



## General Information Brochure

High-Accuracy Precise Measuring  
Multiple Configurable Outputs  
Sunlight-Readable Touch Screen  
Single/Dual Axis Operation  
Horizontal/Vertical Mounting  
Rechargeable Battery  
Hand-held Use

MPI/2020

# Multi-Output Precision Inclinometer



### PRODUCT SAFETY GUIDE FOR RIEKER MPI DIGITAL GRAPHIC DISPLAY

Important safety, health, and regulatory info that applies to the Rieker MPI Digital Graphic Display.



#### **WARNING: Outdoor and Wet Conditions Use**

The Rieker MPI device is rugged and dust tight - it is NOT waterproof and is not impervious to water damage in wet environments. To avoid damaging this device, do not submerge it or expose it to excessive rain or moisture. To reduce the risk of fire or shock, do not attempt to change batteries in rain or excessive moisture conditions.



#### **WARNING: Do Not Attempt Repairs**

Do not attempt to take apart, open, service, or modify the product, accessories, or power supply. Doing so could present the risk of electric shock or other hazard. Any evidence of any attempt to open and/ or modify this device, including any peeling, puncturing, or removal of any of the labels, will void the Limited Warranty.



#### **WARNING: Battery Safety**

This device contains a lithium ion battery, improper use of which may result in fire or explosion. To reduce the risk of fire or explosion, do not heat, open, puncture, mutilate, or dispose of the product in fire.

Do not leave the device in direct sunlight, such as on the dash of a car in the summer, for an extended period of time. Product contains rechargeable batteries do not recharge your device near a fire or in extremely hot conditions.



#### **WARNING: Proper Storage - Extreme Environmental Conditions**

Only store your Rieker graphic display device in a clean, dry environment. Do not store your Rieker MPI device where the ambient temperature is above 158°F (70°C) or below -4°F (-20°C). Do not store your Rieker device where it is exposed to strong electromagnetic fields or where it may be exposed to direct electrical current. Using or storing the Rieker MPI device in an environment where the external temperature varies widely and quickly might damage the display. When moved to a location with a temperature difference of 20°F (11°C) or more from the previous location, allow the device to come to room temperature before turning it on.



#### **WARNING: Potentially Explosive Atmospheres**

Areas with potentially explosive atmospheres are often, but not always, posted and can include fueling areas, such as below decks on boats, fuel or chemical transfer or storage facilities, or areas where the air contains chemicals or particles, such as grain dust, or metal powders. The Rieker MPI device is NOT rated for hazardous locations. When you are in such an area, turn off the device, and do not remove or install battery chargers, AC adapters, or any other accessory. In such areas, sparks can occur and cause an explosion or fire.



#### **CAUTION:**

This MPI has been manufactured to allow for trip angle adjustment. Purchaser assumes the responsibility of ensuring that the settings are appropriate for their specific application. **IN NO EVENT WILL RIEKER BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND.**



#### **CALIBRATION NOTES:**

This instrument has been calibrated to perform to precise specifications. Any tampering or reconfiguration of this instrument may change the properties of the product, and will therefore void the warranty. All sensors are sealed. If the seal is broken the calibration and warranty is void.

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### High-Accuracy Digital Inclinometer with Sunlight Readable Touch Screen & Adjustable Output Parameters for Precision Angle Measurements.

#### Description

The MPI provides accurate and precise single or dual axis inclination sensing in a rugged machined Aluminum housing - the anodized finish protects the surface from wear. The design is well suited for hand-held use; each side is a machined flat reference surface.

The MPI offers multiple configurable outputs: Graphic Touch-Screen Sunlight-readable Display, Digital RS232 & RS485, Analog Voltage, and multiple Relay Switches providing maximum functionality.

