

Encoder Installation Manual

NorthStar™ brand

SERIES EN42

Zone 1 Hazardous Area Rated Encoder

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



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



General

The following instructions are meant to assist in proper installation of the EN42 Sealed Hollowshaft Encoder. The encoder is a 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 hollowshaft feature eliminates the need for shaft couplings, adapter flanges and machined mounting faces. The encoder is attached to the shaft by a clamping collar. The EN42 can accommodate a variety of shaft diameters by selecting the appropriate “electrically isolated” bore sleeve. An anti-rotation bracket is used to prevent the encoder from rotating while allowing for limited shaft end float and wobble.

The EN42 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
7/64” Hex Key Wrench	Back Cover and Terminal Box Cover
5/32” Hex Key Wrench	Tether Bracket
3/16” Hex Key wrench	Shaft Clamp Collar
10mm Hex Key Wrench	Stopping Plug
1/8” Flat Blade Screwdriver	Terminal Block Wiring
Open End Adjustable Wrench	Cable Gland & Tether Rod Jam Nuts
Caliper & Dial Indicator Gauges	Shaft Checks

Application Environment

The EN42 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. Compliance with the Essential Health and Safety Requirements has been assured by compliance with the following documents:

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

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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

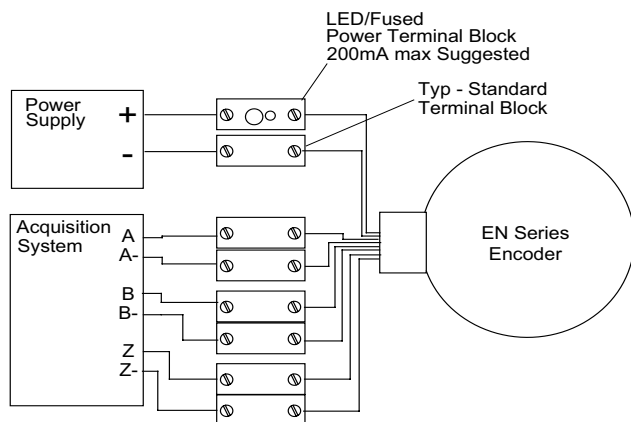
CAUTION: The Encoder wiring configuration for the EN series encoder is different than an Intrinsic Safe wiring configuration. No IS barrier, Zener or Galvanic, is required when using the EN series encoder. Barriers may prevent proper operation and/or frequency performance. Damage to the encoder may occur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

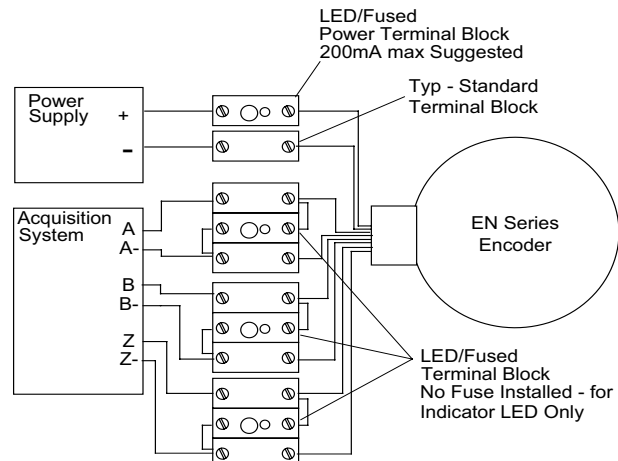
When selecting an encoder, consider the power supply to the encoder and input voltage to your data acquisition, PLC or drive system. Cable length and RPM max will determine which output driver option to select.

