

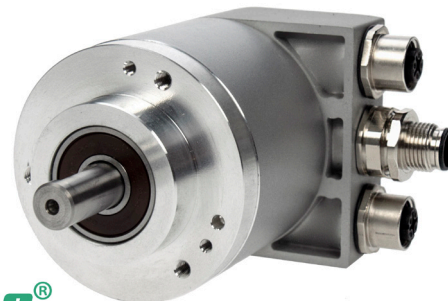
# Encoder Installation Manual

## HENGSTLER *brand*

### SERIES AI25 PROFINET

#### Absolute Encoder

**Document No.:** 703330-0001  
**Revision Level:** -  
**Oct 31, 2019**



## 1. Preface

These installation instructions are provided for the connection and starting procedure of your Absolute Encoder.

You will get further information from the AI25 Profinet datasheet, on request, or by download from our Web Site at [www.dynapar.com](http://www.dynapar.com).

## 2. Safety

### Authorized Personnel

The encoder should only be assembled and dismantled by a qualified person, as the unit contains sensitive electronic circuits.

### Risk of Injury Due to Rotating Shafts

Hair, jewelry or articles of clothing may become caught in rotating shafts or other parts.

→ Prior to commencing all work, 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 which can occur due to friction of the clothing.

→ Do not touch plug contacts or electronic components!

### Risk of Destruction Due to Mechanical Overload

Rigid mounting will give rise to constraining forces which will permanently overload and damage the bearings.

→ Never restrict the freedom of movement of the encoder! Use only the enclosed sheet metal springs or a suitable coupling to secure the unit!

### Risk of Destruction Due to Mechanical Shock

Violent shocks, e.g. due to hammer blows, can lead to the destruction of the optical sensing system and the ball bearings.

→ Never use force! Assembly is simple provided that correct procedures are 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.

→ Over voltage at the connecting terminals must be limited to overvoltage-class-II values (SELV).

→ The connecting cable is not for dragline mounting, only for fixed mounting of the encoder.

→ This encoder is a supply part destined for mounting to other equipment (motor, machine). It is not provided for direct sale to the end customer.

→ Manufacturers integrating this encoder to their facilities are responsible for compliance with CE guidelines and for proper use of the CE mark.

## TABLE OF CONTENTS

Preface.....	Page 1
Safety.....	Page 1
Specifications.....	Page 2
Ordering Information.....	Page 2
Dimensions.....	Page 3
Mounting.....	Page 5
Mechanical Data.....	Page 5
Electrical Data.....	Page 5
Connections.....	Page 6
Diagnostics.....	Page 6

# SPECIFICATIONS

## STANDARD OPERATING CHARACTERISTICS:

**Code:** Absolute, Optical

**Resolution Single-turn:** 10 - 22 Bit

**Resolution Multi-turn:** 12 Bit

**Linearity:** ±½ LSB up to 14 Bit

**Absolute Accuracy (typ.):** ±35 arc-sec

**Repeatability (typ.):** ±10 arc-sec

## ELECTRICAL:

**Interface:** PROFINET IO

**Output Code:** Binary

**Input Voltage:** 7 - 30 VDC

**Current w/o load (typ.):** 24V: 55mA (ST) 65 mA (MT)

**Current w/o load (max.):** (ST/MT) 225 mA

**Device Data:** Position, Velocity, Acceleration,

Diagnostic Data, Alarms

**Configuration Options:** Resolution, Total Measuring Range, Preset, Offset Direction, Scaling, Residual Value Function, Velocity Limits, Acceleration Limits