The display shows angle in degrees (°), percent grade (%), or inch per foot rise (") with either 1, 0.1 or 0.01 degree resolution. The display provides graphical axis level indicators in green, yellow, and red, which can be activated to trip at predefined angles within the specified measuring range - providing the operator a bright visual alert of changed condition. These can be coordinated with the built in Relay outputs - each with field adjustable trip angle settings.

The MPI also has a Bulls-Eye Bubble Level mode for precise leveling applications.



Mounting options include machined plates for permanent installation or with heavy duty magnets added, temporary hands-free placement.



#### Features

- Single or Dual Axis Measurement
- ±180° Measuring Range
- Angle in Degrees, Percent Grade, Inch Per Foot Rise
- Display Resolution 0.01, 0.1, 1
- Bulls-Eye Bubble Level Mode
- Relative & Permanent Zero
- Min/Max Angle Achieved
- Rechargeable Long-lasting Lithium Ion Battery and 8..30VDC Input

#### Outputs

- Graphic Touch Screen Display
- Analog Voltage (0..5VDC)
- Digital Serial RS232
- Digital RS485
- Relay Switches
- Adjustable Trip Angle Settings

#### Applications

- Slope Angle
- Roll Over Early Warning
- Platform Level
- Pitch Angle
- Antenna Position
- Handheld Precision Measuring

#### What's in the box

- Multi-Output Precision Inclinometer
- Charging Cable/Wall Adaptor
- Input/Output Cable
- Changeable Magnetic Mounting Plates
- Hard Carrying Case

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## Multi-Output Precision Inclinometer

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**TABLE 1: SPECIFICATIONS**

INPUT PARAMETERS	
ANGLE MEASURING RANGE	±180°
MEASUREMENT AXES	Single or Dual (User selectable)
MEASUREMENT ORIENTATION	Horizontal or Vertical (User selectable)
INPUT SUPPLY	8..30VDC Non-Regulated Rechargeable 3.7V Lithium Ion Battery (USB charger included)
INPUT PROTECTION	Reverse Polarity, ESD & Surge Protected
CURRENT CONSUMPTION <sup>1</sup>	120mA typical (while operating) 500mA typical (while charging) 620mA typical (while operating and charging)
OUTPUT PARAMETERS	
ACCURACY OVER FULL OPERATING TEMPERATURE	±0.05° typical, ±0.1° absolute max
RESPONSE TIME	< 0.1 seconds (100mSec) (User Configurable)
OUTPUT UNITS OF MEASURE	Degrees (default), Percent Grade, Inch per Foot Rise (User selectable)
GRAPHIC DISPLAY PARAMETERS	
GRAPHIC DISPLAY	Capacitive surface touch screen, sunlight viewable
DISPLAY PROVIDES	Battery life, axis selection, zero adjust, min/max, mounting orientation, green/yellow/red condition change lights, configuration menu
DISPLAY RESOLUTION	0.01° (default), 0.1°, 1° (User selectable)
MIN / MAX READINGS	Stored in Volatile Memory
RELATIVE ZERO	Stored in Volatile Memory
PERMANENT ZERO	Stored in Flash Memory
TRIP ANGLE INDICATOR LIGHTS	Green/Yellow/Red (User Configurable)
ANALOG VOLTAGE OUTPUT	
VOLTAGE RANGE	0..5 VDC (1kΩ load min.)
VOLTAGE OUTPUT <sup>2</sup>	2.5 ± 2.0 VDC
VOLTAGE RESOLUTION	<0.01°
SENSITIVITY <sup>3</sup>	Relative to Scaled Range
RELAY SWITCH OUTPUT	
RELAY INPUT LINE <sup>4</sup>	1 common external input
RELAY OUTPUT TYPE	Single Pole Isolated Contact, 4 available
RELAY LIMITS	60 V Peak max, 0.6A max per relay
SWITCH FUNCTION	Normally Open / Normally Closed (User selectable)
SWITCH TRIP DELAY	Up to 2 seconds (User configurable)
SWITCH TRIP ANGLES	Adjustable trip angle endpoints (User configurable)

