

## PRODUCT CATALOGUE



- Incremental Encoders
- Absolute Encoders
- Multiturn Encoders
- Harsh & Harzardous Area Encoders
- Special Function Encoders
- Commutation Encoders
- Accessories



**GES** *group*



# CONTENTS

## 4 INCREMENTAL ENCODERS

IS 240	<b>6</b>	IH 490	<b>20</b>
IS 280	<b>8</b>	IH 510	<b>22</b>
IS 410	<b>10</b>	IH 581	<b>24</b>
IS 580	<b>12</b>	IH 740	<b>26</b>
IS 581	<b>14</b>	IH 840	<b>28</b>
IS 700	<b>16</b>	IH 950	<b>30</b>
IS 900	<b>18</b>	IH 951	<b>32</b>
		IH 103	<b>34</b>
		IH 120	<b>36</b>

## 39 ABSOLUTE ENCODERS

AS 580	<b>40</b>	AH 580	<b>46</b>
AS 700	<b>42</b>	AH 740	<b>48</b>
AS 900	<b>44</b>	AH 950	<b>50</b>

## 53 MULTITURN ENCODERS

MS 650	<b>54</b>	MH 750	<b>56</b>
--------	-----------	--------	-----------

## 59 HARSH & HAZARDOUS AREA ENCODERS

IX 700	<b>60</b>	IP 700	<b>64</b>
AX 700	<b>62</b>	AP 700	<b>66</b>

## 69 SPECIAL FUNCTION ENCODER

XS 410	<b>70</b>
--------	-----------

## 73 COMMUTATION ENCODERS







CH 410	<b>74</b>	CH 840	<b>78</b>
CH 580	<b>76</b>		

## 80 ACCESSORIES







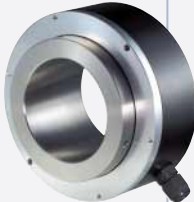
## 84 MECHANICAL INSTALLATION

# INCREMENTAL ENCODER OVERVIEW

Incremental Encoders are the most common types used in the industry due to the simplicity of their use. Each encoder is comprised of an optical disc with the required number of lines together with an (HRS) reading system coupled with a single L.E.D. for longer life, reliability and enhanced performance. Either speed or relative position can be determined by monitoring the frequency or the number of pulses generated by the encoder.

	<i>IS 240</i>	<i>IS 280</i>	<i>IS 410</i>	<i>IS 580</i>	<i>IS 581</i>	<i>IS 700</i>
						
<b>Type-Size</b>	28 mm	28 mm	41 mm	58 mm	58 mm	70 mm
<b>Available Shaft/ Hollow Shaft Sizes</b>	4 mm 6 mm	4 mm 6 mm	6 mm	6 mm 10 mm	6 mm 8 mm 10 mm 1/4" 3/8"	10 mm 12 mm 3/8" 1/2"
<b>Mechanical Options</b>	—	—	stainless steel	stainless steel	—	—
<b>Connector Location</b>	axial radial	axial radial	axial radial	axial radial	axial radial	axial radial
<b>Output Signals</b>	A+B+0 A+B+0+Complim.	A+B+0 A+B+0+Complim.	A+B+0 A+B+0+Complim.	A+B+0 A+B+0+Complim.	A+B+0 A+B+0+Complim.	A+B+0 A+B+0+Complim.
<b>Output Circuit Type</b>	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull
<b>Pulses Per Revolution</b>	1-1024	1-1024	1-10000	1-25000	1-25000	1-25000
<b>Page</b>	<i>6</i>	<i>8</i>	<i>10</i>	<i>12</i>	<i>14</i>	<i>16</i>

	<i>IS 900</i>	<i>IH 490</i>	<i>IH 510</i>
			
<b>Type-Size</b>	90 mm	49 mm	51 mm
<b>Available Shaft/ Hollow Shaft Sizes</b>	10 mm 12 mm	6 mm 8 mm    1/4"	6 mm    1/4"
<b>Mechanical Options</b>	—	stainless steel	—
<b>Connector Location</b>	axial radial	radial	radial
<b>Output Signals</b>	A+B+O A+B+O+Complim.	A+B+O A+B+O+Complim.	A+B+O A+B+O+Complim.
<b>Output Circuit Type</b>	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull
<b>Pulses Per Revolution</b>	1-25000	1-3600	1-1250
<b>Page</b>	18	20	22

