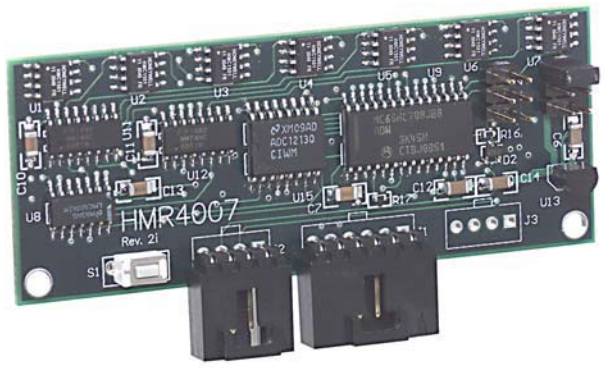
LINEAR POSITION SENSOR MODULE

Features

- 0-69 mm Magnetic Travel (Magnet Dependent)
- Microprocessor Digital and Analog Data Outputs
- 0.1mm Accuracy (Magnet Dependent)
- 0.1mm Repeatability
- -40° to +85°C Operating Temperature Range
- Regulated 5 volt or unregulated 6 to 20 volt DC Supply Compatibility



General Description

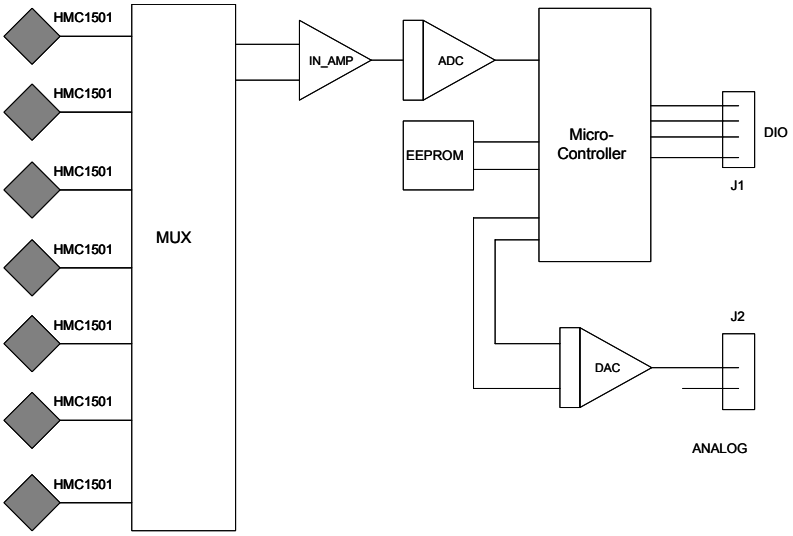
The Honeywell HMR4007 is a high-resolution electronic linear position-sensing module capable of measuring extended range linear position by providing a digital indication of position of a target magnet. Advantages include insensitivity to shock and vibration, known position at power-on, ability to withstand large variations in the gap between the sensor and the magnet, and high sensitivity so lower cost magnets (such as AlNiCo or Ceramic) can be used.

The HMR4007 is manufactured with Honeywell's HMC1501 magnetoresistive (MR) sensors in a stationary array, which provides better performance than Hall Effect devices and only needs a magnetic field source greater than 80 gauss.

APPLICATIONS

- **Linear Displacement**
- **Shaft Position**
- **Potentiometer Replacement**
- **Fluidic Pumps**

Block Diagram



SPECIFICATIONS

Characteristics	Conditions	Min	Typ	Max	Units
General					
Accuracy		0.2	0.1		mm
Resolution			0.01		mm
Hysteresis			0.01		mm
Repeatability			0.01	0.1	mm
Update Rate		10	30		Hz
Standoff	Distance (gap) between the target magnet and the sensor board	0.1	5	(note 1)	mm
Magnetic Field					
Range	magnetic field at the sensor array	35	50 (note 1)		gauss
length	apparent magnet length at sensor array	23			mm
Orientation	Axial = mag poles parallel to sensor array		Axial (note 2)		
Electrical					
Input Voltage	Unregulated	5	10	28	VDC
Current			15	20	mA
Digital Interface					
Baud Rate	nonstandard synchronous serial interface	1000		21,000	Bits / sec.
Signaling Level	TTL levels (“1”) (“0”)	3.5 -0.3		5.0 1.5	VDC VDC
Connector	In-Line 6-Pin Block (0.1” spacing)				
Analog Interface					
Analog Output	D/A output	0		2.5	VDC
Update Rate		10	30		Hz
Signaling Level	TTL levels (“1”) (“0”)	3.5 -0.3		5.0 1.5	VDC VDC
Connector	In-Line 4-Pin Block (0.1” spacing)				
Physical					
Dimensions	Circuit Board Assembly (including connectors)		40.0 x 80.0 x 12.0		mm
Weight	HMR4007		16.5		grams
Environment					
Temperature	Operating Storage	-40 -55	- -	+70 +125	°C

Note 1: A magnet of sufficient strength must be used to maintain a magnetic field strength of 35 gauss (min.) at the sensor array and an apparent magnet length of 23 mm.

