

Encoder Installation Manual

NorthStar™ brand

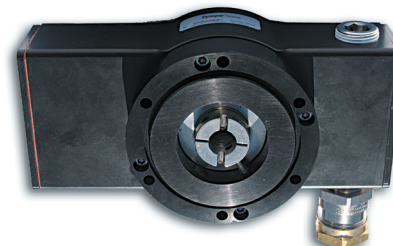
SERIES EN44

Zone 1 Hazardous Area Rated Encoder

Document No.: 702828-0001

Revision Level: K

June 12, 2020



II 2 G D
Ex ia mb eh IIC T4 Gb
EX tb IIC T119°C Db
Sira 09ATEX5172X



US
Ex eb ia mb IIC T4 Gb
Certification No.
CSA 2676947

General

The following instructions are meant to assist in proper installation of the NorthStar Series EN44 Sealed Hub-shaft Encoder. The encoder is a harsh-duty speed and position transducer that when mounted to a rotating shaft, produces output pulses that are directly proportional to the shaft speed and direction. The encoder is attached to the motor shaft via a stainless steel flexible coupling that compensates for motor shaft end-play and run-out. The clamp is also electrically isolated from the encoder to ensure motor shaft currents do not ground through the encoder bearings. Due to this specialized coupling, special precautions must be taken during installation as outlined in this manual.

The EN44 was designed specifically for “Hazardous Area” rated applications common in Oilfield operations. Proper operation is dependant upon installation by suitably trained personnel in accordance with the applicable code of practice.

Care should be taken to inspect the shipping container and product for external damage and/or missing parts. If any is found, contact Dynapar immediately as well as the shipping agent.

Tools Required for Installation

Tool	Purpose
Caliper & Dial Indicator Gages	Shaft Checks
1/4" Hex Key Wrench	Shaft Clamp Access Plug
9/64" Ball End Hex Key Wrench	Shaft Collar Clamp
5/32" Ball End Hex Key Wrench	Shaft Clamp Alignment Screw
3/16" Hex Key Wrench	Encoder Mounting Screws
10mm Hex Key Wrench	Stopping Plug
Open End Adjustable Wrench	Cable Gland
7/64" Hex Key Wrench	Terminal Box Cover
1/8" Flat Blade Screwdriver	Terminal Block Wiring
Torque Wrench, 20–75 inch pound range	Tightening Fasteners
Threadlocker, Loctite 242 or equivalent	Retaining Fasteners

Application Environment

The EN44 is uniquely designed with the primary protection technique as Encapsulation.

The encapsulated electronics and increased safety interface allow for use in Zones 1 and 2 with flammable gases and vapors with apparatus groups IIA, IIB & IIC and with temperature classes T1, T2, T3, and T4. The equipment is only certified for use in ambient temperatures in the range –50°C to 100°C.

Compliance with the Essential Health and Safety Requirements has been assured by compliance with the following documents:

IEC EN 60079-0(General)	EN60079-31
EN 60079-7(Increased Safety)	EN60079-11
EN 60079-18(Encapsulated)	

Before installation or operating in a “Hazardous Area”, the installer must be trained and familiar with hazardous area installation and IEC/EN 60079-14 standards.

Note: Encapsulation techniques are an improvement over “flameproof” 60079-1 Specifications requiring heavy XP metal enclosures to contain a flame. Encapsulation eliminates the air around the electronics preventing ignition and allowing smaller lightweight enclosures to be used in the design.

Table of Contents

Topic	Page
Description & Table of Contents.....	1
Electrical Installation	2-3
Mechanical Installation	4-5
Specifications	6
SIRA Certification	7
SIRA User Instructions	8-9
Ex CSA Certification.....	10-15
CSA Certificate of Compliance	16-19
IECEx Certificate of Conformity.....	20-25
Declaration of Conformity	26

ELECTRICAL INSTALLATION

CAUTION: Before installation, ensure power is off and locked out. Failure to do so may damage encoder and/or cause a spark or explosion.

AVERTISSEMENT : Avant l'installation, assurez-vous que l'alimentation soit éteinte et verrouillée. Ne pas suivre cette instruction pourrait endommager le codeur et/ou provoquer une étincelle ou une explosion.

Electrical Installation must be performed by an individual that is trained and familiar with hazardous area installation. Standards that apply are IEC/EN 60079-14 and other applicable wiring codes that apply to the specific location of the installation. Please follow the guidelines for a type "e" Increased Safety Installation. Other cable considerations include flammability, temperature, chemical, etc as applies to the area and environment of installation. If in doubt see the IEC/EN60079-14 standard as applies to Increased Safety installations and local regulations.

Important Wiring Instructions: Use shielded cable with a defined wire gauge per the following table.

* Terminal blocks type 'e' certified for the conductor range:

Connectable Conductor Cross Section	
Rigid/Soild Wire mm ² (AWG)	0.14 - 2.5 (26-14)
Flexible/Stranded Wire mm ² (AWG)	0.14 - 1.5 (26-16)

Consider the length of cable and desired drive currents for your application. Consider a 0.5mm² or 20AWG cable as a minimum starting point. You can increase or decrease the wire diameter based on your specific application.

SHIELDING – It is good wiring practice for a shield to be connected to signal-ground at the receiving device only. **Connecting the shield at both ends can cause grounding (loops) problems that degrade system performance and give a path for stray currents to travel.**

CABLE PROTECTION - Run the encoder cable through a dedicated conduit (not shared with other wiring). Use of conduit will protect the cable from physical damage and provide a degree of electrical isolation. If a conduit is not practical use wire trays to protect cable. If there is not a practical way to protect the cable you may consider using armored cable - See section 9 of the IEC/EN60079-14 standard as applies to Increased Safety installations. Do not run the cable in close proximity to other conductors that carry current to heavy loads such as motors, motor starters, contactors etc. This practice can induce electrical transients in the encoder cable, potentially interfering with reliable data transmission.

CAUTION: Unused encoder signal wires must be individually insulated and under no circumstances be in contact with ground, voltage sources, or other signal lines.

AVERTISSEMENT : Les fils du signal du codeur non utilisés doivent être isolés individuellement et, en aucun cas, être en contact avec le sol, les sources de tension ou d'autres lignes de signal.

Zone 1 Wiring Considerations

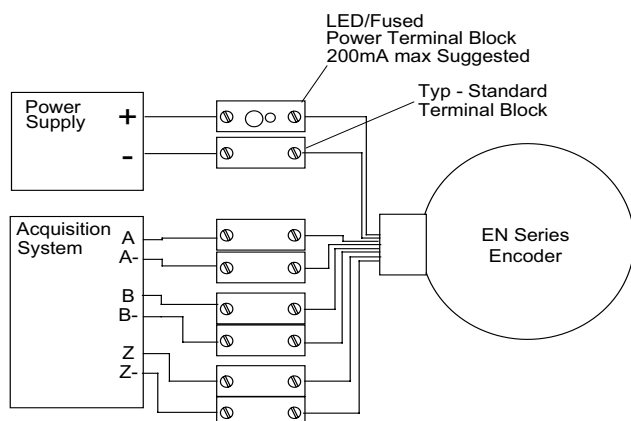
CAUTION: The Encoder wiring configuration for the EN series encoder is different than an Intrinsic Safe wiring configuration. No IS barrier, Zener or Galvanic, is required when using the EN series encoder. Barriers may prevent proper operation and/or frequency performance. Damage to the encoder may occur if the encoder output is connected to an IS barrier.

AVERTISSEMENT : La configuration du câblage du codeur pour le codeur de série EN est différente d'une configuration de câblage de sécurité intrinsèque. Non barrière IS, Zener ou galvanique n'est nécessaire lors de l'utilisation du codeur série EN. Les barrières peuvent empêcher le bon fonctionnement et/ou la performance de la fréquence. Des dommages causés au codeur peuvent se produire si la sortie du codeur est reliée à une barrière IS.

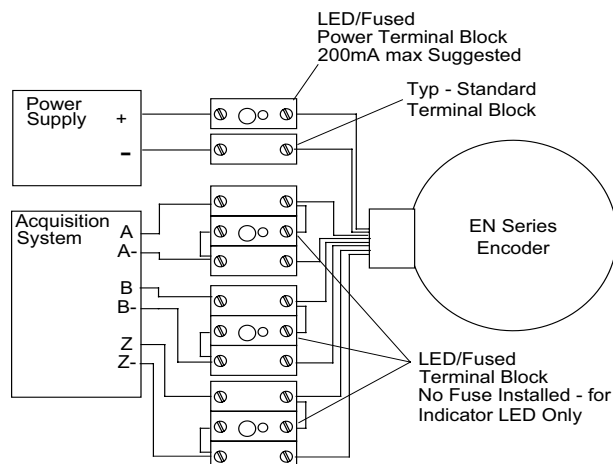
When selecting an encoder, consider the power supply to the encoder and input voltage to your data acquisition, PLC or drive system. Cable length and RPM max will determine which output driver option to select.

