# Series HA25

- *Ultra-reliable, heavy-duty Size 25 (2.5") encoder*
- *Complete electrical protection and noise immunity*
- *Environmentally sealed to NEMA4/IP66*
- *Up to 2540 PPR with optional marker pulse*

**INDUSTRIAL**

## APPLICATION/INDUSTRY

The Dynapar brand Series HA25 is a rugged, reliable and economical encoder for industrial motion applications.

## DESCRIPTION

Protection against installation problems such as wiring errors prevents the encoder from damage, while immunity to electrical noise keeps the encoder signals intact. A NEMA4 / IP66 sealing option protects against damage from contamination.

Packaged in an industry standard 2.5" enclosure, the Series HA25 offers a variety of mechanical options: servo or face mounting, and 1/4" or 3/8" shafts. Electrical options include: resolutions to 2540 pulses/revolution; bidirectional operation with optional index; single ended open collector or push-pull outputs, or differential line drivers; and connector or cable exit terminations.

The Series HA25 utilizes the latest technology optical emitters and sensors, surface mount assembly and precisely fabricated metal components to deliver high reliability and performance in a compact and economical package.

## FEATURES AND BENEFITS

Mechanical / Environmental Features
- Long life, 40 lb bearings
- Extended temperature range available
- Industry Standard, Size 25 Form Factor
- NEMA4 / IP66 washdown rating option

Electrical Features
- Noise Immune to ESD, RFI and electrical transients
- High current outputs
- Over-Voltage protection
- Reverse Voltage protection
- Output Short-Circuit Protection

## SPECIFICATIONS

### STANDARD OPERATING CHARACTERISTICS

**Code:** Incremental
**Resolution:** 1 to 2540 PPR (pulses/revolution)
**Accuracy:** (Worst case any edge to any other edge) ±2.5 arc-min.
**Format:** Two channel quadrature (AB) with optional Index (Z) and complementary outputs
**Phase Sense:** A leads B for CW or CCW shaft rotation as viewed from the shaft end of the encoder; see Ordering Information
**Quadrature Phasing:** 90° ± 22.5° electrical
**Symmetry:** 180° ± 18° electrical
**Index:** 180° ± 18° electrical (gated with B low)
**Waveforms:** Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

### ELECTRICAL

**Input Power:**
4.5 min. to 26 VDC max. at 80 mA max., not including output loads
**Outputs:**
7273 Open Collector: 30 VDC max., 40 mA sink max.
7272 Push-Pull and Differential Line Driver: 40 mA sink or source
4469 Differential Line Driver: 100 mA, sink or source
**Frequency Response:** 100 kHz min.
**Electrical Protection:** Overvoltage, reverse voltage and output short circuit protected
**Noise Immunity:** Tested to EN50082-2 (Heavy Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference

### CONNECTIONS

**Mating Connector:**
7 pin, style MS3106A-16S-1S (MCN-N5);
10 pin, style MS3106A-18-1S (MCN-N6)
5 pin, style M12: Cable with connector available
8 pin, style M12: Cable with connector available

### MECHANICAL

**Shaft Loading:** (at 0.25" from encoder face) 35 lbs. radial, 40 lbs. axial
**Shaft Speed:** 5,000 RPM max.
**Starting Torque:** (max at 25 °C)
HA525: 1.0 oz-in;
HA625: 2.5 oz.-in
**Moment of Inertia:** $3.0 \times 10^{-4}$ oz–in–sec$^2$

### ENVIRONMENTAL

**Operating Temperature:**
Standard: 0 to +70 °C;
Extended: –40 to +85 °C
**Storage Temperature:** –40 to +90 °C
**Shock:** 50 G's for 11 milliseconds duration
**Vibration:** 5 to 2000 Hz at 20 G's
**Humidity:** to 98% without condensation
**Enclosure Rating:**
HA525: NEMA12/IP54 (dirt tight, splashproof); HA625: NEMA4/IP66 (dust proof, washdown)

