

ATEX INTRINSICALLY SAFE INCREMENTAL ENCODER FOR MINING APPLICATIONS, IXO5S RANGE

DIGISINE™ encoder specially designed for explosive application in mining environment

I M1

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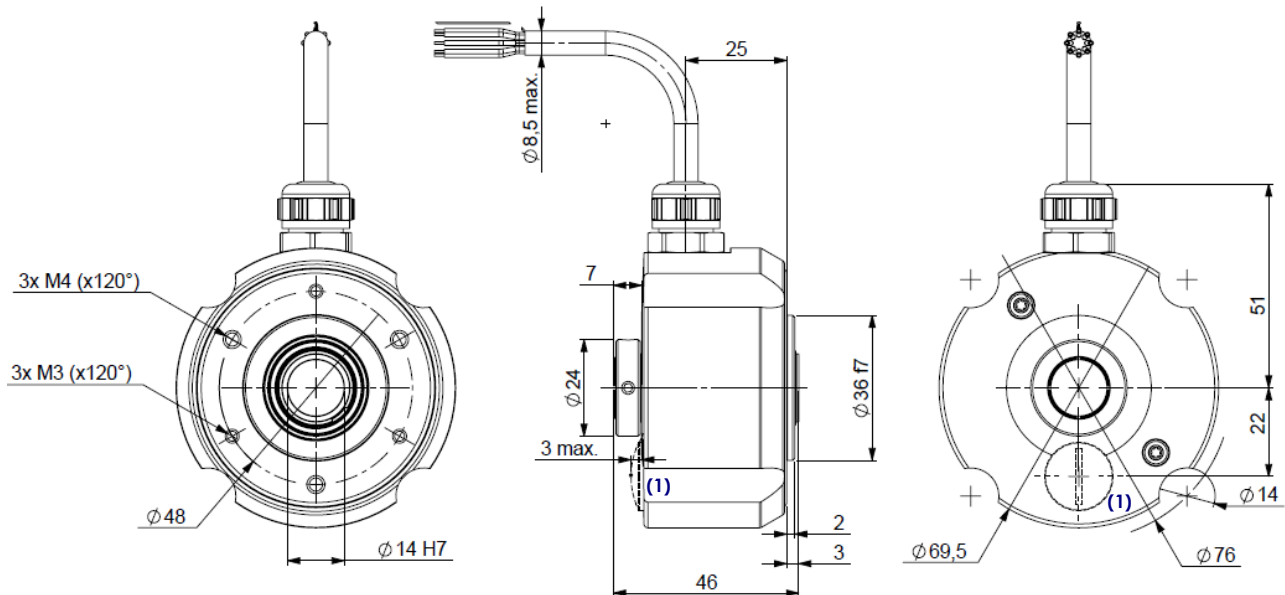
- Robustness and excellent resistance to shocks / vibrations,
- High protection level IP65,
- High resolutions available : up to 80 000 ppr,
- Electronic circuits: 5V or 8 to 12Vdc,
- High performances in temperature -30°C to 70°C,
- High performances in frequency of output signals: 300 kHz.



**MINING
GROUP I**



DIMENSIONS: IXO5S14/M1/ WITH RADIAL CABLE



(1) cap only for programmable resolution version

MECHANICAL CHARACTERISTICS

| | | | |
|--------------------------------------|--|--|---|
| Material (stainless steel option) | Cover : stainless steel | Insulation | 1 000 Veff |
| | Body : stainless steel | Weight (approx.) | 0,900 kg |
| | Shaft : stainless steel | Protection(EN 60529) | IP 65 |
| Bearings | 6 803 serie – sealed | Permissible max. speed | 6 000 min ⁻¹ |
| Maximal loads | Axial : 20 N | Continuous max. speed | 4 000 min ⁻¹ |
| | Radial : 40 N | Storage temperature | -30°C ... +70°C |
| Shaft inertia | ≤ 8500 g.mm ² | Operating temperature | -30°C ... +70°C |
| Static/ Dynamic torque | 10 / 85 mN.m | Theoretical mechanical lifetime L _{10h} * | > 24.10 ⁹ turns 100 000 hours |
| Shock (EN60068-2-27) | ≤ 500m.s ⁻² (during 6 ms) | | |
| Vibration (EN60068-2-6) | ≤ 200m.s ⁻² (10 ... 2 000 Hz) | * continuous max. speed – ½ max. load – according to ISO281: 1990, L ₁₀ | |
| EMC | EN 61000-6-2, EN 61000-6-4 | | |