**Updating of Values / Cycle Times:** 125us / 31.25us

**Noise Immunity:** Tested to EN61326-1

**Electrical Immunity:** Tested to EN61326-1

**Termination:** Bus cover with 3x M12 connectors

## MECHANICAL

**Shaft Diameter:** 6-12mm (solid shafts), 9.52mm – 14mm (hub shafts)

**Mounting Flanges:** Servo Flange, Clamping Flange, Tether Flange, Square Flange

**Shaft Load (axial / radial):** 40 N / 80 N

**Axial/Radial Endplay of Mating Shaft (Hub Shaft only):** ±1.5 mm, ±0.2 mm

**Maximum Speed:** 10,000 U/min (continuous duty), max. 12,000 U/min (short term)

**Starting Torque (at 20 °C):** typ. ≤ 0.05 Nm (lower values available upon request)

**Moment of Inertia:** ca. 3.8 x 10<sup>-6</sup> kgm<sup>2</sup>

**Housing Material:** Aluminum

**Shaft Material:** Stainless Steel

**Disc Material:** Glass

**Weight:** 4.8 oz. (420 g) ST/ 15.9 oz. (450 g) MT

## ENVIRONMENTAL

**Operating Temperature:** -40 °C ... +85 °C

**Storage Temperature:** -40 °C ... +85 °C

**Shock:** 400g, 4000 m/s<sup>2</sup> (6 ms)

**Vibration:** 30g, 300 m/s<sup>2</sup> (10 - 2000 Hz)

**Humidity:** Up to 75%, (no condensation allowed)

**Enclosure Rating:** IP64 or IP67

**General Design:** As per DIN EN 61010-1, protection class III, contamination level 2, overvoltage class II

## 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: Protocol	Code 6: Electrical	Code 7: Connector
<b>AI25</b>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Y</b>	<b>2</b>	<b>R</b>
<b>AI25</b> Size25 Absolute Encoder	<b>0010</b> 10 Bit ST <b>0012</b> 12 Bit ST <b>0013</b> 13 Bit ST <b>0014</b> 14 Bit ST <b>0016</b> 16 Bit ST <b>0017</b> 17 Bit ST <b>0018</b> 18 Bit ST <b>0019</b> 19 Bit ST <b>0020</b> 20 Bit ST <b>0022</b> 22 Bit ST  <b>1212</b> 12 Bit MT, 12 Bit ST <b>1213</b> 12 Bit MT, 13 Bit ST <b>1214</b> 12 Bit MT, 14 Bit ST <b>1216</b> 12 Bit MT, 16 Bit ST <b>1217</b> 12 Bit MT, 17 Bit ST <b>1218</b> 12 Bit MT, 18 Bit ST <b>1219</b> 12 Bit MT, 19 Bit ST <b>1220</b> 12 Bit MT, 20 Bit ST	Available when Code 4 is 0 or A <b>0</b> Servo*  Available when Code 4 is 1, 2, 8, 9 or B, C, H and J <b>1</b> Clamping*  Available when Code 4 is 1,2 or B, C <b>2</b> Square Flange**  Available when Code 4 is 3, 4, 5, 6, 7 or E <b>3</b> Hubshaft w/ Tether†  * 58mm Dia. ** 2.5" Square † 63mm BC	<b>w/o Shaft Seal (IP64)</b> <b>0</b> 6 mm <b>1</b> 3/8" <b>2</b> 10 mm <b>3</b> 3/8" Hubshaft <b>4</b> 12 mm Hubshaft <b>5</b> 1/2" Hubshaft <b>6</b> 10 mm Hubshaft <b>7</b> 14 mm Hubshaft†† <b>8</b> 12 mm†† <b>9</b> 8 mm††  <b>w/ Shaft Seal (IP67)</b> <b>A</b> 6 mm <b>B</b> 3/8" <b>C</b> 10 mm <b>E</b> 12 mm Hubshaft <b>H</b> 12 mm†† <b>J</b> 8 mm††  †† Available only upon request	<b>Y</b> PROFINET	<b>2</b> 7-30 VDC	<b>R</b> Bus Cover with 3 M12 Connectors (1x Male + 2x Female)

## M12 CABLE ASSEMBLIES

Part Number	Description	Standard Lengths (m)
608555-XXXX	M12 Male to RJ45	1,2,5,10,20,30,50,100
608556-XXXX	M12 Female to Flying Leads	1,2,5,10,20,30,50,100
608557-XXXX	M12 Male to M12 Male	1,2,5,10,20,30,50,100

