Dynapar brand

Absolute Shaft Encoders
AI 25 SSI + BISS
Installation instructions

For ACURO™ AI25XXXXXX_XX

Bulletin No. 702627-0001
Revision Level: G
Date:3-17-2011

| 2, 3, A, E, F, G, H, J or K |

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1. Preface

These installation instructions are provided for the connection and starting procedure of your shaft encoder.
You will get further information from the Acuro™ datasheet, on request or on download from our Internet site.
www.dynapar.com

⚠ 2. Safety

Authorised persons
The encoder should only be assembled and dismantled by a qualifed electrician, as the unit contains sensitive electronic circuits.

Risk of injury due to rotating shafts
Hair and items of clothing may become caught up in rotating shafts.
➔ Prior to commencing all works, disconnect all power supplies and ensure that the working environment is Safe!

Risk of destruction due to static electricity
The CMOS modules contained in the encoder are very sensitive to high voltages such as can arise due to friction of the clothing.
➔ Do not touch plug contacts or electronic componants!

Risk of destruction due to mechanical overload
Rigid mounting will give rise to constraining fortes which will permanently overload the bearings.
➔ Never restrict the freedom of movement of the encoder! Use only the enclosed sheet steel springs or a suitable coupling to secure the unit!

Risk of destruction due to mechanical shock
Violent shoocs, e.g. due to hammer blows, can lead to the destruction of the optical sensing system and the ball bearings.
➔ Never use forte! Assembly is simple provided that correct procedure is followed.

Risk of destruction due to overloading
➔ The unit may only be operated within the limits specified in the technical data.

