



RDR Series

Rieker Remote Digital Inclinometer Brochure

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The RDR Series is a Complete Remote Display of Angle Monitoring and Roll Over Early Warning System



Description

The RDR Remote Inclinometer Package is an extension of the RDI Digital Inclinometer series. The package is supplied as a calibrated set featuring an environmentally sealed inclinometer (single or dual axis) and LCD. The RDR has the same features as the RDI including user defined inclination ranges, multiple outputs combinations, and adjustable switch output trip angle settings.

The RDI provides single or dual axis inclination sensing in a rugged environmentally protected housing. This is a semi-custom unit where all subassemblies are stock but specific functions are customized. A modular design allows the customer to select the measurement range, output type, and temperature compensation that best suits the individual application. Standard input ranges $\pm 10^\circ$, $\pm 30^\circ$ and $\pm 70^\circ$ are available for both single and dual axis models - these can be scaled to specific ranges per axis. Special single axis ranges up to $\pm 100^\circ$ are available. Non-symmetrical (or scalable) ranges (ie: -10° to $+90^\circ$) are available for applications that only tilt in one direction.

The RDI can be supplied with multiple output configurations: Digital LCD Display, Analog Voltage output, Digital Serial RS232 output, and up to four (4) Open Collector Switch Outputs providing maximum functionality.

The LCD displays angle in degrees with optional percent grade or inch per foot rise. The LCD comes standard with 3 built in LED's (1 green, 1 yellow, and 1 red). These can be activated to trip at predefined angles within the specified measurement range - providing the operator a bright visual warning signal.

Features

- Single or Dual Axis Measurement
- Custom Input Ranges up to $\pm 90^\circ$
- LCD Angle in Degrees
- LCD Resolution 0.1° or 0.01°
- Relative Zero Function
- Minimum/Maximum Angle Achieved Function

Options

- LCD Displays Angle in Percent Grade
- Analog 0...5VDC Output
- RS232 Serial Output
- Up to 4 Open Collector Switch Outputs
- Adjustable Trip Angle Settings
- High Current-Sink Capability
- Lamp/Solenoid/Relay Driver

Applications

- Slope Warning System
- Roll Over Early Warning
- Platform Leveling
- Pitch and Roll Monitoring
- Vehicle Tilt Monitoring
- Antenna Positioning
- Boom Angle Indicating
- Safe Curve Speed Assignment (Ball Banking)
- Sound System Remote Speaker Alignment
- Mining/Boring Equipment Leveling

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All RDI LCD display models provide a Relative Zero and a Minimum/Maximum Angle function as a standard feature, certain options selected may be substituted. The Relative Zero (REL) allows the operator to temporarily zero the digital readout to obtain relative slope changes. The operator will always know when the device is in the REL mode by the (*) symbol that is displayed after the angle. The Minimum/Maximum Angle (MIN/MAX) function provides the smallest and largest angle the device has sensed since the last reset.

Examples of LED programming:

For leveling applications - the LED function is set so the green LED turns on when level then switches to yellow or red when out of level; For indication of safe and unsafe conditions (such as preventing vehicle rollover) - the green light would indicate the vehicle is within the safe operating zone, the yellow light would indicate a warning zone, and the red light would indicate the vehicle is on a slope that exceeds the recommended safe operating zone - giving the operator a bright visual immediate danger signal to return to more even ground.

RDI Optional Features:

Temperature Compensation can be added depending on the required accuracy over temperature (recommended based on operating temperature). For applications that require remote angle measurement (the sensor unit is mounted separately from the Display box) we offer remote display inclinometer packages.

0..5VDC analog voltage (0.25...4.25V) output is available - a 12 bit digital to analog converter is used to perform the conversion.

RS232 digital output is presented in decimal format in degrees, percent grade, or inch per foot rise. The output is formatted one reading per line for single axis units and two readings per line for dual axis units. The first reading for a dual axis unit represents channel 1 (typically side to side/roll) and the second reading represents channel 2 (typically front to back/pitch). The dual RDI can also be configured with both channels reading along the same axis for double redundancy.