<i>IH 581</i>	<i>IH 740</i>	<i>IH 840</i>	<i>IH 950</i>	<i>IH 951</i>	<i>IH 103</i>	<i>IH 120</i>
						
58 mm	74 mm	84 mm	95 mm	95 mm	103 mm	120 mm
6 mm 10 mm 12 mm	6 mm 10 mm 1/4" 12 mm 14 mm 1/8" 16 mm 18 mm 1/2"	15 mm	14 mm - 30 mm	14 mm - 30 mm	30 mm - 40 mm	40 mm - 65 mm
—	stainless steel	—	stainless steel	stainless steel	—	—
radial	radial	radial	radial	radial	radial	radial
A+B+O A+B+O+Complim.	A+B+O A+B+O+Complim.	A+B+O A+B+O+Complim.	A+B+O A+B+O+Complim.	A+B+O A+B+O+Complim.	A+B+O A+B+O+Complim.	A+B+O A+B+O+Complim.
4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull	4,75-30 VDC Push Pull
1-10000	1-25000	1-3600	1-25000	1-25000	1-50000	1-50000
24	26	28	30	32	34	36

# IS 240

INCREMENTAL SHAFT ENCODER

Micro Miniature Size  
1024 PPR Maximum  
4.75 to 30 Volts, RS 422A Compatible  
100 kHz Maximum Frequency



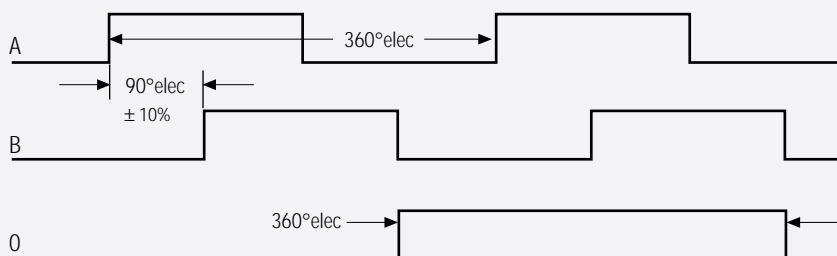
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, 422A
Impulse Frequency	100 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 30 N, Radial 20 N
Protection	IP 65
Temperature	-20'...+70' C (-4'...+158' F)
Weight	0.24 lb (110 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available



# IS 280

INCREMENTAL SHAFT ENCODER

Micro Miniature Size  
1024 PPR Maximum  
4.75 to 30 Volts, RS 422A Compatible  
100 kHz Maximum Frequency



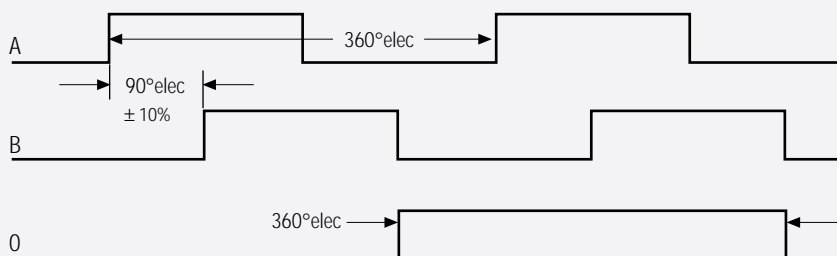
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, 422A
Impulse Frequency	100 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 30 N, Radial 20 N
Protection	IP 65
Temperature	-20'...+70' C (-4'...+158' F)
Weight	0.24 lb (110 g)

