WHITE
F	Case/Earth ground	DRAIN WIRE
G	+Y out	BLUE
H	+12 VDC in	RED
J	-X out	GREY
K	-Y out	BROWN



84800
Single-channel Signal Conditioning Card



The model 84800 is a compact, high performance signal conditioner for use with all Jewell Instruments miniature tilt sensors. Each 84800 conditioning card will drive one tilt channel (X or Y), and one LM35 temperature sensor. Output is a stable ± 5 VDC voltage (± 10 VDC differential). Units also include a built-in 1.75 sec low-pass Butterworth filter for superior noise rejection (specify custom filter times on order), and the square form factor allows for easy packaging in OEM and end-user assemblies.

The model 84800 will drive signals over cable lengths of 300m. Distances between card and tilt sensor can be up to 100m. Use the 84800 signal conditioning card for peak performance from any of our 755-series, 756- or Ceramic Miniature Tilt Sensors.

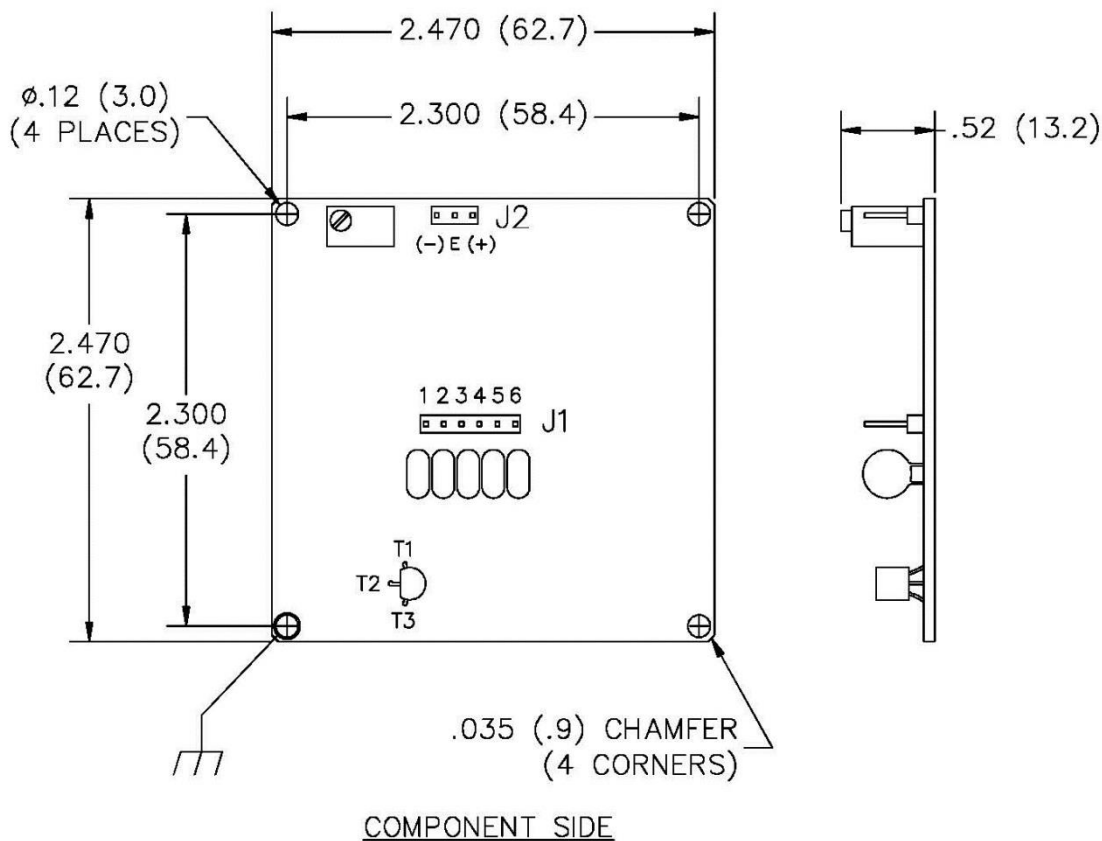
Input Channels	One Tilt Channel, One LM35 Temp. Sensor		
Output Signal	± 5 VDC Single-ended (± 10 VDC differential)		
Gain Settings	Fixed gain		
Standard Calibration	<u>Sensor Type</u>	<u>Scale Factor</u>	<u>Range</u>
	755-Series	0.1°/V	$\pm 0.5^\circ$
	756-Series	1.0°/V	$\pm 5.0^\circ$
	84053 Ceramic	0.6°/V	$\pm 3.0^\circ$
	84064-02 Ceramic	10°/V	$\pm 50^\circ$
Output Filters	2-pole Butterworth low-pass filter, roll-off = 12 dB/octave		
Temperature Output	0.1°C/mV (single-ended)		
Output Impedance	270 Ohms		
Power Requirements	8 to 18 VDC@ 8 mA typical, 250 mV ripple max.; reverse polarity protected		
Connections	Sensor: Au-plated 100 mil header pins; Power/signal: J1 100 mil header pins		
Environmental	-25° to +70°C Operation, -30°C to +100°C Storage, 0-90% humidity non-condensing		
Materials	Fiberglass PCB, surface mount components		
Dimensions and Weight	2.47 x 2.47 x 0.63 inches (63 x 63 x 16 mm), 0.75 oz (21 g)		