2.24

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DANAHER
INDUSTRIAL CONTROLS

## ELECTRICAL CONNECTIONS

**Prewired Cable or Accessory Cables with 7 or 10 Pin MS Connector - when Code 4= 0 to 6, or A, B, C, D or G**

Note: Wire color codes are referenced here for models that are specified with pre-wired cable. Connector/cables are described in the Encoder Accessories section of this catalog and color-coding information is provided here for reference.

| | Table 1 – Differential | | |
|---|---|---|---|
| Pin | Function (If Used) | Wire Color Code | Cable* Accessory Color Code |
| A | Signal A | BRN | BRN |
| B | Signal B | ORN | ORN |
| C | Signal Z | YEL | YEL |
| D | Power Source | RED | RED |
| E | No Connection | — | — |
| F | Common | BLK | BLK |
| G | Case | GRN | GRN |
| H | Signal $\overline{A}$ | BRN/WH | BRN/WH |
| I | Signal $\overline{B}$ | ORN/WH | ORN/WH |
| J | Signal $\overline{Z}$ | YEL/WH | YEL/WH |
| *Cable Accessory: P/N 14006350010 | | | |

| | Table 2 – Single Ended | | |
|---|---|---|---|
| Pin | Function (If Used) | Wire Color Code | Cable* Accessory Color Code |
| A | Signal A | BRN | RED |
| B | Signal B | ORN | BLUE |
| C | Signal Z | YEL | YEL |
| D | Power Source | RED | WHT |
| E | No Connection | — | GRN |
| F | Common | BLK | BLK |
| G | Case | GRN | SHIELD |
| *Cable Accessory: P/N 14004310010 | | | |

| | Table 3 – Differential | |
|---|---|---|
| Pin | Function (If Used) | Cable Accessory Color Code |
| A | Signal A | BRN |
| B | Signal B | ORN |
| C | Signal $\overline{A}$ | BRN/WHT |
| D | Power Source | RED |
| E | Signal $\overline{B}$ | ORN/WHT |
| F | Common | BLK |
| G | Case | GRN |
| *Cable Accessory: P/N 108596 | | |

**Cable Configuration:** PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 26 AWG (output signals), plus 2 twisted pairs 24 AWG (input power)

**5 & 8 Pin M12 Accessory Cables - when Code 4= H to Z**

Connector pin numbers and cable assembly wire color information is provided here for reference.

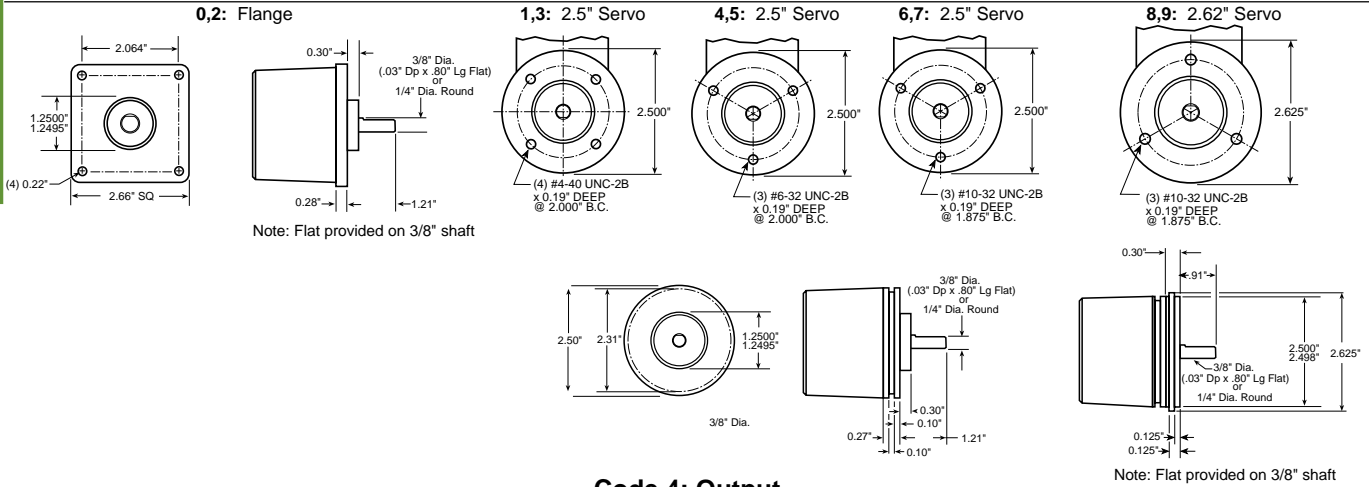| Encoder Function | Table 4 5 Pin Single Ended | | Table 5 8 Pin Single Ended | | Table 6 8 Pin Differential | |
|---|---|---|---|---|---|---|
| | Cable # 112859- | | Cable # 112860- | | Cable # 112860- | |
| | Pin | Wire Color | Pin | Wire Color | Pin | Wire Color |
| Sig. A | 4 | BLK | 1 | BRN | 1 | BRN |
| Sig. B | 2 | WHT | 4 | ORG | 4 | ORG |
| *Sig. Z | 5 | GRY | 6 | YEL | 6 | YEL |
| Power +V | 1 | BRN | 2 | RED | 2 | RED |
| Com | 3 | BLU | 7 | BLK | 7 | BLK |
| Sig. $\overline{A}$ | – | – | – | – | 3 | BRN/WHT |
| Sig. $\overline{B}$ | – | – | – | – | 5 | ORG/WHT |
| *Sig. $\overline{Z}$ | – | – | – | – | 8 | YEL/WHT |
| | | | | | | |

