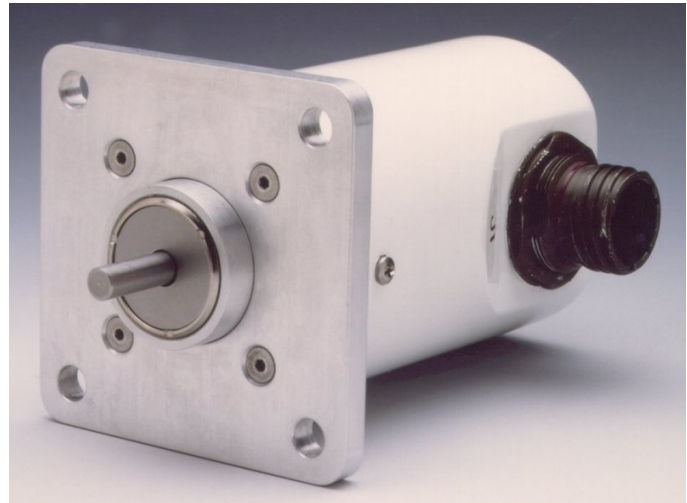


Features:

- Absolute Encoder
- Resolution 14-bits (1.32 arc-min)
- Accuracy (3σ) ± 1 LSB at bit transitions
- Input Voltage +18 to +32 VDC
- Output Interface Asynchronous RS485



Electrical Specifications:

- Input Power: 21 Watts Max at 28 VDC
- Maximum Current: 1.0 Amp
- Output Format: Bidirectional serial data at 115.2 kBaud
- Direction of Rotation: CCW for increasing count viewed facing end of shaft
- Communication Protocol: Figure 2

Mechanical Specifications:

- Outline: Figure 3
- Weight: 2.0 lbs
- Operating Speed: 40 deg/sec
- Starting Torque: 10 in-oz Max
- Connector (J1): PN D38999/24WC8P
- Pin Connections: Figure 1
- Reliability Prediction: 11,500 hours MTBF, Ground Mobile at 61°C Ambient Temperature

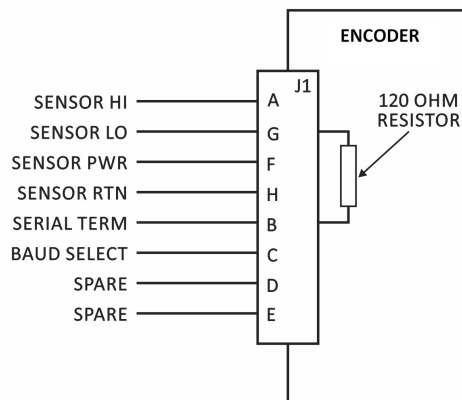


Figure 1. Encoder Pinout

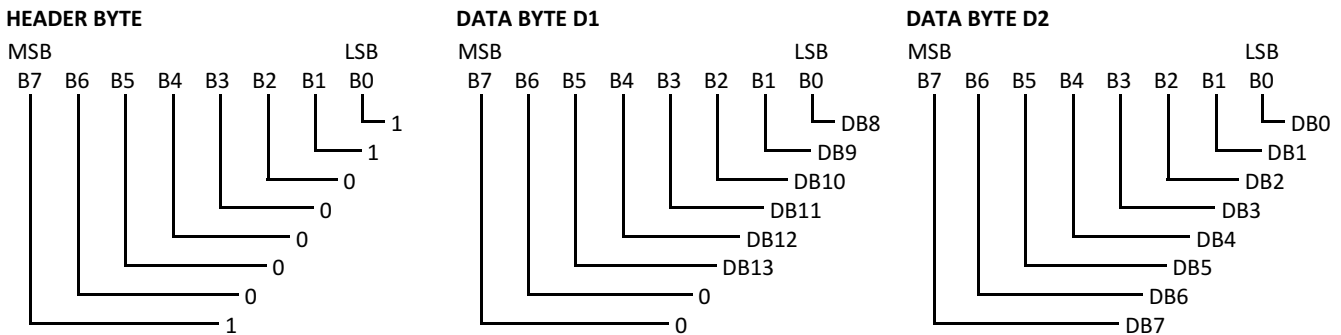
Approved for general release

Environmental Specifications:

