The H25 Absolute Encoder is available with the following certification:

EN 55011 and EN 61000-6-2

H25 Absolute Encoder Ordering Options

Use this diagram, working from left to right to construct your model number (example: H25E-F4-SS-12GC-28V/V-CW-SM14/19).

All notes and tables referred to can be found on the back of these pages.

Mechanical Specifications

- **Shaft Diameter:** 3/8” (1/2” as special feature)
- **Shaft On Shaft:** 3/8” Shaft: 0.80 long X 0.03” deep; 1/2” Shaft: 0.80 long X 0.04” deep (1/2” shaft will not be ordered as a special feature)
- **Shaft Loading:** 3/8” shaft: Up to 40 pounds axial and 35 pounds radial; 1/2” shaft: Up to 90 pounds axial and 80 pounds radial
- **Shaft Runout:** 0.0005 T.I.R. at midpoint regardless of shaft diameter
- **Starting Torque at 25°C:** Without shaft seal 1.0 in-oz (max); With shaft seal 2.5 in-oz (max); 1/2” shaft with shaft seal 3.5 in-oz (max)
- **Bearings:** Class ABEC 7 standard, ABEC 5 for 1/2” shaft
- **Shaft Material:** 416 stainless steel
- **Shaft Housing:** Die cast aluminum with protective finish; stainless steel (special feature)
- **Cover:** Die cast aluminum; stainless steel (special feature)
- **Bearing Life:** 2 X 10^8 revs (1300 hrs at 2500 RPM)

Electrical Specifications

- **Code:** 12 or 13 bits NB or GC, excess gray and BCD available
- **Counts Per Shaft Turn:** 4096 or 8192
- **Count Transition Accuracy:** ± 1/2 bit maximum
- **Supply Voltage:** 5–26 VDC
- **Output Termination Pinouts:** see Table 1, back page
- **Output Formats:** Parallel: Gray Code, Natural Binary and Binary Coded Decimal; Serial: Serial Synchronous Interface (SSI) compatible; Analog: 4–20 mA, 0–10V
- **Frequency Response:** 100kHz (1200 RPM for 12-bits, 600 RPM for 13-bits)
- **Protection Level:** Reverse, overvoltage and output short circuit protection
- **Temperature:** Operating, 0º to 70º C; extended temperature testing available (see note 5); Storage, -25º to 90º C unless extended temperature option called out.
- **Humidity:** 98% RH without condensation
- **Enclosure:** NEMA 4 & 13 (IP 68) when ordered with shaft seal (on units with an MS connector) or a cable gland (on units with cable termination).

H25 Absolute Encoder Ordering Options for assistance call 800-350-2727
Serial Synchronous Interface (SSI)

SSI output provides effective synchronization in a closed-loop control system. A clock pulse train from a controller is used to clock out sensor data: one bit of position data is transmitted to the controller per one clock pulse received by the sensor. The use of a differential driver permits reliable transmission of data over long distances in environments that may be electrically noisy. The encoder utilizes a clock signal, provided by the user interface, to time the data transmission. Receiving electronics must include an appropriate receiver as well as line terminating resistors.

Features:
- Synchronous transmission
- Transmission lengths to 1000 feet
- Accepts clock rates from 100 KHz to 1.8 MHz

Data Transmission Sequence
1. Output driver of the encoder is a MAX 491 transceiver in transmit mode. The recommended receiver is a MAX 491 transceiver in receive mode.
2. Controller provides a series of pulses (or differential pulse pairs) on the CLOCK input lines.
3. On the first HIGH-to-LOW CLOCK transition, the encoder latches its data at the current position and prepares to transmit.
4. Controller reads data on the falling edge of the next 15 clock cycles.
5. The first bit is a START bit and is always HIGH.
6. Next comes 13 data bits beginning with the most significant bit (MSB) and ending with the parity bit. On 12 bit encoders, bit 13 IS LOW. When parity is not ordered, parity is a LOW.
7. After the last CLOCK HIGH-to-LOW transition, a minimum of 40 micro-seconds must pass before the beginning of the next CLOCK cycle.