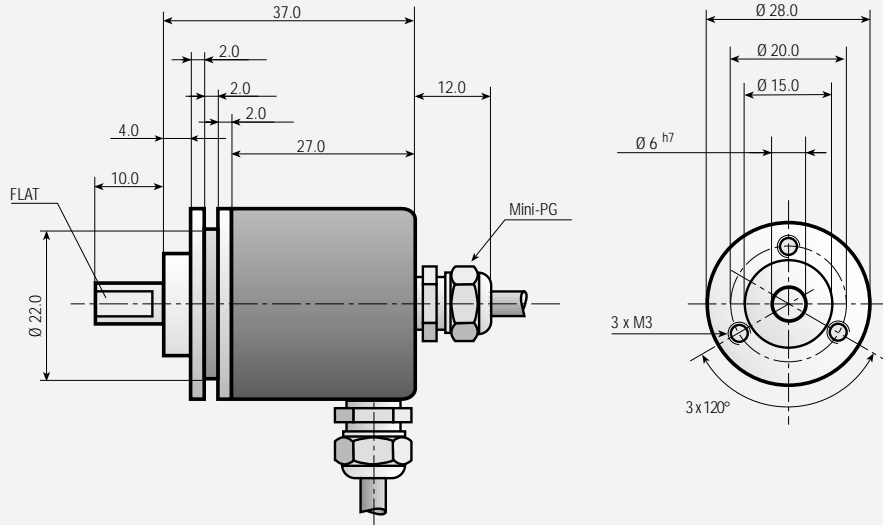
## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available



Drawing available as:  
dxf, iges, step, sld file



**ORDERING CODE**

**IS 280** - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ]  
 a b c d e f g h Pulses Per Revolution

- a Group Function**  
IS=Incremental Solid Shaft
- b Basic Series Number**  
280
- c Shaft Size D**  
06=6 mm
- d Mechanical Options**  
0 = None

- e Connector Type**  
0=2 mtr. Cable
- f Connector Location**  
A=Axial
- g Output Signals**  
3=A+B+0  
6=A+B+0+Compliments
- h Output Circuit Type**  
3=Push Pull 4.75 to 30 VDC

Note: Special functions and designs will be designated by a 4 digit code at the end of the part number. Consult factory for further details

**CONNECTIONS**

Function	Cable Colour Code
0 Volt	white
+ Volt	brown
A	green
B	yellow
0	grey
$\bar{A}$	pink
$\bar{B}$	blue
$\bar{0}$	red

# IS 410

INCREMENTAL SHAFT ENCODER

Miniature Size  
IP65 Protection  
Syncro Flange Mounting  
10000 PPR Maximum  
4.75 to 30 Volts, RS 422 Compatible  
100 kHz Maximum Frequency



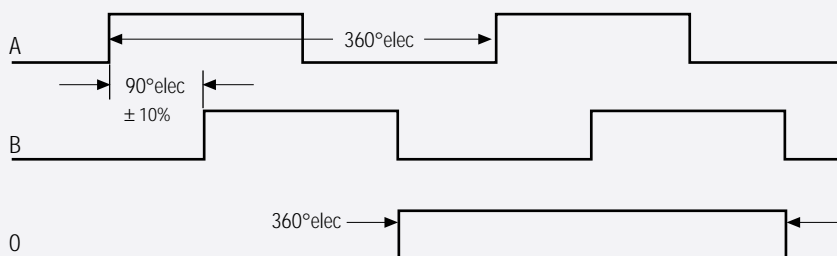
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	100 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 30 N, Radial 20 N
Protection	IP 65
Temperature	-20'...+ 70' C (-4'...+158' F)
Weight	0.31 lb (140 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available



# IS 580

INCREMENTAL SHAFT ENCODER Industry Standard Size 25  
 Syncro Flange Mounting  
 25000 PPR (Maximum)  
 4.75 to 30 Volts, RS 422 Compatible  
 300 kHz Maximum Frequency



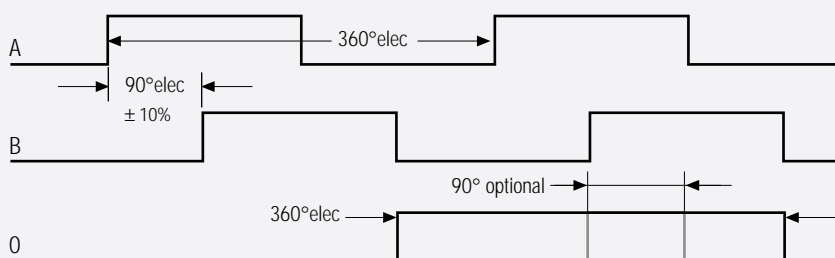
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	8000 RPM (max)
Torque	> 0.05 Nm
Loading	Axial 40 N, Radial 30 N
Protection	IP 65
Temperature	-20'...+70' C (-4'...+158' F) +100' C (+212' F) Optional
Weight	0.74 lb (320 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
 Complimentary channel also available