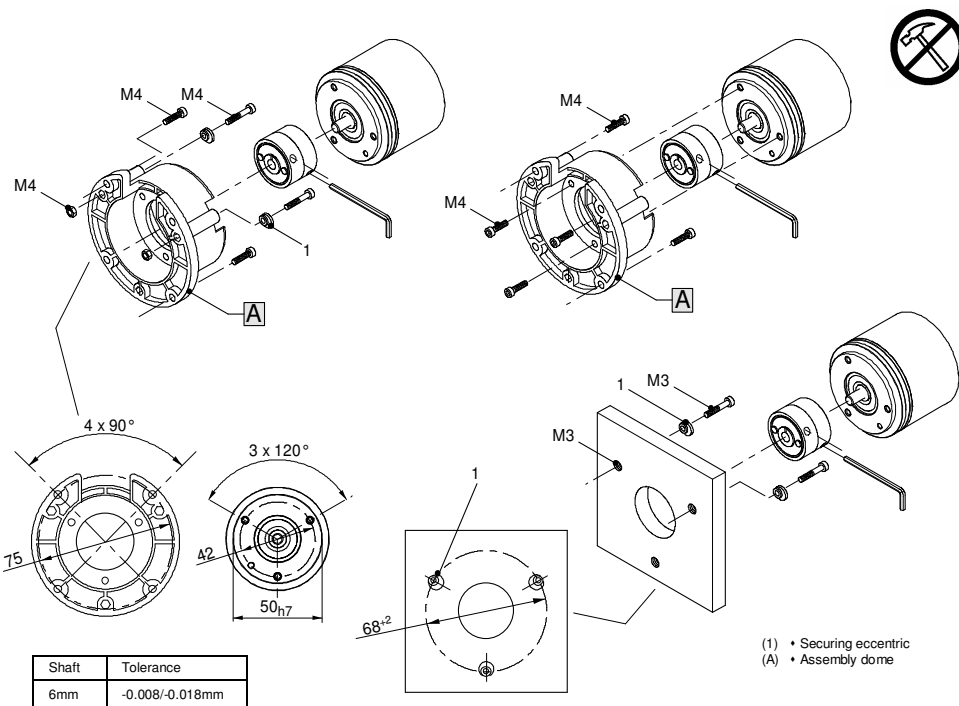**Fields of application: industrial processes and controls.**
Overvoltage at the connecting terminals must be limited to overvoltage-class-II values (SELV).
The connecting cable is not for dragline mounting, only for fix mounting.
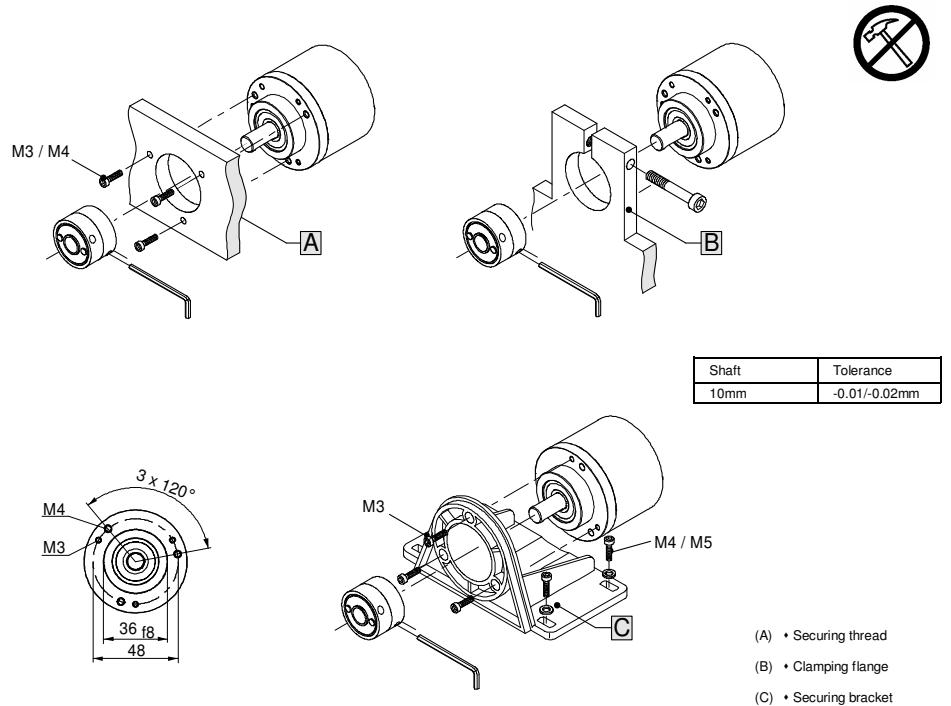This encoder is a supply part destined for mounting to an appliance (motor, machine).It is not provided for customer sale.
Manufacturers integrating this encoder to their facilities are responsible as well for compliance with CE guidelines as for the CE mark.
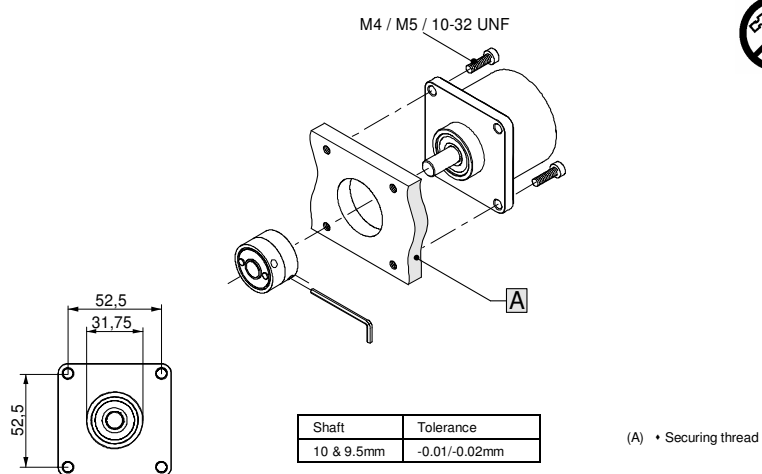
4 Dimensions
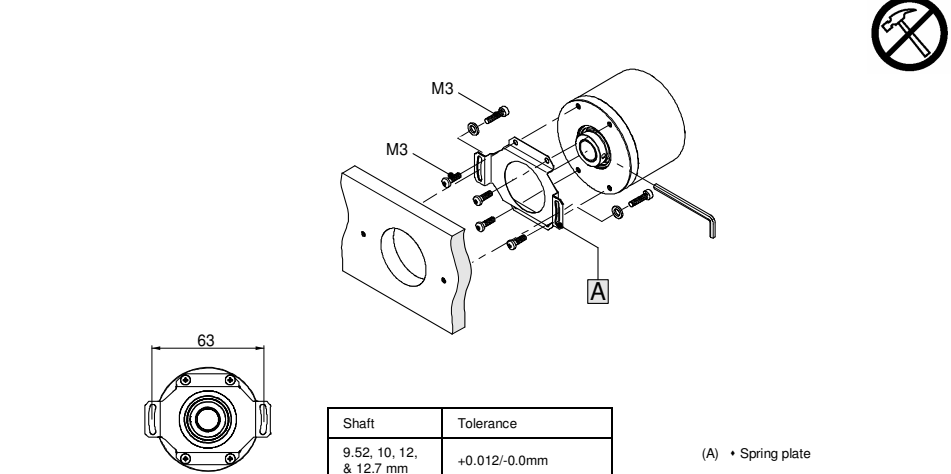#### 4.1 Mounting Dimensions(Ref. Code 3)