- **Temperature:** Operating: -40°C to +71°C
Non-operating: -54°C to +85°C
- **Shock:** 40 g's, 9 millisecond; 20 g's 100 millisecond, MIL-STD-810D, Method 516.3
- **Vibration:** MIL-STD-810D, Method 514.3 figure 514.3-36
- **Humidity:** MIL-STD-810D, Method 507.2 procedure I, circle 3, for non-hazardous test temp
- **Salt Fog.** Units which are open and exposed to the environment shall function normally, without damage and within all applicable performance requirements, after continuous exposure to a salt fog concentration of 5 ± 1 percent for 48 hours, in accordance with MIL-STD-810D, Method 509.2.
- **Sand and Dust.**
 - **Blowing Dust.** Units which are open and exposed to the environment shall function normally, without damage and within all applicable performance requirements, during and after exposure to 11 ± 7 gm/M3 silica flour dust blowing at a velocity of 1.5 ± 0.2 meters/second for 6 hours at 23 °C and an additional hour at +55 °C, in accordance with MIL-STD-810D, Method 510.2.
 - **Blowing Sand.** Units which are open and exposed to the environment shall function normally, without damage and within all applicable performance requirements, during and after exposure to 1.1 ± 0.25 gm/M3 blowing silica sand at a velocity of 1.5 ± 0.2 meters/second for 90 minutes on each face with the unit at a temperature of +71 °C, IAW MIL-STD-810D, Method 510.2.
- **Cleaning Spray.** The encoder shall be undamaged when mounted and powered in the next assembly and shall meet applicable performance requirements, after being subjected to a cleaning jet spray from a nozzle having maximum orifice diameter of 0.25 inch and a minimum flow volume of 10 gallons per minute. The cleaning jet spray shall be applied perpendicular to the unit surfaces at a distance not to exceed one foot and moved to cover the surface at a rate of one square foot/minute .
- **Fungus.** The encoder shall not exhibit fungal growth, damage, or degradation, when tested for a minimum of 28 days in accordance with MIL-STD-810D, Method 508.3.
- **Altitude.**
 - **Operating.** The encoder shall function normally, without damage and within all applicable performance requirements, at an equivalent altitude of up to 50,000 feet.
 - **Nonoperating.** The encoder shall function normally, without damage and within all applicable performance requirements, after exposure to an atmospheric pressure of 8.29 psia for a minimum of one hour, in accordance with MIL-STD-810D, Method 500.2, Procedure I.
- **Rapid Decompression.** The encoder shall not be damaged or create a hazard to personnel or transport aircraft when exposed to rapid decompression from an equivalent altitude of 50,000 feet to an equivalent altitude of 4000 feet in less than 15 seconds, with sustained exposure to the reduced pressure for at least 10 minutes, in accordance with MIL-STD-810D, Method 500.2, Procedure III.
- **Explosive Atmosphere.** The encoder shall operate in a flammable atmosphere without causing an explosion, as verified in accordance with MIL-STD-810D, Method 511.2, Procedure I.

Communication Protocol:

- Byte Format.** Each byte shall be eleven bits of NonReturn to Zero data comprised of one start bit, followed by 8 data bits (standard binary format), followed by an odd parity bit, followed by one stop bit. The byte serial data bit order shall start with the least significant bit. An idle line, while active, and binary one data shall be represented by the MARK condition. Binary zero data shall be represented by a SPACE condition. The SENSOR HI terminal voltage is positive with respect to the SENSOR LO terminal for the MARK condition and negative for the SPACE condition. Note that this is contrary to the signaling sense definition of the EIA RS-485 specification, paragraph 3.2.
- Command Message.** The encoder shall respond to a command message of a byte of hexadecimal 82 preceded by more than 145 microseconds (for a 115.2 kBaud rate) or more than 290 microseconds (for a 57.6 kBaud rate) of bus inactivity. The encoder shall not respond to a command message of a byte of hexadecimal 82 preceded by less than 125 microseconds (for a 115. 2 kBaud rate) or less than 250 microseconds (for a 57. 6 kBaud rate) of bus inactivity.
- Response Message.** A response message shall be generated by the encoder following detection of the command message. The response message shall be initiated within 150 microseconds of receiving the command message. The response shall be a total of 3 bytes, comprised of a header byte followed by two data bytes (D1 and D2) and shall be completed within 600 microseconds (for a 57.6 kBaud rate) or 300 microseconds (for a 115 . 2 kBaud rate). The header byte shall be hexadecimal 83. The data bytes shall be comprised of 14 bits (DB13 – DB0) of angle data in binary format . The response message shall be organized as shown in Figure 2.
- Bus Inactive.** The encoder shall tri-state the serial bus outputs within 75 microseconds after completion of generating a response message . This requirement allows multiple devices to share the same communication bus.