Note: 10 meter cable will be -0010

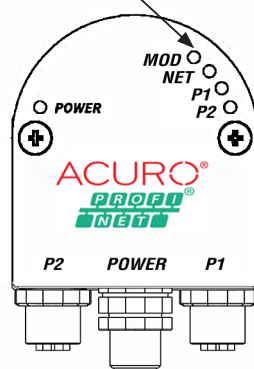
## ELECTRICAL CONNECTIONS

Bus cover with 3x M12 connectors

Pin	P1	Supply voltage	P2
1	TxD+	7-30V in	TxD+
2	RxD+	N.C.	RxD+
3	TxD-	0 V in	TxD-
4	RxD-	N.C.	RxD
Shield	Shield <sup>1</sup>	Shield <sup>1</sup>	Shield <sup>1</sup>

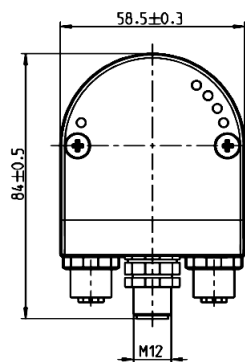
<sup>1</sup>Shield connected to encoder housing

Diagnostic LED's

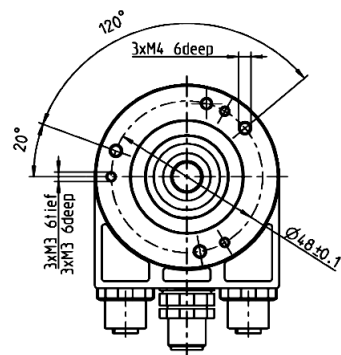
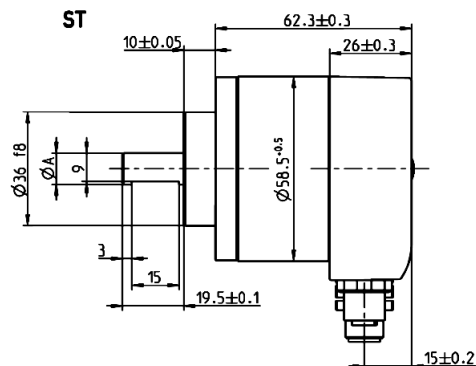


## DIMENSIONS

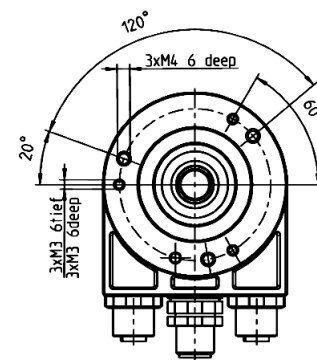
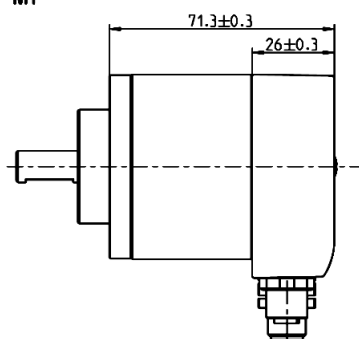
### Clamping Flange



ST

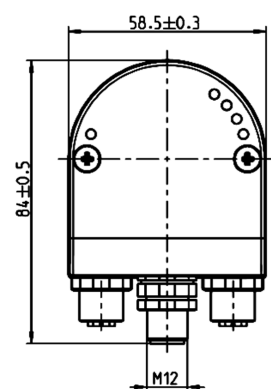


MT

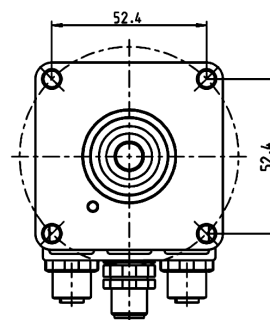
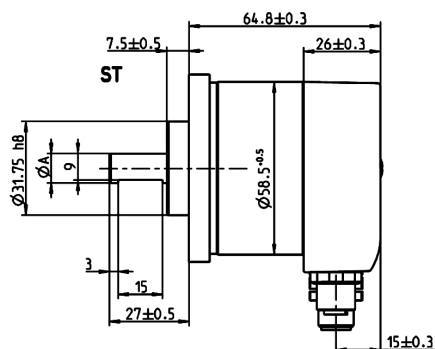