0 Servo

Clamping

2 Square Flange

3 Hubshaft w/Tether

Hub Shaft Diameter	Min. Shaft Length	Max Shaft Length
10mm, 3/8"	15mm(0.59")	22mm(0.79")
12mm, 1/2"	18mm(0.71")	20mm(0.79")
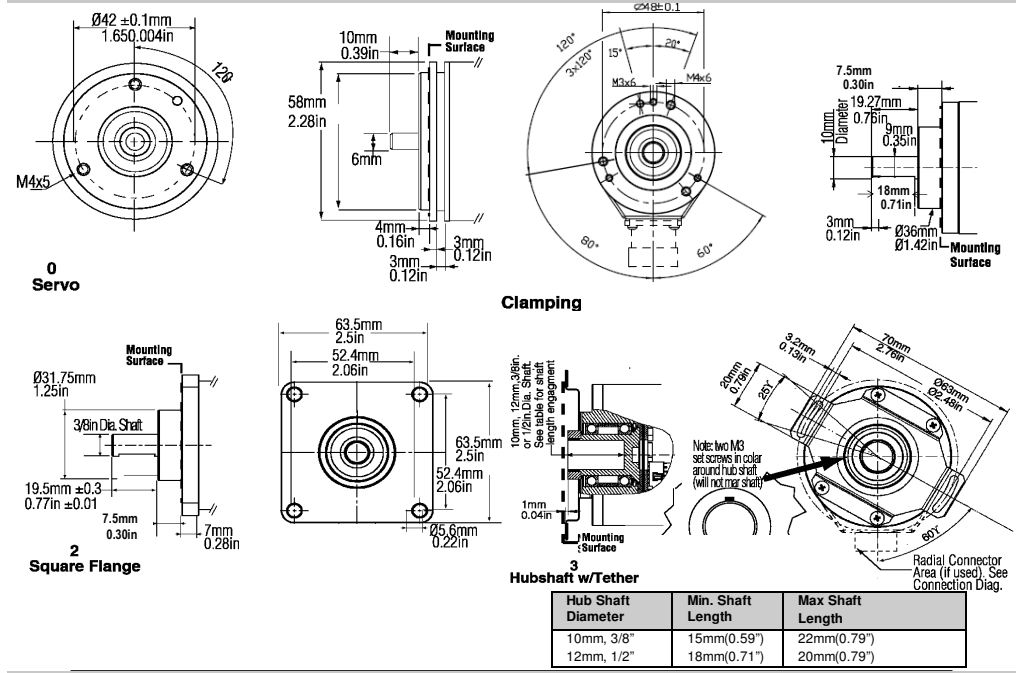
4.2 Housing Dimensions(Ref. Code 7)