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

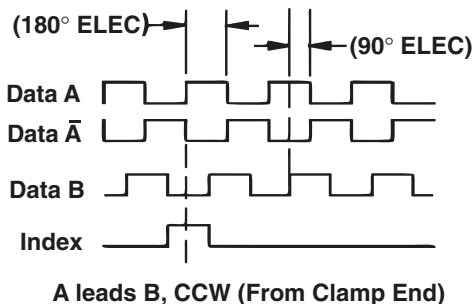
Hawke Datasheet: 501/453/UNIV

Hawke Assembly Instructions: AI2000

Signal and Wiring

WAVEFORMS

DATA AND INDEX
Not all complements shown
 \bar{A} shown for reference



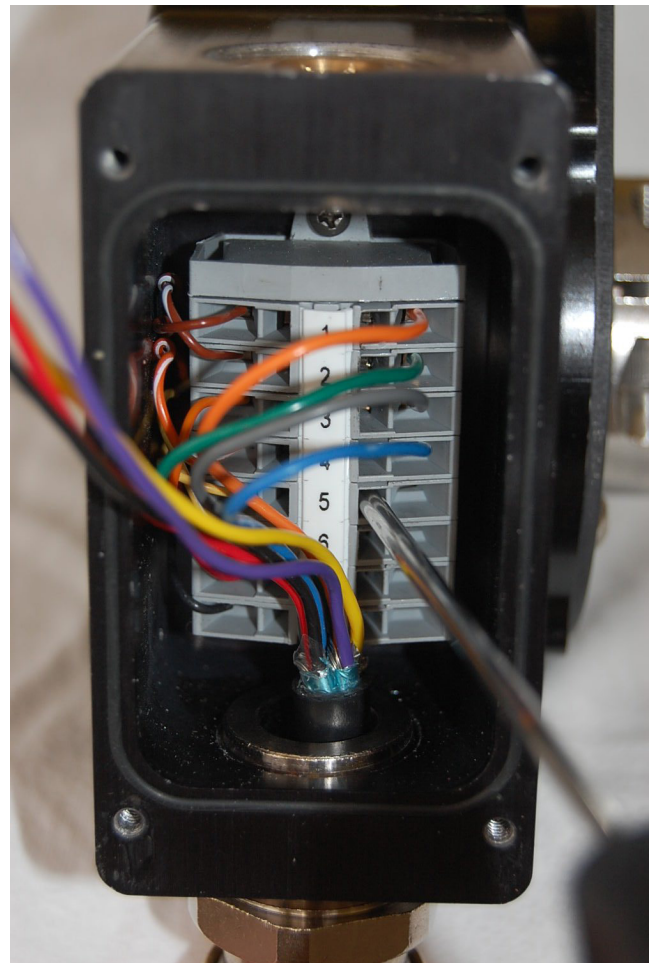
ELECTRICAL CONNECTIONS

Encoder Function	Terminal Box Connection
Sig. \bar{A}	1
Sig. A	2
Sig. \bar{B}	3
Sig. B	4
Sig. \bar{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 9mm.



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

STEP 1: CHECK AND CLEAN THE MATING SHAFT

Ensure that the mating shaft is within proper tolerances. Recommended mating shaft diameter tolerances should be nominal $+0.0000"/-0.0005"$ [0.00 to -0.13mm] and shaft Total Indicated Runout (TIR) should be under 0.002", in accordance with NEMA MG1 specifications for shafts up to 1.625".

Clean the shaft of any burrs and check that mating shaft engagement is at least 2.00" inside the encoder hubshaft.