Open Collector Switch Outputs (up to 4) can be factory set to switch at a predetermined angle anywhere within the selected measurement range. The switching function can be configured for either Normally Open for out of range indication or Normally Closed for in range indication. The outputs can be used to drive an external buzzer, horn, lamp, solenoid, or relay allowing for audible and/or visual warnings and equipment shut down control. **Delay option** - Each switch output can be delayed from 0 to 16 seconds to help eliminate false triggering. Available in both display and non-display models, with a display model the outputs are tied directly to the LED's on the front panel and are configured to indicate when switching occurs for the open collector switch outputs.

Interface cables sold separately, special connectors available upon request.



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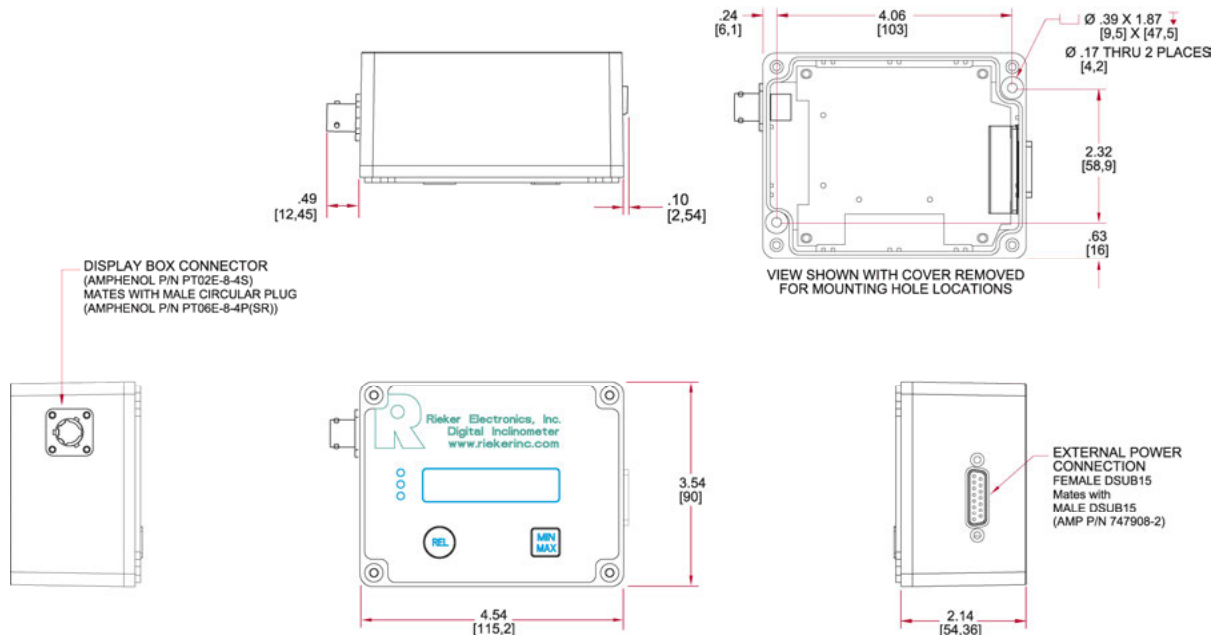
INPUT PARAMETERS			
Measuring Angle Ranges	Standard: $\pm 10^\circ$, $\pm 30^\circ$, $\pm 70^\circ$ Scalable: Symmetrical $\pm 4^\circ$ min to $\pm 70^\circ$ max (single axis up to $\pm 90^\circ$) Scalable: Non-Symmetrical anywhere within full scale of range (ie: -10° to $+90^\circ$)		
Measurement Axes	Single or Dual		
Axis Mounting	Any Direction		
Input Power Supply	8..30 VDC Non-Regulated, (5VDC Regulated, 9V Battery, 110VAC or 240VAC wall adaptor optional)		
Current Consumption	Display Version (Without LED): 15mA typical Display Version (One LED): 35mA typical Max All Options: 100mA max.		
OUTPUT PARAMETERS			
Non-Linearity ¹	< 0.5% FR		
Null Repeatability	< 0.05°		
Transverse Sensitivity	<1.0% at 30° Tilt		
Response Time	< 0.3 seconds (300mSec), (slower response times available)		
Temperature Drift of Sensitivity ²	< -0.17%/°C for $\pm 10^\circ$ models and lower < -0.12%/°C for models greater than $\pm 10^\circ$		
Temperature Drift of Zero ²	< ± 0.05 mV/°C for $\pm 10^\circ$ models and lower < ± 0.025 mV/°C for models greater than $\pm 10^\circ$		
Temperature Compensated Output Drift	< $\pm 1.0^\circ$ (over full operating temperature range)		
Output Units	Degrees, (Percent Grade optional)		
LCD BOX PARAMETERS			
LCD	Single Axis: Single Line Display, Dual Axis: Dual Line Display		
LCD Resolution	Standard: 0.1°, (0.01° optional)		
Min / Max Readings	Stored in Volatile Memory		
Relative Zero	Stored in Volatile Memory		
LED ³	1 green, 1 yellow, 1 red (Activated per customer request)		
ANALOG VOLTAGE 0-5V OUTPUT			
Analog Voltage Output	2.25 \pm 2.0 VDC		
Voltage Resolution	$\pm 10^\circ$	$\pm 30^\circ$	$\pm 70^\circ$
	<0.01°	<0.02°	<0.04°
DIGITAL SERIAL RS232 OUTPUT (DECIMAL OUTPUT)			
Baud Rate	9600		
Data Bits	8		
Parity	None		
Stop Bits	1		