0, 1
2 1,5M Cables

2, 3
Conin 12 Pin Connector

C, D
M12, 8-pole Connector

Length (L) Mounting Surface to Rear For 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 Fling	45.5/1.79	45.5/1.79
(3) Hubshaft	53.4/2.1	53.4/2.1

3. Assembly

Shaft	Tolerance
6mm	-0.008/-0.018mm

(1) • Securing eccentric
(A) • Assembly dome

A   Synchro flange

Shaft	Tolerance
10mm	-0.01/-0.02mm

(A) • Securing thread
(B) • Clamping flange
(C) • Securing bracket

B   Clamping flange

M4 / M5 / 10-32 UNF

Shaft	Tolerance
10 & 9.5mm	-0.01/-0.02mm

(A) • Securing thread

C   Square flange

Shaft	Tolerance
9.52, 10, 12, & 12.7 mm	+0.012/-0.0mm

(A) • Spring plate

D   Spring plate, hollow shaft

5. Mechanical Specifications

d = 6mm	F<20N	F<40N
d = 9.52/10mm	F<40N	F<60N

n	- peak	= 12 000 min⁻¹
n	- continuous duty	= 10 000 min⁻¹

Operating: -40 ... +100 ℃
Storage: -40 ... +85 ℃

- Vibration	100 m/s² (10 ... 500 Hz)
- Shock	1 000 m/s² (6 ms)

ESD

6. Electrical

	Singleturn	Multiturn
U$_{in}$ =	5 VDC −5%/+10%	10 ... 30VDC [1]
I$_{max}$ (only Encoder) =	50 mA	100 mA
I$_{max}$ (incl. Output) = Fuse	150 mA	200 mA
- Alarm output	SSI - Alarm Bit(on request) BiSS - Warning and Alarm bits	
- Clock Frequency	100kHz....10MHz(BiSS) 100KHz....2MHz(SSI)* * ≥14 bit singleturn resolution requires ≥5µs first pulse for non-Fast SSI encoders)	
- Cable length	max. 400m@100KHz	

RoHS Compliant

[1] Operating delay time typically 10 ms for push-pull control. When controlling with PNP-Open Collector, an external pull-down resistor (1 kΩ) is needed.

7. Connection diagrams

7.1 Begriffserläuterungen
**Explanation of terms · Terminologie
Spiegazioni sui termini · Explicaciones de conceptos**

| Direction	+U$_B$ [2] =	Ascending code value when turning cw
	0 V =	Descending code value when turning cw
N.C.	=	Not Connected
LSB	=	Least Significant Bit
MSB	=	Most Significant Bit
S0, S1, ...	=	Data bits for resolution per turn
M0, M1, ... (Multiturn)	=	Data bits for number of turns

[2] or unattached

7.2 cable
Connector 12p

Color	Pin	Signal
Brown(small)	1	0V
Pink	2	Data
Yellow	3	Clock
White/Green	4	A + (SinCos Only)
Blue	5	Direction
Red	6	B + (SinCos Only)
Violet	7	A - (SinCos Only)
White(small)	8	5V / 10-30V
Brown/Green	9	B - (SinCos Only)
Gray	10	Data
Green	11	Clock
Black	12	0 V Data

Gegenstecker · Mating Connector: 12pin Conin
Art.No. G3 539 202

Kabel · Cable
Art. No.: G3 280 220

Verlängerungskabel mit Stecker · Extension cable with connector
3m   Art.No. G1 542 003
5m   Art.No. G1 542 004
10m   Art.No. G1 542 005

7.3 M12 Eurofast Connector

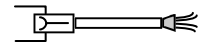| Farbe / Colour	Pin	Signal
white	1	10....30 Volt
brown	2	0 Volt
	3	N.C.
green	4	Clock
pink	5	Data
yellow	6	Clock
blue	7	Direction
gray	8	Data
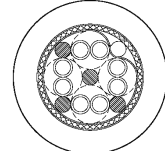
Pin 1 and 2 twisted pair
Pin 4 and 6 twisted pair
Pin 3 and 7 twisted pair
Pin 5 and 8 twisted pair