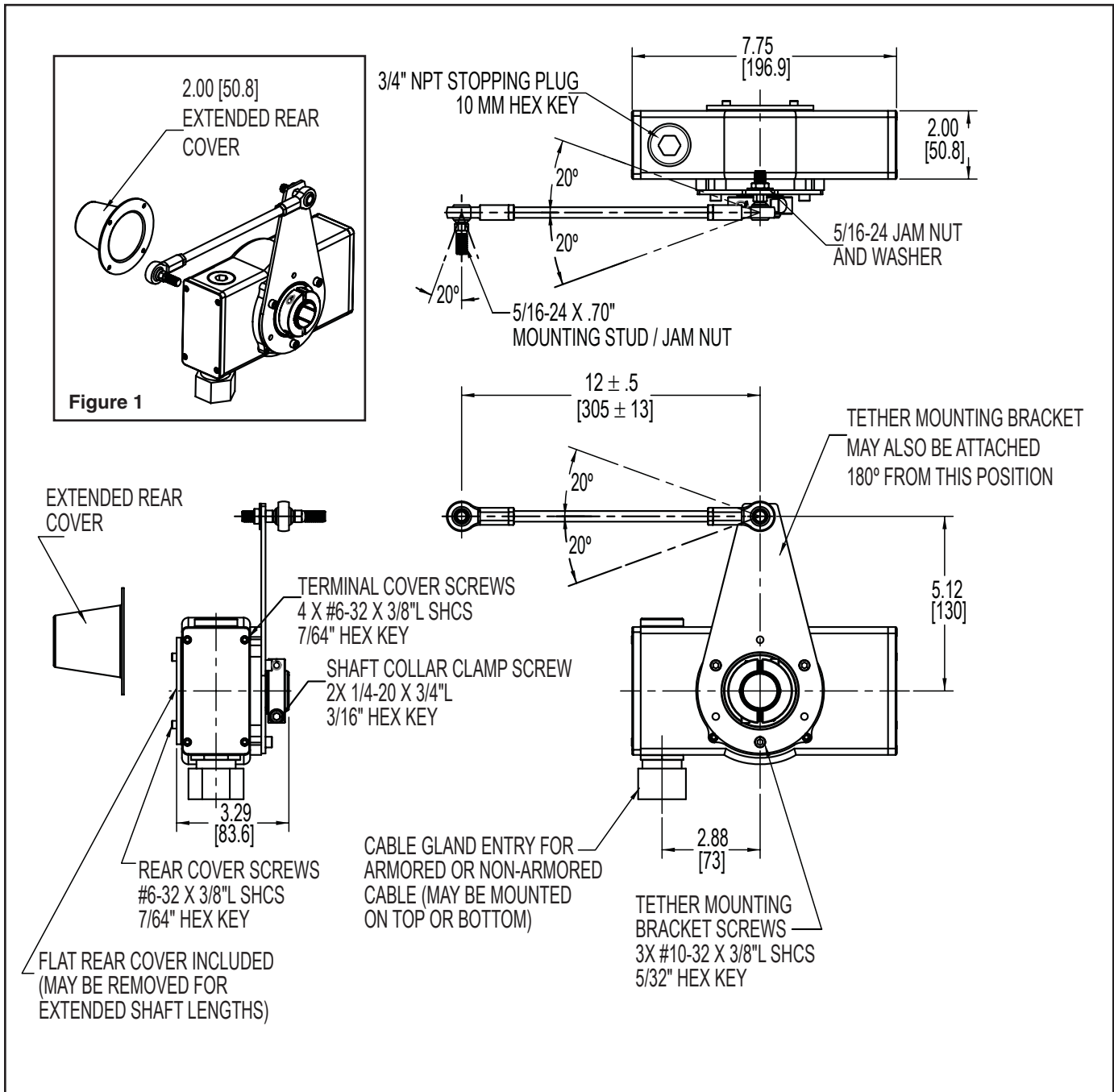
NOTE: The minimum shaft engagement length is 2.00". Recommended is 2.50" [40.6mm] to reduce wobble. The longest shaft length as measured from the mounting face that will allow installation of the endcap is 2.6" [66mm] maximum.

STEP 2: PREPARING THE ENCODER

The encoder ships with both a Flat Rear Cover and an Extended Rear Cover. Although installation is optional, it is recommended for additional environmental protection. The Flat Cover can be used with motor shafts up to 2.66" long and the Extended Cover can be used with motor shafts up to 4.66" long.

Install either the Flat or Extended cover by aligning the (4) holes in the cover with the holes in the mating gasket and housing. Place the gasket between the housing and cover and install (4) #6-32 x 3/8" long socket head cap screws. Reference Figure 1, below.

DIMENSIONS inch [mm] Shown with Heavy Duty Swivel Rod Tether attached



MECHANICAL INSTALLATION

STEP 3: INSTALL TETHER ON ENCODER

The EN42 can be ordered with an adjustable rod style tether or a spring steel tether. Both are designed to prevent the encoder from rotating, while giving some degree of flexibility to the encoder. Refer to the drawing on previous page when assembling and attaching tether.