The configurations below are examples of protected wiring practices and help to determine the best wiring scheme.

EN Series Encoder Wiring Configuration with Fused Power



EN Series Encoder Wiring Configuration with Fused Power and LED activity Lights



Cable Entry & Gland Selection

This product is supplied with dual 3/4" NPT entry holes for wiring to the terminal block. SPECIAL CONDITIONS FOR SAFE USE (denoted by X in the certificate number) require cable entry to be fitted with an ATEX certified Type "e" cable gland. Any gland certified for use as Type "e" and matching the cable selected and designed to fit a 3/4" NPT can be used. In addition, the remaining 3/4" NPT hole that is not used for cable entry must be fitted with a Stopping Plug (supplied).

Manufacturer's Instructions must be followed for both the Cable Gland and the Stopping Plug. Refer to the list below for the instructions for the Stopping Plug and Cable Glands supplied by Dynapar.

Note: For Ingress Protection greater than IP54, the use of a suitable non-setting thread sealant is recommended. Both the Cable Gland and the Stopping Plug must be "wrench tight" in the enclosure.

Dynapar Stopping Plug and Cable Glands (ref. page 6 "Ordering Information" – Code 5)
Detailed Instructions are available on the Hawke Website: www.ehawke.com.

All Codes:

Stopping Plug – Hawke 475 3/4" NPT Brass Nickel Plated
Hawke Datasheet: 475
Hawke Assembly Instructions: AI404

Code 1:

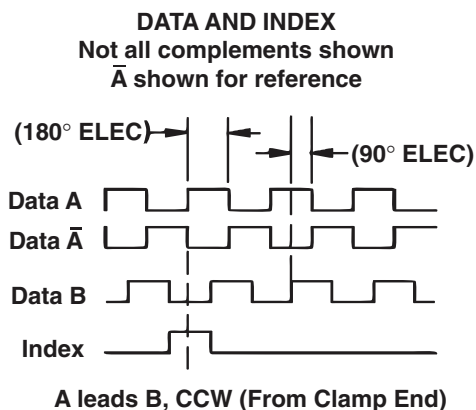
Non-Armored Cable Gland – Hawke 501/421 A 3/4" NPT NP Brass S
Hawke Datasheet: 501/421
Hawke Assembly Instructions: AI307

Code 2:

Armored Cable Gland – Hawke 501/453/UNIV A 3/4" NPT NP Brass
Hawke Datasheet: 501/453/UNIV
Hawke Assembly Instructions: AI2000

Signal and Wiring

WAVEFORMS



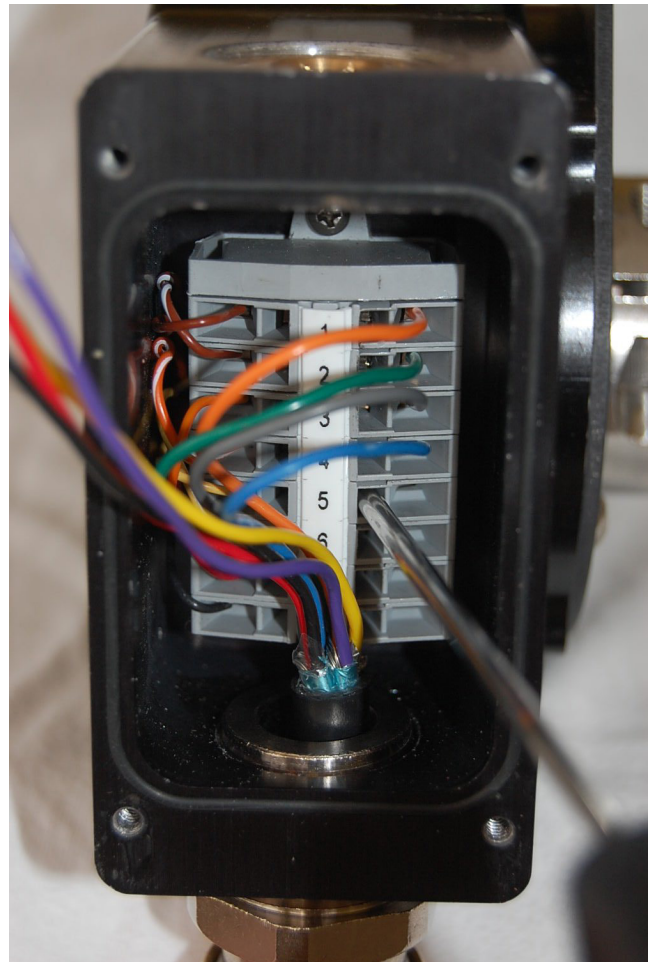
ELECTRICAL CONNECTIONS

Encoder Function	Terminal Box Connection
Sig. A	1
Sig. A	2
Sig. B	3
Sig. B	4
Sig. Z	5
Sig. Z	6
Power +V	7
Com	8

Wiring Procedure

Step 1: Remove terminal box cover. Assemble cable & gland per manufactures instructions.

Step 2: Strip cable jacket back 3 inches. Strip individual leads back 0.35".



Step 3: Wire to terminal block using pin assignment on this page or on the inside of terminal box cover. Carefully press a 1/8" flat blade screw-driver into the inboard hole to open terminal. Insert wire completely and remove screwdriver.

Step 4: Replace terminal box cover.

MECHANICAL INSTALLATION

CAUTION: Upon initial inspection of the shaft coupling area of the EN44 you will notice a 10-32 screw that extends through the encoder body and into the shaft coupling.

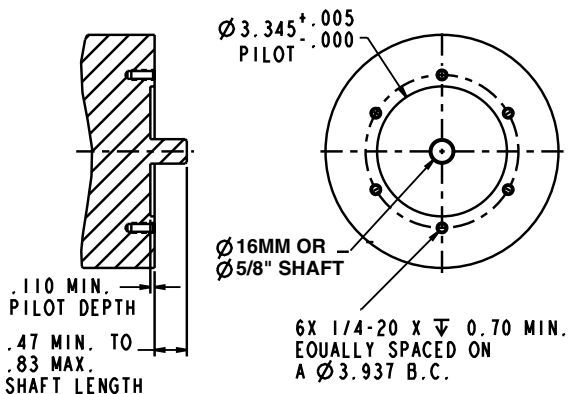
DO NOT remove this Coupling Locating Screw until directed to do so in Step 9 of the Installation Procedure.

Please familiarize yourself with the following as seen in the magnified view drawing below:

1. Shaft Clamp Screw
2. Shaft Clamp Access Plug
3. Flex Coupling Locating Screw
4. Coupling Locating Hole

Note: The encoder can be mounted on shafts of varying lengths (MIN 0.47 in, MAX 0.83 in).

EN44 MOTOR MOUNT REQUIREMENTS



STEP 1: Please reference the below diagram titled "EN 44 Motor Mount Requirements" to ensure that a correct mounting interface is provided for the mechanical installation of this encoder. The EN44 has a 0.110 inch piloted face that is concentric with the Flex Coupling. Be sure to create a concentric pilot with the six 1/4-20 inch threaded holes on customer equipment as shown in the diagram.

STEP 2: Ensure the mounting interface and shaft extension are free of dirt, grease, or any other foreign matter. Check the shaft Total Indicated Run-out (TIR), and ensure that it does not exceed 0.005" TIR.

STEP 3: Using the 1/4" hex key, remove the Shaft Clamp Access Plug from the side of the encoder body.