	Mass/dimension	
Wellen-ØA/shaft-ØA	10 <sup>+0.01</sup> <sub>-0.02</sub>	9.52 <sup>+0.01</sup> <sub>-0.02</sub>
Code/code	"2"	"6"

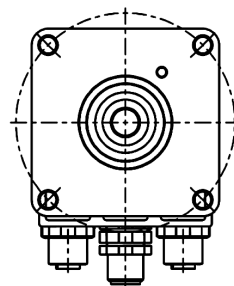
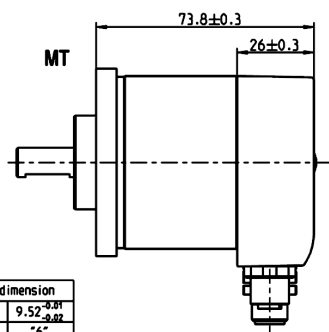
### Square Flange



ST

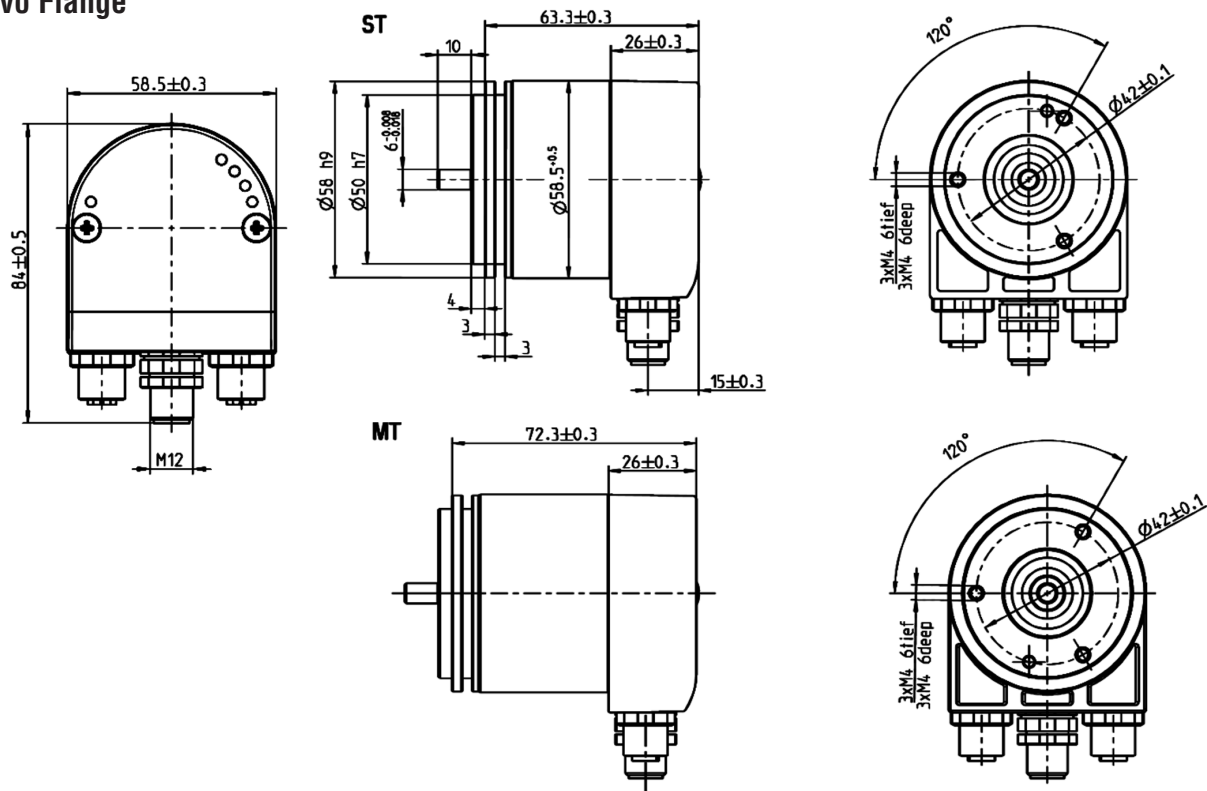


MT

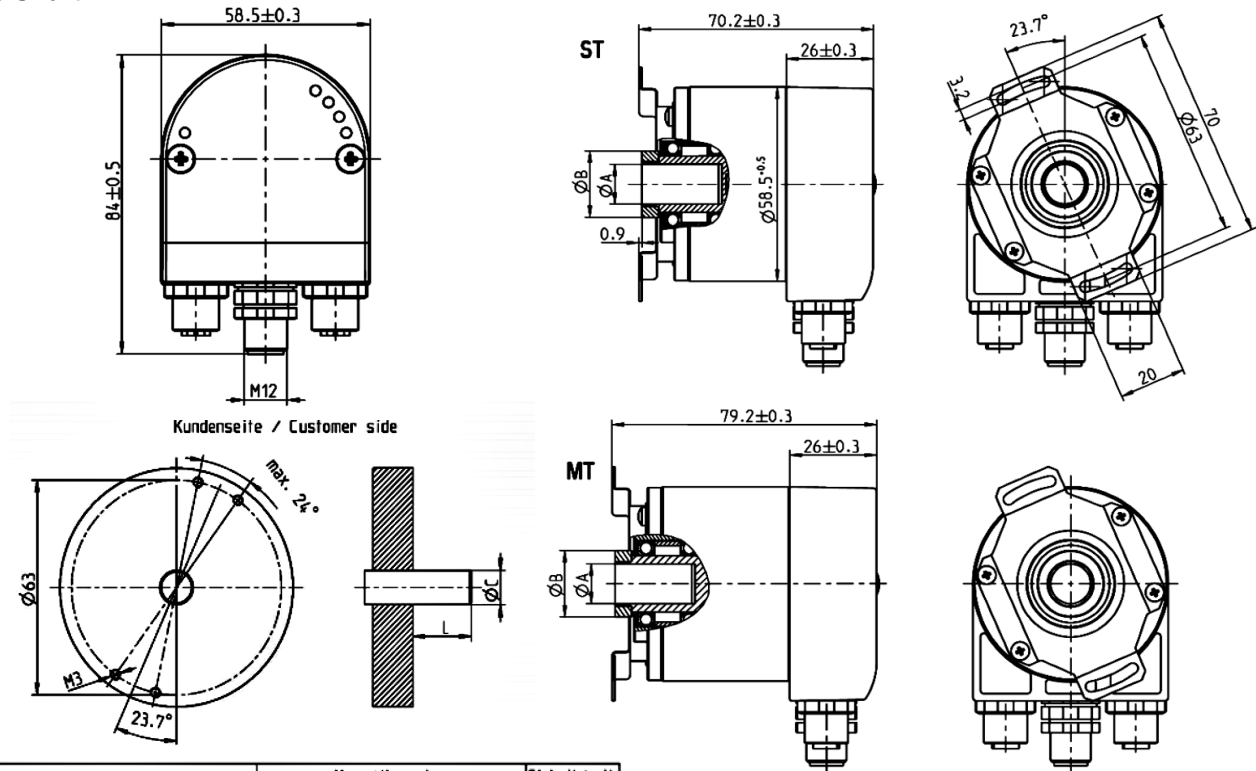


	Mass/dimension	
Wellen-ØA/shaft-ØA	10 <sup>+0.01</sup> <sub>-0.02</sub>	9.52 <sup>+0.01</sup> <sub>-0.02</sub>
Code/code	"2"	"6"