\* Index not provided on all models. See ordering information

**Cable Configuration:** PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum
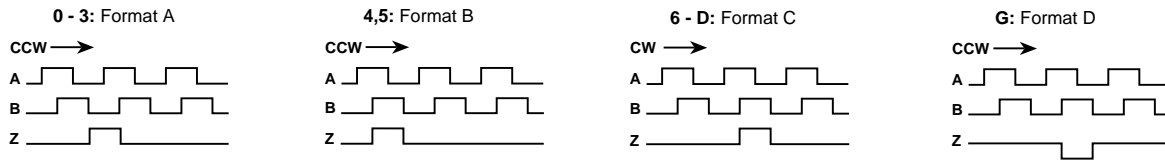
See "Accessories" Section for Connectors and Cable Assemblies Ordering Information
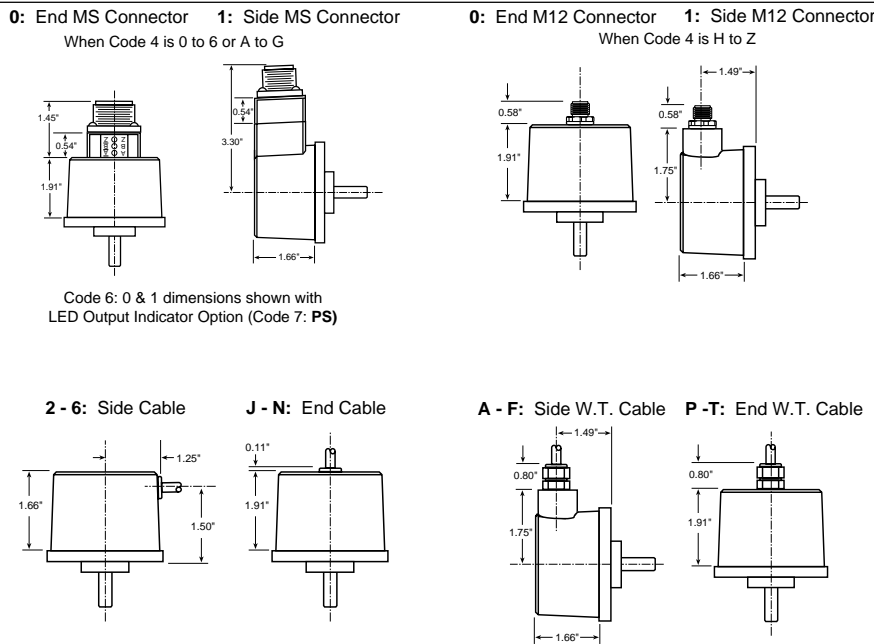
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## Code 3: Mechanical

**0,2:** Flange  **1,3:** 2.5" Servo  **4,5:** 2.5" Servo  **6,7:** 2.5" Servo  **8,9:** 2.62" Servo

2.064"

1.2500"
1.2495"

(4) 0.22"

2.66" SQ

0.30"

3/8" Dia.
(.03" Dp x .80" Lg Flat)
or
1/4" Dia. Round

0.28"

1.21"

Note: Flat provided on 3/8" shaft

2.500"

(4) #4-40 UNC-2B
x 0.19" DEEP
@ 2.000" B.C.

2.500"

(3) #6-32 UNC-2B
x 0.19" DEEP
@ 2.000" B.C.

2.500"

(3) #10-32 UNC-2B
x 0.19" DEEP
@ 1.875" B.C.

2.625"

(3) #10-32 UNC-2B
x 0.19" DEEP
@ 1.875" B.C.

0.30"

.91"

2.50"  2.31"

1.2500"
1.2495"

3/8" Dia.

3/8" Dia.
(.03" Dp x .80" Lg Flat)
or
1/4" Dia. Round

0.27"

0.30"
0.10"

0.10"

1.21"

2.500"
2.498"   2.625"

3/8" Dia.
(.03" Dp x .80" Lg Flat)
or
1/4" Dia. Round

0.125"
0.125"

Note: Flat provided on 3/8" shaft

## Code 4: Output

**0 - 3:** Format A  **4,5:** Format B  **6 - D:** Format C  **G:** Format D

CCW  A B Z
CCW  A B Z
CW  A B Z
CCW  A B Z

## Code 6: Termination

**0:** End MS Connector  **1:** Side MS Connector
When Code 4 is 0 to 6 or A to G

**0:** End M12 Connector  **1:** Side M12 Connector
When Code 4 is H to Z

1.45"
0.54"
1.91"

0.54"
3.30"

1.66"

0.58"
1.91"

1.49"
0.58"
1.75"

1.66"

Code 6: 0 & 1 dimensions shown with
LED Output Indicator Option (Code 7: **PS)**

**2 - 6:** Side Cable  **J - N:** End Cable  **A - F:** Side W.T. Cable  **P -T:** End W.T. Cable

1.25"
1.66"
1.50"

0.11"
1.91"

1.49"
0.80"
1.75"

1.66"

0.80"
1.91"

## ORDERING INFORMATION

# Series HA25

| Code 1: Model | Code 2: PPR | | Code 3: Mechanical | Code 4: Output | Code 5: Electrical | Code 6: Termination | Code 7: Options |
|---|---|---|---|---|---|---|---|
| **HA ☐25 ☐☐☐☐** | | | ☐ | ☐ | ☐ | ☐ | ☐☐ |

| | | | | Ordering Information | | | |
|---|---|---|---|---|---|---|---|
| **HA525** Size 25 Enclosed, Shielded Bearings, Glass Disk<br><br>**HA625** Size 25 Enclosed, with Shaft Seal, Glass Disk | 0001<br>0005<br>0010<br>0012<br>0050<br>0060<br>0100<br>0120<br>0150<br>0180<br>0200<br>0240<br>0250<br>0256<br>0300<br>0360<br>0400<br>0500<br>0512 | 0600<br>0625<br>0635<br>0720<br>0800<br>0900<br>1000<br>1024<br>1200<br>1250<br>1270<br>1500<br>1600<br>1800<br>1968<br>2000<br>2048<br>2400<br>2500<br>2540 | **0** Flange Mount, 3/8" Shaft<br>**1** 2.50" Servo Mount/ 4 Hole, 2.00" BC Face Mount, 3/8" Shaft<br>**2** Flange Mount, 1/4" Shaft<br>**3** 2.50" Servo Mount/ 4 Hole 2.00" BC Face Mount, 1/4" Shaft<br>**4** 2.50" Servo Mount/ 3 Hole, 2.00" BC Face Mount, 3/8" Shaft<br>**5** 2.50" Servo Mount/ 3 Hole, 2.00" BC Face Mount, 1/4" Shaft<br>**6** 2.50" Servo Mount/ 3 Hole, 1.88" BC Face Mount, 3/8" Shaft<br>**7** 2.50" Servo Mount/ 3 Hole, 1.88" BC Face Mount, 1/4" Shaft<br>**8** 2.62" Servo Mount/ 3 Hole, 1.88" BC Face Mount, 3/8" Shaft<br>**9** 2.62" Servo Mount/ 3 Hole, 1.88" BC Face Mount, 1/4" Shaft | **7 Pin MS Connector or Cable**<br>**0** Single Ended, no Index, Format A, Table 2<br>**1** Single Ended, with Index, Format A, Table 2<br>**4** Single Ended, with Index, Format B, Table 2<br>**6** Differential, no Index, Format C, Table 3<br>**A** Single Ended, with Index, Format C, Table 2<br>**C** Single Ended, no Index, Format C, Table 2<br>**G** Single Ended, with Index, Format D, Table 2<br><br>**10 Pin MS Connector or Cable**<br>**2** Differential, no Index, Format A, Table 1<br>**3** Differential, with Index, Format A, Table 1<br>**5** Differential, with Index, Format B, Table 1<br>**B** Differential, with Index Format C, Table 1<br>**D** Differential, no Index, Format C, Table 1<br><br>**5 Pin M12 Connector**<br>**H** Single ended, no index, Format A, Table 4<br>**J** Single ended, with index, Format A, Table 4<br>**K** Single ended, with index, Format B, Table 4<br>**L** Single ended, with index, Format C, Table 4<br>**M** Single ended, no index, Format C, Table 4<br>**N** Single ended, with index, Format D, Table 4<br><br>**8 Pin M12 Connector**<br>**P** Single ended, no index, Format A, Table 5<br>**Q** Single ended, with index, Format A, Table 5<br>**R** Single ended, with index, Format B, Table 5<br>**S** Single ended, with index, Format C, Table 5<br>**T** Single ended, no index, Format C, Table 5<br>**U** Single ended, with index, Format D, Table 5<br>**V** Differential, no index, Format A, Table 6<br>**W** Differential, with index, Format A, Table 6<br>**X** Differential, with index, Format B, Table 6<br>**Y** Differential, with index, Format C, Table 6<br>**Z** Differential, no index, Format C, Table 6 | **0** 5-26V in; 5-26V Open Collector with 2.2kΩ Pullup out<br>**1** 5-26V in; 5-26V Open Collector out<br>**2** 5-26V in; 5V Totem Pole out<br>**3** 5-26V in; 5V Line Driver out (7272)<br>**4** 5-26V in; 5-26V Line Driver out (7272)<br>**5** 5-26V in, 5V Differential Line Driver out (4469)<br>**6** 5-15V in, 5-15V Differential Line Driver out (4469)<br>**A** Same as "0" with extend. temp range<br>**B** Same as "1" with extend. temp range<br>**C** Same as "2" with extend. temp range<br>**D** Same as "3" with extend. temp range<br>**E** Same as "4" with extend. temp range | **0** End Mount Connector<br>**1** Side Mount Connector<br>**2** 18" Cable, Side<br>**3** 3' Cable, Side<br>**4** 6' Cable, Side<br>**5** 10' Cable, Side<br>**6** 15' Cable, Side<br>**J** 18" Cable, End<br>**K** 3' Cable, End<br>**L** 6' Cable, End<br>**M** 10' Cable, End<br>**N** 15' Cable, End<br><br>available when Code 1 is HA625:<br>**A** 18" Watertight, Side<br>**B** 3' Watertight, Side<br>**C** 6' Watertight, Side<br>**D** 10' Watertight, Side<br>**F** 15' Watertight, Side<br>**P** 18" Watertight, End<br>**Q** 3' Watertight, End<br>**R** 6' Watertight, End<br>**S** 10' Watertight, End<br>**T** 15' Watertight, End | available when Code 4 is 0 thru G, and Code 6 is 0 or 1:<br><br>**PS** LED Output Indicator |