

## ATEX INTRINSICALLY SAFE INCREMENTAL ENCODER FOR MINING APPLICATIONS, IXO5S RANGE

**DIGISINE™** encoder specially designed for explosive application in mining environment

I M1

**Ex ia I Ma**

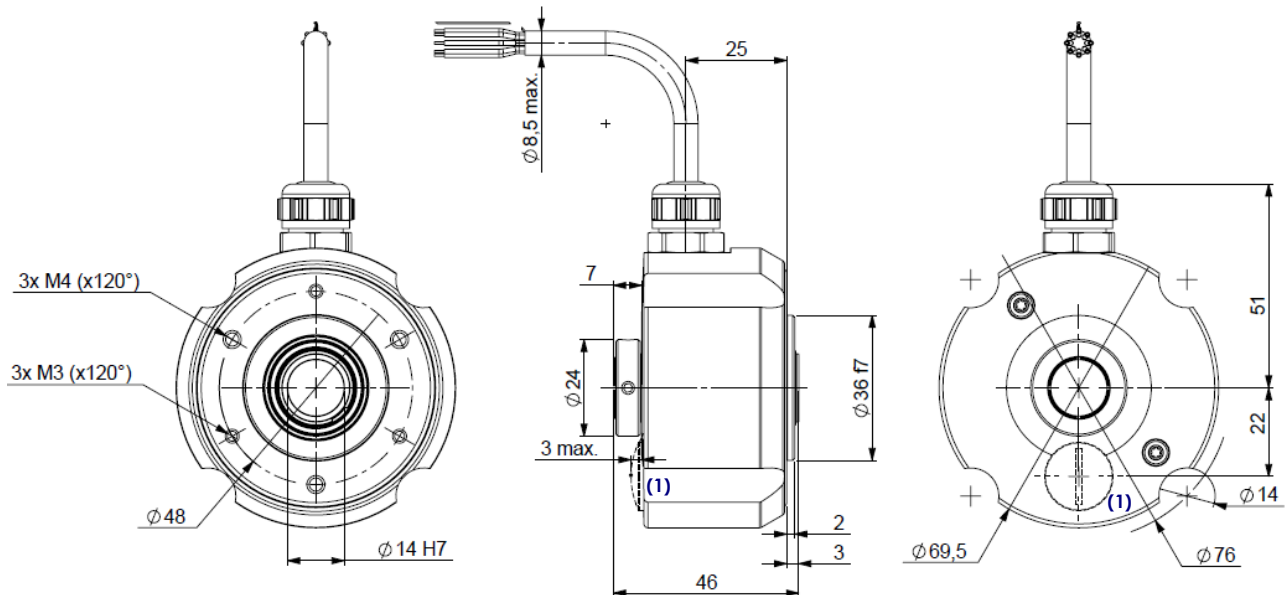
- Robustness and excellent resistance to shocks / vibrations,
- High protection level IP65,
- High resolutions available : up to 80 000 ppr,
- Electronic circuits: 5V or 8 to 12Vdc,
- High performances in temperature  $-30^{\circ}\text{C}$  to  $70^{\circ}\text{C}$ ,
- High performances in frequency 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 <sup>-1</sup>
Maximal loads	Axial : 20 N	Continuous max. speed	4 000 min <sup>-1</sup>
	Radial : 40 N	Storage temperature	$-30^{\circ}\text{C}$ ... $+70^{\circ}\text{C}$
Shaft inertia	$\leq 8500 \text{ g}\cdot\text{mm}^2$	Operating temperature	$-30^{\circ}\text{C}$ ... $+70^{\circ}\text{C}$
Static/ Dynamic torque	10 / 85 mN.m	Theoretical mechanical lifetime $L_{10h}^*$	> 24.10 <sup>9</sup> turns 100 000 hours
Shock (EN60068-2-27)	$\leq 500 \text{ m}\cdot\text{s}^{-2}$ (during 6 ms)		
Vibration (EN60068-2-6)	$\leq 200 \text{ m}\cdot\text{s}^{-2}$ (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		



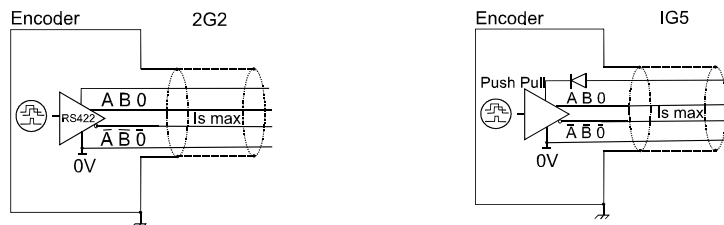
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### STANDARD CONNECTIONS

		-	+	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 <sub>i</sub> ≤10V, I <sub>i</sub> ≤750mA, P <sub>i</sub> ≤1W C <sub>i</sub> =1,3µF, L <sub>i</sub> =0
Output signal	RS422, 40 mA, TTL 20mA, F <sub>max</sub> =300kHz U <sub>i</sub> ≤10V, I <sub>i</sub> ≤200mA, P <sub>i</sub> ≤0,1W C <sub>i</sub> =1,3µF, L <sub>i</sub> =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 :



**IM1**  
**Ex ia I Ma**

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 obtenu :

**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:



**IM1**  
**Ex ia I Ma**

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

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