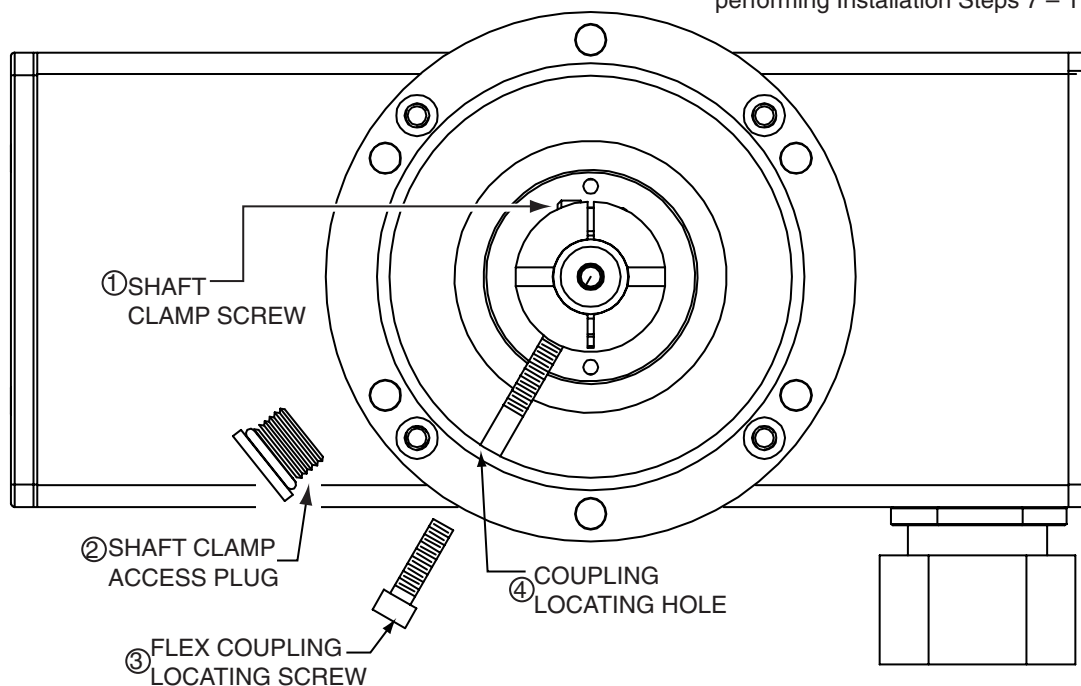
STEP 4: Place the 9/64" ball end hex key into the access hole and loosen the Shaft Collar Clamp Screw. Place a small amount of threadlocker on the screw threads and re-install it into the Clamp Collar. Re-thread the screw into the clamp loosely. **DO NOT TIGHTEN.** Remove the 9/64" ball end hex key from the access hole.

STEP 5: Place a Lockwasher onto each 1/4-20 x 1" Encoder Mounting Screw (6 required). Apply a small amount of threadlocker to the screw threads.

STEP 6: While observing the proper orientation of the cable exit, slide the encoder straight over the motor shaft extension, and engage the encoder's Flex Coupling. Note again, shaft engagement is MIN 0.47" MAX 0.83".

EN44 COUPLING/CLAMP INSTALLATION

Note: Please refer to this figure when performing Installation Steps 7 – 11.



MECHANICAL INSTALLATION

Note: Please refer to 'EN44 Coupling/Clamp Installation' figure (previous page) when performing Installation Steps 7 – 11.

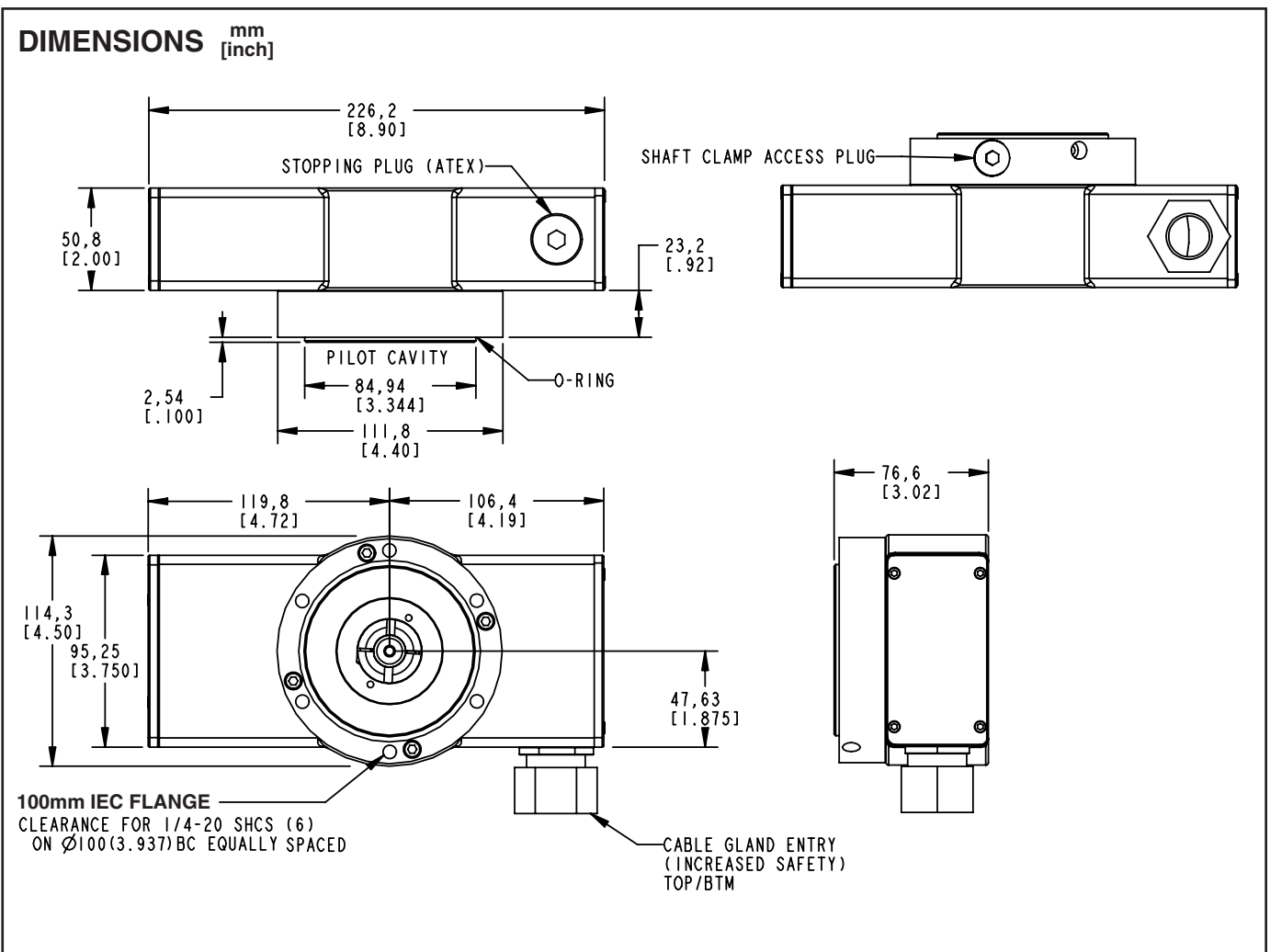
STEP 7: Install the six Encoder Mounting Screws using the 3/16" hex key and torque to 75 inch pounds.

STEP 8: Using the 9/64" hex key, tighten the Shaft Clamp Screw. Torque to 45 inch pounds. Remove the 9/64" hex key.

CAUTION: The motor shaft must NOT be rotated until Step 9 (below) is performed, or damage to the encoder flex coupling will result.

STEP 9 Using the 5/32 hex key, completely remove the 10-32 x 1.5" Flex Coupling Location Screw. This screw is no longer needed for installation, instead replace with the shorter 10-32 x 7/8" screw. Obtain the 10-32 x 7/8" SHCS from the hardware kit (this screw has an o-ring under the head). Apply a small amount of threadlocker to the screw threads. Using the 5/32" hex key install the screw into the Coupling Locating Hole and torque to 20 inch pounds. The purpose of this shorter screw is to block the hole while in operation.

STEP 10 Apply a small amount of threadlocker to 1/8" NPT Shaft Clamp Access Plug threads. Using the 1/4 hex key, install the plug and torque to 60 inch pounds.



SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 1024 to 2048 PPR (pulses/revolution)
 See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z, ungated), and complementary outputs
Index: 180 degrees \pm 18 degrees (electrical), ungated
Phase Sense: A leads B for CCW shaft rotation viewing the shaft clamp end of the encoder
Quadrature Phasing:
 For resolutions 200 to 300 PPR and 1200 PPR and above: 90° \pm 30° electrical; all other resolutions: 90° \pm 15°
Symmetry:
 For resolutions 200-300 PPR and above 1024 PPR: 180° \pm 25° electrical; all other resolutions: 180° \pm 18°
Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

ELECTRICAL

Input Voltage: 7-15VDC, 7-26VDC, 10-30VDC (see ordering information)
Input Current: 65mA max., not including output loads
Outputs: 4428 (7-15VDC), 7272 (7-26VDC) and High Powered Mosfet Line Drivers (10-30VDC)
Output Current: (Refer to Ordering Information Table, Code 4: Output Format)
 Code 4, Option 0 or 2: 125mA max. per channel
 Code 4, Option 1 or 3: 10mA max. per channel @ 100°C; 15mA max. per channel @ 90°C
 Code 4, Option 4: 90mA max per channel @ 60°C; 60mA max per channel at 95°C

ELECTRICAL (cont.)