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

ORDERING CODE

Model No.	Filter f_c (Hz)	Typical Time Constant (s)
84800 - 01	0.183	1.750
84800 - 02	1.829	0.175
84800 - 03	0.638	0.500
84800 - 04	0.318	1.000
84800 - 05	0.064	5.000

DIMENSIONS



Dimensions in inches (mm)

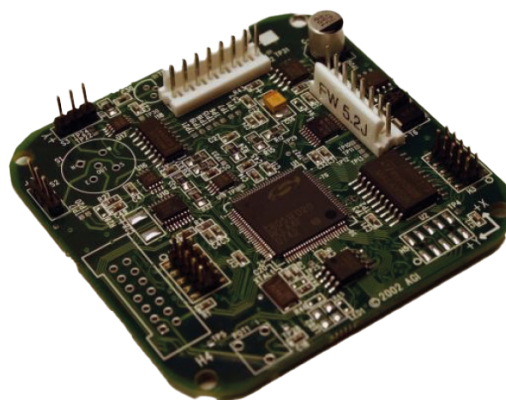
WIRING AND PIN-OUT:

J1 Pin	Function
1	8-18 VDC
2	Signal Ground
3	Power Ground
4	+Tilt
5	-Tilt (differential)
6	Temperature



 **IRIS-SC**
Digital Signal Conditioning Card

The IRIS-SC digital signal conditioning card is a powerful control device designed for use with all Jewell miniature tilt sensors. Output is ASCII RS232 or RS422(485) serial. Standard firmware includes five user-programmable alarm/trigger thresholds for tilts tilt switch/control applications. When a selected threshold is reached, the circuitry sets the output high on one of the pins in the H3 control connector.



Other firmware features include user programmable data output rates, sample averaging, autozero (nulling), and baud rate. The IRIS-SC can also log up to 22,000 samples to internal memory for data dump/download on user command. All IRIS-SC units include calibration when ordered with Jewell miniature tilt sensors (specify calibrated range on order).

Input Channels	Two Tilt Channels (X and Y tilt)
Resolution	16-bit ADC
Output	RS232 and RS422(RS485 Full Duplex) Digital Serial, ASCII
Temperature Output	On-board Temperature Sensor
Sample Rates	User-selectable from 10/second to 1/hour
Data Storage	512 kB of nonvolatile Flash Memory available* (approx. 22,000 samples)
Baud Rate	9600 (default), 19200, 28800, 57600, 115200, 230400
Data Format	NMEA XDR, Trimble TCM, Ashtech, Simple (X, Y, temp., S/N)
Control Outputs	8 TTL-compatible CMOS control outputs (0-5 VDC); 20mA source Power per channel (not to exceed 100mA across all 8 channels)
Power Requirements	7-28 VDC @ 27 mA, 250 mV ripple max., reverse polarity and surge protected.
Environmental	-40°C to +85°C operating and storage; 90% humidity, noncondensing
Connections	Four 24-in cables included: Two for signal (H1, one for RS232 and another for RS485); Power (H2); Control Output (H3)
Dimensions and Weight	67 x 67 x 25mm max. (2.6 x 2.6 x 1.0 inches); 31g (1.1 oz)