Optional Gated Marker Pulse  
 Gated with A+B Shown



# IS 581

INCREMENTAL SHAFT ENCODER

Industry Standard Size 25

IP65 Protection

25000 PPR Maximum

4.75 to 30 Volts, RS 422 Compatible

300 kHz Maximum Frequency



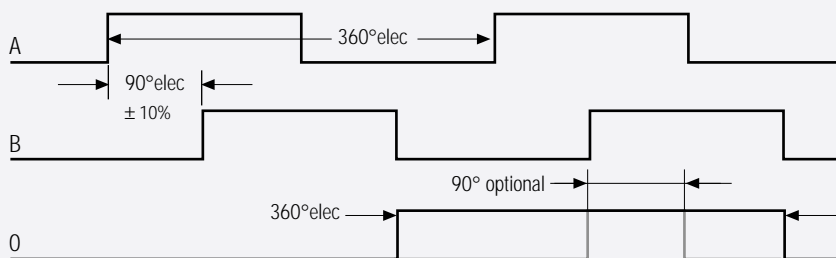
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	8000 RPM (max)
Torque	> 0.05 Nm
Loading	Axial 40 N, Radial 30 N
Protection	IP 65
Temperature	-20'...+70' C (-4'...+158' F) +100' C (+212' F) Optional
Weight	0.74 lb (320 g)

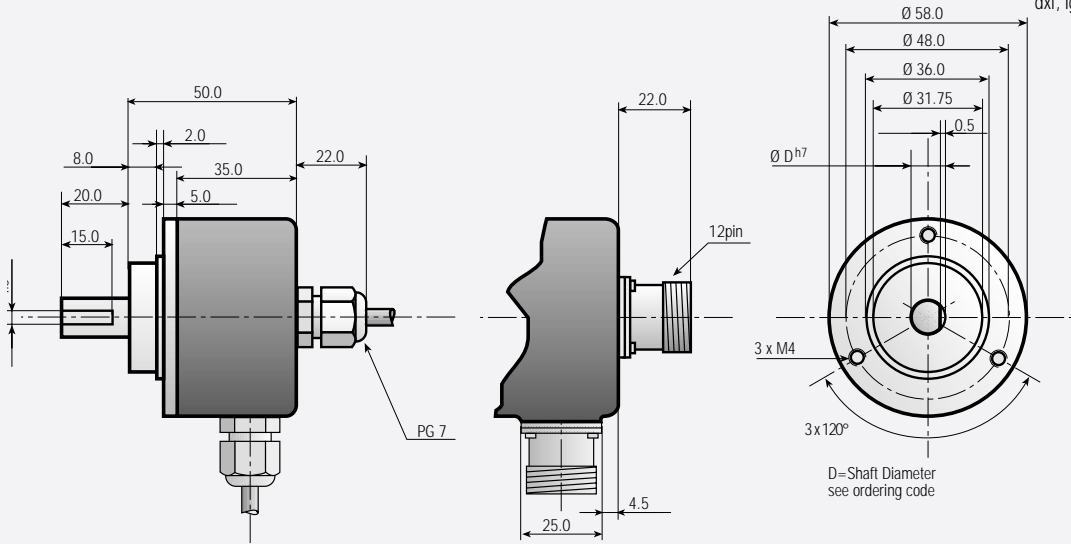
## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available

Optional Gated Marker Pulse  
Gated with A+B Shown

Drawing available as:  
dxf, iges, step, sld file



**ORDERING CODE**

**IS 581** - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ] [ ]  
 a    b    c    d    e    f    g    h                      Pulses Per Revolution

- a Group Function**  
IS=Incremental Solid Shaft
- b Basic Series Number**  
581
- c Shaft Size D**  
06=6 mm 08=8 mm 10=10 mm  
AA=1/4" AB=3/8"
- d Mechanical Options**  
0=None

- e Connector Type**  
0=2 mtr. (6ft.) Cable, 4=6 Pin Mil,  
5=7 Pin Mil, 7=12 Pin, 9=10 Pin Mil
- f Connector Location**  
A=Axial  
R=Radial
- g Output Signals**  
3=A+B+0  
6=A+B+0+Compliments
- h Output Circuit Type**  
3=Push Pull 4.75 to 30 VDC