Interfacing Long Data Lines

Ordering SSI:

1. HOW TO SPECIFY SSI OUTPUT IN THE ENCODER
2. MODEL NUMBER: Use the designation, S3 between the Code Format designation and the Connector designation. Example: H25D-SS-12GC-S3-CW-SM18

Output Code and Terminations

<table>
<thead>
<tr>
<th>PARALLEL CODE</th>
<th>TERMINATION TYPE</th>
<th>Gray Code</th>
<th>Natural Binary</th>
</tr>
</thead>
<tbody>
<tr>
<td>M14/19 Conn.</td>
<td>Cable</td>
<td>M14/19 Conn.</td>
<td></td>
</tr>
</tbody>
</table>

MSB
- 2^0: WHT/BLK
- 2^1: WHT/BRN
- 2^2: WHT/RED
- 2^3: WHT/ORN
- 2^4: WHT/YEL
- 2^5: WHT/GRN
- 2^6: WHT/BLU
- 2^7: WHT/WO
- 2^8: WHT/GRY
- 2^9: WHT
- 2^10: GRY/BLK
- 2^11: GRY/BRN
- 2^12: GRY

LSB
- 2^13: GRY/ORN
- 2^14: DIRECTION OF ORN R
- 2^15: CASE GROUND
- 2^16: O/CIRCUIT COMMON
- 2^17: LATCH CONTROL
- 2^18: +V SUPPLY VOLTAGE
- 2^19: SHIELD DRAIN

Direction of Count: Standard is CW increasing when viewed from the shaft end. Pin R is normally HI (or N/C) and is pulled up internally to +V. To reverse the count direction, Pin R must be pulled LO (COMMON).

Latch Control: Encoder outputs are active and provide continuous parallel position information when Pin U is HI (or N/C). Pin U is pulled up internally to +V. When Pin U is LO (COMMON) the encoder outputs are latched at the logic state that is present when the latch is applied and will stay latched until Pin U is no longer grounded.

M18 Connector is a M3102R-P18-1P, 10-pin connector on the encoder body and mates to an M3102F18-1S connector or can be used with a standard cable/connector assembly. BEI P/N 924-3102E18-1P, 10-pin connector on the encoder body and mates to an MS3106F18-1S connector or can be used with a standard cable/connector assembly, BEI P/N 924-31186-18XX.

M14/19 Connector is a M3112E14-19P, 19-pin connector on the encoder body and mates to an M3112F14-19P connector.

Notes
1. Mounting is usually done either using the D-style square flange mount, E- or G-style serve mount, or one of the standard face mounts, F1 for example. Consult factory for additional face mount options.
2. The shaft seal is recommended in virtually all installations. The most common exceptions are applications requiring a very low starting torque or those requiring operation at both high temperature and high speed.
3. Output IC’s: Output IC’s are available as either Line Driver (LD) or NPN Open Collector (OC) types. Open Collectors require pull-up resistors, resulting in higher output source impedance (sink impedance is similar to that of line drivers). In general, use of a Line Driver style output is recommended. Line Drivers source or sink current and their lower impedance mean better noise immunity and faster switching times. Warning: Do not connect any line driver outputs directly to circuit common/VO, which may damage the driver. Unused outputs should be isolated and left floating. Our applications specialists would be pleased to discuss your system requirements and the compatibility of your receiving electronics with Line Driver type outputs.

28V/V: Multi-voltage Line Driver (7277): 100 mA source/sink, Input voltage 5 to 28 VDC +/- 5% standard. This driver is TTL compatible when used with 5 volt supply. Supply lines are protected against overvoltage to 60 volts and reverse voltage. Outputs are short circuit protected for one minute. Supply current is 120 mA typical (plus load current). This is the recommended replacement for 3904R and 7409R open collector outputs with internal pullup resistors. It is also a direct replacement for any 4469, 8830, 8830 or 26L37 line driver.

28V/5: Multi-voltage Line Driver (7277): 100 mA source/sink, Input voltage 5 to 28 VDC +/- 5% standard, internally regulated with 5V (TTL compatible) logic output. Supply lines are protected against overvoltage to 60 volts and reverse voltage. Outputs are short circuit protected for one minute. Supply current is 50 mA typical (plus load current). This is the recommended replacement for 3904, 3906, and 3908. Open collector outputs with internal pullup resistors. It is also a direct replacement for any 4469, 8830, 8830 or 26L37 line driver.

28V/OC: NPN Open Collector (3904, 2727): Current sink of 80 mA max. Current sourced by external pull-up resistor. Output can be pulled up to voltage other than supply voltage (30 V max). Input voltage 5 to 28 VDC +/- 5% standard. Supply current is 120 mA typical. This replaces prior IC’s with designations of 3904, 7406, 3906, 3908, 681 and 689.

Specific –5 at the end of the model number is used to define a variety of non-standard features such as special shaft lengths, voltage options, or special testing. Please consult the factory to discuss your special requirements.

Extended temperature ranges are available in the following ranges: -40 to 70°C, -40 to 85°C. Some models can operate down to -55°C. Extended temperature ranges can affect other performance factors. Consult with factory for more specific information.

Figure 1: Gray Code

Figure 2: Natural Binary