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OPEN COLLECTOR SWITCH OUTPUT		
Open Collector Outputs	Up to 4 available for activation	
Open Collector Current	1A each	
Switch Function	Normally Open: out of range indication, Normally Closed: in range indication	
Switch Trip Delay	0 to 16 seconds	
Switch Trip Angles	Factory set anywhere within range, (Adjustable Trip Setting optional)	
MECHANICAL CHARACTERISTICS		
Housing	LCD	Remote Inclinometer
	Die Cast Aluminum – Painted Black	Die Cast Aluminum – Painted Black
Environmental Rating	Nema 4 – not 100% waterproof	Nema 4 – ALL-Weather
Mounting Holes	Two M4 x 0.7 or Two #8-32 (Mounting Feet Optional)	
Outline Dimensions	4.54" x 3.54" x 2.27" (115 x 90 x 56mm) See Drawing	
Electrical Connection	DSUB15-pin & Amphenol PT0 Type	Amphenol PT0 Type
Weight	16 ounces (not including mounting feet)	
Operating Temperature	-20°C to +70°C (-4°F to +158°F)	-40°C to +85°C (-40°F to +185°F)
Notes: 1. Non-linearity generated by best fit straight line using least squares regression. Output is linear with respect to the input angle directly. 2. Sensor Temperature Drifts apply to Non-Temperature Compensated versions. 3. LED trip angles can only be set within the measuring range of the device and must match the open collector switch outputs if they are selected.		

FIGURE 1: RDI Display Box, Dimensions (Inches [mm]) and Mounting Position



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FIGURE 2: RDI Remote Inclinometer Box, Dimensions (Inches [mm]) and Mounting Position

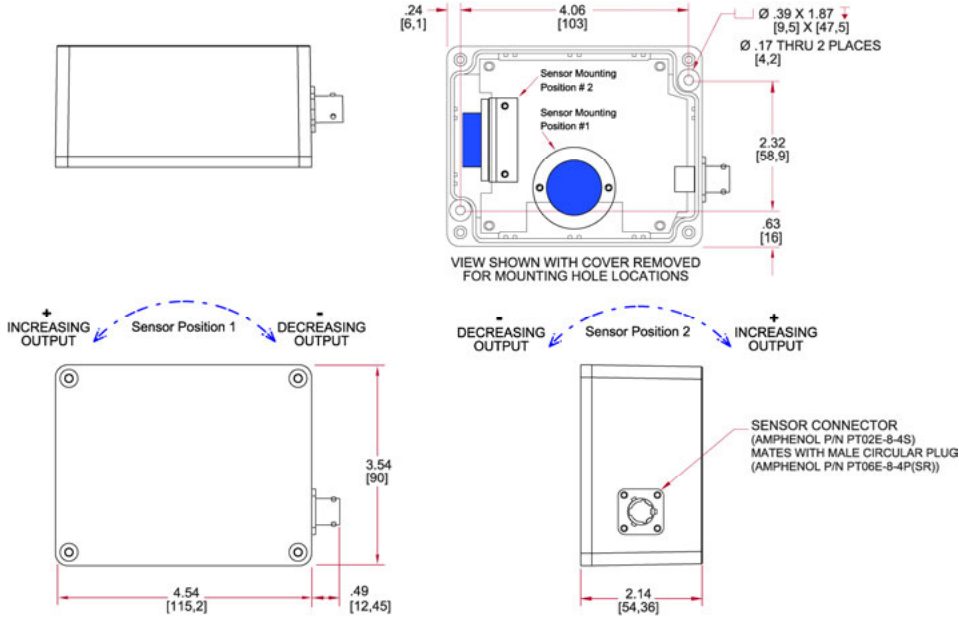
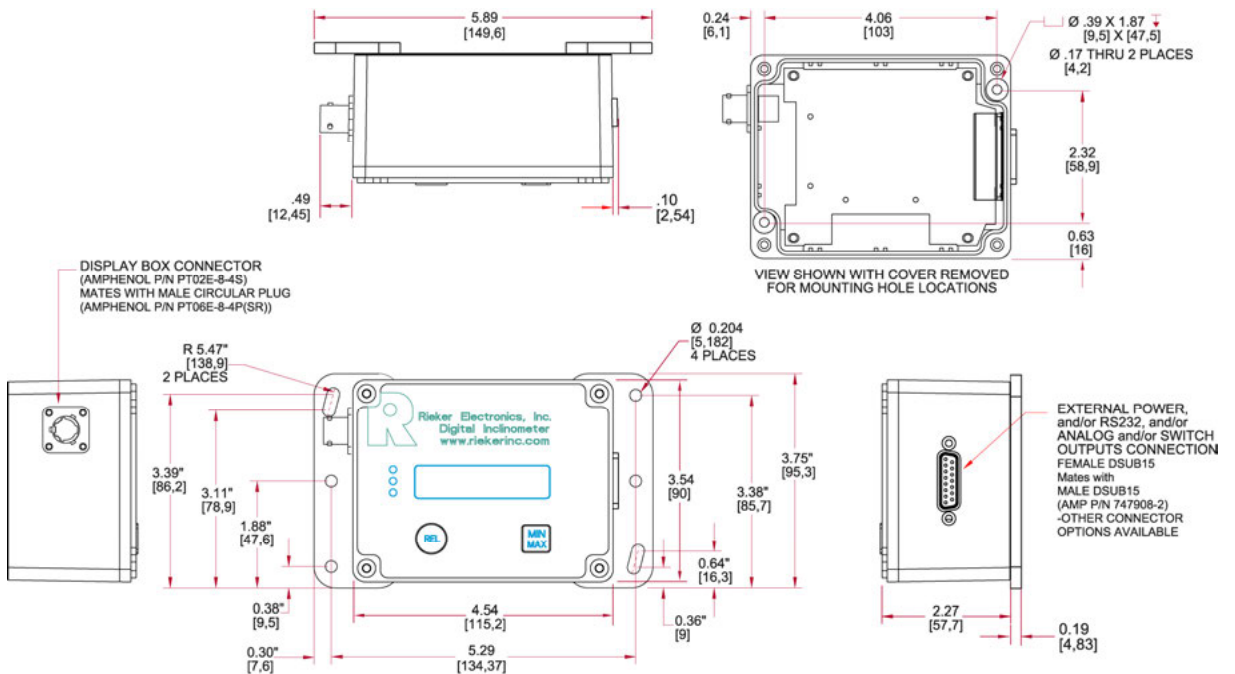


FIGURE 3: RDI Display Box with Mounting Feet, Dimensions (Inches [mm]) and Mounting Position



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FIGURE 4: Remote Box (optional mounting feet) Dimensions (Inches [mm]) & Mounting Position

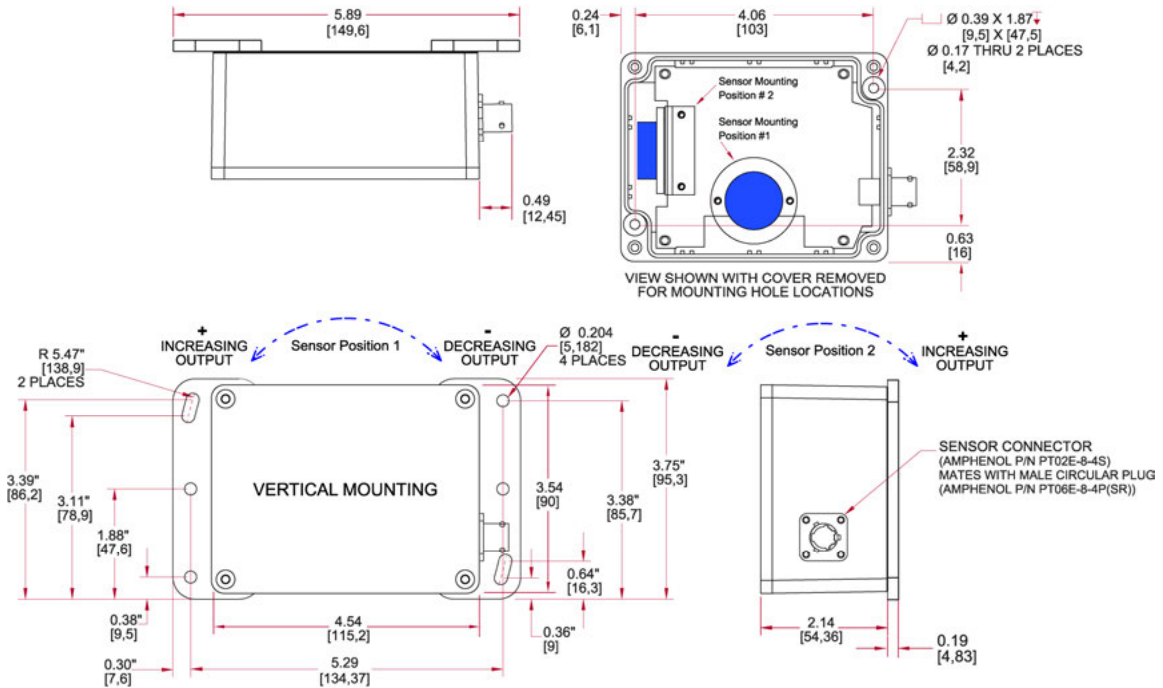
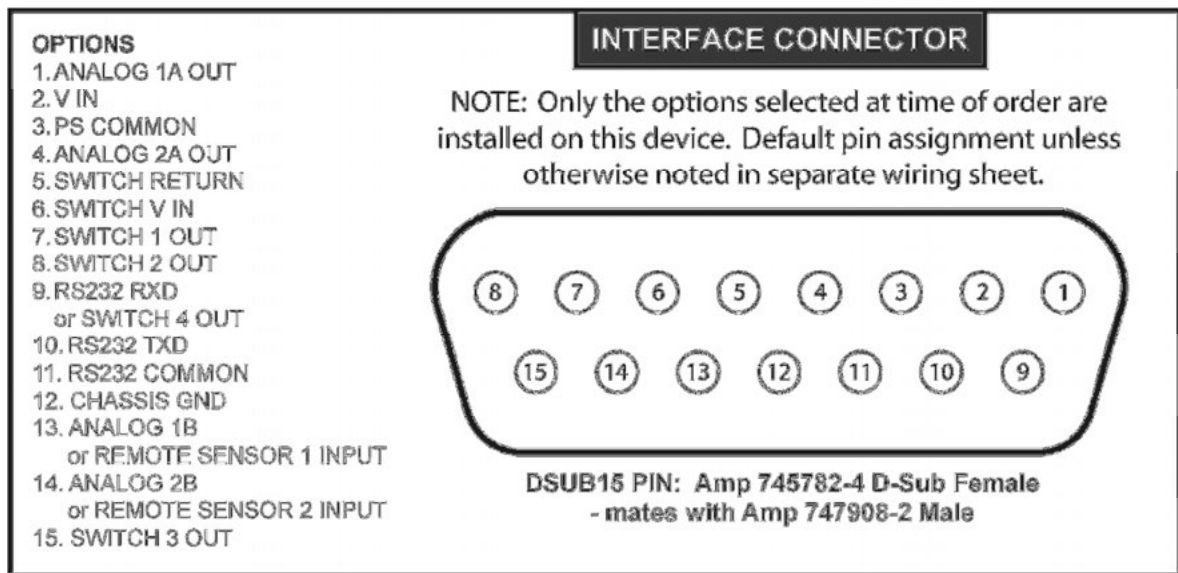


FIGURE 5: DSUB Wiring Connector for Input Power and Selected Outputs

Note: the DSUB15 pin connector is the default electrical connection for the RDI LCD package. The chart below shows all optional outputs, specific models and customer specifications may be different - options may vary from model to model. Semi-custom models may also include alternate connectors.



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