

DSK5H MODELS

FUNCTIONAL SAFETY SIL3/PLE

This Quick Installation Guide is a summary of Chapter 4 "Installation and Start Up" from the "Safety User Manual". It is used as an aid during mounting to ensure that the Sensata | BEI Sensors safety encoders are correctly incorporated into safety system loops. More detailed information is available in the Safety User Manual on request. Customer documentation (Encoder datasheet, Safety EC-Type certificate, etc.) is available for customer download on Sensata website.

SAFETY INSTALLATION REQUIREMENTS

⚠ WARNING / CAUTIONS

- The safety function requires that the four safety signals (A, A/ and B, B/ in digital or S, S/ and C, C/ in sine versions) are always connected to the safe PLC and used in the safety loop.
- Channel 0 (Z, Z/) is not part of the safety function. If Z, Z/ are not used they must be terminated through 3kOhm pull-down resistors connected to 0V.
- Good installation practice must be followed, including, but not limited to: tightening screws to proper torque, install all cover plugs correctly and never connect the encoder to power mains (115 VAC, 220 VAC)
- The safety system must be compliant with the following documents:
 - Safety Loop Prerequisites (table to the right)
 - Specifications in the Safety User Manual
- If external damage is detected on the box, inspect encoder carefully before mounting (connector, shaft, stator coupling...). Damage due to transport may lead to dangerous fault. In case of doubt, unit must be replaced.

External Safety Loop Prerequisites

Electrical Encoder Version	Positive lock	Cable break detection	Safe supply voltage with monitoring	Vector length monitoring	Speed comparison	Zero crossing detection	Inverse signal monitoring	Exclusive bit check
2WT	X	X	Y ⁽¹⁾	Y	Y	Y		
5WT	X	X		Y	Y	Y		
2G2	X	X	Y		Y		Y	Y ⁽¹⁾
5G5	X	X			Y		Y	Y ⁽¹⁾
5G2	X	X			Y		Y	Y ⁽¹⁾

X: Prerequisite for all safety levels

Y: Additional prerequisite for SIL3/PLE

⁽¹⁾ Not required for SIL3/PLE for Speed without Direction

MECHANICAL MOUNTING PROCEDURE

1. Check: <ul style="list-style-type: none"> - Driving shaft runout and tolerances: diameter X H7. - Shaft interfaces cleanliness (avoid particles and burrs). - Connections aspect (seals, threads). 	<table border="1"> <thead> <tr> <th>Speed (RPM)</th> <th>Permissible runout</th> </tr> </thead> <tbody> <tr> <td>0-100</td> <td>0.5</td> </tr> <tr> <td>100-1500</td> <td>0.3</td> </tr> <tr> <td>1500-6000</td> <td>0.05</td> </tr> </tbody> </table>	Speed (RPM)	Permissible runout	0-100	0.5	100-1500	0.3	1500-6000	0.05
Speed (RPM)	Permissible runout								
0-100	0.5								
100-1500	0.3								
1500-6000	0.05								
2. Install the stator coupling/tether arm on the encoder with provided fasteners at recommended torque.									
3. Plug and lock out electrical connection.									
4. Check that clamping ring and encoder shaft slots are aligned.									
A. Install the key on the driving shaft.									
B. Align and mate the encoder to the driving shaft.									
C. Tighten the clamping ring at recommended torque.									
D. Fasten the encoder on the frame at recommended torque.									

Notes:

- Secure all fasteners with threadlocker Loctite 243 or equivalent.
- Recommended torques:
 - Hexalobular recessed screws (Torx): M3: 1.8 N.m | M4: 2.5 N.m | M5: 4.5 N.m
 - Set screws (Hc): M4: 1.8 N.m | M5: 1.5N.m

GENERAL MECHANICAL PRECAUTIONS

- Never hard couple both the body and the shaft of an encoder. Flexible couplings or other flexible mountings ensure long bearing life.
- Avoid installing with the shaft upright as water can pool around the shaft and may eventually work its way into a sealed area.
- It is good practice to use lockwashers and thread locker when mounting an encoder. Use the manufacturer's recommended torque for screws to ensure good mechanical and electrical function.
- Inspect connectors for damaged O-rings, threads or bent connector pins. Replace connector if necessary.
- Install so that the cable leads down and away from the encoder body. If the cable runs up it is susceptible to damage.
- Do not subject the encoder to excessive shock (hammering or dropping).
- Do not attempt to disassemble or modify the encoder by machining.
- Keep encoder in original package until ready for installation. Always handle product by the body, not the cable.



ENCODER EXTRACTION PROCEDURE

1. Unscrew the anti-rotation device.
2. Loosen the 2 Hc M4 or M5 clamping ring screws.
3. Remove the encoder.



GENERAL ELECTRICAL PRECAUTIONS

Cable	<ul style="list-style-type: none"> Follow good cable installation practices, including: <ul style="list-style-type: none"> Protecting cable from cuts or abrasion Follow recommend bend radius Provide a service loop from cable to mounting clamp to avoid damage due to snagging cable Avoid coiling up excess cable – trim to proper length for the installation
Connection	<ul style="list-style-type: none"> Never connect data lines to each other or to a potential Refer to WARNINGS/CAUTIONS regarding handling of the 0 (Z and Z/) signals. Do not use the same cable for high power drive (motor drive, VFD) and encoder. Keep encoder signals separate from potential electrically interfering signals and follow proper shielding and grounding procedures. Metal connectors should have 360° shielding contact Connect each data line with its logical pair. i.e. A with A/, B with B/ and Z with Z/ in a differential receiver.
Grounding	<ul style="list-style-type: none"> Cable shield and encoder body should be connected at the same potential Do not leave the ground plane unconnected. Connect the cable shield ground to the control cabinet ground if available. Otherwise to 0V. Always ground the encoder housing to prevent electrostatic discharging through the mounting shaft.

Cable Requirements		
Supply	Output	Length
5VDC	2WTN	100 m
	2G29	100 m ⁽¹⁾
11-30 VDC	5WTN	100 m
	5G29	100 m
	5G59	100 m ⁽²⁾

- ⁽¹⁾ Cable > 20 m use "GP" with voltage sensing power supply.
⁽²⁾ Frequency restrictions – check "Safety User Manual"

Allowable Bend Radius		
Cable	Static	Dynamic
G3-U3	30 mm	N/R
GC	50 mm	150 mm
TE	60 mm	60 mm
GP	30 mm	90 mm

Recommended Wire Cross Section	
Power	> 0.22 mm ²
Data Signal	< 0.22 mm ²



ELECTRICAL MOUNTING PROCEDURE

- Verify that you have the correct power supply and that it is switched off prior to starting installation.
- Ensure that you have the correct wiring connections identified. Either through a sticker on the encoder or an installation manual.
- Make sure the cable run is in accordance with the tables shown in the installation guide.
- Power to the encoder and to the controller should be switched on (or off) simultaneously to ensure proper power up during initialization.

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