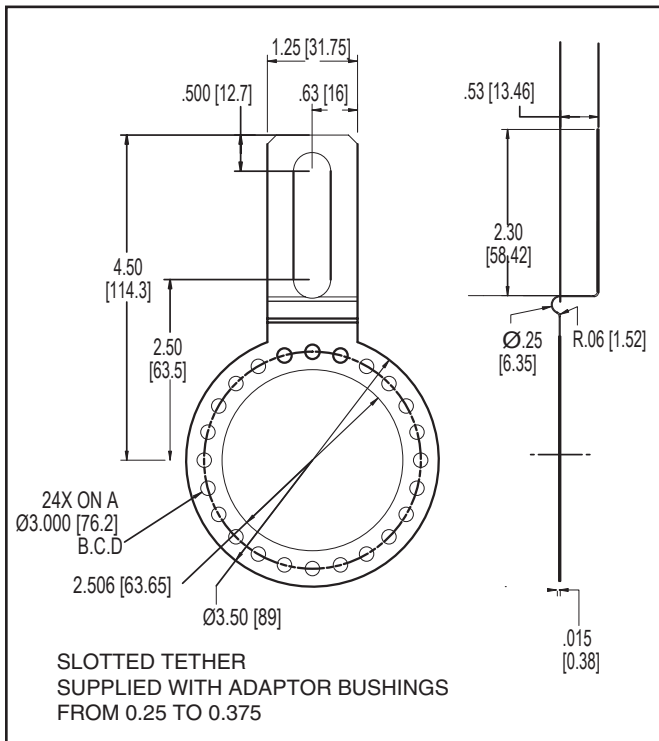
Adjustable Rod Style:

- Attach tether mounting bracket to EN42 housing using the three (3) #10-32 x 3/8" SHCS socket head cap screws provided. Apply removable thread locker (example: LOCTITE® 242).
- Attach encoder side of rod to the tether bracket via the 5/16"- 24 x .7" bolt and torque nut to 20 ft. lbs [27 Nm].
- Loosely adjust anti-rotation arm to desired length. Desired length will be determined in the next step. Apply removable thread locker (example: LOCTITE® 242) on the threaded rod and nuts.
- The other side of the rod will be attached in the next step along with tightening of the rod hardware.

Spring Style Slotted Tether:

- Rotate the tether to the required orientation and tighten the tether arm to the encoder using the three (3) #10-32 x 3/8" SHCS socket head cap screws provided.

Note: The drawing on previous page does not illustrate the Slotted Tether which is shown below. Contact Application Engineering for available options.



STEP 4: INSTALL THE ENCODER

A. Carefully slide the encoder on the shaft. Position the encoder so that the clamp collar faces the motor or machine. The encoder should slide on easily, if not, check shaft again. Position the encoder as close as possible until the tether bolt threads into the desired motor or machine tapped hole.

B. Secure 5/16"- 24 x .7" tether bolt to motor or machine. Torque nut to 20 ft. lbs [27 Nm]. Check to make sure the tether is properly aligned, and then tighten adjustable rod hardware. Check that the tether and encoder are "unstressed". If not, loosen, adjust and retighten.

C. Tighten the shaft clamp collar to 50 to 55 in-lbs. This secures the encoder to the shaft

NOTE: The EN42 comes equipped with a split collar, requiring both screws to be tightened securely. Hand tighten each screw to ensure an even gap in both splits, then tighten.

STEP 5: INSTALLATION CHECK POINT

Follow the 3 step installation check to ensure a good installation thus far.

A. Check clearances from mounting face. Ensure you have a minimum clearance of 1/16" between the encoder shaft and any non-rotating surface closest to the encoder shaft

B. Check tether installation. Make sure that the tether is in proper alignment. There should be no visible bending or deflection on any surface of the tether. Visible tether deflections should be corrected immediately. If the tether is bent or distorted, DO NOT USE, and call the factory for a replacement tether. Tether installation is critical to the long life of the bearings and improper tether installation will lead to excessive bearing loads and encoder failure.

C. Check wobble of encoder housing. Turn the shaft by hand and make sure that the shaft turns freely and does not produce excessive runout/wobble of the encoder. Most encoder installations will have wobble arising from shaft tolerances. Measure the wobble on the visible back face of the encoder. A wobble of 0.005" TIR (or less) will not have any adverse effect on encoder performance. In general, the lower the TIR of runout, the better.