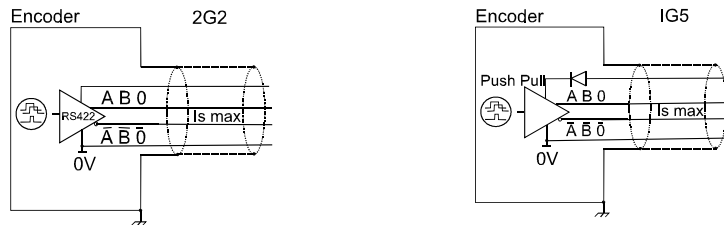
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STANDARD CONNECTIONS

| | | - | + | A | B | 0 | A/ | B/ | 0/ | Ground |
|----|--------------------------------|----------------------------------|----------------------------------|-------------|--------------|------------|------------|-------------|-------------|----------------------|
| G3 | PVC cable 8 wires 8230/020 | WH white | BN brown | GN green | YE yellow | GY grey | PK pink | BU blue | RD red | General shielding |
| GP | PUR cable 12 wires 8230/050 | WH white + WH/GN white /green | BU blue + BN/GN brown / green | GY grey | BN brown | RD red | PK pink | GN green | BK black | General shielding |

1) NON PROGRAMMABLE RESOLUTION

OUTPUT ELECTRONIC / SUPPLY - DIGITAL SIGNALS (SQUARE WAVE SIGNALS) – NON PROGRAMMABLE RESOLUTION



| Types | Electronic 2G2 | Electronic IG5 |
|--------------------------|---|---|
| Power supply | 4.5 to 6Vdc, cons. : 75mA | 8 to 12Vdc, cons. : 75mA |
| | $U_i \leq 10V$, $I_i \leq 750mA$, $P_i \leq 1W$ $C_i = 1,3\mu F$, $L_i = 0$ | $U_i \leq 16V$, $I_i \leq 750mA$, $P_i \leq 1W$ $C_i = 1,3\mu F$, $L_i = 0$ |
| Output signal | RS422, 40 mA, TTL 20mA, $F_{max} = 300kHz$ | Push Pull 50mA, $F_{max} = 300kHz$ |
| | $U_i \leq 10V$, $I_i \leq 200mA$, $P_i \leq 0,1W$ $C_i = 1,3\mu F$, $L_i = 0$ | $U_i \leq 16V$, $I_i \leq 150mA$, $P_i \leq 0,1W$ $C_i = 1,3\mu F$, $L_i = 0$ |
| Cable linear capacitance | 100pF/m | |
| Cable linear inductance | 1,2μH/m | |

ORDERING REFERENCE – NON PROGRAMMABLE RESOLUTION (Contact the factory for special versions: special flanges, connections)

| | Shaft Ø | Digital signals (Square wave) | | | | Connection | Connection orientation |
|--------------------------------------|------------------|--------------------------------------|--|--|---------------|---|---|
| | | Electronics : 2G2, IG5 | | Output signals | resolution | | |
| | | Supply | Output stage | | | | |
| IXO5S St. steel cover and body | 14/M1/ : 14mm | 2 : 5Vdc 1 : 8 to 12Vdc | G2 : driver 5Vdc RS422 G5 : push-pull | 9 : A,A/,B,B/,0,0/ (0 gated A & B) | 80 000 max | GP: PUR cable 12wires G3: PVC cable 8wires | Example : R020: radial cable 2m |
| Ex: IXO5S | 14/M1/ | 2 | G2 | 9 // | 1 024 // | GP | R020 // |

AVAILABLE RESOLUTIONS DIGITAL SIGNALS: 50 60 100 120 125 127 150 180 200 240 250 256 300 314 360 375 400 500 512 600 720 750 768 800 927 1000 1024 1200 1250 1280 1440 1500 1800 2000 2048 2400 2500 3000 3600 4000 4096 5000

INTERPOLATED AVAILABLE RESOLUTIONS DIGITAL SIGNALS: 1080 1536 2560 2880 3072 4320 4500 5120 5400 5760 6000 6144 7200 7500 8000 8192 9000 10000 10240 10800 12000 12500 12288 14400 15000 16000 16384 18000 20000 20480 21600 24000 24576 25000 28800 30000 32000 32768 36000 40000 40960 43200 48000 49152 50000 57600 60000 64000 65536 80000