Note 2: Sensor boards are factory calibrated in the axial mode using a 27mm length cylindrical magnet. Operation in the radial mode must be digitally reconfigured by the user.

PIN CONFIGURATION

Pin Number	Pin Name	Description
Digital Interface		
1	RTS	Serial Clock Output
2	Data_Out	Serial Data Output
3	Data_In	Serial Data Input
4	CTS	Serial Clock Input
5	Power	Unregulated Power Input (+6 to +28 VDC) (see note 1)
6	GND	Power and Signal Ground
Analog Interface		
1	Power	Unregulated Power Input (+6 to +28 VDC) (see note 1)
2	Analog Out	0 - 2.5 VDC analog output
3	Position Valid	TTL level (0 = position invalid, 1 = position valid)
4	GND	Power and Signal Ground
Jumper Block #1		
2-5	Note 1	Analog Output port selected as power source
3-6	Note 1	Serial Communications port selected as power source

Note 1: The board contains three interface connectors for digital and/or analog communications. Power is supplied to the board through any one of these connectors and is selected by jumper block #1. Only ***ONE*** of the three positions on JP1 should be shorted at a time. Shorting more than one may result in excessive power supply currents and board damage.

CIRCUIT DESCRIPTION

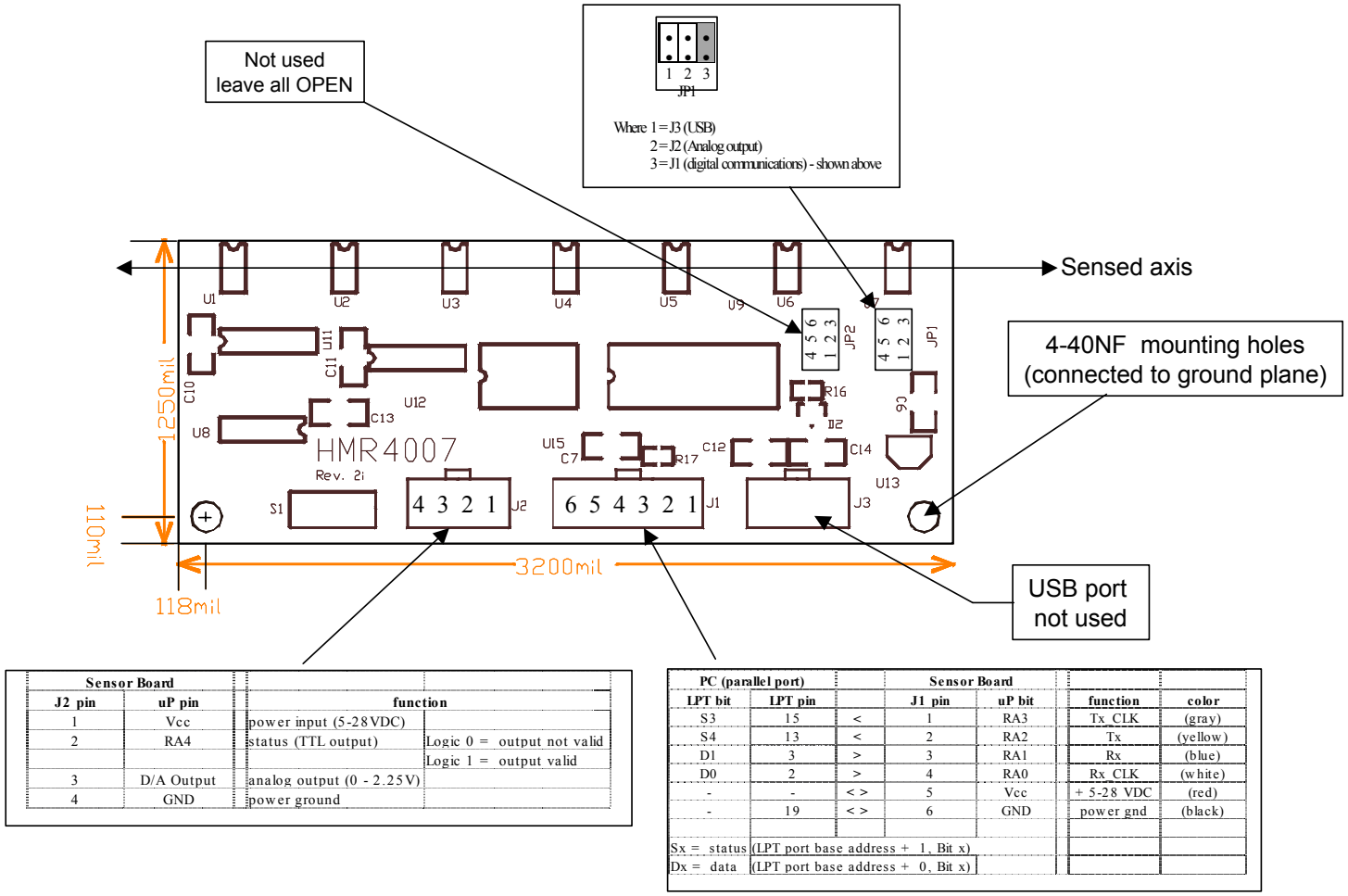
The HMR4007 Linear Position Sensor circuit board includes all of the basic sensors and electronics to provide a digital indication of position of a target magnet. The HMR4007 starts with an array of seven Honeywell HMC1501 single axis magnetoresistive (MR) sensors to determine the field geometry and direction of a target magnet attached to the moving part of a device under test. These sensors are supplied power by a constant voltage source, and the use of an array of sensors helps to maintain accuracy over temperature and run-out. The sensor outputs are routed to a multiplexed Analog to Digital Converter (ADC) integrated circuit. A microcontroller integrated circuit periodically queries the multiplexed ADC and performs sensor offset and gain corrections and computes the position of the target magnet as a function of the distance of travel along the long axis of the sensor board. The position data, along with an error bit, is available thought the serial interface or is present on the Digital to Analog Converter (DAC) output port. ***The serial interface is not needed in order to use the board's stand-alone analog output.*** The microcontroller also performs the external serial data interface and other housekeeping functions. An onboard EEPROM integrated circuit is employed as a nonvolatile storage to retain necessary data and configuration variables for best performance.

