

HENGSTLER SERIES AI25 SSI



Absolute Encoder

Key Features

- Up to 34 Bit (22 Bit ST + 12 Bit MT)
- SSI Interface
- Additional Sin/Cos Outputs Available
- Onboard Diagnostics Option Available
- Available with Multiple Shaft Configurations
- Enclosure Ratings of IP64 or IP67

IND
Industrial Duty



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS:

Code: Absolute, Optical
Resolution Single-turn: 10-22 Bit
Resolution Multi-turn: 12 Bit
Linearity: $\pm \frac{1}{2}$ LSB (± 1 LSB for resolution > 13 Bit)
Absolute Accuracy: $\pm 0.01^\circ$ mechanical (36 arc-sec.)
Repeatability: $\pm 0.002^\circ$ mechanical (7.2 arc-sec.)

ELECTRICAL:

Interface: SSI
Output Code: Binary, Gray, Gray Excess, parameterization through AcuroSoft
Parameterization: Resolution code type, sense of rotation, warning, alarm
Input Power: $\pm 10\%$ 5 VDC or 10-30 VDC
Intrinsic Current Consumption:
 5V: 100 mA (ST), 150 mA (MT);
 10-30V: 100 mA (ST), 150 mA (MT)
Permissible Load: max 30mA
Output Current: 60 mA per bit, short circuit protected
Frequency Response (Baud Rate): 500 kHz
Maximum Cable Length: 400 m
Control Inputs: Direction
Alarms & Warning Outputs (SSI Extended Only):
 Alarm Bit = LED Current;
 Warning Bit = Temperature;
 Additional Temperature String Readout
Status LED (IP64 only): Green = OK, Red = Alarm
Preset Switch (IP64 Only): Sets encoder to zero output at present mechanical position
Number of Sin/Cos Pulses: 2048
Noise Immunity: Tested to EN61326-1
Electrical Immunity: Tested to EN61326-1

MECHANICAL:

Shafted Diameters: 6mm, 10mm, 3/8"
Hubshaft Diameters: 10mm, 12mm, 3/8", 1/2"
Shaft Load (axial/radial): 40N (9lb.) / 60N (13lb.)
Shaft Tolerance (hubshaft only): ± 1.5 mm axial, ± 0.2 mm radial
Shaft Load (hub shaft): Spring Tether Tolerance: Axial ± 0.5 mm; Radial ± 0.05 mm
Maximum Shaft Speed: 10,000 RPM (continuous), 12,000 RPM (peak)
Starting Torque: < 1.4 in-oz
Housing Material: Aluminum
Shaft Material: Stainless Steel
Disc Material: Glass
Weight:
 Single-Turn: approx. 9.2 oz (260 g)
 Multi-Turn: approx. 11 oz. (310 g)
Termination: Cable, axial or radial;
 M23 connector (Conin), 12 pole, axial or radial;
 M12 connector, 8 pole, axial or radial

ENVIRONMENTAL:

Operating Temperature: -40 °C ...+100 °C
Storage Temperature: -40 °C ...+100 °C
Shock: 100G, 1,000 m/s² for 6 msec
Vibration: 10G, 100 m/s² (10 to 2,000 Hz)
Humidity: Up to 75%, (no condensation allowed)
Enclosure Rating: IP64 or IP67



Ordering Information

To order, complete the model number with code numbers from the table below:

Code 1: Model	Code 2: Resolution	Code 3 :Mounting	Code 4: Shaft Size	Code 5: Interface	Code 6: Output	Code 7: Termination	Code 8: Cable Length Option
AI25	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AI25 Size25 Absolute Encoder	0010 10 Bit ST	Available when Code 4 is 0 or A 0 Servo*	w/o shaft seal (IP64) 0 6 mm 1 3/8" 2 10 mm 3 3/8" Hubshaft 4 12 mm Hubshaft 5 1/2" Hubshaft 6 10mm Hubshaft	2 SSI Gray 3 SSI Binary E SSI Binary + Sin/Cos 1Vp-p F SSI Gray + Sin/Cos 1Vp-p Q SSI Binary + High Active Preset P SSI Gray + High Active Preset R SSI Binary Extended	0 5 VDC 2 10-30 VDC	Available for all Code 5 options 0 Cable, axial 1 Cable, radial 2 M23 Conin 12 pin axial, CW 3 M23 Conin 12 pin radial, CW 4 M23 Conin 12 pin axial, CCW 5 M23 Conin 12 pin radial, CCW	Available only when Code 7 is 0 or 1: BLANK 1.5m D 3m F 5m K 10m P 15m U 20m V 25m
	0012 12 Bit ST						
	0013 13 Bit ST	Available when Code 4 is 1, 2 or B, C 1 Clamping* 2 Square Flange**	w/ shaft seal (IP67) A 6 mm B 3/8" C 10 mm				
	0014 14 Bit ST						
	0017 17 Bit ST	Available when Code 4 is 3, 4, 5 or 6 3 Hubshaft w/ Tether†	Available only when Code 2 is ST (Single Turn) K 1/4" Hubshaft				
	0019 19 Bit ST						
	0022 22 Bit ST						
	1212 12 Bit MT						
	1213 12 Bit MT						
	1214 12 Bit MT						
	1217 12 Bit MT						
	1219 12 Bit MT						
	1222 12 Bit MT						
						Available only when code 5 is 2, 3, or R C M12 , 8-pole connector axial D M12 , 8-pole connector radial	

NOTE:
¹ Sin/Cos Models supplied with 12 leads, Non-Sin/Cos supplied with 8 leads. See Electrical Connections for appropriate lead connection references
² CW & CCW references wiring direction of M23 Connector. If CW wiring is selected for encoder, correct interface cable assembly for this would be CW (ref code 7 and accessory cables below).

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DIMENSIONS

Code 3: Mounting

0 Servo

1 Clamping

2 Square Flange

3 Hubshaft w/Tether

Note: two M3 set screws in collar around hub shaft (will not mar shaft)

Hubshaft Diameter	Min. Shaft Length	Max. Shaft Length
10mm, 3/8"	15mm (0.59")	20mm (0.79")
12mm, 1/2"	18mm (0.71")	20mm (0.79")

Radial Connector Area (if used). See Connection Diag.

Code 7: Connector

Cables

Conin 12 Pin Connector

M12, 8-pole Connector

Length (L) Mounting Surface to RearFor connector and cable types

Mount (Code 3)	Single-Turn	Multi-Turn
(0) Servo	46.5/1.83	46.5/1.83
(1) Clamping	45.5/1.79	45.5/1.79
(2) Square Flng	45.5/1.79	45.5/1.79
(3) Hubshaft	53.4/2.1	53.4/2.1

SSI Data Format

Bits	T1 - T10	T11	T12	T13	T14	T15	T16	T17	T18	T19
10	S9 - S0	0	0	0	0	S9	S8	S7	S6	S5
12	S11 - S2	S1	S0	0	0	S11	S10	S9	S8	S7
13	S12 - S3	S2	S1	S0	0	S12	S11	S10	S9	S8
14	S13 - S4	S3	S2	S1	S0	0	S13	S12	S11	S10
17	S16 - S7	S6	S5	S4	S3	S2	S1	S0	0	S16

Bits	T1 - T12	T13 - T21	T22	T23	T24	T25	T26	T27	T28	T29
1212	M11 - M0	S11 - S3	S2	S1	S0	0	0	M11	M10	M9
1213	M11 - M0	S12 - S4	S3	S2	S1	S0	0	M11	M10	M9

S9, S8 Data Bits for resolution per turn.

S9 - S0 Data Bits S9, S8, S7, S6, S5, S4, S3 Etc.

M11, M10 Data Bits for number of turns.

M11- M0 Turn Data Bits M11, M10, M9, M8, Etc.

T1, T2 SSI Clock number

ELECTRICAL CONNECTIONS

**M23 Connector (Conin), 12 Pole
Interfaces SSI Binary, SSI Gray and SSI Extended**

Cable	M23 Pin	Signal
brown ³	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
	4	N.C.
blue	5	$\overline{\text{Direction}}^1$
	6	N.C.
brown/green	7	N.C.
white ³	8	DC 5/10 - 30 V
	9	N.C.
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	0 V-signal output ²

¹ $\overline{\text{Direction}}$: UB or unconnected = ascending code values with rotation cw

0 V = descending code values with rotation cw

² Connected with 0 V in the encoder.

Use this to change counting Direction (see note 1)

³ use only thin wires $\varnothing = 0.14 \text{ mm}$

**M23 Connector (Conin), 12 Pole / Cable
Interfaces SSI Binary and SSI Gray with Sin/Cos 1V p-p**

Cable	M23 Pin	Signal
brown ²	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
white/green	4	A+
blue	5	$\overline{\text{Direction}}^1$
red/blue	6	B+
brown/green	7	A-
white ²	8	DC 5/10 - 30 V
grey/pink	9	B-
grey	10	$\overline{\text{Data}}$
green	11	$\overline{\text{Clock}}$
black	12	Sense

¹ $\overline{\text{Direction}}$: +UB or unconnected = ascending code values with rotation cw

0 V = descending code values with rotation cw

² use only thin wires ($\varnothing = 0.14 \text{ mm}$)

**8 Pole M12 / 8 Pole Standard Cable
Interfaces SSI Binary, SSI Gray and SSI Extended**

Cable	M12 Pin	Signal
white	1	DC 5/ 10 - 30 V
brown	2	0 V
	3	N.C.
green	4	$\overline{\text{Clock}}$
pink	5	Data
yellow	6	Clock
blue	7	$\overline{\text{Direction}}^1$
grey	8	$\overline{\text{Data}}$



View on
connector

¹ $\overline{\text{Direction}}$: + UB or unconnected = ascending code values with rotation cw

0 V = descending code values with rotation cw

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M23 Connector (Conin), 12 Pole / Cable Interfaces High Active Preset: SSI Binary and SSI Gray

Cable	M23 Pin	Signal
brown	1	0 V (supply voltage)
pink	2	Data
yellow	3	Clock
white/green	4	N.C.
blue	5	Direction ¹
red/blue	6	N.C.
brown/green	7	N.C.
white	8	DC 5/ 10-30V
grey/pink	9	N.C.
grey	10	Data
green	11	Clock
red	12	Preset ¹
Screen	Screen	Screen

¹ Preset and Direction Active High

High $\geq 70\%$ V-Input; Low $\leq 20\%$ V-Input or Unconnected

Preset Bounce Time $\geq 2s$

Direction Bounce Time $\leq 1ms$

Preset Value: Zero. Other Preset Values on request

Encoder M12 Mating Cable Assemblies

Part Number	Description	Length
G1565329	M12, 8 Pole, PUR Cable, Female Mating connector to Flying leads, 3m	3m
G1565330	M12, 8 Pole, PUR Cable, Female Mating connector to Flying leads, 5m	5m
G1535331	M12, 8 Pole, PUR Cable, Female Mating connector to Flying leads, 10m	10m

Encoder M12 and M23 Female Mating Connectors

Part Number	Description	Length
G3539597	M12 Connector, Female, 8 Pin, A-Coded	Connector Only
G3539229	M23 Connector, CW, Female, 12 Pin	Connector Only
G3539202	M23 Connector, CCW, Female, 12 Pin	Connector Only

Encoder M23 Mating Cable Assemblies

	Part Number	Description	Length
M23 12 Pole CW Female w/ ScrewLock	G1542003	M23, 12 Pole, TPE Cable, CW, Female Mating connector to Flying leads, 3m	3m
	G1542004	M23, 12 Pole, TPE Cable, CW, Female Mating connector to Flying leads, 5m	5m
	G1542005	M23, 12 Pole, TPE Cable, CW, Female Mating connector to Flying leads, 10m	10m
	G1542006	M23, 12 Pole, TPE Cable, CW, Female Mating connector to Flying leads, 15m	15m
	G1542007	M23, 12 Pole, TPE Cable, CW, Female Mating connector to Flying leads, 20m	20m
	G1542008	M23, 12 Pole, TPE Cable, CW, Female Mating connector to Flying leads, 25m	25m
M23 12 Pole CCW Female w/ ScrewLock	G1542009	M23, 12 Pole, TPE Cable, CW, Female Mating connector to Flying leads, 30m	30m
	G1542010	M23, 12 Pole, TPE Cable, CCW, Female Mating connector to Flying leads, 3m	3m
	G1542011	M23, 12 Pole, TPE Cable, CCW, Female Mating connector to Flying leads, 5m	5m
	G1542012	M23, 12 Pole, TPE Cable, CCW, Female Mating connector to Flying leads, 10m	10m
	G1542013	M23, 12 Pole, TPE Cable, CCW, Female Mating connector to Flying leads, 15m	15m
	G1542014	M23, 12 Pole, TPE Cable, CCW, Female Mating connector to Flying leads, 20m	20m
	G1542015	M23, 12 Pole, TPE Cable, CCW, Female Mating connector to Flying leads, 25m	25m
	G1542016	M23, 12 Pole, TPE Cable, CCW, Female Mating connector to Flying leads, 30m	30m



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