Frequency Response: 125 kHz (data & index)
Termination: Terminal block - Ex screwless w/spring cage-clamp
Interface: HAWKE type "E" increased safety rated gland for armored and non-armored cables.
HAWKE Part Numbers:
 Non-Armored Gland: HAWKE 501/421 A 3/4" NPT S (accepts 8.5 - 13mm cable, OD)
 Armored Gland: HAWKE 501/453 UNIV A 3/4" NPT (accepts 12.5 - 20.5mm cable, OD)

MECHANICAL

Mechanical Interface: Electrically isolated stainless steel shaft flex coupling
Coupling: 16mm, flexible
Mounting: 100mm IEC Flange
Mating Shaft Length: 0.47" to 0.83" (11.9mm to 28.1mm)
Shaft Speed: 6000 RPM, max.
Bearings: 6107
Housing Material: Aluminum Alloy, Black Anodized
Shaft Material: Stainless Steel
Disc Material: Mylar®
Weight: 6 lb. 6 oz, typical

ENVIRONMENTAL

Operating Temperature: Refer to Temperature Range Table (below)
Storage temperature: -50 to 100°C. Armored Gland high-temperature specification limited to +80°C.
Shock: 50G's for 11msec duration
Vibration: 5 to 2000Hz @ 20 G's
Humidity: 100%
Enclosure Rating: IP67

CERTIFICATIONS

IECEX SIR 15.0051X
 Sira 09ATEX5172X
 Ex ia mb eb IIC T4 Gb
 Ex tb IIIC T119°C Db IP64
 CSA 2676947
 Ex eb ia mb IIC T4 Gb
 Ex tb IIIC T119°C Db IP64
 Ex mb IIC T4 Gb and Class III, Div 1; Class II, Div 1, Groups E, F and G
 Class I, Zone 1, AEx eb ia mb IIC T4 Gb
 Zone 21, AEx tb IIIC T119°C Db IP64

TEMPERATURE RANGE

Code 4 Option	Output Current	Group II Ambient Temperature Range	Group III Ambient Temperature Range
0 or 2	125mA max per channel	Ta = -50°C to +100°C	Ta = -25°C to +100°C
1 or 3	10mA max per channel	Ta = -50°C to +100°C	Ta = -25°C to +100°C
1 or 3	15mA max per channel	Ta = -50°C to +90°C	Ta = -25°C to +90°C
4	90mA max per channel	Ta = -50°C to +60°C	Ta = -25°C to +60°C
4	60mA max per channel	Ta = -50°C to +95°C	Ta = -25°C to +95°C

Models

Ordering Information

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

Code 1: Model	Code 2: PPR	Code 3: Bore Size	Code 4: Output Format	Code 5: Termination
EN44	□□□□	□	□	□
Ordering Information				
EN44 Triple Certified ATEX Zone 1 Hollowshaft Encoder	1024 2048	A 16mm	0 Differential AB, 7-15V in, 7-15V out* 1 Differential AB, 7-26V in, 5V out* 2 Differential ABZ, 7-15V in, 7-15V out* 3 Differential ABZ, 7-26V in, 5V out* 4 Differential ABZ, 10-30V in, 10-30V out*	0 No Gland 1 Ex Gland for non-armored cables (8.5 - 13.5mm OD) 2 Ex Gland for armored cables (12.5 - 20.5mm OD) See †Note

* See Electrical Specifications for Details

† Note: Armored Gland high-temperature specification limited to +80°C.

* Specifications subject to change without notice. All product and brand names are trademarks of their respective owners. All rights reserved.

NorthStar™ brand is a trademark of Dynapar.

All rights reserved. © 2019 Dynapar

Mylar® is a registered trademark of Dupont

NorthStar™

Heavy Duty Optical User Instructions Non Barrier Unit Certificate SIRA 09ATEX5172X IECEX SIR 15.0051X

The following text will be reproduced without change in an instruction manual for the above and an instruction manual will accompany each product or batch of products. In addition, when appropriate, this Instruction manual will be accompanied by a translation in the language or languages of the country in which the equipment is to be used.

The instruction manual will contain all drawings and diagrams necessary for the putting into service, maintenance, inspection, checking of correct operation and repair of the equipment.

With regard to safety aspects, any other literature produced will not contradict these instructions.

Installation

- Temperature ratings - The equipment is only certified for use in an ambient temperature range -50°C to +100°C (Refer to note 1 for temperature restrictions due to line driver type and load current.)
- The encoder is rated at IP54 for certification purposes. In order to achieve this level of protection, appropriate ATEX certified type 'e' Glands or Plugs must be used by the end user. The thread form of the cable entries is 3/4 NPT.
- Terminal blocks type 'e' certified for the conductor range:

Connectable conductor cross section		
- rigid [mm²] (AWG)	0,14 - 2,5 (26-14)	0,14 - 2,5 (26-14)
- flexible [mm²] (AWG)	0,14 - 1,5 (26-16)	0,14 - 1,5 (26-16)

Maintenance Issues

- Periodic checks should be made to ensure that there is not excessive play in the encoder shaft due to bearing wear or damage.
- Periodic checks should be made to ensure that there is not excessive friction in the encoder shaft due to bearing wear or damage.

PREPARATION:

Disconnect power from equipment and encoder cable.

Note: Ensure that pipe-thread tape or equivalent sealer is applied to the conduit entry stopping plug and mating cable gland for proper sealing.

Position the anti-rotation arm at a 90 degree angle (Ideal) to the motor shaft.

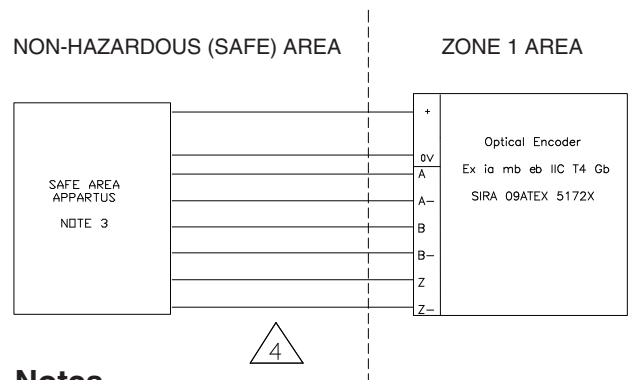
This orientation ensures:

* Minimal housing rotation and encoder error caused by relative motion.

* Reduced misalignment of bearing rod ends to prevent binding and premature wear due to high degrees of misalignment.

Do not disrupt the anti-rotation arm's 90° alignment with the motor shaft during mounting. A parallel orientation between the anti-rotation arm and the motor shaft is not recommended because it will significantly reduce the anti-rotation arm's performance and operational lifetime. Each rod end can withstand only 50° of deviation. Ideally, the anti-rotation arm should be mounted with rod-end ball centered in its socket.

Recommended torque: 20 FT-LBS. [27 N-m].



Notes

- 1 THE INSTALLATION SHALL FOLLOW THE LOCAL ELECTRICAL WIRING CODE FOR THE AREA CLASSIFICATION
- 2 ELECTRICAL CIRCUIT IN HAZARDOUS AREA SHALL BE ABLE TO WITHSTAND 500VRMS TO EARTH OR FRAME OF APPARATUS FOR 1 MIN. WITHOUT BREAKDOWN
- 3 NON-HAZARDOUS SUPPLY LIMITED TO NO MORE THAN 250 VRMS OR 250 VDC WITH RESPECT TO EARTH
- 4 CABLE AND INSTALLATION TO COMPLY WITH IEC/EN 60079-14

The following instructions relevant to safe use in a hazardous area apply to equipment covered by certificate numbers IECEx SIR 15.0051X / Sira 09ATEX5172X.