The HMR4007 uses an on-board low drop out (LDO) +5 volt regulator so that a regulated +5 volt power supply or an unregulated power supply in the range of +6VDC to +28VDC can be used. The power is supplied to the board through one of the three user ports being (serial, analog, or USB) and a jumper is used to select which port is the power source. Only one jumper should be in place at any one time as the board does not have over current protection and use of more than one jumper can result in excessive power supply currents and board damage.

PHYSICAL CHARACTERISTICS

The circuit board for the HMR4007 Linear Position Sensor is approximately 340mm by 80mm. A 6-pin right angle connector (J1) and two 4-pin connectors (J2, J3) protrude from the back of the board for user connections. Components on the top-side have a maximum height of 12mm. Figure 1 shows a typical circuit board with dimensions.

Parts Placement



Sensor Board			
J2 pin	uP pin	function	
1	Vcc	power input (5-28 VDC)	
2	RA4	status (TTL output)	Logic 0 = output not valid
			Logic 1 = output valid
3	D/A Output	analog output (0 - 2.25 V)	
4	GND	power ground	

PC (parallel port)			Sensor Board			
LPT bit	LPT pin		J1 pin	uP bit	function	color
S3	15	<	1	RA3	Tx_CLK	(gray)
S4	13	<	2	RA2	Tx	(yellow)
D1	3	>	3	RA1	Rx	(blue)
D0	2	>	4	RA0	Rx_CLK	(white)
-	-	< >	5	Vcc	+ 5-28 VDC	(red)
-	19	< >	6	GND	power gnd	(black)
Sx = status	(LPT port base address + 1, Bit x)					
Dx = data	(LPT port base address + 0, Bit x)					

Figure 1 – Sensor board layout and connector pin designations

Mating Parts

Connectors J1, J2, and J3 mate with GC/Waldom C-Grid™ crimp-style shells and terminals. Polarized shells (with a locking tab) or unpolarized shells are available. The applicable GC/Waldom part numbers are:

Connector	pins	Polarized shell	Unpolarized shell	Crimp terminals
J1	6	50-57-9406	50-57-9006	16-02-0097
J2	4	50-57-9404	50-57-9004	16-02-0097
J3	4	50-57-9404	50-57-9004	16-02-0097

Ordering Information

Ordering Number	Product
HMR4007	PCB Module Only

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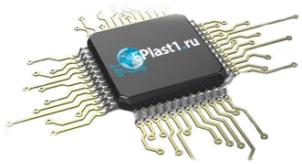
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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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