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

ORDERING CODE

Model No.	Description
IRIS-SC	IRIS Signal Conditioning Card, RS232/RS422 Output, 16-bit, Dual Channel, Fixed Gain

INCLUDED ACCESSORIES

Part No.	Description
84063-01	Extra 24-in Cable Assembly, RS232 , H1 Header to DB9-sub Connector
84063-02	Extra 24-in Cable Assembly, Power (H2)
84088-01	Extra 24-in Cable Assembly, RS422 , H1 Header to DB9-sub Connector
84083-01	24-in Tilt Switch Control Cable (Connects to H3 Terminal), Tinned Ends
00254-02	Transformer, 100-240VAC to 12VDC

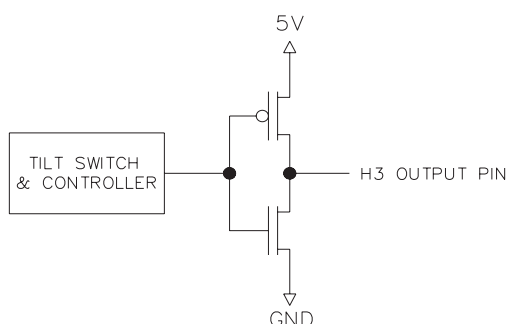
PERFORMANCE SPECIFICATIONS

A Full-Featured Signal Conditioner

IRIS-SC is a versatile dual channel signal conditioner. Serial ASCII data are output as either RS232 or RS422(485) signals for recording by an external terminal or computer. Important features are firmware-controlled and user-selectable. These include output data rates and formats, signal averaging, autozero (nulling), and internal data storage (logging). Several output data formats are provided, all of which include X tilt, Y tilt, Temperature and Serial Number information.

A Powerful Control Device

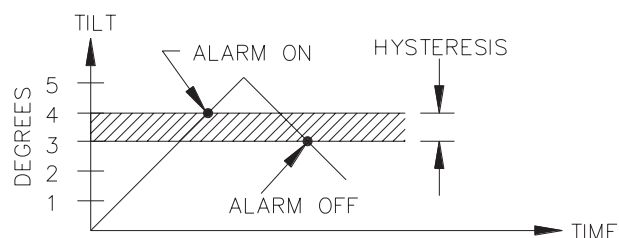
The firmware on the standard IRIS board has 5 user programmable thresholds. When a tilt measurement is taken, it is compared to each of these thresholds: +X tilt, -X tilt, +Y tilt, -Y tilt and tilt in any direction. If the measurement exceeds one or more of the thresholds, the corresponding output pin(s) in the H3 connector, are set high (5V), as shown below. If the threshold is not exceeded, the output remains at 0 Volts. The reference angle for the threshold measurement is selected using the autozero command. Threshold checking may be turned off with a single firmware command when it is not needed.



The standard IRIS firmware also allows the user to set the hysteresis of the control thresholds.