1.	The certification marking is as follows: Ex ia mb eb IIC T4 Gb Ex tb IIIC T119°C Db	
	Types: EN42xxxxx0xxxx, EN44xxxxx0xxx EN42xxxxx2xxxx, EN44xxxxx2xxx	-50°C ≤ Ta ≤ 100°C when Iload ≤ 125mA(GAS) -25°C ≤ Ta ≤ 100°C when Iload ≤ 125mA(DUST)
	Types: EN42xxxxx1xxxx, EN44xxxxx1xxx EN42xxxxx3xxxx, EN44xxxxx3xxx	-50°C ≤ Ta ≤ 100°C when Iload ≤ 10mA(GAS) -50°C ≤ Ta ≤ 90°C when Iload ≤ 15mA(GAS) -25°C ≤ Ta ≤ 100°C when Iload ≤ 10mA(DUST) -25°C ≤ Ta ≤ 90°C when Iload ≤ 15mA(DUST)
	Types: EN42xxxxx4xxxx EN44xxxxx4xx	-50°C ≤ Ta ≤ 60°C when Iload ≤ 90mA(GAS) -50°C ≤ Ta ≤ 95°C when Iload ≤ 60mA(GAS) -25°C ≤ Ta ≤ 60°C when Iload ≤ 90mA(DUST) -25°C ≤ Ta ≤ 95°C when Iload ≤ 60mA(DUST)
2.	The equipment may be used in zones 1 & 2 with flammable gases and vapours with apparatus groups IIA, IIB & IIC and with temperature class T4.	
3.	The equipment may be used in zones 21 & 22 with flammable dusts, fibres and flyings in groups IIIA, IIIB and IIIC, T119°C.	
4.	The equipment is only certified for use in ambient temperatures in the range -50°C to +100°C and should not be used outside this range. Refer to note 1 for temperature restrictions due to line driver type and load current.	
5.	The equipment has not been assessed as a safety-related device (as referred to by Directive 2014/34/EU Annex II, clause 1.5).	
6.	Installation shall be carried out in accordance with the applicable code of practice by suitably-trained personnel	
7.	There is no special checking or maintenance conditions other than a periodic check.	
8.	With regard to explosion safety, it is not necessary to check for correct operation.	
9.	The equipment contains no user-replaceable parts and is not intended to be repaired by the user. Repair of the equipment is to be carried out by the manufacturer, or their approved agents, in accordance with the applicable code of practice.	
10.	Repair of this equipment shall be carried out in accordance with the applicable code of practice	
11.	If the equipment is likely to come into contact with aggressive substances, e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected thus ensuring that the type of protection is not compromised.	

12.	<p>The certificate number has an 'X' suffix which indicates that special conditions of installation and use apply. Those installing or inspecting this equipment must have access to the contents of the certificate or these instructions. The conditions listed in the certificate are reproduced below:</p> <table border="1"> <tr> <td data-bbox="315 260 444 386">i.</td><td data-bbox="444 260 1435 386">All cable entry holes shall be fitted with either an ATEX, IECEx certified 'Ex e' cable gland or an ATEX, IECEx certified 'Ex e' stopping plug that is suitable for the application. The type of cable, glands and stopping plugs shall have temperature ratings of at least 100°C.</td></tr> <tr> <td data-bbox="315 386 444 554">ii.</td><td data-bbox="444 386 1435 554"> <p>The terminals shall only be fitted with wires that have cross sectional area falling within the following limitations:</p> <p>Rigid: 0.08 mm² to 4 mm²</p> <p>Flexible: 0.08 mm² to 2.5 mm²</p> </td></tr> <tr> <td data-bbox="315 554 444 617">iii.</td><td data-bbox="444 554 1435 617">The equipment shall be supplied from a power supply that has an output that is isolated from earth.</td></tr> <tr> <td data-bbox="315 617 444 772">iv.</td><td data-bbox="444 617 1435 772">Under certain extreme circumstances, the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth.</td></tr> </table>	i.	All cable entry holes shall be fitted with either an ATEX, IECEx certified 'Ex e' cable gland or an ATEX, IECEx certified 'Ex e' stopping plug that is suitable for the application. The type of cable, glands and stopping plugs shall have temperature ratings of at least 100°C.	ii.	<p>The terminals shall only be fitted with wires that have cross sectional area falling within the following limitations:</p> <p>Rigid: 0.08 mm² to 4 mm²</p> <p>Flexible: 0.08 mm² to 2.5 mm²</p>	iii.	The equipment shall be supplied from a power supply that has an output that is isolated from earth.	iv.	Under certain extreme circumstances, the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth.
i.	All cable entry holes shall be fitted with either an ATEX, IECEx certified 'Ex e' cable gland or an ATEX, IECEx certified 'Ex e' stopping plug that is suitable for the application. The type of cable, glands and stopping plugs shall have temperature ratings of at least 100°C.								
ii.	<p>The terminals shall only be fitted with wires that have cross sectional area falling within the following limitations:</p> <p>Rigid: 0.08 mm² to 4 mm²</p> <p>Flexible: 0.08 mm² to 2.5 mm²</p>								
iii.	The equipment shall be supplied from a power supply that has an output that is isolated from earth.								
iv.	Under certain extreme circumstances, the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore, the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth.								
13.	<p>The certification of this equipment relies on the following materials used in its construction:</p> <p style="text-align: center;">Enclosure: Case material type - Anodized and/or powder coated aluminium. Other external parts and Shaft materials are anodized aluminium Steel, SST.</p> <p style="text-align: center;">Potting Compounds: Silicone Based Sealing O-rings: Silicone type Shaft seals: Viton</p> <p>If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.</p> <p>"Aggressive substances" - e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials.</p> <p>"Suitable precautions" - e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.</p>								

Additional documentation to be provided with each unit:

- Sira Certificate
- Installation, NonBarrier #200872-0001



EU-TYPE EXAMINATION CERTIFICATE

Equipment intended for use in Potentially Explosive Atmospheres Directive 2014/34/EU

Certificate Number: **Sira 09ATEX5172X** Issue: **6**

Equipment: **Optical Encoder**

Applicant: **Dynapar Corporation**

Address: 1675 Delany Road
Gurnee
Illinois
60031-1282
USA

This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

CSA Group Netherlands B.V., Notified Body Number 2813 in accordance with Articles 17 and 21 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

IEC EN 60079-0:2018	EN 60079-11:2012	EN 60079-7:2015/A1:2018
EN 60079-18:2015+ A1:2017	EN 60079-31:2014	

If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to Specific Conditions of Use identified in the schedule to this certificate.

This EU-Type Examination Certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

The marking of the equipment shall include the following:



II 2 G D

Ex ia mb eb IIC T4 Gb

Ex tb IIIC T119°C Db

(For applicable ambient temperature ranges, see Ratings Table in the Certificate Schedule)

Project Number 80044015

Signed: J A May

Title: Director of Operations



SCHEDULE

EU-TYPE EXAMINATION CERTIFICATE

Sira 09ATEX5172X
Issue 6

13 DESCRIPTION OF EQUIPMENT

The equipment is an optical encoder that is intended to be attached to the rotating shaft of a machine. It uses an anodized aluminium enclosure that has three internal compartments. A compartment at one end of the equipment contains certified 'Ex e' terminals that are used for external connections; external cables enter this compartment via certified cable glands and any unused entries are blanked by certified stopping plugs. This 'Ex e' compartment is fitted with a lid that allows access to the terminals. The compartment at the other end of the encoder contains 'Ex m' devices that include an encapsulated printed circuit board assembly. The central compartment houses an optically encoded disc, this is fitted to a shaft that emerges from the wall of the compartment. The disc is fitted with an optical reading device that is protected by intrinsic safety, 'Ex ia', however, there are no intrinsically safe inputs or outputs.

An alternative version of the equipment is fitted with a permanently connected cable. This version of the equipment has no Ex 'e' terminal compartment. Entry of the cable is again via a certified cable gland.

Ratings Table

Equipment model	Ratings - Load current at each driver output	Ratings – Supply
Encoder Type EN42xxxx0xxxx Encoder Type EN44xxxx0xxx Encoder Type EN42xxxx2xxxx Encoder Type EN44xxxx2xxx	Group II 125 mA (Ta = -50°C to +100°C) Group III 125 mA (Ta = -25°C to +100°C)	Rated supply voltage = 7 – 15 V Rated supply current = 500 mA max. Um = 250 V
Encoder Type EN42xxxx1xxxx Encoder Type EN44xxxx1xxx Encoder Type EN42xxxx3xxxx Encoder Type EN44xxxx3xxx	Group II 10 mA (Ta = -50°C to +100°C) 15 mA (Ta = -50°C to +90°C) Group III 10 mA (Ta = -25°C to +100°C) 15 mA (Ta = -25°C to +90°C)	Rated supply voltage = 7 – 26 V Rated supply current = 500 mA max. Um = 250 V
Encoder Type EN42xxxx4xxxx Encoder Type EN44xxxx4xxx	Group II 90 mA (Ta = -50°C to +60°C) 60 mA (Ta = -50°C to +95°C) Group III 90 mA (Ta = -25°C to +60°C) 60 mA (Ta = -25°C to +95°C)	Rated supply voltage = 10 – 30 V Rated supply current = 400 mA max. Um = 250 V

Variation 1 - This variation introduced the following change:

- A 26 V rated version of the equipment was introduced, consequently, the ratings in the description were updated to recognise this change.

Variation 2 - This variation introduced the following changes:

- The previous table in the description that detailed the Supply Input was replaced by a new table of Ratings.
- The introduction of two, new models, Encoder Types EN42xxxx4xxxx and EN44xxxx4xxxx, that have a modified circuit and associated p.c.b. assembly. In addition, the references of the existing models are now specified in the Ratings Table above that details all available versions.
- Following appropriate assessment, it has been recognised that the equipment may be used in the presence of potentially explosive dusts, the list of standards and the marking being modified accordingly.