## DIMENSIONS Servo Flange



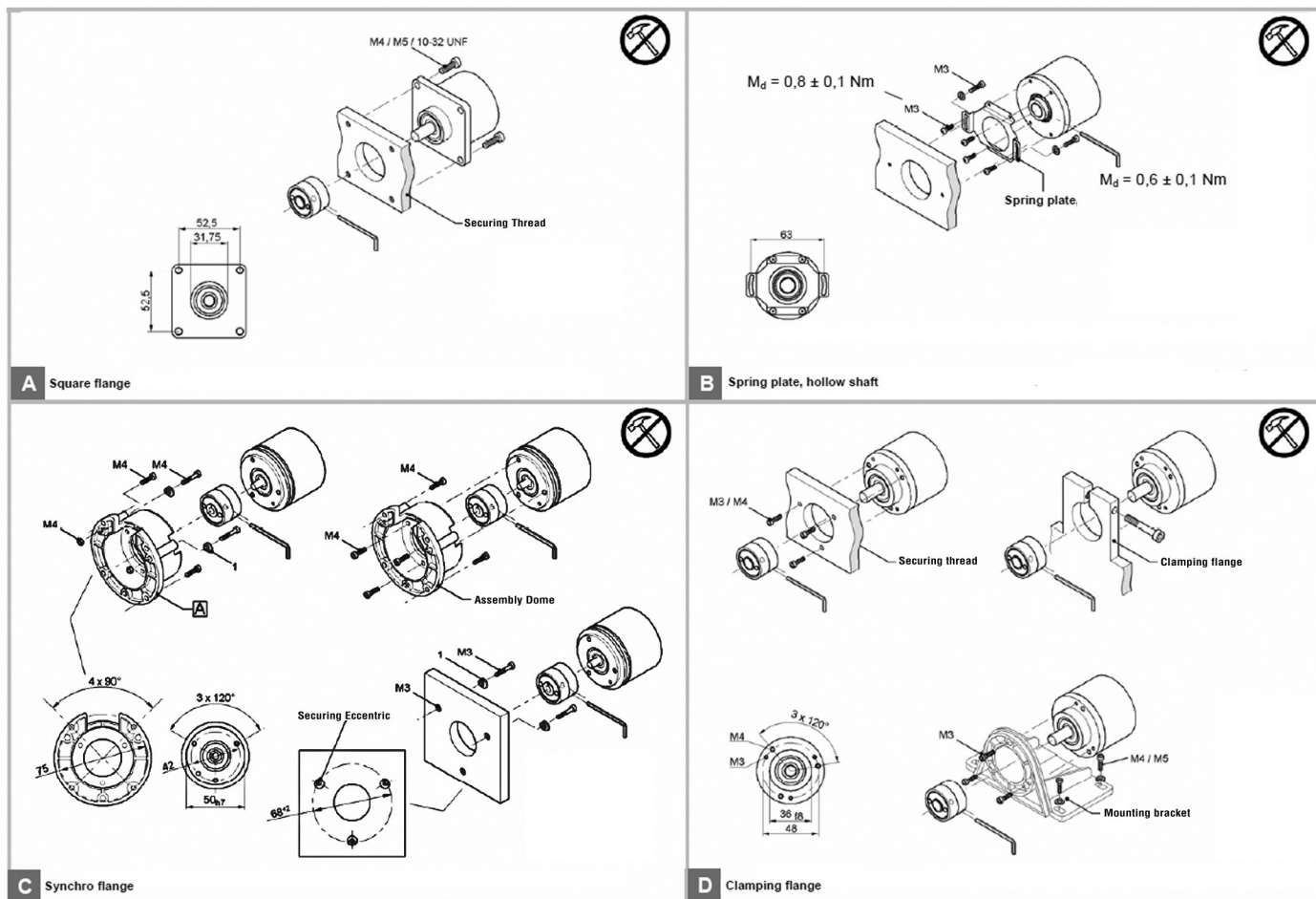
## Hub Shaft



	Mass/dimension				Einheit/unit
Hohlwellen- $\phi A$ /hollow shaft- $\phi A$	$10^{+0.002}$	$12^{+0.002}$	$9.52^{+0.002}$	$12.7^{+0.002}$	mm
Anschlusswellen- $\phi C$ /connecting shaft- $\phi C$	$10_{\text{gr}}$	$12_{\text{gr}}$	$9.52_{\text{gr}}$	$12.7_{\text{gr}}$	mm
Klemmring- $\phi B$ /clamping ring- $\phi B$	18	20	18	22	mm
L min.	15	18	15	18	mm
L max.	20	20	20	20	mm
Wellen-Code / shaft code	"2"	"7"	"6"	"E"	

L = Eintauchtiefe der Anschlusswelle in den Geber  
L = Length of customers shaft inside of encoder

## MOUNTING



## MECHANICAL DATA

$d = 6...12 \text{ mm:}$ $F_r = 80 \text{ N}$ $F_a = 40 \text{ N}$		
	- Short term	$= 12\,000 \text{ min}^{-1}$
	- Continuous duty	$= 10\,000 \text{ min}^{-1}$
	$-40 \dots +85 \text{ }^{\circ}\text{C}$	
- Vibration - Shock	$300 \text{ m/s}^2 (10 \dots 2000 \text{ Hz})$ $4000 \text{ m/s}^2 (6 \text{ ms})$	

## ELECTRICAL DATA

	Singleturn	Multiturn
$U_{in}^{1)} =$	7...30VDC	7...30VDC
$I_{max}$ typ. (only Encoder) @ 24 VDC	55 mA	65 mA