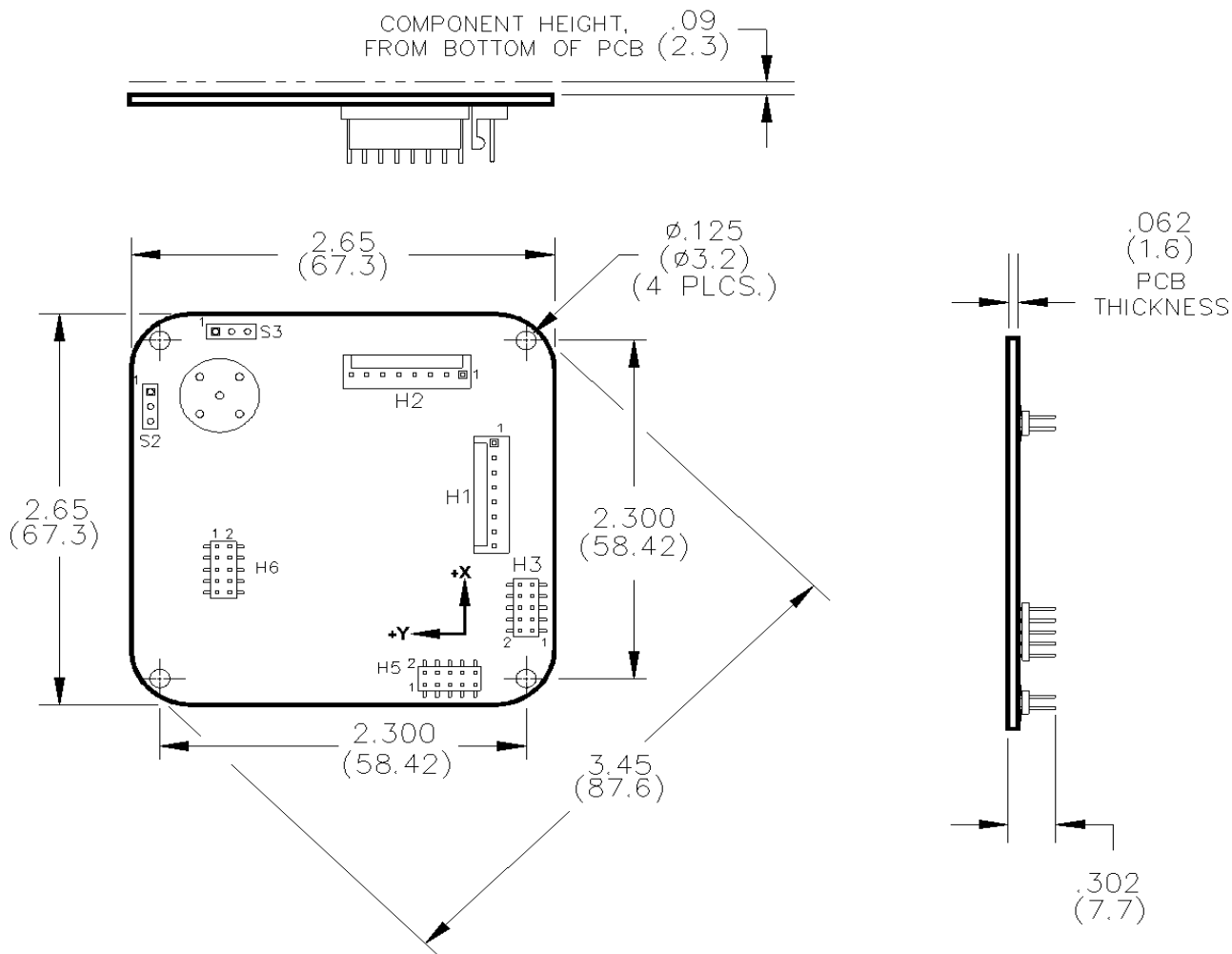
The hysteresis is used as follows: After an H3 output pin is set high, it is not set low again until the tilt reading has reached a level that is below the threshold by an amount equal to the hysteresis (see diagram).

IRIS includes 3 additional control output pins in the H3 connector, bringing the total to 8. The 3 additional pins are not active in the regular versions of the product, but may be implemented for your application by custom programming by our software engineers. Each of the 8 control outputs is separately programmable. Another custom option is "normally high" control output instead of the standard "normally low" output. With "normally high" controls the voltage level of the H3 pin is 5V until a threshold is reached, at which time it switches to 0V.



In the regular versions of IRIS the control pins in connector H3 are all set high for approximately 150 milliseconds on power up, after which they reset to their "normally low" value of 0V until a tilt threshold is detected.