SCHEDULE

EU-TYPE EXAMINATION CERTIFICATE

Sira 09ATEX5172X
Issue 6

Variation 3 - This variation introduced the following changes:

- i. Following appropriate re-assessment, EN 60079-0:2006, EN 60079-0:2009 (used for the 'Ex t' dust protection assessment and testing and for guidance in respect of marking for gas applications), EN 60079-11:2007, EN 60079-18:2004 and EN 60079-31:2009 were replaced by EN 60079-0:2012, EN 60079-11:2012, IEC 60079-18:2014 and EN 60079-31:2014; as a result the Conditions of Manufacture were modified and a new one introduced.
- ii. The MZB series terminals were replaced by MSB series terminals certified as PTB 08ATEX1075U, as a result, a Special Conditions of Certification was modified.
- iii. The encapsulant used in the ASIC module was changed from "Sylgard" to "Optically clear potting compound".
- iv. The ASIC module assembly, drawing number 502947-001, Rev C, was revised to include an alternative size resistor.
- v. Thermal fuses (F7 & F8) were changed from SDJ1 DF 1285 to SDF DF128S.
- vi. The General Assembly Specifications, drawing number 200869-0001, Rev I were revised to include seal details.
- vii. Drawings were revised to include minor editorial changes.

Variation 4 - This variation introduced the following change:

- i. Following appropriate assessment to demonstrate compliance with the latest technical knowledge, EN 60079-0:2012, EN 60079-7:2007 and IEC 60079-18:2014 were replaced by IEC EN 60079-0:2018, EN 60079-7:2015/A1:2018 and EN 60079-18:2015+ A1:2017, the markings in section 12 were updated accordingly and the Condition of Manufacture was amended to recognise the new standard.

Variation 5 - This variation introduced the following change:

- i. To allow powder coating of the enclosure. An electrostatic warning was added to the label and an electrostatic Specific Condition of Use has been added to the certificate.

14 DESCRIPTIVE DOCUMENTS

14.1 Drawings

Refer to Certificate Annexe.

14.2 Associated Sira Reports and Certificate History

Issue	Date	Report no.	Comment
0	17 September 2009	R59A16953A	The release of the prime certificate.
1	22 October 2009	R20998A	The introduction of Variation 1.
2	21 December 2009	R26528A/00	The introduction of Variation 2.
3	25 June 2015	R70007960A	This Issue covers the following changes: <ul style="list-style-type: none">• The marking in Section 12 was amended to correct a typographical error.• The introduction of Variation 3.



SCHEDULE

EU-TYPE EXAMINATION CERTIFICATE

Sira 09ATEX5172X
Issue 6

Issue	Date	Report no.	Comment
4	16 May 2019	R70186004B	This Issue covers the following changes: <ul style="list-style-type: none">EC Type-Examination Certificate in accordance with 94/9/EC updated to EU Type-Examination Certificate in accordance with Directive 2014/34/EU. <i>(In accordance with Article 41 of Directive 2014/34/EU, EC Type-Examination Certificates referring to 94/9/EC that were in existence prior to the date of application of 2014/34/EU (20 April 2016) may be referenced as if they were issued in accordance with Directive 2014/34/EU. Variations to such EC Type-Examination Certificates may continue to bear the original certificate number issued prior to 20 April 2016.)</i>The introduction of Variation 4.
5	15 October 2019	1598	Transfer of certificate Sira 09ATEX5172X from Sira Certification Service to CSA Group Netherlands B.V.
6	27 May 2020	R80044015A	The introduction of Variation 5.

15 **SPECIFIC CONDITIONS OF USE** (denoted by X after the certificate number)

- 15.1 All cable entry holes shall be fitted with either a cable gland or a stopping plug that is suitable for the application and has been certified by a notified body. The type of cable, glands and stopping plugs shall have temperature ratings of at least 100°C.
- 15.2 The terminals shall only be fitted with wires that have cross sectional area falling within the following limitations:
Rigid: 0.08 mm² to 4 mm²
Flexible: 0.08 mm² to 2.5 mm²
- 15.3 The equipment shall be supplied from a power supply that has an output that is isolated from earth.
- 15.4 Under certain extreme circumstances, the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth

16 **ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II** (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

Certificate Annexe

Certificate Number: Sira 09ATEX5172X
Equipment: Optical Encoder
Applicant: Dynapar Corporation



Issue 0

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
114507-0001	1 of 1	B	17 Sep 09	LABEL,4428,EN,ATEX
200869-0001	1 of 3	D	15 Sep 09	DWG, ASSEMBLY, EN, ATEX
200869-0002	2 of 3	D	15 Sep 09	DWG, ASSEMBLY, EN, ATEX
200869-0003	3 of 3	D	15 Sep 09	DWG, ASSEMBLY, EN, ATEX
200870-0001	1 of 1	-	15 Sep 09	DWG, ARTWORK, EN ATEX
200871-0001	1 of 1	C	15 Sep 09	DWG, SCHEMATIC, EN, ATEX
200885-0001	1 of 1	-	15 Sep 09	ATEX NON BARRIER POTTING INSTRUCTIONS
502947-0001	1 of 1	A	15 Sep 09	ASIC MODULE ASSEMBLY

Issue 1

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
114507-0002	1 of 1	B	21 Oct 2009	Label, 4428, EN, ATEX
200871-0001	1 of 1	D	21 Oct 2009	Dwg, Schematic, EN, ATEX

Issue 2

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
115282-0001	1 of 1	-	20 Dec 12	Certification Label, CSA IS Encoder Assembly
115282-0002	1 of 1	-	20 Dec 12	Certification Label, CSA IS Encoder Assembly
115282-0003	1 of 1	-	20 Dec 12	Certification Label, CSA IS Encoder Assembly
200869-0001	1 of 3	G	20 Dec 12	Assembly Specifications, EN, ATEX
200869-0001	2 of 3	G	20 Dec 12	Assembly Specifications, EN, ATEX
200869-0001	3 of 3	G	20 Dec 12	Assembly Specifications, EN, ATEX
200870-0001	1 of 2	A	20 Dec 12	DWG, Artwork, EN, ATEX
200870-0001	2 of 2	A	20 Dec 12	DWG, Artwork, EN, ATEX
200871-0001	1 of 2	E	20 Dec 12	DWG, Schematic, EN, ATEX
200871-0001	2 of 2	E	20 Dec 12	DWG, Schematic, EN, ATEX

Issue 3

Drawing no.	Sheets	Rev.	Date (Sira stamp)	Description
200869-0001	1 of 3	I	28 Apr 15	General Assembly Specifications
200869-0001	2 of 3	I	26 May 15	General Assembly Specifications
200869-0001	3 to 3	I	28 Apr 15	General Assembly Specifications
200871-0001	1 to 2	G	28 Apr 15	Schematic Diagram
200870-0001	1 to 2	B	28 Apr 15	PCB Artwork Drawing
502947-0001	1 of 1	C	28 Apr 15	ASIC Optical Encoder Module Assembly
200885-0001	1 of 1	A	28 Apr 15	Non Barrier Potting Instruction
115282-0001	1 of 1	B	28 Apr 15	Marking Drawing, 10-30V, IS Encoder Assembly
115282-0002	1 of 1	B	28 Apr 15	Marking Drawing, 7-15V, IS Encoder Assembly
115282-0003	1 of 1	B	26 May 15	Marking Drawing, 7-26V, IS Encoder Assembly
115282-0003	1 of 1	B	26 May 15	Marking Drawing, 7-26V, IS Encoder Assembly

Issue 4

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
115282-0001	1 of 1	C	05 Oct 18	Marking Drawing, 10-30V, Encoder Assembly
115282-0002	1 of 1	C	05 Oct 18	Marking Drawing, 7-15V, Encoder Assembly
115282-0003	1 of 1	C	05 Oct 18	Marking Drawing, 7-26V, Encoder Assembly

Certificate Annexe



Certificate Number: Sira 09ATEX5172X

Equipment: Optical Encoder

Applicant: Dynapar Corporation

Drawing	Sheets	Rev.	Date (Sira stamp)	Title
200869-0001	1 of 3	J	07 May 19	General Assembly Specifications
200869-0001	2 of 3	J	07 May 19	General Assembly Specifications
200869-0001	3 of 3	J	07 May 19	General Assembly Specifications
502947-0001	1 of 1	D	07 May 19	ASIC Optical Encoder Module Assembly

Issue 5. No new drawings were introduced.

Issue 6

Drawing	Sheets	Rev.	Date (Stamp)	Title
115282-0001	1 of 1	E	18 May 20	Marking Drawing, 10-30V, Encoder Assembly
115282-0002	1 of 1	E	18 May 20	Marking Drawing, 7-15V, Encoder Assembly
115282-0003	1 of 1	E	18 May 20	Marking Drawing, 7-26V, Encoder Assembly
200869-0001	1 to 3	K	26 May 20	General Assembly Specifications



Certificate of Compliance

Certificate: 2676947

Master Contract: 176674

Project: 70186005

Date Issued: August 07, 2019

Issued to: Dynapar Corporation
1675 Delany Rd
Gurnee, IL
60031-1282
USA

Attention: Brad Stecker

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and US Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only



Issued by:

Oong Lee

PRODUCTS

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

CLASS 2258 82 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations - Certified to US Standards

Ex eb ia mb IIC T4 Gb

Ex tb IIIC T119°C Db IP64

Class I, Zone 1, AEx eb ia mb IIC T4 Gb

Zone 21, AEx tb IIIC T119°C Db IP64

Optical encoders, models EN42xxxxxaxxx and EN44xxxxxax rated Um = 250 V and as depicted in model code options below:

- a =**
- 0 – Differential AB, 7-15 V in, 500 mA max input, 7-15 V out*
 - 1 – Differential AB, 7-26 V in, 500 mA max input, 5 V out*
 - 2 – Differential ABZ, 7-15 V in, 500 mA max input, 7-15 V out*
 - 3 – Differential ABZ, 7-26 V in, 500 mA max input, 5 V out*
 - 4 – Differential ABZ, 10-30 V in, 400 mA max input, 10-30 V out*



Certificate: 2676947

Master Contract: 176674

Project: 70186005

Date Issued: August 07, 2019

*Option	Output current	Group II Ambient Temperature Range	Group III Ambient Temperature Range
0 or 2	125mA max per channel	Ta = -50°C to +100°C	Ta = -25°C to +100°C
1 or 3	10mA max per channel	Ta = -50°C to +100°C	Ta = -25°C to +100°C
1 or 3	15mA max per channel	Ta = -50°C to +90°C	Ta = -25°C to +90°C
4	90mA max per channel	Ta = -50°C to +60°C	Ta = -25°C to +60°C
4	60mA max per channel	Ta = -50°C to +95°C	Ta = -25°C to +95°C

x = Model code options depicting PPR, bore size, termination, tether, and cover. These options are not critical to certification and can be any alpha and numeric combination.

Conditions of Acceptability

- All cable entry holes shall be fitted with either an approved cable gland or an approved stopping plug that is suitable for the application. The type of cable, glands and stopping plugs shall have temperature ratings of at least 100°C.
- The equipment enclosure has 3/4 NPT entries, therefore, when it is being installed, it shall be fitted with external conduit that is compatible with these entries, in addition, the seal between the conduit and the equipment enclosure shall maintain a minimum ingress protection of IP54 when installed in Zone 1 and IP6X when installed in Zone 21.
- The terminals shall only be fitted with wires that have cross sectional area falling within the following limitations:
Rigid: 0.14 to 2.5 mm² / 26 to 14 AWG
Flexible: 0.14 to 1.5 mm² / 26 to 16 AWG
- The equipment shall be supplied from a power supply that has an output that is isolated from earth.
- With regard to the Canadian Approval, installation shall be in accordance with the C22.1, Canadian Electrical Code, Part 1. With regard to the US Approval, installation shall be in accordance with the National Electrical Code NFPA 70.
- This equipment must be supplied from a source providing double insulation, reinforced insulation, or two layers of basic insulation per 61010-1 between the hazardous live voltages and terminals of this equipment.
- The equipment shall be supplied with Limited Energy Circuit (LEC) as defined in CSA C22.2 No. 61010-1-12, Class 2 as defined in article 725.121 of NFPA70, or Limited Power Source (LPS) as defined in CAN/CSA C22.2 No. 60950-1.



Certificate: 2676947

Master Contract: 176674

Project: 70186005

Date Issued: August 07, 2019

APPLICABLE REQUIREMENTS

CAN/CSA C22.2 No. 0-10	General Requirements - Canadian Electrical Code, Part II
CAN/CSA C22.2 No. 60079-0:15 (R2018), Edition 3	Explosive atmospheres – Part 0: Equipment - General requirements
CAN/CSA C22.2 No. 60079-7:16, Edition 3	Explosive atmospheres – Part 7: Equipment protection by increased safety “e”
CAN/CSA C22.2 No. 60079-11:14 (R2018), Edition 2	Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”
CAN/CSA C22.2 No. 60079-18:16, Edition 2	Explosive atmospheres – Part 18: Equipment protection by encapsulation “m”
CAN/CSA C22.2 No. 60079-31:15, Edition 2	Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure “t”
CAN/CSA C22.2 No. 61010-1-12, UPD1:2015, UPD2:2016, AMD1:2018, Edition 3	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements
UL 60079-0-2013 (R2017), Edition 6	Explosive atmospheres – Part 0: Equipment – General requirements
UL 60079-7-2017, Edition 5	Explosive Atmospheres – Part 7: Equipment protection by increased safety “e”
UL 60079-11-2018, Edition 6	Explosive Atmospheres – Part 11: Equipment protection by intrinsic safety “i”
UL 60079-18-19, Edition 4	Explosive Atmospheres – Part 18: Equipment protection by encapsulation “m”
UL 60079-31-15, Edition 2	Explosive Atmospheres – Part 31: Equipment Dust Ignition Protection by Enclosure “t”
UL 61010-1-12, AMD1:2018, Edition 3	Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements



Certificate: 2676947

Master Contract: 176674

Project: 70186005

Date Issued: August 07, 2019

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

For details of the actual marking requirements see assessments against specific standards below.

The following markings are marked on an aluminum label that is secured with screws and attached to the outside of the enclosure:

- Manufacturer's name: "Dynapar", or CSA Master Contract Number "176674", adjacent to the CSA Mark in lieu of manufacturer's name.
- Model number: As specified in the PRODUCTS section, above.
- Electrical ratings: As specified in the PRODUCTS section, above.
- Ambient temperature rating: As specified in the PRODUCTS section, above.
- Manufacturing date in WWYY format, or serial number, traceable to year and month of manufacture.
- Enclosure ratings: As specified in the PRODUCTS section, above.
- The CSA Mark with or without "C" and "US" indicators, as shown on the Certificate of Conformity.
- The certificate reference in the following form 14.2676947X adjacent to the CSA Mark or CSA 14CA.2676947.
- Gas temperature code and Dust enclosure surface temperature, as specified in the PRODUCTS section, above.
- Warning – Potential Electrostatic Charging Hazard – See Instructions
- The following words:
 - "Connecting cable must be rated 100°C min."



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx SIR 15.0051X**

Page 1 of 4

Certificate history:

Status: **Current**

Issue No: 2

[Issue 1 \(2019-05-16\)](#)

[Issue 0 \(2015-07-30\)](#)

Date of Issue: 2020-05-27

Applicant: **Dynapar Corporation**
1675 Delany Rd
Gurnee IL
60031
United States of America

Equipment: **Optical Encoder**

Optional accessory:

Type of Protection: **Intrinsic Safety, Increased Safety, Encapsulation and Dust Ignition Protection by Enclosure**

Marking: Ex ia mb eb IIC T4 Gb
Ex tb IIIC T119°C Db
Refer to ANNEXE for ambient temperature range

Approved for issue on behalf of the IECEx
Certification Body:

N Jones

Position:

Certification Manager

Signature:
(for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.



Certificate issued by:

SIRA Certification Service
CSA Group
Unit 6, Hawarden Industrial Park
Hawarden, Deeside, CH5 3US
United Kingdom

sira
CERTIFICATION





IECEx Certificate of Conformity

Certificate No.: **IECEx SIR 15.0051X**

Page 2 of 4

Date of issue: 2020-05-27

Issue No: 2

Manufacturer: **Dynapar Corporation**
1675 Delany Rd
Gurnee
Illinois 60031
United States of America

Additional
manufacturing
locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-11:2011 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:6.0

IEC 60079-18:2017 Explosive atmospheres - Part 18: Protection by encapsulation "m"
Edition:4.1

IEC 60079-31:2013 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
Edition:2

IEC 60079-7:2017 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
Edition:5.1

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

[GB/SIR/ExTR15.0166/00](#)

[GB/SIR/ExTR18.0189/00](#)

[GB/SIR/ExTR20.0103/00](#)

Quality Assessment Report:

[GB/SIR/QAR15.0014/03](#)



IECEx Certificate of Conformity

Certificate No.: **IECEx SIR 15.0051X**

Page 3 of 4

Date of issue: 2020-05-27

Issue No: 2

EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The equipment is an optical encoder that is intended to be attached to the rotating shaft of a machine. It uses an anodized aluminium enclosure that has three internal compartments. A compartment at one end of the equipment contains certified 'Ex e' terminals that are used for external connections; external cables enter this compartment via certified 'Ex e' cable glands and any unused entries are blanked by certified 'Ex e' plugs. This 'Ex e' compartment is fitted with a lid that allows access to the terminals. The compartment at the other end of the encoder contains 'Ex m' devices that include an encapsulated printed circuit board assembly. The central compartment houses an optically encoded disc, this is fitted to a shaft that emerges from the wall of the compartment. The disc is fitted with an optical reading device that is protected by intrinsic safety, 'Ex ia', however there are no intrinsically safe inputs or outputs. Refer to ANNEXE for additional description and Conditions of Manufacture.