Figure 2. Data Format

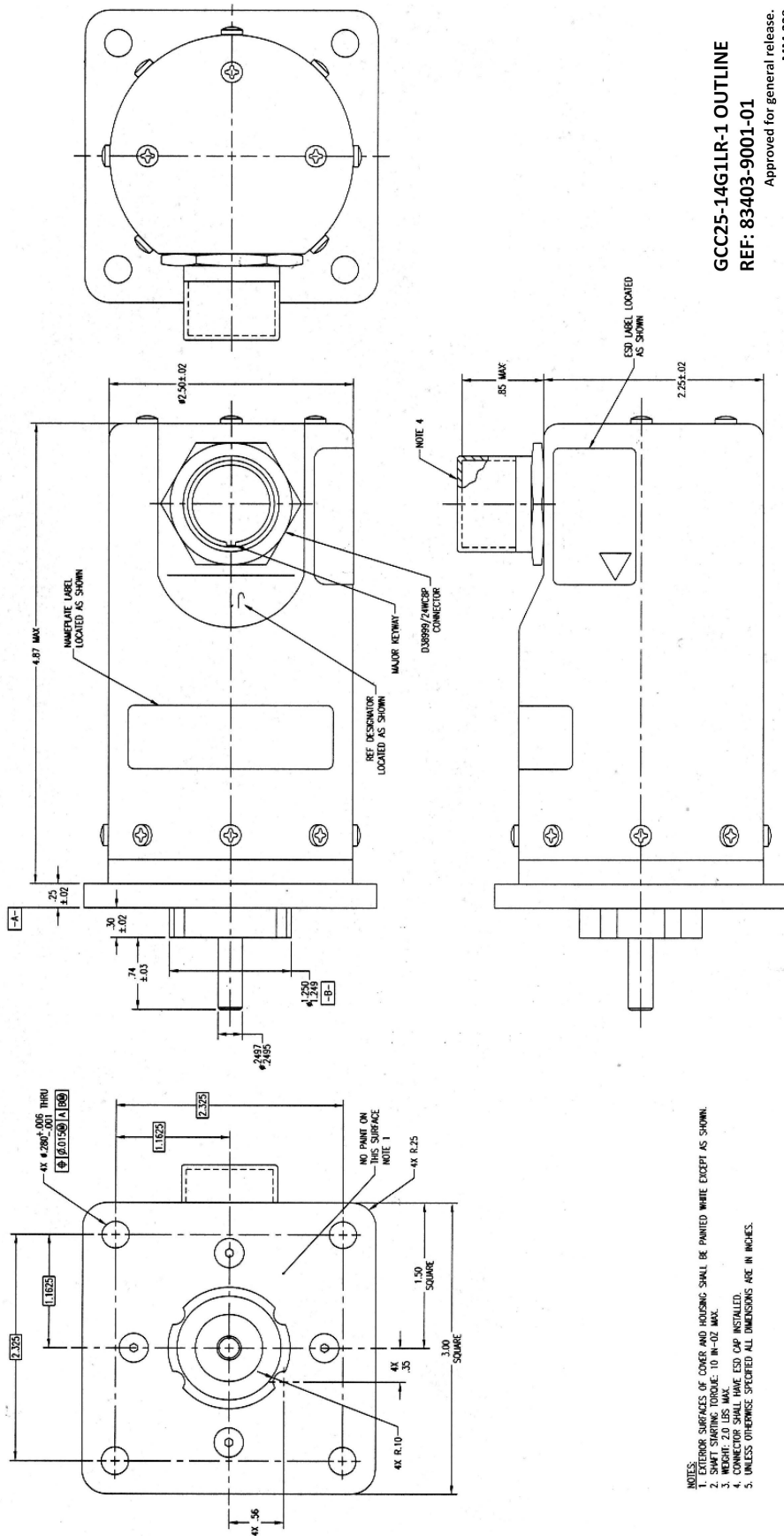


Figure 3. Outline Drawing

- NOTES:
1. EXTERIOR SURFACES OF COVER AND HOUSING SHALL BE PAINTED WHITE EXCEPT AS SHOWN.
 2. SHAFT STARTING TORQUE: 10 IN-OZ MAX.
 3. WEDGE: 2.0 LBS MAX.
 4. CONNECTOR SHALL HAVE ESD CAP INSTALLED.
 5. UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES.