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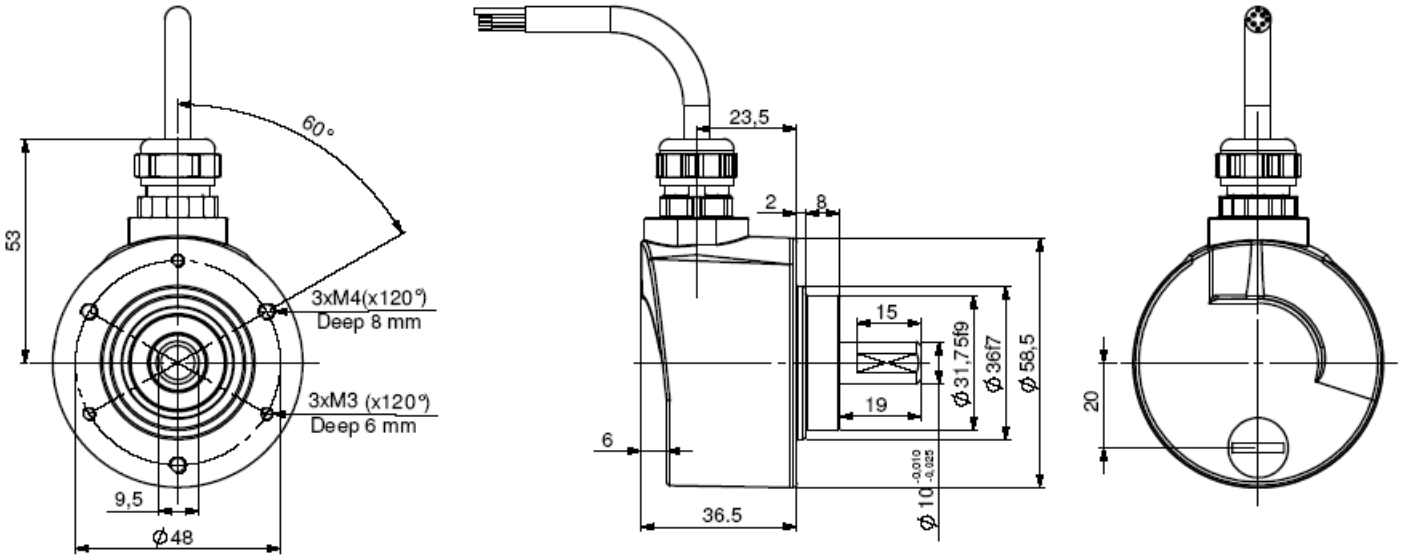
DHM5

PROGRAMMABLE INCREMENTAL ENCODERS, DHM5 RANGE

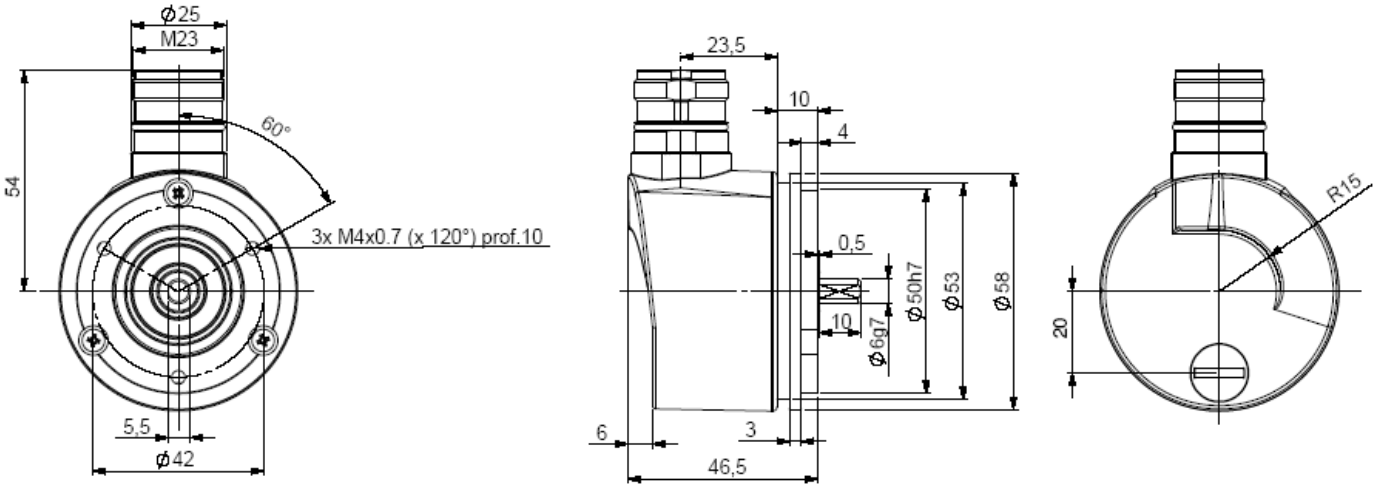
The programmable encoder : ***DIGISINE™,*** unique combination of performance and flexibility

- Easy programming without any specific software or hard-ware
- Robustness and excellent resistance to shocks / vibrations
- High protection level IP65, IP67 option with a sealing flange
- High resolutions available : up to 80 000 cpt
- Universal electronic circuits from 5 to 30 Vdc
- High performances in temperature –30°C to +70°C (option –40°C)
- High performances in frequency of output signals : 300 kHz

DHM5_10 connection G3R radial cable



DHM5_06 connection G6R (radial M23), flange 9500/003* mounted on body



* Accessory to be ordered separately

Material	Cover : zinc alloy	Shock (EN60068-2-27)	≤ 500m.s^{-2} (during 6 ms)
	Body : aluminium	Vibration (EN60068-2-6)	≤ 100m.s^{-2} (55 … 2 000 Hz)
	Shaft : stainless steel	EMC	EN 50081-1, EN 61000-6-2
Bearings	6 000 serie	Isolation	1 000 Veff
Maximum loads	Axial : 50 N	Encoder weight (approx.)	0,300 kg
	Radial : 100 N	Operating temperature	- 30 ... + 70 °C (encoder T°)
Shaft inertia	≤ 1.10^{-6} kg.m^2	Storage temperature	- 40 ... + 80 °C
Torque	≤ 4.10^{-3} N.m	Protection(EN 60529)	IP 65 (IP67 with flange option)
Permissible max. speed	12 000 min^{-1}	Theoretical mechanical lifetime 10^9 turns (F_{axial} / F_{radial})	
Continuous max. speed	9 000 min^{-1}	25 N / 50 N : 99	50 N / 100 N : 12

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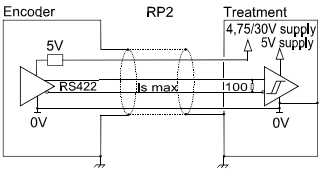
DHM5

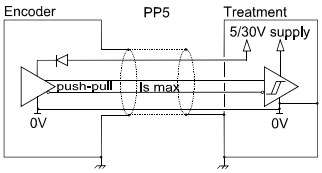
CE

PROGRAMMABLE INCREMENTAL ENCODERS, DHM5 RANGE

DIGITAL OUTPUT SIGNALS (SQUARE WAVE)



RP2 electronic (300kHz)
Supply : 4,75 to 30Vdc
Cons. without load : 75mA max
Current per channel: 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = 4Vdc



PP5 electronic (300kHz)
Supply: 5 to 30Vdc
Cons. without load : 75mA max
Current per channel: 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = Vcc-2,5Vdc

Protection against short circuits and against reverse polarity for all the electronics

STANDARD CONNECTION

		-	+	A	B	0	A/	B/	0/	Ground
G6	M23 - 12 pins CW	1	2	3	4	5	6	7	8	Connector body
G8	M23 - 12 pins CCW	10 + 11	2 + 12	8	5	3	1	6	4	Connector body
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

ORDERING REFERENCE (Contact the factory for special versions, ex: special electronics, flanges, connections...)

	Shaft Ø	Digital signals (Square wave)				Connection	Connection orientation
		Electronic : PP5, RP2		Output signals	Resolution		
		Supply	Output stage				
DHM5	**06** : 6mm **10** : 10mm **08**: 8mm (option)	**R** : 4.75 to 30Vdc **P** : 5 to 30Vdc	**P2** : driver 5Vdc RS422 **P5** : push-pull	**9** : A,A/,B,B/,0,0/ (0 gated A & B)	**5 000** max basic resolution	**G6**: M23 12 pins CW **G5** : M23 12 pins CW **G8** : M23 12 pins CCW **G1**: solenoid valve 4 pins **G2** : DIN 5 pins **GD**: DIN 8 pins	**R** : radial
						G3 : PVC cable 8 wires **GP** : PUR cable 12 wires	Example : **R020** : radial cable 2m
Ex: DHM5 _	**10** //	**P**	**P5**	**9** //	**5 000** //	**GP**	**R020**

AVAILABLE INTERPOLATED RESOLUTIONS

Easy multiplication of the basis resolution of the disk : 1, 2, 3, 4, 5, 8, 10, 12 and 16 times per dip-switch without specific software nor hardware

Interpolation factor	*Basis resolutions*										
	250	***256***	***360***	***500***	***1 024***	***2 500***	***3 000***	***3 600***	***4 000***	***4 096***	***5 000***
X 1	*250*	*256*	*360*	*500*	*1 024*	*2 500*	*3 000*	*3 600*	*4 000*	*4 096*	*5 000*
X 2	*500*	*512*	*720*	*1 000*	*2 048*	*5 000*	*6 000*	*7 200*	*8 000*	*8 192*	*10 000*
X 3	*750*	*768*	*1 080*	*1 500*	*3 072*	*7 500*	*9 000*	*10 800*	*12 000*	*12 288*	*15 000*
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 5	*1 250*	*1 280*	*1 800*	*2 500*	*5 120*	*12 500*	*15 000*	*18 000*	*20 000*	*20 480*	*25 000*
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 10	*2 500*	*2 560*	*3 600*	*5 000*	*10 240*	*25 000*	*30 000*	*36 000*	*40 000*	*40 960*	*50 000*
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 16	*4 000*	*4 096*	*5 760*	*8 000*	*16 384*	*40 000*	*48 000*	*57 600*	*64 000*	*65 536*	*80 000*

switchs position					
factor	CODE SWITCH 1	2	3	4	
x 1	ON				
x 2	ON				
x 3	ON				
x 4	ON				
x 5	ON				
x 8	ON				
x 10	ON				
x 12	ON				
x 16	ON				

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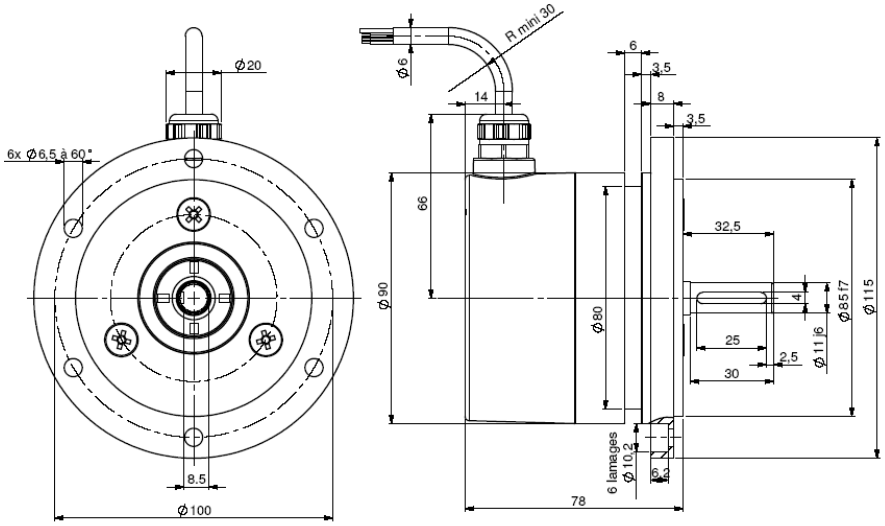
DHM9

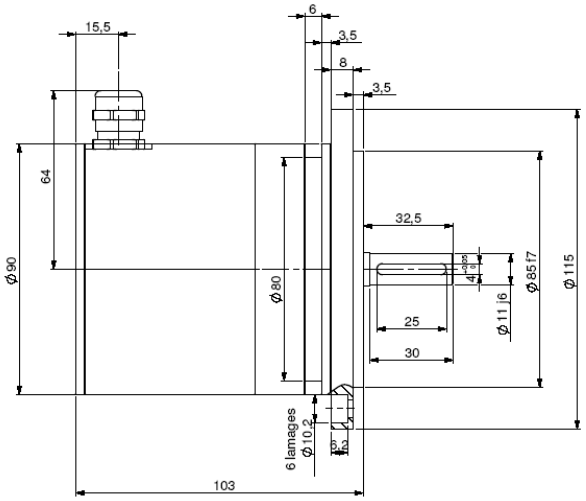
INCREMENTAL ENCODERS, DHM9 RANGE 100°C

- Especially designed for heavy-duty (steel, paper, wood – mills, cranes …) Compact and robust conception. Excellent resistance to shocks/vibrations and to extreme axial/radial loads
- High performances in temperature –30°C to 100°C (option –40°C)
- High protection level: IP 65
- Universal electronic circuits from 5 to 30 Vdc (option 5 to 36Vdc)
- High resolutions: up to 80 000 cpt (Programmable resolutions option)
- Connection with terminal box, cable or connector output
- Square or sine wave available
- Mechanical overspeed switch option
- 12mm solid shaft or 11mm with REO 115mm flange (Euroflange B10) for tacho-generator mounting

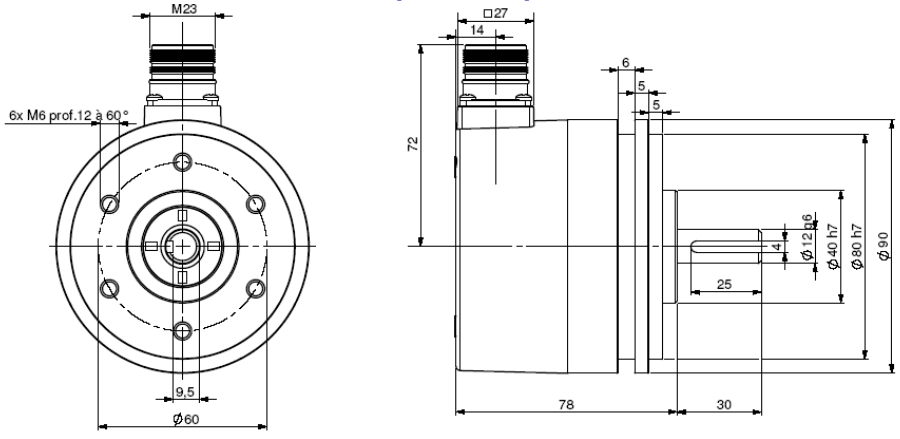
DHM9_11 connection G3R (radial cable)



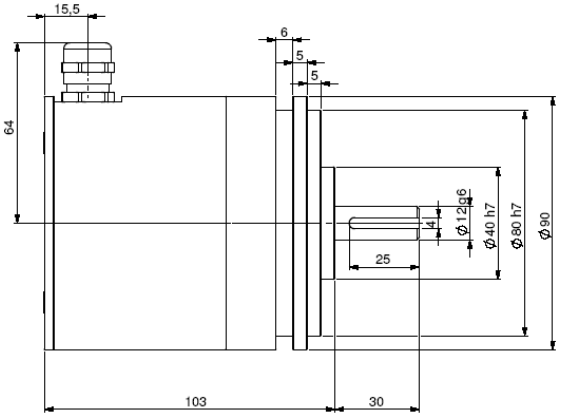
DHM9_11 connection GBR (terminal box)



DHM9_12 connection G6R (radial M23)



DHM9_12 connection GBR (terminal box)



Material (cable or connector version), Stainless steel option	Cover : zinc alloy
	Body : aluminium
Material (terminal box version), Stainless steel option	Cover: treated alu.
	Body: aluminium
Shaft material	Stainless steel
Bearings	6001 serie
Maximum loads	Axial : 100 N
	Radial : 200 N
Shaft inertia	≤ 15.10^{-6} kg.m²
Torque	≤ 10.10^{-3} N.m
Permissible max. speed	9 000 min^{-1}
Continuous max. speed	6 000 min^{-1}
Shaft seal	Viton double lips

Shocks (EN60068-2-27)	≤ 500 $m.s^{-2}$ (during 6ms)
Vibrations (EN60068-2-6)	≤ 200 $m.s^{-2}$ (10 … 1 000 Hz)
EMC	EN 61000-6-4, EN 61000-6-2
Isolation	1 000 V eff
Encoder weight (approx.) Cable or connector version	1,100kg zinc alloy cover, alu. body
	2,600kg stainless steel cover & body
Encoder weight (approx.) Terminal box version	1,300kg aluminium cover & body
	2,800kg stainless steel cover & body
Operating temperature	- 30 ... + 100 °C (encoder T°)
Storage temperature	- 40 ... + 100 °C
Protection(EN 60529)	IP 65

Theoretical mechanical lifetime 10^9 turns (F_{axial} / F_{radial})

20 N / 30 N : 360	50 N / 100 N : 18	100 N / 200 N: 2,2

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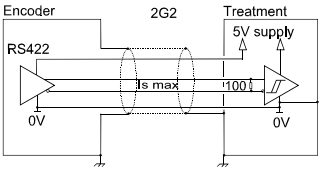
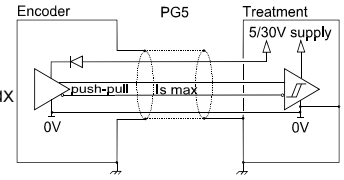
DHM9

INCREMENTAL ENCODERS, DHM9 RANGE 100°C

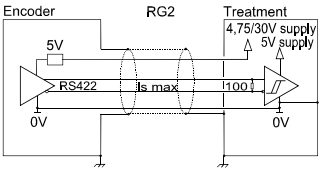
DIGITAL OUTPUT SIGNALS (SQUARE WAVE SIGNALS)



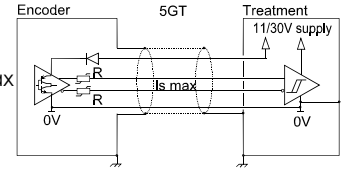
Electronic 2G2 (100°C,300kHz)
Supply : 5Vdc ± 10%
Cons. without load : 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = 4Vdc



Electronic PG5 (100°C, 300kHz)
Supply : 5 to 30Vdc
Cons. without load : 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = Vcc-2,5Vdc

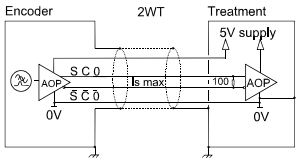


Electronic RG2 (100°C,300kHz)
Supply : 4,75 to 30Vdc
Cons. without load : 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = 4Vdc



Electronic 5GT (70°C, 120kHz)
Supply : 11 to 30Vdc
Cons. without load : 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 1,5Vdc
1 min (Is=20mA) : V_{oh} = Vcc-2,5Vdc

SINE WAVE OUTPUT SIGNALS



Electronic 2WT (100°C)
Supply : 5Vdc ± 10%
Cons. without load : 75mA max
Output signals :
1Vpp (peak to peak)

ELECTRONIC PROTECTIONS

Protection against short circuits of the electronics: 2G2, RG2, PG5, 5GT and 2WT
Protection against reverse polarity for all the electronics except 2G2 and 2WT

Consult us for special electronics : programmable resolution, 5 to 36Vdc, 100mA per channel...

STANDARD CONNECTIONS

		-	+	A or S	B or C	0 or Z	A/ or S/	B/ or C/	0/ or Z/	Ground
GB	Terminal box	1	2	3	4	5	6	7	8	On cable gland
G6	M23 - 12 pins CW	1	2	3	4	5	6	7	8	Connector Body
G8	M23 - 12 pins CCW	10 + 11	2 + 12	8	5	3	1	6	4	Connector Body
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

ORDERING REFERENCE (Contact the factory for special versions, ex: electronics 5-36V, special flanges, connections...)

	Shaft Ø	Digital signals (Square wave)				Connection	Connection orientation
		Electronics : 2G2, PG5, RG2 , 5GT		Output signals	resolution		
		Supply	Output stage				
DHM9 **DBM9** Stainless steel body **DXM9** Stainless steel cover and body	**11**:11mm **12** : 12mm	**2** : 5Vdc **5** : 11 to 30Vdc **P** : 5 to 30Vdc **R** : 4.75 to 30Vdc	**G2** : driver 5Vdc RS422 **G5** : push-pull 5-30Vdc **GT** : transistorized push-pull 11-30Vdc	**9** : A,A/,B,B/,0,0/ (0 gated A & B)	**80 000** max	**G6**: M23 12 pins CW **G5** : M23 12 pins CW **G8** : M23 12 pins CCW **GB** : terminal box	**R** : radial **A** : axial
		Sine-wave signals				**GP** : PUR cable 12 wires **G3** : PVC cable 8 wires	Example : **R020** : radial cable 2m **A020**: axial cable 2m
		2: 5Vdc	**WT**: sine 1Vpp	**9**: S,S/,C,C/,Z,Z/	**2 500** max		
Ex: DHM9 _	**12**	**//** **P**	**G5**	**9**	**// 80 000//**	**GP**	**R020**

Available resolutions (100°C electronic) : *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 6000 7200 8000 8192 10000*

Interpolated available resolutions (70°C electronic) : *1080 2560 2880 3072 4320 5120 7500 5760 9000 10240 10800 12000 12500 12288 14400 15000 16000 16384 18000 20000 20480 24000 25000 28800 30000 32000 32768 36000 40000 40960 43200 48000 49152 50000 57600 60000 64000 65536 80000*

Available resolutions sine-wave signals (100°C electronic) : *250 256 360 500 1024 2500*

Nota : The maximal resolution with the 5GT electronic is 5 000 pulses per turn (non available electronic with interpolation)

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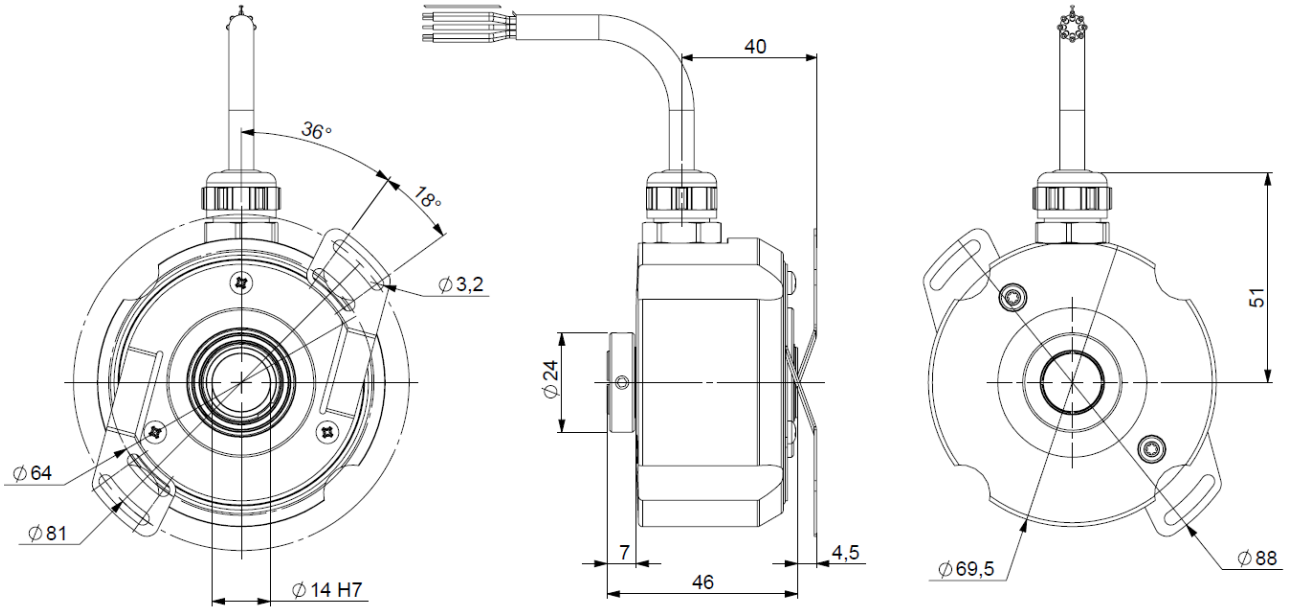
DHO5S

ATEX INCREMENTAL ENCODER FOR ATEX ZONE 2 AND 22, DHO5S RANGE

***DIGISINE™* encoder specially designed for explosive DUST and GAS atmosphere**
Ex II 3GD
ZONE 2 : Ex nA IIC T6…T4(*) Gc
ZONE 22 : Ex tc IIIC T120°C…T80°C (*) Dc
TAmb: (*) see table above

- Robustness and excellent resistance to shocks / vibrations,
- High protection level IP65,
- High resolutions available : up to 80 000 cpt,
- Universal electronic circuits from 5 to 30 Vdc,
- High performances in temperature –30°C to 70°C,
- High performances in frequency of output signals: 300 kHz.

DHO5S14/E2/ WITH RADIAL CABLE AND 9445/015 ANTI-ROTATION SYSTEM**



**9445/015 anti-rotation to be ordered separately

MECHANICAL CHARACTERISTICS

Material	Cove : aluminum
	Body : aluminum
	Shaft : stainless steel
Bearings	6 803 serie – sealed
Maximal loads	Axial : 20 N
	Radial : 40 N
Shaft inertia	≤ 9500 g.mm²
Static/ Dynamic torque	10 / 85 mN.m
Shock (EN60068-2-27)	≤ 500m.s^{-2} (during 6 ms)
Vibration (EN60068-2-6)	≤ 200m.s^{-2} (10 … 2 000 Hz)
EMC	EN 61000-6-2, EN 61000-6-4

Insulation	1 000 Veff
Weight (approx.)	0,300 kg
Protection(EN 60529)	IP 65
Permissible max. speed	9 000 min^{-1}
Continuous max. speed	4 000 min^{-1}
Storage temperature	-30°C … +70°C
Operating temperature	Cf table below
Theoretical mechanical lifetime L_{10}h***	> 24.10^9 turns 100 000 hours

*** continuous max. speed – ½ max. load – according to ISO281: 1990, L_{10}

(*) TEMPERATURE CLASS VERSUS AMBIENT TEMPERATURE AND ENCODER SPEED

Ta, Ambient temperature	Gas temperature class	Dust temperature class
-30°C< Ta < +45°C : speed up to 4000rpm	T6	T 80°C
-30°C< Ta < +50°C : speed up to 4000rpm	T5	T 100°C
-30°C< Ta < +60°C : speed up to 1500rpm	T5	T 100°C
-30°C< Ta < +65°C : speed up to 1500rpm	T4	T 120°C
-30°C< Ta < +70°C : speed up to 1000 rpm	T4	T 120°C

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DHO5S

ATEX INCREMENTAL ENCODER FOR ATEX ZONE 2 AND 22, DHO5S RANGE

ELECTRICAL CHARACTERISTICS

Electronic Version	Output signals	Operating Voltage Vcl	Supply current	Current per channel pair	Short circuits proof	Reverse polarity protected	Output Low max (Is=20mA)	Output High min (Is=20mA)	Frequency max	Temperature range
2G2	Digital TTL RS422	5V +/-5%	75mA with no loads	40mA	Yes	No	0.5V	4V	300kHz	-30°C +70°C
RG2		4.75-30V			Not to Vcl	Yes				
PG5	Digital HTL	5-30V			Yes			Vcl - 2.5V		
5GT		10-30V					1.5V		120kHz	-30°C +70°C
2WT	Sine Cosine 1Vpp	5V +/-5%		10mA	Yes	No	1Vpp +/-10% (Is=10mA)		300kHz	-30°C +70°C
5WT		10-30V			Not to Vcl	Yes				

STANDARD CONNECTIONS

		-	+	A or S	B or C	0 or Z	A/ or S/	B/ or C/	0/ or Z/	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

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

	Shaft Ø	Digital signals (Square wave)				Connection	Connection orientation
		Electronics : 2G2, PG5, RG2 , 5GT		Output signals	resolution		
		Supply	Output stage				
DHO5S	**14/E2/** : 14mm reduction hubs available up to 6mm	**2** : 5Vdc **5 :** 11 to 30Vdc **P** : 5 to 30Vdc **R** : 4.75 to 30Vdc	**G2**: driver 5Vdc RS422 **G5**: push-pull **GT**: transistorized push-pull 11-30Vdc	**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
		Sine-wave signals					
		2: 5Vdc **5 :** 11 to 30Vdc	**WT**: sine 1Vpp	**N**: S,S/,C,C/,Z,Z/	**2 500** max		
Ex: DHO5S	**14/E2/**	**P**	**G5**	**9** //	**5 000** //	**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

AVAILABLE RESOLUTIONS SINE-WAVE SIGNALS: 250 256 360 500 512 1000 1024 1500 1800 2000 2048 2500

Nota : The maximal resolution with the 5GT electronic is 5 000 pulses per turn (non available electronic with interpolation).

Made in FRANCE

BEI Sensors SAS
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DHO5S

ATEX INCREMENTAL ENCODER FOR ATEX ZONE 2 AND 22, DHO5S RANGE

CE

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 electrical installation to which the apparatus is connected must provide a protection against transients > 119V.
When the encoder is used in an ambient temperature of 75°C, the supply cable shall be suitable for a temperature of 85°C.

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 ATEX, type

DHM5S, DHK5S, DHO5S, KHM5S, KHK5S, KHO5S

3) Avec les inscriptions suivantes :

CE Ex II 3GD, Ex nA IIC T6…T4 Gc
Ex tc IIIC T120°C…T80°C Dc

A été conçu et fabriqué conformément aux directives applicables suivantes :

ATEX : 2014/34/UE

CEM : 2014/30/UE

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

(*) ATEX: EN 60079-0 :2012+A11:2013, EN 60079-15 :2010, EN60079-31 :2014
IECEx: IEC60079-0: 2012, IEC60079-15:2010, IEC60079-31:2013

(*) Une étude comparative des normes EN 60079-0 (2012 et A11 2013), et EN 60079-31 (2009 et 2014) montre que le matériel n'est pas concerné par les modifications substantielles.

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

LCIE 14 ATEX 1024X
et une notification :
LCIE 03 ATEX Q8060

6) Un certificat de conformité IECEx a été obtenu :

IECEx LCIE 14.0047X
et une notification :
FR/LCI/QAR08.0002

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

GRME, Cellule CEM, B.P.8, 68840 Pulversheim

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

1) **EU declaration of conformity**

2) We, BEI Sensors, certify that this material : ATEX sensor, type

DHM5S, DHK5S, DHO5S, KHM5S, KHK5S, KHO5S

3) With the following inscriptions :

CE Ex II 3GD, Ex nA IIC T6…T4 Gc
Ex tc IIIC T120°C…T80°C Dc

Conceived and manufactured has the directive applicable following :

ATEX : 2014/34/EU

EMC: 2014/30/EU

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

(*)ATEX: EN 60079-0 :2012+A11:2013, EN 60079-15 :2010, EN60079-31 :2014
IECEx: IEC60079-0:2012, IEC60079-15:2010, IEC60079-31:2013

(*) A comparative study of the standards EN 60079-0 (2012 and A112013) and EN 60079-31 (2009 and 2014) shows that the product is not concerned by the substantial modifications.

5) EC type examination certificate was obtained :

LCIE 14 ATEX 1024X
and a notification :
LCIE 03 ATEX Q8060

6) IECEx certificate of conformity was obtained :

IECEx LCIE 14.0047X
and a notification :
FR/LCI/QAR08.0002

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

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 company in charge of certification **CEM** is named :

GRME, Cellule CEM, B.P.8, 68840 Pulversheim

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

Date :

ATEX Certified Product Approved Person
Jean-Marc HUBSCH

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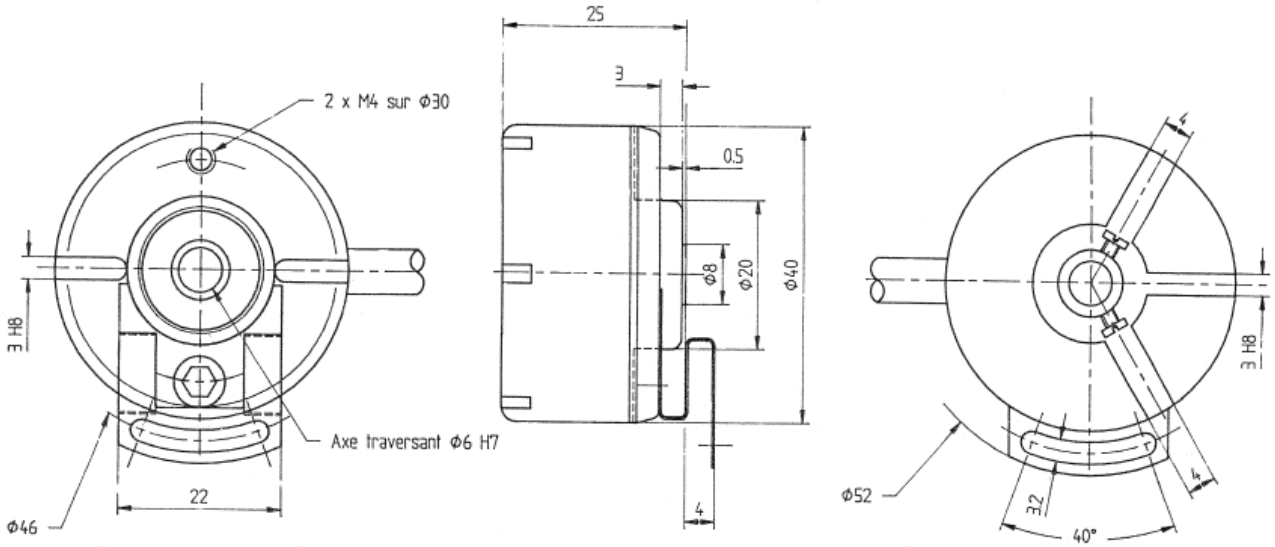
GHT4

INCREMENTAL ENCODERS, GHT4 RANGE

- With its 40mm size and a 6mm through shaft, this encoder characterizes itself by its strength and robustness of the mechanical and opto-electronic parts. It's the most compact industrial encoder with a through shaft.
- Stable and unbreakable Polyfass™, Mylar-Myca composite coded discs (Except 2500 points: glass disc is used).
- Available resolution up to 2 500 counts per turn.
- Universal electronics 5 to 30Vdc available.
- Ideal applications : micro-robotics, printing machines, low power DC motors, shears.

GHT4 connection G3R (radial cable) and 9445/006* anti-rotation system



* to be ordered separately

MECHANICAL CHARACTERISTICS

Material	Shaft : aluminum
	Cover : aluminum
	Body : aluminum
Bearings	688 serie
Maximum loads	Axial : 10 N
	Radial : 20 N
Shaft inertia	≤ $0{,}1.10^{-6}$ kg.m²
Torque	≤ 2.10^{-3} N.m
Permissible max. speed	12 000 min^{-1}
Continuous max. speed	9 000 min^{-1}
Encoder weight (approx.)	0,240 kg

EMC	EN 50082-2 (1995)
	EN 50081-1 (1992)
Isolation	1 000 Veff
Operating temperature	- 20 ... + 80 °C (encoder T°)
Storage temperature	- 40 ... + 80 °C
Protection CEI60529 (1989)	IP 52
Shocks (EN60068-2-27)	≤ 300 $m.s^{-2}$ (during 11 ms)
Vibrations (EN60068-2-6)	≤ 100 $m.s^{-2}$ (10 ... 500 Hz)
Torque (shaft pressure screw)	Nominal :0,3N.m ; break : 0,5N.m
Theoretical mechanical lifetime 10^9 turns (F_{axial} / F_{radial})	
5 N / 10 N : 260	10 N / 20 N : 33

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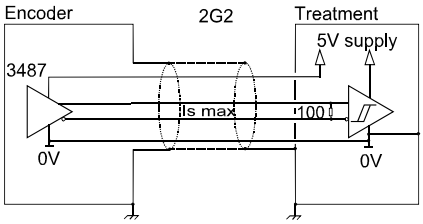
GHT4

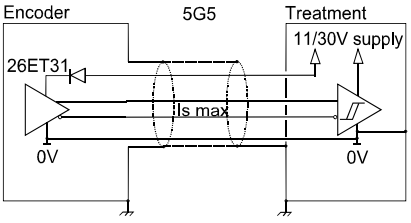
INCREMENTAL ENCODERS, GHT4 RANGE

CE

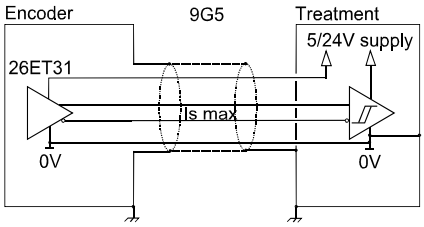
OUTPUT ELECTRONIC / POWER SUPPLY



2G2 electronic (100kHz)
Supply : 5Vdc ± 10%
Cons. without load : 100mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = 2,5Vdc



5G5 electronic (100kHz)
Supply : 11 to 30Vdc
Cons. without load: 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1min (Is=20mA) : V_{oh} = Vcc-3Vdc



9G5 electronic(100kHz)
Supply : 5 to 24Vdc
Cons. without load : 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1min (Is=20mA) : V_{oh} = Vcc-3Vdc

Protection against short circuits of the electronics : 5G5 and 9G5.
Protection against inversion of polarity for the electronics : 5G5.

STANDARD CONNECTION

		-	+	A	B	0	A/	B/	0/	Ground
G3	PVC cable, 8 wires 8230/024	WH white	BN brown	GN green	YE yellow	VT violet	OG orange	BU blue	RD red	General shield

ORDERING REFERENCE (Contact the factory for special versions, ex: special flanges, electronics, connections.)

	Shaft Ø	Available electronics		Output signals	Resolution	Connection	Connection orientation
GHT4	**06** : 6mm **04**: 4mm (option) **I4** : 6.35 mm (option)	**2G2, 5G5, 9G5** **Supply** **2** : 5Vdc **5** : 11 to 30Vdc **9** : 5 to 24Vdc	**Output stage** **G2** : 5Vdc RS422 **G5** : push-pull	**9**: AA/ BB/ 00/ (0 gated A & B)	**2 500** max	**G3** :PVC cable 8 wires	Example : **R020**: radial cable 2m
Ex:GHT4	**06** //	**5**	**G5**	**9** //	**1 024** //	**G3**	**R020**

Available resolutions *: 1 2 4 5 8 10 16 20 24 25 27 30 36 40 50 60 64 90 100 120 125 128 144 150 170 180 200 250 300 360 400 500 512 600 720 800 1000 1024 2500*

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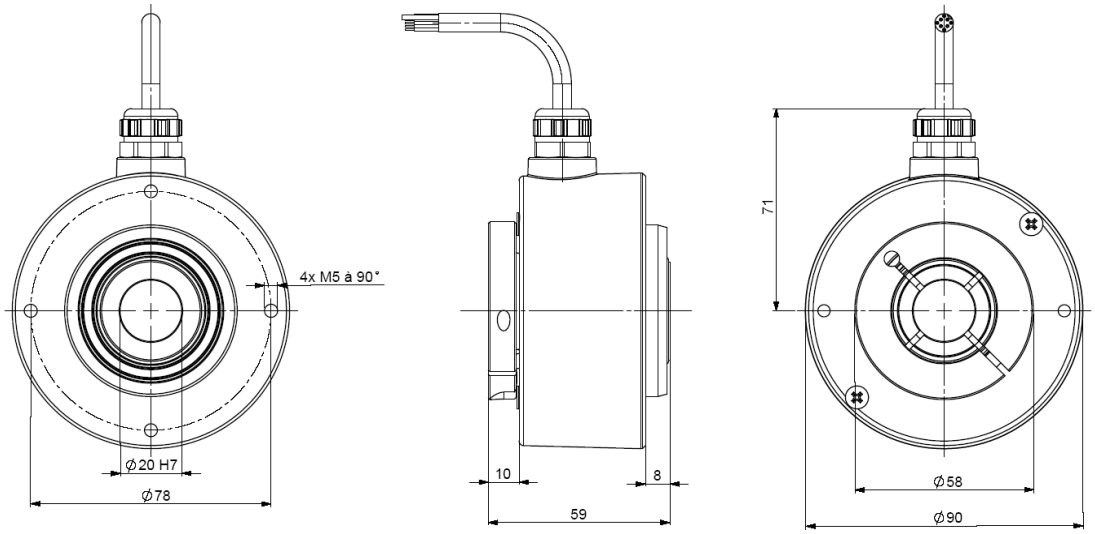
GHU9

INCREMENTAL ENCODERS, GHU9 RANGE

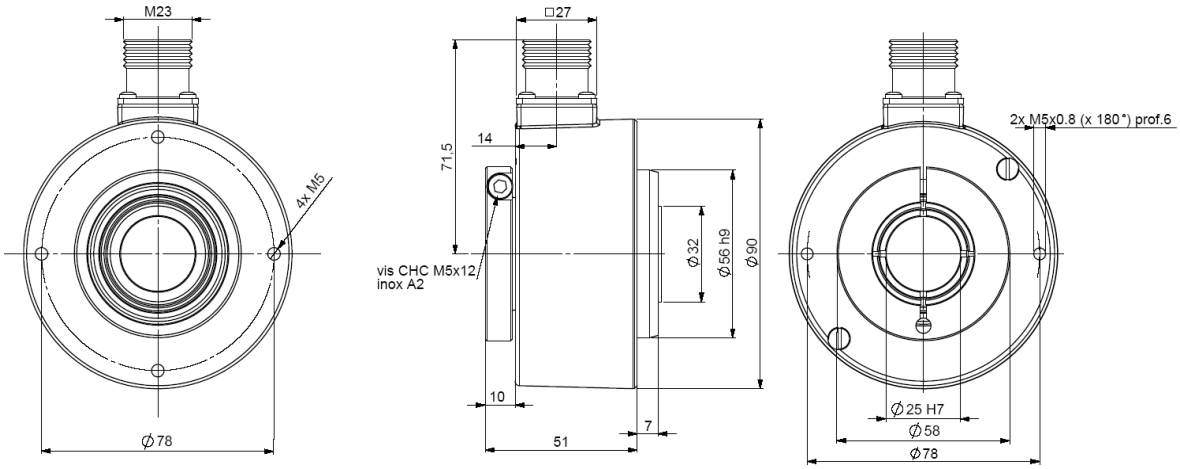
- Especially designed for heavy-duty (steel, paper, wood – mills, cranes…), compact and robust conception, its connection can be done with industrial connector or shield cable
- Various standard and specials electronics: push-pull 11-30V (HTL) & 5VRS422 (TTL); for long, high capacity cables: push-pull 11-30V transistorised
- Hollow shaft of up to 30mm, adaptation of the bore size with composite hub for thermal and electric insulation (aluminium hubs in option)
- Digital incremental signals, option - analogue output signals (Tachoencoders , optotachos)
- Self-monitoring MaxControl (optional) : detection of shocks, vibrations, temperatures
- Double/triple mounting in combinations of incremental, absolute, analogue signals, mechanical over-speed switch

New : terminal box option

GHU9_20 connection G3R (radial cable output), with reduction hub 9418/I20 mounted in the shaft



GHU9_25 connection G6R (radial M23), with reduction hub 9418/I25 mounted in the shaft



Material Stainless steel option	Cover : zinc alloy
	Body : aluminium
Shaft	Inox
Bearings	6807 serie
Maximum loads	Axial : 50 N
	Radial : 80 N
Shaft inertia moment	≤ 55.10^{-6} kg.m²
Torque	≤ 25.10^{-3} N.m
Permissible max. speed	6 000 min^{-1}
Continuous max. speed	3 600 min^{-1}
Shaft seal	Viton
Shocks (EN60068-2-27)	≤ 2 000 m.s^{-2} (during 6 ms)

Vibration (EN60068-2-6)	≤ 200 m.s^{-2} (10 … 1 000 Hz)
EMC	EN 50081-1, EN 61000-6-2
Isolation	1 000 Veff
Encoder weight (approx.)	0,700kg zinc alloy cover, alu body
	1,000kg zinc alloy cover, stainless steel body
	1,200kg stainless steel cover and body
Operating temperature	- 20 ... + 80 °C (Encoder T°)
Storage temperature	- 40 ... + 80 °C
Protection(EN 60529)	IP 65
Torque (ring screw)	nominal: 3N.m, break: 4N.m
Theoretical mechanical lifetime 10^9 turns (F_{axial} / F_{radial})	
25 N / 40 N: 140	50 N / 80 N : 17

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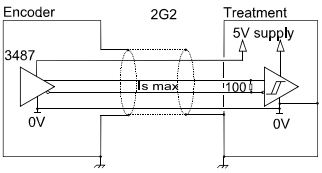
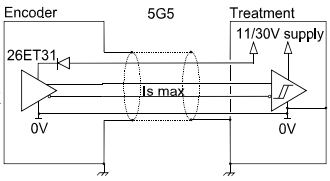
GHU9

INCREMENTAL ENCODERS, GHU9 RANGE

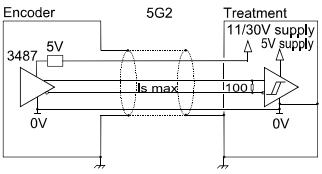
OUTPUT ELECTRONIC / SUPPLY



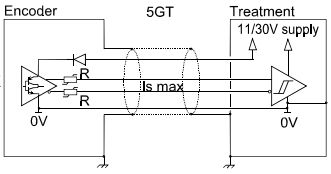
2G2 electronic (100kHz)
Supply : 5Vdc ± 10%
Cons. without load : 100mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = 2,5Vdc



5G5 electronic (100kHz)
Supply : 11 to 30Vdc
Cons. without load : 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = Vcc-3Vdc



5G2 electronic (100kHz)
Supply : 11 to 30Vdc
Cons. without load : 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = 2,5Vdc



5GT electronic, optional (100kHz)
Supply : 11 to 30Vdc
Cons. without load : 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = Vcc-2,5Vdc

Electronics 5GT is designed for long and high capacity cables (contact our factory)

Available in option :
- 3G3 electronic, supply between 15 and 30Vdc, push-pull output regulated 12Vdc
- 5GH electronic permits to 'drive different inputs (plc + display for example)

Protection against short circuits the electronics: 5G5, 5GT, 3G3
Protection against inversion of polarity for all the electronics except 2G2

Option ''Max control'' : the encoder gives on real time its physical environment parameters: shocks and vibrations, too high or too low temperature, too low or too high supply, quality of the output signals : upon request..

STANDARD CONNECTION

		-	+	A	B	0	A/	B/	0/	Ground
G6	M23 - 12 pins CW	1	2	3	4	5	6	7	8	connector body
G8	M23 - 12 pins CCW	10 + 11	2 + 12	8	5	3	1	6	4	connector body
G3	PVC cable 8 wires 8230/020	WH white	BN brown	GN green	YE yellow	GY grey	PK pink	BU bleu	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

ORDERING REFERENCE (Contact the factory for special versions ex: overspeed switch, electronics, special flanges, connections ...)

	Shaft Ø	Available electronic		Output signal	Resolution	Connection	Connection orientation
GHU9 Cover : zinc Body alu **GBU9** Cover : zinc Body: stainless steel **GXU9** Cover and body: stainless steel	**30**: 30mm Nota: reduction hubs available **32**: 32mm option consult us	**2G2, 5G2, 5G5, 5GT, 5GH, 3G3**		**9** : A,A/,B,B/,0,0/ (0, A&B gated) **A** : A,A/,B,B/,0,0/ (0, A gated) **N** : A,A/,B,B/,0,0/ (0 ungated)	**10 000** max	**G6**: M23 12 pins CW **G5**: M23 12 pins CW **G8**: M23 12 pins CCW **GT**: terminal box	**R** : radial
		Supply	**Output stages**				
		2 : 5Vdc **5** : 11 to 30Vdc **3** : 15 to 30Vdc	**G2** : driver 5Vdc RS422 **G3** : driver 12Vdc **G5** : push-pull **GT** : push-pull 11-30Vdc transistorised **GH** : push-pull 11-30Vdc 150 mA			**G3** : PVC cable 8 wires **GP** : PUR cable 12 wires	Example: **R020**: axial 2m cable
Ex: GHU9 _	**30** //	**5**	**G5**	**9** //	**5 000** //	**GP**	**R050**

Available resolutions *: 1 2 3 4 5 6 7 8 9 10 12 13 14 15 16 19 20 21 24 25 26 28 29 30 32 35 36 39 40 43 45 46 48 50 54 56 58 60 62 63 64 66 67 70 72 74 75 76 80 84 86 88 89 90 91 94 96 100 107 110 120 122 123 125 127 128 130 132 135 138 140 147 150 157 159 160 168 169 170 172 175 180 188 191 196 200 201 205 220 222 225 234 240 241 242 245 246 248 250 254 255 256 258 259 267 268 275 283 285 295 300 305 314 315 318 320 330 340 350 360 367 375 378 380 381 388 390 397 400 405 410 424 425 438 443 450 471 480 489 495 500 505 512 515 534 540 550 565 580 600 623 625 628 630 632 635 650 660 700 720 746 750 752 754 800 810 840 860 880 891 900 942 990 1000 1024 1080 1100 1131 1200 1225 1250 1260 1280 1290 1400 1414 1440 1500 1536 1570 1600 1620 1630 1750 1800 1885 2000 2048 2250 2400 2500 2640 3000 3456 3600 3680 3750 4000 4096 4500 4900 5000 7200 9000 10000*

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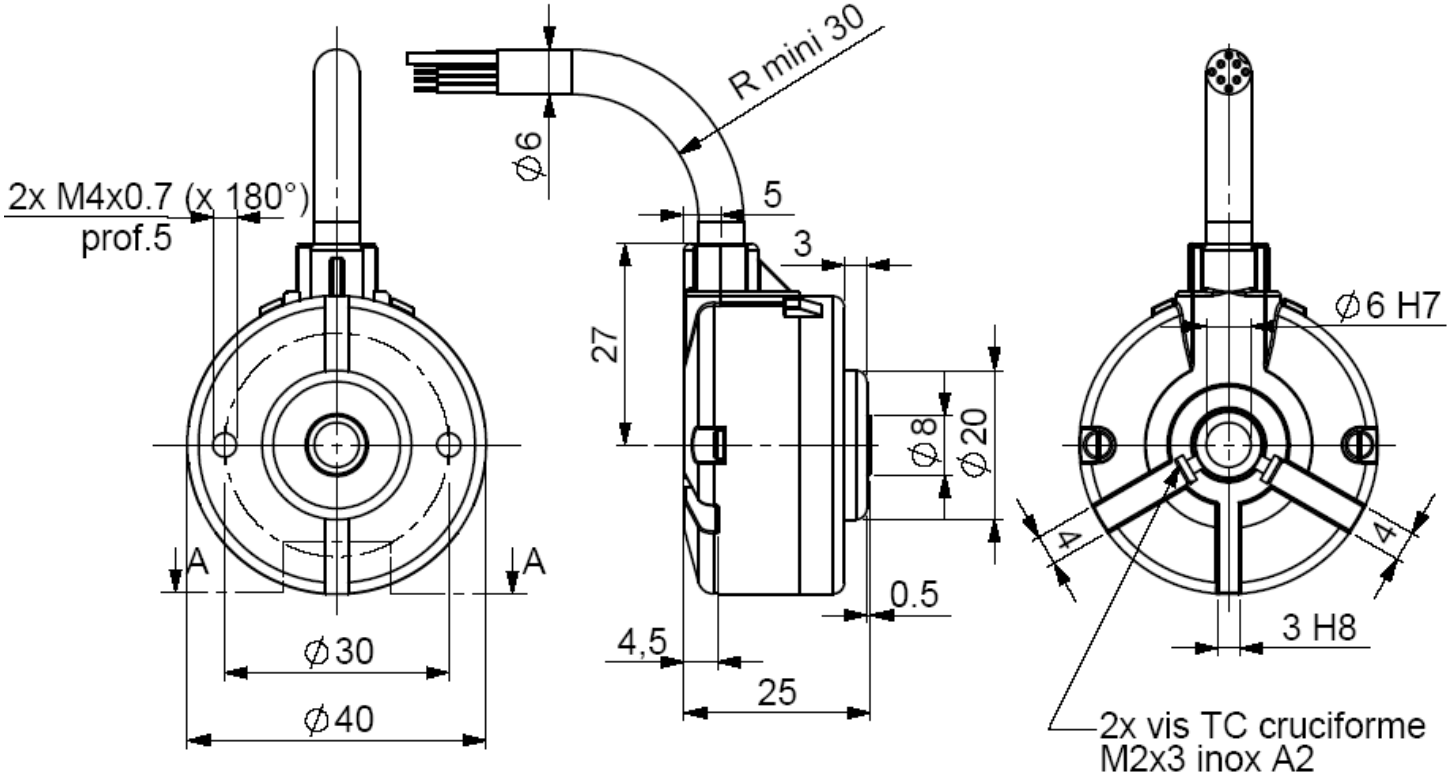
GZT4

INCREMENTAL ENCODERS, GZT4 RANGE

- With its 40mm size and a 6mm through shaft, this encoder characterizes itself by its strength and robustness of the mechanical and opto-electronic parts, it's the most compact truly industrial encoder with a through shaft
- Coded discs in synthetic material are used: stable and unbreakable (Polyfass™, Mylar-Myca composite)
- Available resolution up to 1 024 counts per turn (GHT4 option, up to 2 500 counts per turn)
- Universal electronics 5 to 24Vdc available
- Application fields : micro-robotics, printing machines, low power DC motors, shears...

GZT4 connection G3R (radial cable)



CHARACTERISTICS

Material	Axe : aluminium
	Capot : zamac
	Embase : zamac
Bearings	688 serie
Maximum loads	Axial : 10 N
	Radial : 20 N
Shaft inertia	≤ $0{,}1.10^{-6}$ kg.m²
Torque	≤ 2.10^{-3} N.m
Permissible max. speed	12 000 min^{-1}
Continuous max. speed	9 000 min^{-1}
Encoder weight (approx.)	0,240 kg

EMC	EN 50082-2 (1995)
	EN 50081-1 (1992)
Isolation	1 000 Veff
Operating temperature	- 20 ... + 80 °C (encoder T°)
Storage temperature	- 40 ... + 80 °C
Protection CEI60529 (1989)	IP 52
Shocks (EN60068-2-27)	≤ 300 $m.s^{-2}$ (during 11 ms)
Vibrations (EN60068-2-6)	≤ 100 $m.s^{-2}$ (10 ... 500 Hz)
Torque (shaft pressure screw)	Nominal :0,3N.m ; break : 0,5N.m
Theoretical mechanical lifetime 10^9 turns (F_{axial} / F_{radial})	
5 N / 10 N : 260	10 N / 20 N : 33

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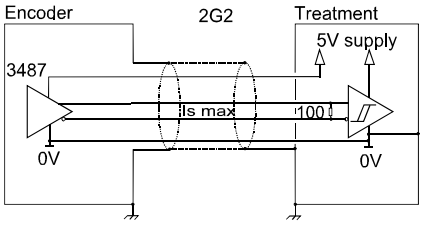
GZT4

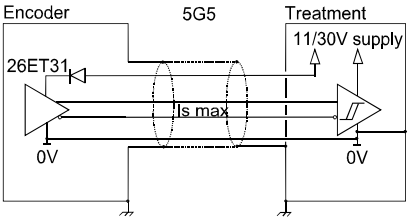
INCREMENTAL ENCODERS, GZT4 RANGE

CE

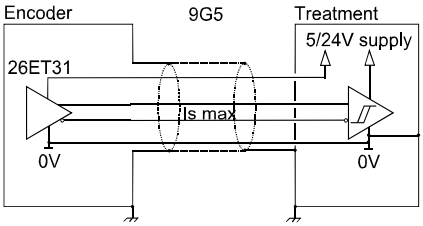
OUTPUT ELECTRONIC / POWER SUPPLY



2G2 electronic (100kHz)
Supply : 5Vdc ± 10%
Cons. without load : 100mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1 min (Is=20mA) : V_{oh} = 2,5Vdc



5G5 electronic (100kHz)
Supply : 11 to 30Vdc
Cons. without load: 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1min (Is=20mA) : V_{oh} = Vcc-3Vdc



9G5 electronic(100kHz)
Supply : 5 to 24Vdc
Cons. without load : 75mA max
Current per channel : 40mA max
0 max (Is=20mA) : V_{ol} = 0,5Vdc
1min (Is=20mA) : V_{oh} = Vcc-3Vdc

Protection against short circuits of the electronics : 5G5 and 9G5
Protection against inversion of polarity for the electronics : 5G5

STANDARD CONNECTION

		-	+	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	Connector body

ORDERING REFERENCE (Contact the factory for special versions , ex: special flanges, electronics, connections...)

	Shaft ∅	Available electronics		Output signals	Resolution	Connectique	Connection orientation
		2G2, 5G5, 9G5					
		Supply	Output stage				
GZT4	**06** : 6mm **04**: 4mm (option) **I4** : 6.35 mm (option)	**2** : 5Vdc **5 :** 11 to 30Vdc **9** : 5 to 24Vdc	**G2** : 5Vdc RS422 **G5** : push-pull	**9**:A,A/,B,B/,0,0/ (0 gated A & B) **A**:A,A/,B,B/,0,0/ (0 gated A) **N**:A,A/,B,B/,0,0/ (0 ungated)	**1 024** max Nota : **2500** with the GHT4	**G3 :** PVC cable 8 wires	Example : **R020**: radial cable 2m
Ex:GZT4	**06 //**	**5**	**G5**	**9 //**	**1 024 //**	**G3**	**R020**

Available resolutions *: 1 2 4 5 8 10 16 20 24 25 27 30 36 40 50 60 64 90 100 120 125 128 144 150 170 180 200 250 300 360 400 500 512 600 720 800 1000 1024*

Made in France

L25 Incremental Optical Encoder

BEI SENSORS

The L25 is a lighter duty version of BEI's H25 optical encoder. Incorporating the same high quality optics and electronics as the H25, the L25 also offers low starting torque. Other features include ABEC 5 bearings, EMI shielding, a 1/4" diameter stainless steel shaft and a drawn aluminum cover. Typical applications include use with light machine tools, test and laboratory instrumentation, the biomedical industry and flow metering.

Mechanical Specifications

Shaft Diameter: 1/4" nominal

Flat On Shaft: 0.80 long x 0.03 deep

Shaft Loading: up to 5 lbs. axial and 8 lbs. radial

Shaft Runout: .0005 T.I.R. maximum

Starting Torque at 25°C: 0.07 in-oz typical, 0.12 in-oz maximum without sealed bearings; 0.50 in-oz typical, 1.0 in-oz maximum with sealed bearings

Bearings: Class ABEC 5

Shaft material: 416 stainless steel

Bearing Housing: Die cast aluminum with iridite finish

Cover: Drawn aluminum, 0.060" wall, protective finish standard. Die cast aluminum with protective finish for EM, SM, ECS and SCS terminations

Bearing Life: 1 X 10^9 revs (6,700 hrs at 2500 RPM)

Maximum RPM: 10,000

Moment of Inertia: 4.1 x 10^{-4} oz-in-sec^2

Weight: 13 oz. typical

Electrical Specifications

Code: Incremental

Cycles Per Shaft Turn: 1 to 28,800

Voltage/Output: (see note 5)
15V/V: Line Driver, 5–15 VDC in, $V_{out} = V_{in}$
28V/V: Line Driver, 5–28 VDC in, $V_{out} = V_{in}$
28V/5V: Line Driver, 5–28 VDC in, V_{out} = 5 VDC
28V/OC: Open collector, 5–28 VDC in, OC_{out}

Current Requirements: TTL: 175 mA maximum 125 mA typical

Output Format: 2 channels in quadrature = 27º electrical typical. Optional index is typically gated 1/2 cycle wide (see figure 1)

Protection Level: Reverse, overvoltage and output short circuit (4469, 7272 only)

Frequency Response: 100 kHz (see note 7), up to 800 KHz with interpolation option

Output Terminations: (see table 1)

Environmental Specifications

Enclosure Rating: NEMA 2 (IP43)

Temperature: Operating, 0º to 70º C; extended temperature testing available (see note 8); storage; -25º to 90º C

Shock: 50 g's for 11 msec duration

Vibration: 5 to 2000 Hz @ 20 G's

Humidity: 98% RH without condensation

NOTES & TABLES: All notes and tables referred to in the text can be found on the back of this page.

Model L25 Ordering Options

FOR ASSISTANCE CALL 800-350-2727

Use this diagram, working from left to right to construct your model number (Example: L25G-F3-SB-2000-ABZC-28V/V-SC18).

L25	G	–		–		–		–			–		–			–	

TYPE:
L = Heavy Duty
25 = 2.500" Dia.

HOUSING CONFIG. LETTER:
G=2.62 Dia. Servo Mount
See dimensions

OPTIONAL FACE MOUNTS
F1, F2, F3, or F4
Blank = None

SHAFT SEAL CONFIGURATION:
SB = Seal Integral with Bearing
Blank = Shielded Bearing

CYCLES PER TURN:
(Enter Cycles)
See table 2

NO. OF CHANNELS:
A = Single Channel
AB = Dual Quad. Ch.
ABZ = Dual with Index
AZ = Single with Index
See note 3

COMPLEMENTS
C = Complementary Outputs
Blank = None
See note 4

VOLTAGE/OUTPUT:
15V/V = 5-15 $V_{in/out}$ 28V/V = 5-28$V_{in/out}$
28V/5 = 5-28V_{in}/5V_{out}
28V/OC = 5-28V_{in}/OC_{out}
See note 5

OUTPUT TERMINATION LOCATION:
E = End
S = Side

OUTPUT TERMINATION:
M16 = MS3102R16S-1P
D15 = DA15P
C = Pigtail Cable
CS = Cable with Seal
Cable length specified in inches (i.e. C18 = Pigtail 18" long)
See table 1 & note 9

SPECIAL FEATURES:
S= Special features specified on purchase order (consult factory)
See table 6

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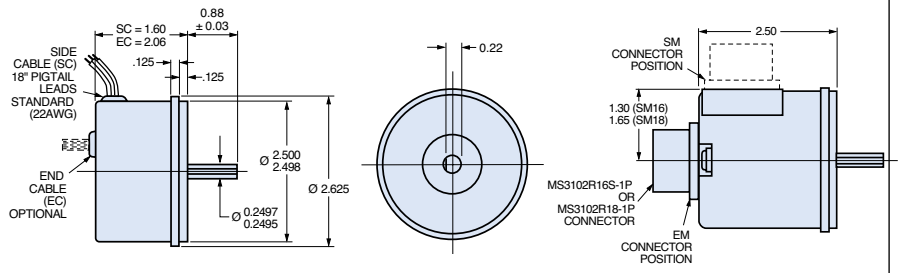
Specification No. 02004-001 Rev.08-11

L25 Incremental Optical Encoder

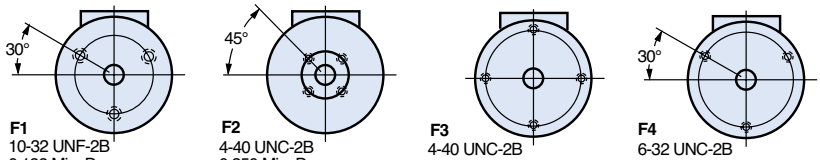
BEI SENSORS

Dimensions

L25G - M16 or M18



Optional Face Mounts



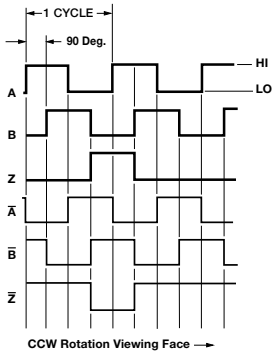
F1
10-32 UNF-2B
0.188 Min. Deep
3 places equally spaced
on a Ø 1.875. bolt circle.

F2
4-40 UNC-2B
0.250 Min. Deep
4 places equally spaced
on a Ø 1.272 bolt circle.
(0.900 square, Ref.)

F3
4-40 UNC-2B
0.250 Min. Deep
4 places equally spaced
on a Ø 2.00 bolt circle.

F4
6-32 UNC-2B
0.250 Min. Deep
3 places equally spaced
on a Ø 2.00 bolt circle.

Figure 1 Output Waveform



Tables

Table 1–Incremental Output Terminations

The connector style will determine pinouts. For example, an encoder with ABC channels and an M18 connector uses the table to the right.

M14 CONNECTOR	M16 CONNECTOR	CHANNELS DESIGNATED IN MODEL NO.	
PIN	PIN	ABZ	ABC
E	A	A	A
D	B	B	B
C	C	Z	Ā
B	D	+V (SUPPLY VOLTAGE)	
F	E	—	B̄
A	F	0 V (CIRCUIT COMMON)	
	G	CASE GROUND (CG) (except H20)	

M18 CONNECTOR	
PIN	CHANNEL
A	A
B	B
C	Z
D	+V
E	—
F	0V
G	CG
H	Ā
I	B̄
J	Z̄

WIRE COLOR (22AWG)	DA 15P CONNECTOR	CHANNELS DESIGNATED IN MODEL NO.		
		ABZ	ABC	ABZC
YEL	13	A	A	A
BLUE	14	B	B	B
ORN	15	Z	—	Z
W-Yel	10	—	Ā	Ā
W-Blu	11	—	B̄	B̄
W-Orn	12	—	—	Z̄
RED	6	+V (SUPPLY VOLTAGE)		
BLK	1	0 V (CIRCUIT COMMON)		
GRN	9	CASE GROUND (CG) (except H20)		
WHITE		SHIELD DRAIN (Shielded Cable Only)		

M12 CONNECTOR	
PIN	CHANNEL
A	A
B	B
C	Z
D	+V
E	—
F	0V
G	CG
H	Ā
J	B̄
K	Z̄

Table 2–Disc Resolutions for Incremental Encoder Model L25

1, 2, 3, 5, 6, 7, 8, 10, 13, 16, 20, 24, 25, 26, 30, 32, 33, 34, 36, 37, 40, 45, 48, 50, 51, 56*, 60, 64, 66, 72, 75, 80, 86, 88, 90, 100, 102, 120, 122,125, 127, 128, 132, 144, 148, 150, 158, 160, 175, 176, 180, 187, 192, 200, 202, 204*, 217, 220, 240, 250, 254, 255, 256, 264*, 274, 280, 283, 288, 292, 300, 312, 320, 321, 325, 360, 366, 372, 375, 377, 380, 381, 384, 385, 393, 400, 430, 432, 450, 462, 480, 490, 500, 502, 508, 512, 522, 530, 550, 560*, 576, 598, 600, 604, 625, 628, 635, 638, 640, 660, 672, 676, 680, 687, 690, 700, 720, 725, 735, 740, 744, 748, 750, 762, 768, 780, 785, 800, 812, 825, 850, 864, 878, 888, 900, 912, 914, 938, 942, 955, 960, 1000, 1016, 1024, 1030, 1035, 1036, 1040, 1054, 1056, 1074, 1076, 1080,1088, 1100, 1101, 1125, 1136, 1200, 1237, 1250, 1257, 1270, 1280, 1300, 1314, 1332, 1333, 1390, 1400, 1414, 1427, 1440, 1484, 1500, 1562, 1570, 1596, 1600, 1650, 1666, 1718, 1745, 1774, 1800, 1840*, 1850, 1855, 1875, 1894, 1920, 1952, 1968, 1979, 1995, 2000, 2048, 2080, 2094, 2100, 2160, 2164, 2199, 2200, 2250, 2356, 2400, 2485, 2500, 2514, 2519, 2540, 3000, 3125, 3600, 4000, 4096, 5000

* AB or ABC output only. **Note:** Resolutions up to 72,000 are available.

Notes

1. Mounting is usually done either using the D-style square flange mount, E- or G-style servo mounts, or one of the standard face mounts, F1 for example. Consult factory for additional face mount options.

2.The shaft seal is recommended in virtually all installations. The most common exceptions are applications requiring a very low starting torque or those requiring operation at both high temperature and high speed.

3. Non-standard index widths and multiple indices are available by special order. Consult factory.

4. Complementary outputs are recommended for use with line driver type (source/sink) outputs. When used with differential receivers, this combination provides a high degree of noise immunity.

5. Output IC's: Output IC's are available as either Line Driver (LD) or NPN Open Collector (OC) types. Open Collectors require pull-up resistors, resulting in higher output source impedance (sink impedance is similar to that of line drivers). In general, use of a Line Driver style output is recommended. Line Drivers source or sink current and their lower impedance mean better noise immunity and faster switching times. **Warning:** Do not connect any line driver outputs directly to circuit common/0V, which may damage the driver. Unused outputs should be isolated and left floating. Our applications specialists would be pleased to discuss your system requirements and the compatibility of your receiving electronics with Line Driver type outputs.

28V/V: Multi-voltage Line Driver (7272*): 100 mA source/sink. Input voltage 5 to 28 VDC +/- 5% standard (Note: $V_{out} = V_{in}$). This driver is TTL compatible when used with 5 volt supply. Supply lines are protected against overvoltage to 60 volts and reverse voltage. Outputs are short circuit protected for one minute. Supply current is 120 mA typical (plus load current). This is the recommended replacement for 3904R and 7406R open collector outputs with internal pullup resistors. It is also a direct replacement for any 4469, 88C30, 8830 or 26LS31 line driver

28V/5: Multi-voltage Line Driver (7272*): 100 mA source/sink. Input voltage 5 to 28 VDC +/- 5% standard, internally regulated with 5V (TTL compatible) logic out. Supply lines are protected against overvoltage to 60 volts and reverse voltage. Outputs are short circuit protected for one minute. Supply current is 90 mA typical (plus load current). **Note:** Limit encoder load to 2.5W max at ambient. Example at 12 VDC: 2.5W/(+12VDC minus +5VDC) = 357 mA total allowed current. Consult factory for your specific requirements.

15V/V: Multi-voltage Line Driver (4469*): 100 mA source/sink. Input voltage 5 to 15 VDC +/- 5% standard (Note: $V_{out} = V_{in}$). TTL compatible when used with 5 volt supply. Supply lines are protected against overvoltage to 60 volts and reverse voltage. Outputs are short circuit protected for one minute. Supply current is 90 mA typical (plus load current). This is a direct replacement for the 4469 Line Driver. **28V/OC:** NPN Open Collector (3904*, 7273*). Current sink of 80 mA max. Current sourced by external pull- up resistor. Output can be pulled up to voltage other than supply voltage (30 V max). Input voltage 5 to 28 VDC +/- 5% standard. Supply current is 120 mA typical. This replaces prior IC's with designations of 3904, 7406, 3302, 681 and 689. **5V/OCR, 15V/OCR, 24V/OCR:** Open Collector (3904R*, 7406R*, 7273R*): Current sink of 70 mA max. Includes internal pull-ups sized at approximately 100 ohms/volt. Max current source is 10 mA. Supply current is 100 mA typical, 120 mA with internal pull-ups. The 5V/OCR, 15V/OCR and 24V/OCR are often replaced by the 28V/V in system upgrades. **3904, 3904R, 4469, 5V/V, 5V/OC, 5V/OCR, 9V/OC:** Intrinsically safe line driver and open collector outputs. These drivers are specific to intrinsically safe encoders, and are installed per the appropriate control drawings listed in Table 2.on this page.

6. Special –S at the end of the model number is used to define a variety of non-standard features such as special shaft lengths, voltage options, or special testing. Please consult the factory to discuss your special requirements.

7. Higher frequency response may be available. Please consult with the factory.

8. Extended temperature ratings are available in the following ranges: -40 to 70°C, -40 to 85°C, –20 to 105°C and –40 to 105°C depending on the particular model. Some models can operate down to -55°C. Extended temperature ranges can affect other performance factors. Consult with factory for more specific information.

9. Mating straight plug receptacles may be ordered from the factory:
For M12 use MS3116F12-10S, For M14 use MS3106F14S-6S
For M14/19 use MS3116J14-19S, For M16 use MS3106F16S-1S
For M18 use MS3106F18-1S, For M20 use MS3106F20-29S

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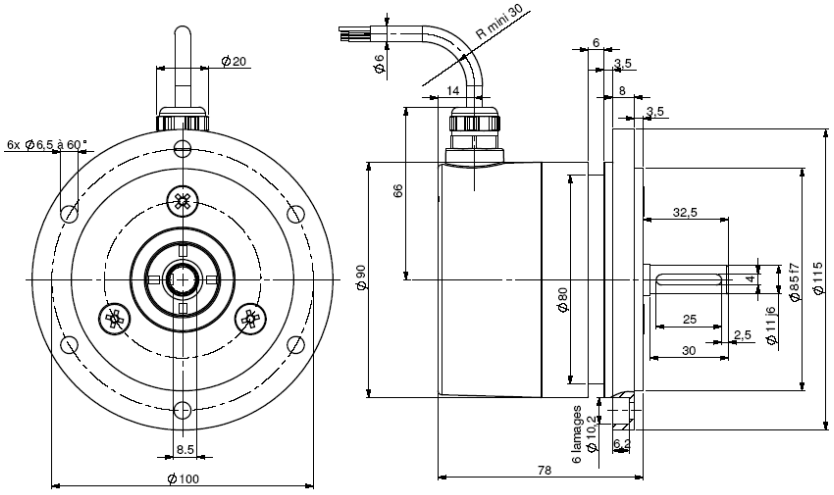
NHM9

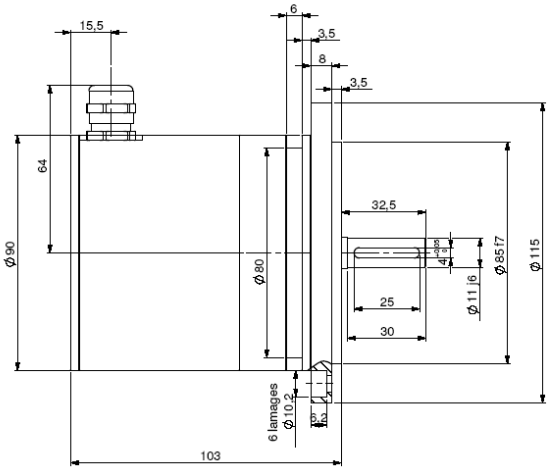
OPTOTACHYS, SERIE NHM9

- Codeur 90mm de conception compacte et robuste,
- Axes sortant de 12 mm ou de 11 mm avec bride RE0 115 mm (Euroflange B10) pour montage de type dynamo tachymétrique
- Alimentation : 4,5 à 5,5Vdc ou 11 à 30Vdc,
- Sortie analogique proportionnelle à la vitesse,
- Calibration usine possible entre et 1 et 6000 tr/min,
- Son raccordement s'effectue par connecteur industriel M23, câble blindé ou boîte à bornes.

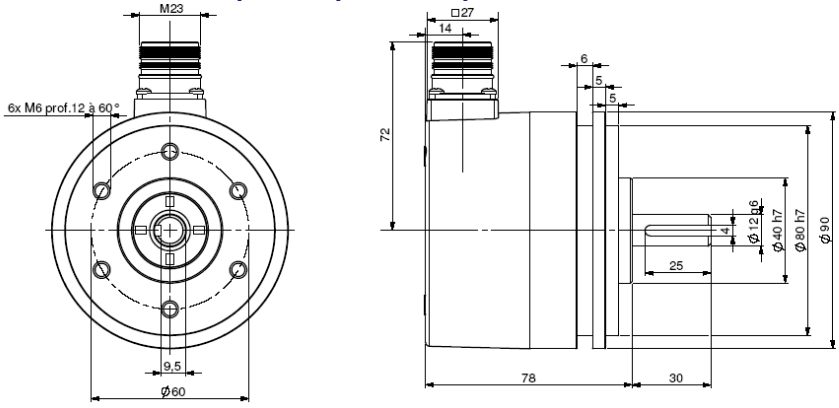
NHM9_11 connectique N3R (câble radial)



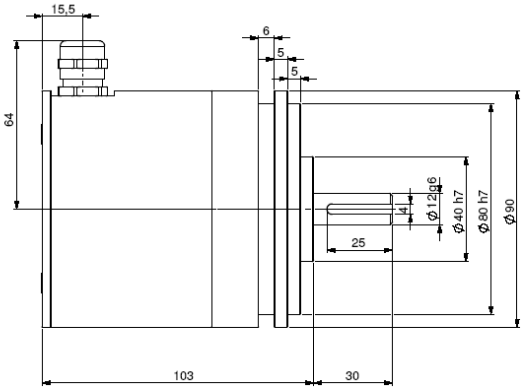
NHM9_11 connectique NBR (boîte à bornes)



NHM9_12 connectique N6R (M23 radial)



NHM9_12 connectique NBR (boîte à bornes)



CARACTERISTIQUES MECANIQUES

Matériau (version sortie connecteur ou câble) Inox en option	Capot : zamac
	Embase : aluminium
Matériau (version boîte à bornes), Inox en option	Capot : aluminium
	Embase : aluminium
Axe	Inox
Roulements	Série 6001
Charges maximales	Axial : 100 N
	Radial : 200 N
Moment d'inertie de l'axe	≤ 15.10^{-6} kg.m²
Couple	≤ 10.10^{-3} N.m
Vitesse max. en pointe	9 000 min^{-1}
Vitesse max. en continu	6 000 min^{-1}
Joint d'axe	Double lèvre viton
Tenue chocs (EN60068-2-27)	≤ 2000m.s^{-2} (durant 6ms)

Vibrations (EN60068-2-6)	≤ 200 m.s^{-2} (10 … 1 000 Hz)
CEM	EN 61000-6-4, EN 61000-6-2
Tension d'isolement	1 000 Veff
Masse codeur (env.) Version connecteur / câble	1,100kg capot zamac, embase alu
	2,400kg capot zamac, embase inox
	2,600kg capot inox, embase inox
Masse codeur (env.) Version boîte à bornes	1,300kg capot alu, embase alu
	2,600kg capot aluminum, embase inox
	2,800kg capot inox, embase inox
Température d'utilisation	- 20 … + 80 °C (T° codeur)
Température de stockage	- 40 … + 80 °C
Degré de Protection(EN 60529)	IP 65

Durée de vie mécanique théorique 10^9 tours (F_{axial} / F_{radial})

20 N / 30 N : 360	50 N / 100 N : 18	100 N / 200 N: 2,2

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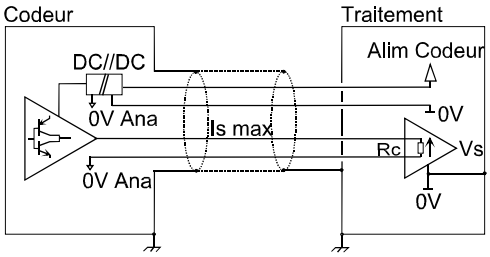
NHM9

OPTOTACHYS, SERIE NHM9

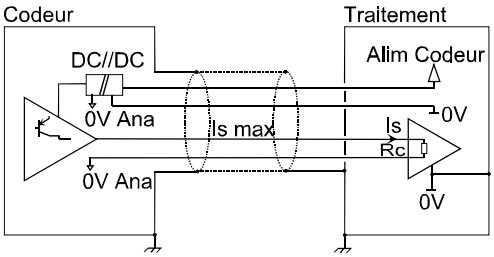
ETAGE DE SORTIE ANALOGIQUE / ALIMENTATION

2VM : alimentation 5 Vdc – driver 0...10 Vdc
5VM : alimentation 11-30 Vdc – driver 0...10 Vdc
2VP : alimentation 5 Vdc – driver – 10 Vdc ... + 10 Vdc
5VP : alimentation 11-30 Vdc – driver – 10 Vdc ... + 10 Vdc



Rc min	1 kOhms
Rc max	/
Charge cap. Max.	470nF

2V1 : alimentation 5 Vdc – driver 0...20 mA
2V2 : alimentation 5 Vdc – driver 4...20 mA
2V3 : alimentation 5 Vdc – driver –20 mA ... + 20 mA
5V1 : alimentation 11-30 Vdc – driver 0...20 mA
5V2 : alimentation 11-30 Vdc – driver 4...20 mA
5V3 : alimentation 11-30 Vdc – driver –20 mA ... + 20 mA



Rc min	0 Ohms
Rc max	500 Ohms

Les deux versions, sortie courant et tension sont protégées contre les courts-circuits et les surtensions provisoires sur l'alimentation.
Les versions 11-30Vdc sont également protégées contre les inversions de polarité de l'alimentation
Les produits sont équipés d'une isolation galvanique totale (1 kV) entre l'étage analogique et le reste de l'électronique.
Consommation à vide : 150mA.

CONNECTIQUES

		-	+	0V ana	Sortie ana	Masse
V6	12 broches sens horaire	1	2	9	10	Embase connecteur
V3	Câble PUR	WH blanc	BN brun	WH-GN blanc-vert	BN-GN brun-vert	Blindage général
VB	Boîte à bornes	1	2	9	10	Reprise PE

Note : ne pas raccorder les autres broches / fils

REFERENCE DE COMMANDE (Exécution spécifique sur demande, ex: relais survitesse, bride/électronique/connectique spécifique...)

	Ø axe	Electronique disponible		Vitesse	Connectique	Orientation connectique
		5V1, 5V2, 5V3, 5VM,5VP 2V1, 2V2, 2V3, 2VM, 2VP				
		Alim	**Etage de sortie**			
NHM9 Capot : zamac Embase : alu **NBM9** Capot : zamac Embase : inox **NXM9** Capot : inox Embase : inox	**11** : 11mm **12** : 12mm	**2**: 5Vdc +/- 10% **5** : 11 à 30Vdc	**V1** : 0 ... 20 mA **V2** : 4 ... 20 mA **V3** : -20 mA ...+20mA **VM** : 0 ... 10Vdc **VP** : -10V ... +10Vdc	Exemple: **U05** : 5tr/min **D10** : 10tr/min **C20** : 200tr/min **M30** : 3000tr/min Vitesse paramétrée usine, calibration possible de 1 à 6000 tours/min	**V3**: câble PUR **V6**: M23 12 pins horaire **VB** : boîte à bornes	Exemple: **R020**:radiale câble 2m **A050** : axiale câble 5m **R** : radiale **A** : axiale

Ex: NHM9 _ 12 // 5 V2 // M15 // V3 R050

Fabriqué en FRANCE

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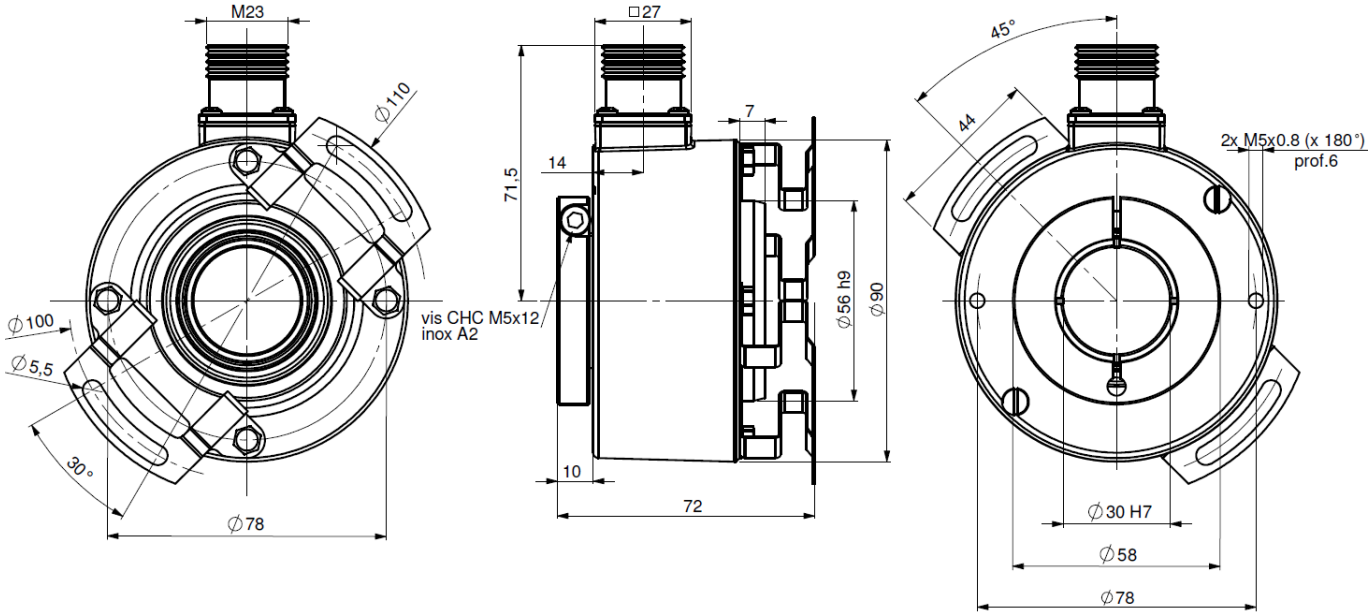
NHU9

OPTOTACHYS, SERIE NHU9

- Codeur 90mm de conception compacte et robuste,
- Axe traversant de 30mm, adaptation par bagues de réduction en composite - isolation électrique et thermique (aluminium en option),
- Alimentation : 4,5 à 5,5Vdc ou 11 à 30Vdc,
- Sortie analogique proportionnelle à la vitesse,
- Calibration usine possible entre 1 et 6000 tr/min,
- Son raccordement s'effectue par connecteur industriel M23, câble blindé ou boîte à bornes,
- Possibilité de montage double ou triple en associant des fonctions incrémentale, absolue ou tachymétrique.

DIMENSIONS NHU9_30 CONNECTIQUE V6R (M23 RADIAL) – SYSTEME DAC 9445/009 MONTE SUR EMBASE*



*Accessoire à commander séparément

CARACTERISTIQUES MECANIQUES

Matériau Inox en option	Capot : zamac	Vibration (EN60068-2-6)	≤ 200 m.s^{-2} (10 ... 1 000 Hz)
	Embase : aluminium	CEM	EN 61000-6-4, EN 61000-6-2
Axe	Inox	Tension d'isolement	1 000 Veff
Roulements	Série 6807	Masse codeur (env.)	0,700kg capot zamac, embase alu
Charges maximales	Axial : 50 N		1,000kg capot zamac, embase inox
	Radial : 80 N		1,150kg capot inox, embase inox
Moment d'inertie de l'axe	≤ 55.10^{-6} kg.m^2	Température d'utilisation	- 20 ... + 80 °C (T° codeur)
Couple	≤ 25.10^{-3} N.m	Température de stockage	- 40 ... + 80 °C
Vitesse max. en pointe	6 000 min^{-1}	Degré de Protection(EN 60529)	IP 65
Vitesse max. en continu	3 600 min^{-1}	Couple (vis du collier de l'axe)	nominal: 3N.m, rupture: 4N.m
Joint d'axe	Viton	Durée de vie mécanique théorique 10^9 tours (F_{axial} / F_{radial})	
Tenue chocs (EN60068-2-27)	≤ 2 000 m.s^{-2} (durant 6 ms)	25 N / 40 N: 140	50 N / 80 N : 17

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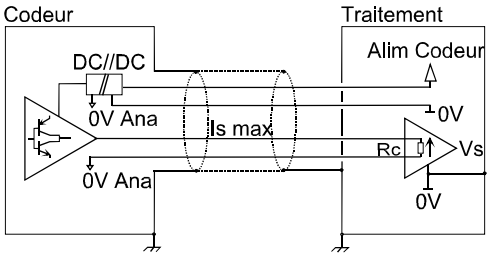
NHU9

CE

OPTOTACHYS, SERIE NHU9

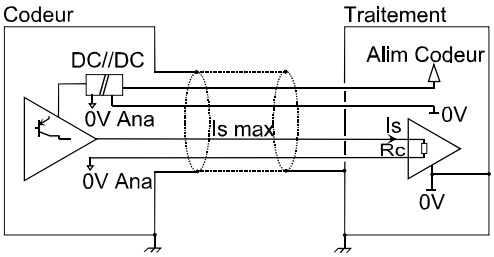
ETAGE DE SORTIE ANALOGIQUE / ALIMENTATION

2VM : alimentation 5 Vdc – driver 0...10 Vdc
5VM : alimentation 11-30 Vdc – driver 0...10 Vdc
2VP : alimentation 5 Vdc – driver – 10 Vdc ... + 10 Vdc
5VP : alimentation 11-30 Vdc – driver – 10 Vdc ... + 10 Vdc



Rc min	1 kOhms
Rc max	/
Charge cap. Max.	470nF

2V1 : alimentation 5 Vdc – driver 0...20 mA
2V2 : alimentation 5 Vdc – driver 4...20 mA
2V3 : alimentation 5 Vdc – driver –20 mA ... + 20 mA
5V1 : alimentation 11-30 Vdc – driver 0...20 mA
5V2 : alimentation 11-30 Vdc – driver 4...20 mA
5V3 : alimentation 11-30 Vdc – driver –20 mA ... + 20 mA



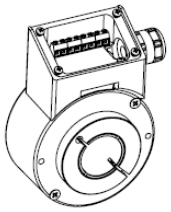
Rc min	0 Ohms
Rc max	500 Ohms

Les deux versions, sortie courant et tension sont protégées contre les courts-circuits et les surtensions provisoires sur l'alimentation.
Les versions 11-30Vdc sont également protégées contre les inversions de polarité de l'alimentation
Les produits sont équipés d'une isolation galvanique totale (1 kV) entre l'étage analogique et le reste de l'électronique.
Consommation à vide : 150mA.

CONNECTIQUES – M23 ET SORTIE CÂBLE

		-	+	0V ana	Sortie ana	Masse
V6	12 broches sens horaire	1	2	9	10	Embase connecteur
V3	Câble PUR	WH blanc	BN brun	WH-GN blanc-vert	BN-GN brun-vert	Blindage général

BOITE A BORNES EGALEMENT DISPONIBLE



Note : ne pas raccorder les autres broches / fils

REFERENCE DE COMMANDE (Exécution spécifique sur demande, ex: relais survitesse, bride/électronique/connectique spécifique...)

	Ø axe	Electronique disponible		Vitesse	Connectique	Orientation connectique
		5V1, 5V2, 5V3, 5VM,5VP 2V1, 2V2, 2V3, 2VM, 2VP				
		Alim	**Etage de sortie**			
NHU9 Capot : zamac Embase : alu **NBU9** Capot : zamac Embase : inox **NXU9** Capot : inox Embase : inox	**30** : 30mm Bague de réduction disponible de 10 à 28mm	**2**: 5Vdc +/- 10% **5** : 11 à 30Vdc	**V1** : 0 ... 20 mA **V2** : 4 ... 20 mA **V3** : -20 mA ...+20mA **VM** : 0 ... 10Vdc **VP** : -10V ... +10Vdc	Exemple: **U05** : 5tr/min **D10** : 10tr/min **C20** : 200tr/min **M30** : 3000tr/min Vitesse paramétrée usine, calibration possible de 1 à 6000 tours / min	**V3**: câble PUR **V6**: M23 12 pins horaire **VT** : boîte à bornes	Exemple: **R020**:radiale câble 2m **R** : radiale

Ex: NHU9 _ 30 // 5 V2 // M15 // V3 R050

Fabriqué en FRANCE