SPECIFIC CONDITIONS OF USE: YES as shown below:

1. All cable entry holes shall be fitted with either an IECEx certified cable gland or an IECEx certified stopping plug that is suitable for the application. The type of cable, glands and stopping plugs shall have temperature ratings of at least 100°C.
2. The MSB series terminals shall only be fitted with wires that have cross sectional area falling within the following limitations:
3. Rigid: 0.08 mm² to 4 mm²
4. Flexible: 0.08 mm² to 2.5 mm²
5. The equipment shall be supplied from a power supply that has an output that is isolated from earth.
6. Under certain extreme circumstances, the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. In addition, the equipment shall only be cleaned with a damp cloth.



IECEx Certificate of Conformity

Certificate No.: **IECEx SIR 15.0051X**

Page 4 of 4

Date of issue: 2020-05-27

Issue No: 2

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

This issue, Issue 2, recognises the following change; refer to the certificate annex to view a comprehensive history:

1. To allow powder coating of the enclosure. An electrostatic warning was added to the label and an electrostatic Specific Condition of Use has been added to the certificate.

Annex:

[IECEx SIR 15.0051X Iss 2 Annexe.pdf](#)

Annexe to: IECEx SIR 15.0051X Issue 2

Applicant: Dynapar Corporation

Apparatus: Optical Encoder



An alternative version of the equipment is fitted with a permanently connected cable. This version of the equipment has no Ex 'e' terminal compartment. Entry of the cable is again via an 'Ex e' cable gland.

Ratings Table:

Equipment model	Ratings - Load current at each driver output	Ratings – Supply
Encoder Type EN42xxxx0xxx Encoder Type EN44xxxx0xxx Encoder Type EN42xxxx2xxx Encoder Type EN44xxxx2xxx	Group II 125 mA (Ta = -50°C to +100°C) Group III 125 mA (Ta = -25°C to +100°C)	Rated supply voltage = 7 – 15 V Rated supply current = 500 mA max. Um = 250 V
Encoder Type EN42xxxx1xxx Encoder Type EN44xxxx1xxx Encoder Type EN42xxxx3xxx Encoder Type EN44xxxx3xxx	Group II 10 mA (Ta = -50°C to +100°C) 15 mA (Ta = -50°C to +90°C) Group III 10 mA (Ta = -25°C to +100°C) 15 mA (Ta = -25°C to +90°C)	Rated supply voltage = 7 – 26 V Rated supply current = 500 mA max. Um = 250 V
Encoder Type EN42xxxx4xxx Encoder Type EN44xxxx4xxx	Group II 90 mA (Ta = -50°C to +60°C) 60 mA (Ta = -50°C to +95°C) Group III 90 mA (Ta = -25°C to +60°C) 60 mA (Ta = -25°C to +95°C)	Rated supply voltage = 10 – 30 V Rated supply current = 400 mA max. Um = 250 V

Ambient Temperature Range

Ambient range:	Types: EN42xxxx0xxxx EN44xxxx0xxx EN42xxxx2xxxx EN44xxxx2xxx	-50°C <= Ta <= 100°C when Iload <= 125mA(GAS)
		-25°C <= Ta <= 100°C when Iload <= 125mA(DUST)
	Types: EN42xxxx1xxxx EN44xxxx1xxx EN42xxxx3xxxx EN44xxxx3xxx	-50°C <= Ta <= 100°C when Iload <= 10mA(GAS)
		-50°C <= Ta <= 90°C when Iload <= 15mA(GAS)
		-25°C <= Ta <= 100°C when Iload <= 10mA(DUST)
		-25°C <= Ta <= 90°C when Iload <= 15mA(DUST)
Types: EN42xxxx4xxxx EN44xxxx4xx	-50°C <= Ta <= 60°C when Iload <= 90mA(GAS)	
	-50°C <= Ta <= 95°C when Iload <= 60mA(GAS)	
		-25°C <= Ta <= 60°C when Iload <= 90mA(DUST)
		-25°C <= Ta <= 95°C when Iload <= 60mA(DUST)

Conditions of Manufacture

- i. In accordance with IEC 60079-11:2011 clause 10.3, each manufactured sample of the equipment shall be subjected to an electric strength test using a test voltage of 500 Vac applied between the all terminals and the equipment enclosure. There shall be no evidence of flashover or breakdown and the maximum current flowing shall not exceed 5 mA.

Date: 27 May 2020

Page 1 of 2

Form 9530 Issue 1

Sira Certification Service

Unit 6 Hawarden Industrial Park,
Hawarden, CH5 3US, United Kingdom

Tel: +44 (0) 1244 670900
Email: ukinfo@csagroup.org
Web: www.csagroupuk.org

Annexe to: IECEx SIR 15.0051X Issue 2

Applicant: Dynapar Corporation

Apparatus: Optical Encoder



- ii. In accordance with IEC 60079-18:2017 clause 9.1, each manufactured item shall be subjected to a visual inspection. No damage shall be evident, such as cracks in the compound, exposure of the encapsulated parts, flaking, inadmissible shrinkage, swelling, decomposition, failure of adhesion (separation of any adhered parts) or softening.
- iii. The optical power output from the IR emitting device in the internal encoder module shall be nominally 0.55mW at 20mA.

Full Certificate Change History

Issue 1 – this Issue introduced the following change:

- 1. Following appropriate assessment to demonstrate compliance with the latest technical knowledge, IEC 60079-0:2011 Ed 6, IEC 60079-7:2017 Ed 5.1 and IEC 60079-18:2014 Ed 4 were replaced by IEC 60079-0:2017 Ed 7, IEC 60079-7:2017 Ed 5.1 and IEC 60079-18:2017 Ed 4.1, the markings were updated accordingly and the Condition of Manufacture was amended to recognise the new standard.

Issue 2 – this Issue introduced the following change:

- 1. To allow powder coating of the enclosure. An electrostatic warning was added to the label and an electrostatic Specific Condition of Use has been added to the certificate.

Date: 27 May 2020

Page 2 of 2

Form 9530 Issue 1

Sira Certification Service

Unit 6 Hawarden Industrial Park,
Hawarden, CH5 3US, United Kingdom

Tel: +44 (0) 1244 670900
Email: ukinfo@csagroup.org
Web: www.csagroupuk.org



Declaration of EU-Conformity

Manufacturers Name: Dynapar
Manufacturers Address: 1675 Delany Road
Gurnee, IL 60031 USA

Representative in the EU:

Hengstler GmbH
Uhlandstr. 49
78554 Aldingen

Notified Body:

CSA Group Netherlands B.V.
Utrechtseweg 310,
6812 AR, Arnhem,
Netherlands

Product Type: Optical Encoder
Model Names: EN42 & EN44

We declare to the best of our knowledge that the products listed above comply with the essential requirements of the directives and standards listed below.

Directives:

EMV/EMC 2014/30/EU
RoHS 2011/65/EU
ATEX 2014/34/EU

II 2G D Ex ia mb eb IIC T4 Gb
Ex tb IIIC T119°C Db

Standards:

EN 61326-1:2013*
EN 55011:2016+A1:2017
EN IEC 63000:2018
EN60079-31:2014

EN IEC 60079-0:2018
EN 60079-11:2012
EN 60079-7:2015/A1:2018
EN 60079-18:2015+A1:2017

Immunity: Industrial environment

Emission: Group 1 Class B

ATEX Certificates:

EC Type Examination Certificate SIRA 09ATEX5172X

* The connection cable must be shielded, less than 30 meters in length and not connected to a DC supply network.

Sandy Thompson

Quality Manager - Dynapar

Date/Place of issue: November 12, 2019
Aldingen, Germany

Brad Stecker

ATEX Representative - Dynapar

This declaration certifies the accordance with the above-mentioned directives. It does not, however, constitute a guarantee of features. Please observe the Safety Notes of the product documentation attached.