DIMENSIONS



Dimensions in inches (mm)

PIN-OUTS

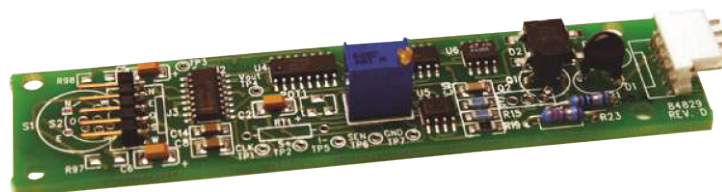
H1 Pin	Function
1	V+
2	GND
3	Tx (RS232)
4	Rx (Rs232)
5	Tx+ (RS422)
6	Tx- (RS422)
7	Rx- (RS422)
8	Rx+ (RS422)

H2 Pin	Function
1	V+
2	GND
3	GND
4	--
5	--
6	--
7	Analog X-out
8	Analog Y-out

H3 Pin	Function
1	-X tilt threshold
2	+X tilt threshold
3	-Y tilt threshold
4	+Y tilt threshold
5	Optional threshold*
6	Optional threshold*
7	Optional threshold*
8	Threshold in any direction
9	Ground
10	3.3 VDC output



 **TULIP-SC**
4-20mA Signal Conditioning Card



The Tulip-SC is a precision 4-20mA signal conditioning card for use with all Jewell Instruments miniature tilt sensors. Each Tulip- SC card operates one single axis tilt sensor. Tilt output is measured as a 4-20mA output.

The Tulip-SC is current loop powered, so measurements can be made over long cable lengths using an economical 2-wire pair. Units also come with an on-board thermistor for measuring temperature. Jewell provides factory calibration for all Tulip-SC electronics when ordered with our 84053 and 84064 Ceramic, or Model 755- and 756- miniature tilt sensors.

Input Channels	1 Tilt Channel (X or Y)		
Output Signal	4-20mA, 2-wire Current Loop		
Gain Settings	Fixed		
Standard Calibration	<u>Sensor Type</u>	<u>Scale Factor</u>	<u>Linear Range</u>
	755-Series	0.0625°/mA	±0.25°
	756-Series	0.625°/mA	±5.0°
	84053	0.375°/mA	±3.0°
	84064-02	6.25°/mA	±60.0°
Output Filter	0.15 sec ¹		
Temperature Output	2500-Ohm thermistor, on-board (type-B curve)		
Power	(0.02 Ampere x R + 10 VDC) < Vs < 29 VDC		
Environmental	-40 to +85°C operation and storage, 0-90% humidity non-condensing		
Dimensions	4.05 x 0.92 x 0.51 in (103 x 23.4 x 13 mm), 0.5 oz (15 g)		
Materials	Fiberglass PCB, surface mount components		

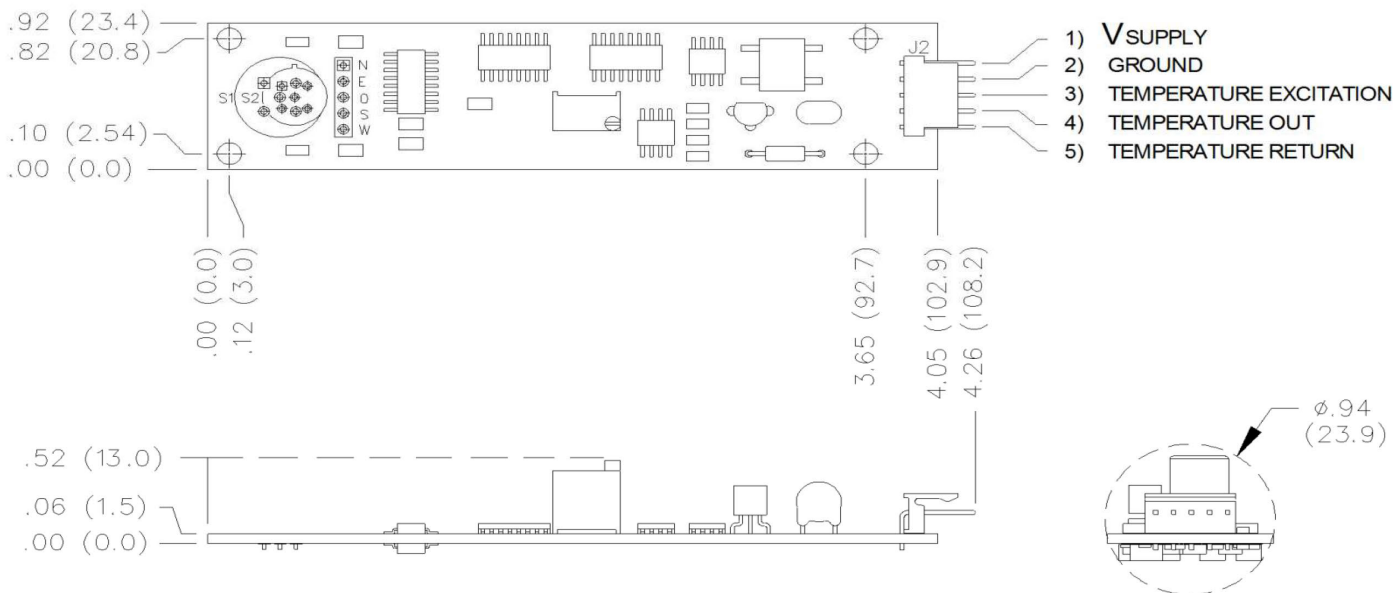
Specifications subject to change without notice on account of continued product research and development