SPECIFICATIONS

STANDARD OPERATING CHARACTERISTICS

Code: Incremental, Optical
Resolution: 15 to 5000 PPR (pulses/revolution) See Ordering Information
Format: Two channel quadrature (AB) with optional Index (Z, ungated), and complementary outputs
Index: 180 degrees ±25 degrees (electrical), ungated, A leads B, CCW (from clamp end)
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° ±30° electrical; all other resolutions: 90° ±15°
Symmetry:
 For resolutions 200-300 PPR and above 1024 PPR: 180°±25° electrical; all other resolutions: 180°±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
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

Bore Diameter: 1.00", 0.875, 0.750", 0.625", 16mm, 15mm. Insulated inserts provided for bores under 1 inch
Mating Shaft Length: 2.00", Minimum; 2.50", Recommended
Shaft Speed: 3600RPM Maximum continuous; 6000RPM Peak
Starting Torque: 8.0 in-oz. maximum (at 25°C)
Running Torque: 5.0 in-oz. maximum (at ambient)
Bearings: 61806-ZZ
Housing and Cover: Hard Anodized Aluminum
Shaft Material: Stainless steel or anodized aluminum (See ordering information)
Disc Material: Metal or Plastic
Accessory Fasteners, Provided With:
 Tether Bracket: (3) #10-32 x 3/8" SHCS Socket Head Cap Screws
 Threaded Rod: (2) 5/16-24 x .70" Mounting Bolts
 Rear Cover: (4) #6-32 x 3/8" SHCS Socket Head Cap Screws
 Terminal Box: (4) #6-32 x 3/8" SHCS Socket Head Cap Screws
Weight: 6.5 lb, typical

ENVIRONMENTAL

Operating Temperature: Refer to Temperature Range Table (see page 2)
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
 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

Code 1: Model	Code 2: PPR	Code 3: Bore Size	Code 4: Output Format	Code 5: Termination	Code 6: Tether	Code 7: Cover
EN42	□□□□	□	□	□	□	□
Ordering Information						
EN42 Triple Certified ATEX Zone 1 Hollowshaft Encoder	0015 1000 0032 1024 0100 1200 0200 2000 0240 2048 0250 2500 0500 4000 0512 5000 0600	Stainless Steel Hub 8 5/8" 9 15 mm A 16mm D 3/4" F 7/8" H 1" Non-Isolated Anodized Aluminum Hub R 1" Isolated	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* * See Electrical Specifications for Details	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	0 Slotted Tether 1 Heavy Duty Swivel Rod Tether	0 Covers, Standard Flat and Extended

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

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

NorthStar™

Heavy Duty Optical User Instructions Non Barrier Unit Certificate SIRA O9ATEX5172X 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 ¾ 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.

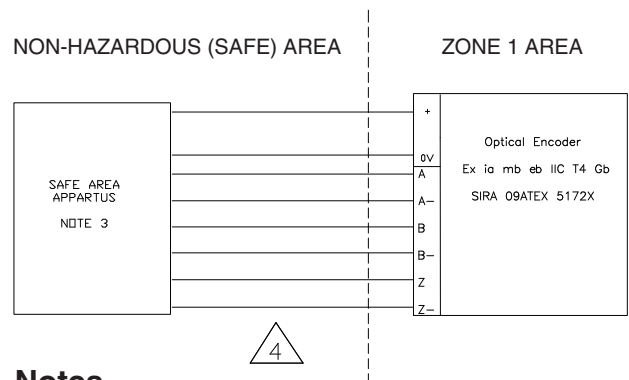
This orientation ensures:

* 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: 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)
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.	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:
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.	The terminals shall only be fitted with wires that have cross sectional area falling within the following limitations: Rigid: 0.08 mm ² to 4 mm ² Flexible: 0.08 mm ² to 2.5 mm ²
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="padding-left: 40px;">Enclosure: Case material type - Anodized and/or powder coated aluminium. Other external parts and Shaft materials are anodized aluminium Steel, SST.</p> <p style="padding-left: 40px;">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



1 **EU-TYPE EXAMINATION CERTIFICATE**

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

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

4 Equipment: **Optical Encoder**

5 Applicant: **Dynapar Corporation**

6 Address: 1675 Delany Road
Gurnee
Illinois
60031-1282
USA

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

8 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.

9 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

10 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.

11 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.

12 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:

- i. 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:

- i. The previous table in the description that detailed the Supply Input was replaced by a new table of Ratings.
- ii. 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.
- iii. 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	<u>Certificate history:</u> Issue 1 (2019-05-16) Issue 0 (2015-07-30)
Status:	Current	Issue No: 2	
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





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 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

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

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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

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Form 9530 Issue 1

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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.