$I_{max}$ (incl. Output) = Fuse	1 A Middle slow blow	1 A Middle slow blow
- Interface	PROFINET IO	
- Cable length		
ESD		



Connecting the encoder to a DC line voltage without a protective circuit for EMC is not allowed.

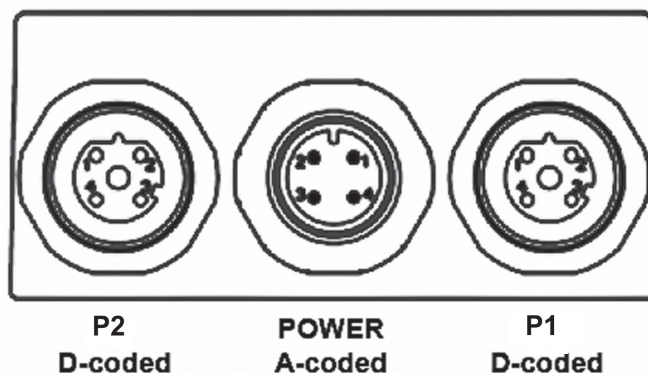


## CONNECTION DIAGRAMS

Bus cover with 3x M12 connectors

Pin	P1	Supply Voltage	P2
1	TxD+	7-30V in	TxD+
2	RxD+	N.C.	RxD+
3	TxD-	0 V in	TxD-
4	RxD-	N.C.	RxD
Shield	Shield <sup>1</sup>	Shield <sup>1</sup>	Shield <sup>1</sup>

<sup>1</sup>Shield connected to encoder housing



## DIAGNOSTIC LEDS

Indicator	Status	Meaning
<b>Module LED</b>	OFF	No Power
	Solid Green	Module Active
	Orange Flashing	Firmware Update Running
	Solid Red	Module Error
	Red Flashing	Module-Configuration Missing
<b>Network LED</b>	OFF	Network Inactive
	Solid Green	PROFINET Active
	Orange Flashing	Firmware Update Running
	Solid Red	Network Active, PROFINET Inactive
	Red Flashing	Network Connection Missing
<b>P1 &amp; P2 LED</b>	OFF	No Ethernet Connection
	Solid Green	Ethernet-Component Connected on this Port
	Flashing Green	Ethernet-Component Connected on this Port, Communication Running