 **ORDERING CODE**

Model no.	Part no.	Description
TULIP-SC	84829	Tulip Signal Conditioning Card, 4-20mA, Single Channel, Fixed Gain and Filter
70382-03	70382-03	Miniature Tilt Sensor Hookup Cable, 9-conductor (3 twisted shielded triples), specify required length on order

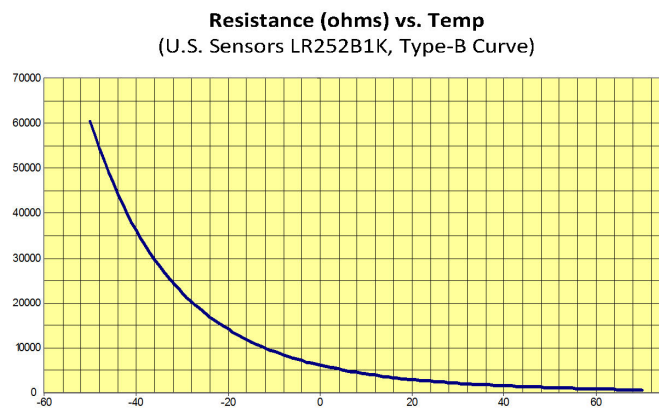
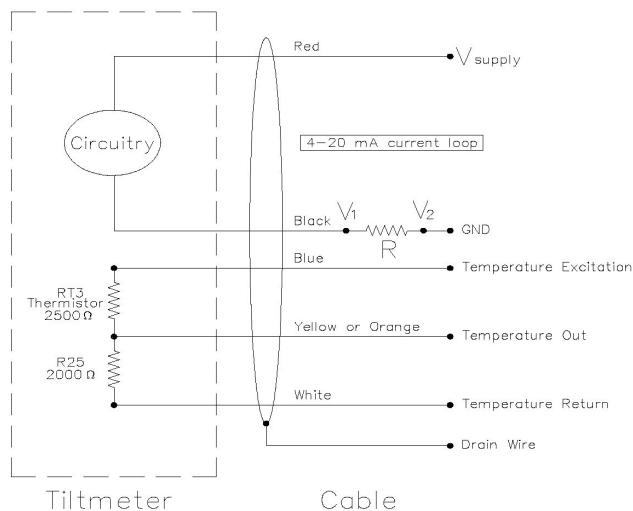


DIMENSIONS



CIRCUIT DIAGRAM:

THERMISTOR OUTPUT



$$T = 1/[A + B \ln(RT3) + C \ln(RT3)^3 + D \ln(RT3)^5] - 273.15$$

where *T* is in degrees Celsius and *RT3* = thermistor resistance.
A = 7.34862E-04; *B* = 3.38205E-04; *C* = -1.30862E-07; *D* = 1.21751E-09