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2) PROGRAMMABLE RESOLUTION

OUTPUT ELECTRONIC / SUPPLY - DIGITAL SIGNALS (SQUARE WAVE SIGNALS) – PROGRAMMABLE RESOLUTION

| Types | Electronic 2P2 |
|--------------------------|--|
| Power supply | 4.5 to 6Vdc, cons. : 75mA |
| | U _i ≤10V, I _i ≤750mA, P _i ≤1W C _i =1,3µF, L _i =0 |
| Output signal | RS422, 40 mA, TTL 20mA, F _{max} =300kHz |
| | U _i ≤10V, I _i ≤200mA, P _i ≤0,1W C _i =1,3µF, L _i =0 |
| Cable linear capacitance | 100pF/m |
| Cable linear inductance | 1,2µH/m |

ORDERING REFERENCE – PROGRAMMABLE RESOLUTION (Contact the factory for special versions: special flanges, connections)

| | Shaft Ø | Digital signals (Square wave) | | | | Connection | Connection orientation |
|----------------------------------|------------------|-------------------------------|---------------------------------------|---------------------------------------|------------|---|------------------------------------|
| | | Electronics : 2P2 | | Output signals | resolution | | |
| | | Supply | Output stage | | | | |
| IXO5 St. steel cover and body | 14/M1/ : 14mm | 2 : 5Vdc | P2: driver 5Vdc RS422 programmable | 9 : A,A/,B,B/,0,0/ (0 gated A & B) | 5 000 max | GP: PUR cable 12wires G3: PVC cable 8wires | Example : R020: radial cable 2m |
| Ex: IXO5S | 14/M1/ | 2 | P2 | 9 // | 5 000 // | GP | R020 // |

AVAILABLE INTERPOLATED RESOLUTIONS – PROGRAMMABLE RESOLUTION

Simple multiplication of the basic disk resolution: 1, 2, 3, 4, 5, 8, 10, 12 and 16 times with dip-switch without software, nor hardware

| Interpolation Factor | Basis Resolutions | | | | | | | | | | | switchs position | | | | |
|----------------------|-------------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|------------------|-------------|-----|-----|-----|
| | 250 | 256 | 360 | 500 | 1 024 | 2 500 | 3 000 | 3 600 | 4 000 | 4 096 | 5 000 | factor | CODE SWITCH | | | |
| X 1 | 250 | 256 | 360 | 500 | 1 024 | 2 500 | 3 000 | 3 600 | 4 000 | 4 096 | 5 000 | x 1 | ON | OFF | OFF | OFF |
| X 2 | 500 | 512 | 720 | 1 000 | 2 048 | 5 000 | 6 000 | 7 200 | 8 000 | 8 192 | 10 000 | x 2 | ON | OFF | OFF | OFF |
| X 3 | 750 | 768 | 1 080 | 1 500 | 3 072 | 7 500 | 9 000 | 10 800 | 12 000 | 12 288 | 15 000 | x 3 | ON | OFF | OFF | OFF |
| X 4 | 1 000 | 1 024 | 1 440 | 2 000 | 4 096 | 10 000 | 12 000 | 14 400 | 16 000 | 16 384 | 20 000 | x 4 | ON | OFF | OFF | OFF |
| X 5 | 1 250 | 1 280 | 1 800 | 2 500 | 5 120 | 12 500 | 15 000 | 18 000 | 20 000 | 20 480 | 25 000 | x 5 | ON | OFF | OFF | OFF |
| X 8 | 2 000 | 2 048 | 2 880 | 4 000 | 8 192 | 20 000 | 24 000 | 28 800 | 32 000 | 32 768 | 40 000 | x 8 | ON | OFF | OFF | OFF |
| X 10 | 2 500 | 2 560 | 3 600 | 5 000 | 10 240 | 25 000 | 30 000 | 36 000 | 40 000 | 40 960 | 50 000 | x 10 | ON | OFF | OFF | OFF |
| X 12 | 3 000 | 3 072 | 4 320 | 6 000 | 12 288 | 30 000 | 36 000 | 43 200 | 48 000 | 49 152 | 60 000 | x 12 | ON | OFF | OFF | OFF |
| X 16 | 4 000 | 4 096 | 5 760 | 8 000 | 16 384 | 40 000 | 48 000 | 57 600 | 64 000 | 65 536 | 80 000 | x 16 | ON | OFF | OFF | OFF |

SPECIAL CONDITIONS FOR SAFE USE

To prevent excessive heating caused by friction of shaft seals and bearings the encoder shaft must be connected to the drive system by a flexible connection (rotary or statoric coupling) in order to compensate driving shaft alignment and limiting so the axial and radial loads on the encoder as described in this data sheet.