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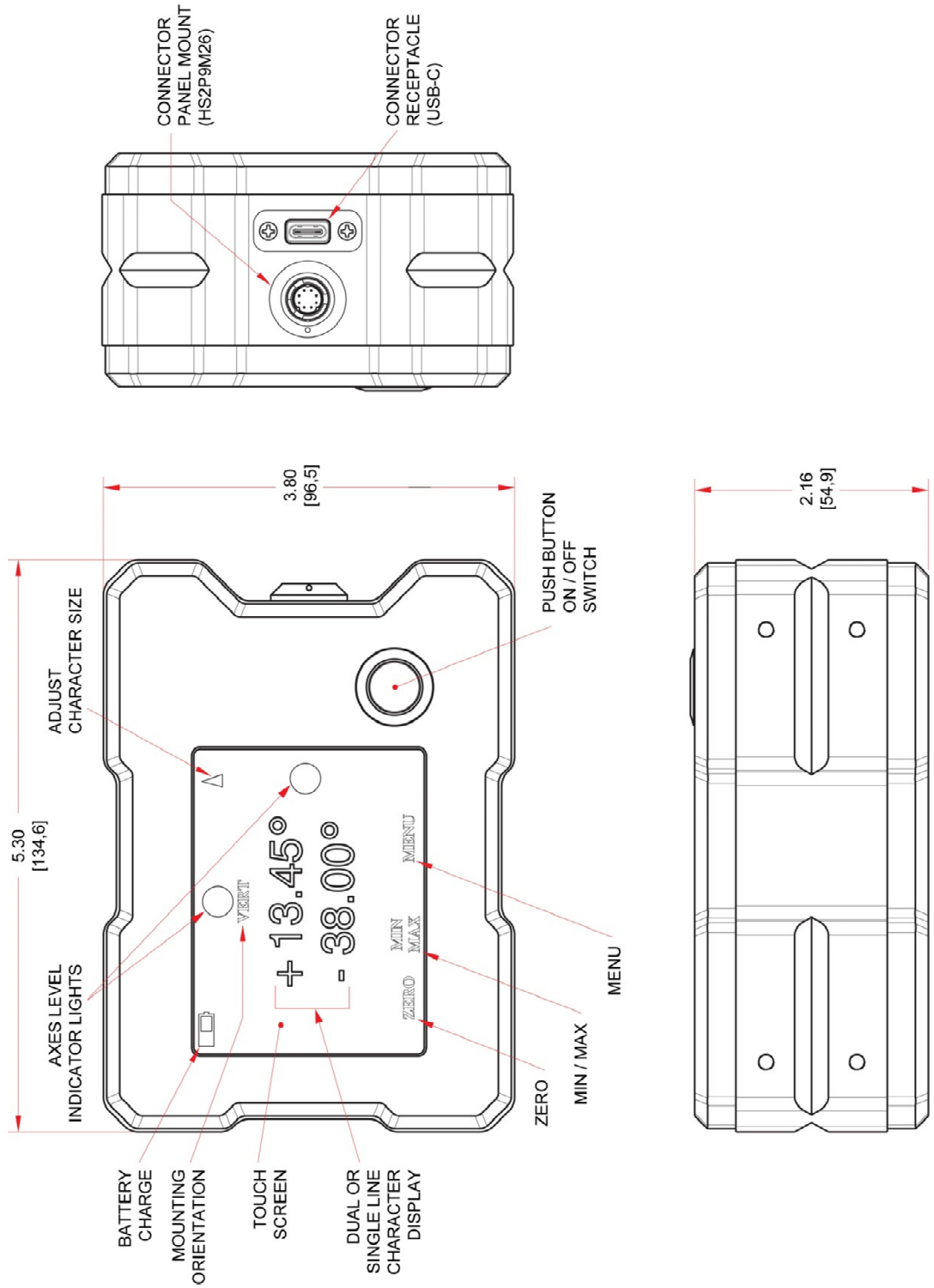
DIGITAL SERIAL RS232 OUTPUT (DECIMAL OUTPUT)	
BAUD RATE	9600 to 250K (User Configurable)
DATA BITS	8
PARITY	None
STOP BITS	1
DIGITAL RS485 OUTPUT	
OUTPUT TYPE	RS-485 Half Duplex (2-wire)
INCLINATION OUTPUT	32-Bit IEEE Packetized Float
BAUD RATE	125K Default (User Configurable from 9600 to 250K)
BYTE FORMAT	8 Data Bits, No Parity, 1-stop Bit, No Flow Control
PACKET FORMAT	See Installation Manual for Packet Details and Commands
INFORMATION RATE	Polled (up to 10 times/sec)
MECHANICAL CHARACTERISTICS	
HOUSING	Machined Aluminum, Anodized
ENVIRONMENTAL RATING	IP65
OUTER DIMENSIONS	5.3 x 3.8 x 2.16" [134.62 x 96.52 x 54.86mm]
MOUNTING HOLES	#8-32 x .25" deep (x8)
MOUNTING PLATE #1 (Magnetic)	6.5 x 2.16 x 0.19" [165.1 x 54.86 x 4.83mm]
MOUNTING PLATE #2 (Magnetic)	6.5 x 3.75 x 0.19" [165.1 x 95.25 x 4.83mm]
ELECTRICAL CONNECTION	USB-C (for charging)
ELECTRICAL CONNECTION (I/O)	9-pin HS2P9M26
POWER ON SWITCH	Push Button On/Off
WEIGHT	31 ounces (879 grams)
OPERATING TEMPERATURE	+14°..+140°F (-10°..+60°C)
STORAGE TEMPERATURE	-4°..+158°F (-20°..+70°C)
<b>Notes:</b>	