Cable
Art. No.: G3 280 251
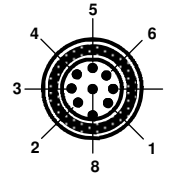
**Cable Connector
M 12 Connector**
Art. No.: G3 539 597

Cable with connector
3m   Art.No. G1 565 329
5m   Art.No. G1 565 330
10m   Art.No. G1 565 331

8. Malfunction

LED	Encoder
Green / Red	O.K. / Error

LED
PRESET

The operational state of the encoder is displayed by a green LED. The occurrence of a malfunction will be indicated by a red LED.
Preset
Press the Preset button with a blunt item to set the absolute position without a time delay to the preset value. Behaviour is dynamic, i.e. the preset command is independent of how long the button is held down and is effective once the button is pressed. The LED however signals the actuation of the button by a continuous red and green light while the button is pressed.

9. Identifikationscode
**Ordering data · Code d´identification
Chiave per l´ordinazione · Código de pedido**

Code 1: Model	Code 2: Bits	Code 3: Mounting	Code 4: Shaft Size	Code 5: Protocol	Code 6: Electrical	Code 7: Connector
AI25 ▢▢▢▢	▢	▢	▢	▢	▢	▢
AI25 Size 25 Acuro™ Absolute Encoder	**Single-Turn** 0010 10 Bit 0012 12 Bit 0013 13 Bit 0014 14 Bit 0017 17 Bit	Available when Code 4 is 0 or A **0** Servo*	**w/o shaft seal (IP64)** **0** 6mm **1** 3/8'' **2** 10mm **3** 3/8'' Hub Shaft **4** 12mm Hubshaft **5** 1/2'' Hubshaft **6** 10mm Hubshaft	**2** SSI Gray **3** SSI Binary **A** BiSS **G** Fast-SSI Gray **H** Fast-SSI Binary	**0** 5 VDC **2** 10-30 VDC	**0** 1.5m axial cable **1** 1.5m radial cable **2** M23 Conin 12 pin axial CW
	Multi-Turn 1212 12 Bit Multi-Turn, 12 Bit Single-Turn	Available when Code 4 is 2 or C **1** Clamping*	**w/ shaft seal (IP67)** **A** 6mm **B** 3/8'' **C** 10mm	Available when Code 7 is 0 thru 3 **E** SSI Binary (+SinCos 1Vss)		**3** M23 Conin 12 pin radial CW **4** M23 Conin 12 pin axial CCW
	1213 12 Bit Multi-Turn, 13 Bit Single-Turn	Available when Code 4 is1 or B **2** Square flange**		**F** SSI Gray (+SinCos 1Vss)		**5** M23 Conin 12 pin radial CCW
	1214 12 Bit Multi-Turn, 14 Bit Single-Turn (BiSS)	Available when Code 4 is 3, 4, 5 or 6 **3** Hubshaft w/tether+		**J** BiSS Binary (+SinCos 1Vss)		**C** M12, 8-pole Connector axial
	1217 12 Bit Multi-Turn, 17 Bit Single-Turn	* 58mm Dia. ** 2.5" Square + 63mm BC		**K** BiSS Gray (+SinCos 1Vss)		**D** M12, 8-pole Connector radial

SSI Data Format

Bits	T1 - T10	T11	T12	T13	T14	T15	T16	T17	T18	T19
0010	S9 - S0	0	0	0	0	S9	S8	S7	S6	S5
0012	S11 - S2	S1	S0	0	0	S11	S10	S9	S8	S7
0013	S12 - S3	S2	S1	S0	0	S12	S11	S10	S9	S8
0014	S13 - S4	S3	S2	S1	S0	0	S13	S12	S11	S10
0017	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.
M11, M10 Data Bits for number of turns.
T1, T2 SSI Clock number

S9 - S0 Data Bits S9, S8, S7, S6, S5, S4, S3 Etc.
M11- M0 Turn Data Bits M11, M10, M9, M8, Etc.
Note: 1214 and 1217 are BiSS only.