The encoder is certified for reduced shock at 0,7 joules without additional protection. It's mandatory to be mechanically protected by an additional cover in order to withstand shocks over 0,7 joules.

The electrical installation to which the apparatus is connected must provide a protection against transients > 119V.

ASSEMBLY CAUTION

DO NOT OPEN WHEN ENERGIZED

For electrical installation use the standard EN/IEC 60079-14.

For maintenance, use the standard EN 60079-17.

The customer obliges to take up and to use our products, according to our specifications and to the manners of the profession.

1) Déclaration UE de conformité

2) Nous, société BEI Sensors, certifions que ce matériel :
capteurs à sécurité intrinsèque, type

IXK5, IXM5, IXO5

3) Avec les inscriptions suivantes :



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A été conçu et fabriqué conformément à la directive applicable suivante :

ATEX : 2014/34/UE

CEM : 2014/30/UE

4) La certification a été obtenue grâce à l'application des normes suivantes :

(*) ATEX: EN60079-0:2012+A11:2013, EN60079-11:2012

(*) Une étude comparative de la norme EN 60079-0 (2009 et 2012+A11 2013) montre que le matériel n'est pas concerné par les modifications substantielles.

5) Une attestation d'examen CE de type a été obtenue :

LCIE 15 ATEX 3026 X

et une notification :

LCIE 03 ATEX Q8060

7) L'application des normes suivantes a participé à l'obtention de la certification :

EN 60-529, NFC 23-520, NFC 23-539, EN 50081-1, EN 55022 classe B, EN 55014, EN 61000-6-2, CEI 61000-4-2, CEI 61000-4-3, CEI61000-4-4, CEI 61000-4-5, CEI 61000-4-6, CEI 61000-4-8, CEI 61000-4-11

8) L'organisme notifié responsable du suivi de la directive **ATEX** est le

LCIE,B.P.8, F92260 Fontenay-aux-Roses

Numéro d'identification : 0081

9) La société chargée de la certification **CEM** est nommée ci-après :

LCIE BUREAU VERITAS, Aire de la Thur,
68840 Pulversheim

10) Nous certifions que nos produits désignés ci-dessus sont conformes à la directive et aux normes spécifiées

Date :

Personne Autorisée Produits certifiés ATEX
Jean-Marc Hubsch

1) EU Declaration of conformity

2) We, BEI Sensors, certify that this material: sensor intrinsically safe standard

IXK5, IXM5, IXO5

3) With the following inscriptions:



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Conceived and manufactured has the directive applicable following:

ATEX : 2014/34/EU

CEM : 2014/30/EU

4) Certification to summer obtained thanks to the application of the standards :

(*) ATEX: EN60079-0:2012+A11:2013, EN60079-11:2012

(*) A comparative study of the standard EN 60079-0 (2009 and 2012+A112013) shows that the product is not concerned by the substantial modifications.

5) EC type examination certificate was obtained :

LCIE 15 ATEX 3026 X

and a notification :

LCIE 03 ATEX Q8060

7) The application of the following standards took part in obtaining certification:

EN 60-529, NFC 23-520, NFC 23-539, EN 50081-1, EN 55022 classe B, EN 55014, EN 61000-6-2, CEI 61000-4-2, CEI 61000-4-3, CEI61000-4-4, CEI 61000-4-5, CEI 61000-4-6, CEI 61000-4-8, CEI 61000-4-11

8) The notified organization responsible for the follow-up of the directive **ATEX** is the

LCIE,B.P.8, F92260 Fontenay-aux-Roses

Identification number : 0081

9) The company in charge of certification **CEM** is named :

LCIE BUREAU VERITAS, Aire de la Thur,
68840 Pulversheim

10) We certify that our indicated products so above are in conformity with the directive and the specified standards