<ol style="list-style-type: none"> <li>1. The current consumption provided with the default display brightness setting of 3.</li> <li>2. The voltage output is always configured to provide a <math>2.5 \pm 2.0</math> VDC output but is configurable to match any measurement range with the <math>\pm 180^\circ</math> range. Ex. 0 to 60° or <math>\pm 45^\circ</math>. IMPORTANT: Voltage output should only be used in Battery Power mode or while charging battery through USB port.</li> <li>3. Sensitivity defined as (max analog voltage range which is always 4V) / (sensor input angle range). Ex. The <math>2.5 \pm 2.0</math> V range set to a measurement range of <math>\pm 30^\circ</math> will have a corresponding sensitivity of 4V/60° or 0.0667V/°.</li> <li>4. The Relay input line is shared between the four relays internally and it can be connected to ground or any voltage within limits.</li> </ol>	

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**Figure 1: Mounting Positions with Axis Orientations (inches [mm])**



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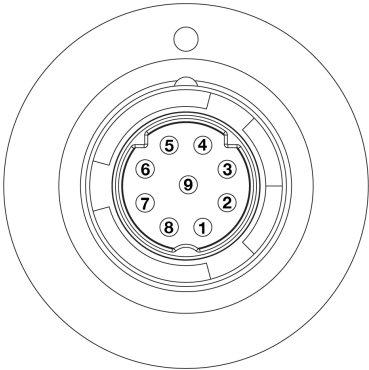
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**TABLE 2: HS2P9M26 9-PIN INPUT/OUTPUT CONNECTOR WIRING**

PIN	FUNCTION
1	RELAY 1 OUTPUT
2	RELAY 2 OUTPUT
3	RELAY 3 OUTPUT
4	RELAY 4 OUTPUT
5	RELAY INPUT
6	OUTPUT 1*
7	OUTPUT 2*
8	POWER / SIGNAL COMMON
9	8..30VDC INPUT



**NOTES**

\*Output may be Analog Voltage, RS232 TXD/RXD or RS485 A/B depending on what output is selected in the menu.

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