Note: Special functions and designs will be designated by a 4 digit code at the end of the part number. Consult factory for further details

**CONNECTIONS**

Function	Cable Colour Code	12 Pin Connector	6 Pin CR3102A14S	7 Pin CR3102A16S	10 Pin CR3102A18S
0 Volt	white	1	F	F	F
+ Volt	brown	2	D	D	D
A	green	3	A	A	A
B	yellow	4	B	B	B
0	grey	5	C	C	C
Ā	pink	6	N/C	G	H
B̄	blue	7		E	I
0̄	red	8			J

# IS 700

INCREMENTAL SHAFT ENCODER

Heavy Duty Construction

IP65 Protection

25000 PPR Maximum

4.75 to 30 Volts, RS 422 Compatible

300 kHz Maximum Frequency



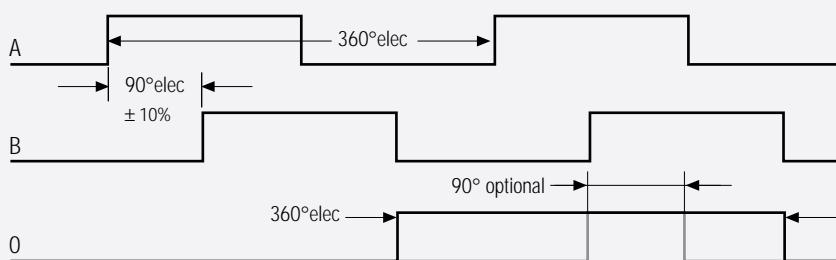
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.1 Nm
Loading	Axial 60 N, Radial 50 N
Protection	IP 65
Temperature	-20'...+70' C (-4'...+158' F) +100' C (+212' F) Optional
Weight	1.125 lb (450 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available

Optional Gated Marker Pulse  
Gated with A+B Shown





# IS 900

INCREMENTAL SHAFT ENCODER

Heavy Duty Construction  
 IP65 Protection (Optional IP 66)  
 25000 PPR Maximum  
 4.75 to 30 Volts, RS 422 Compatible  
 300 kHz Maximum Frequency



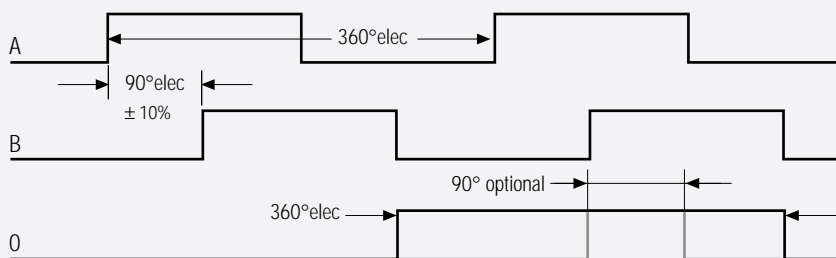
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Steel
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.1 Nm
Loading	Axial 60 N, Radial 50 N
Protection	IP 65
Temperature	-20'...+70' C (-4'...+158' F) +100' C (+212' F) Optional
Weight	1.870 lb (850 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
 Complimentary channel also available

Optional Gated Marker Pulse  
 Gated with A+B Shown



# IH 490

INCREMENTAL HOLLOW SHAFT ENCODER

Compact Construction  
Shaft Mounted  
3600 PPR Maximum  
4.75 to 30 Volts, RS 422 Compatible  
100 kHz Maximum Frequency



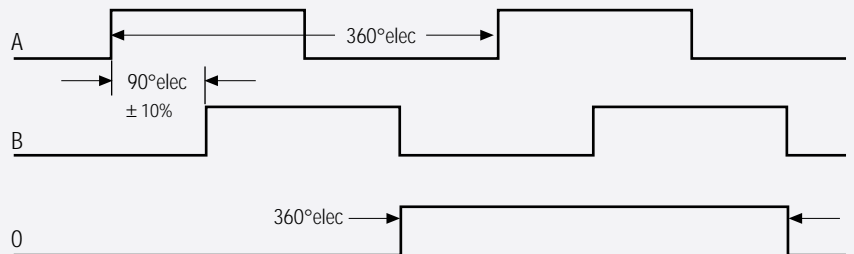
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	100 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

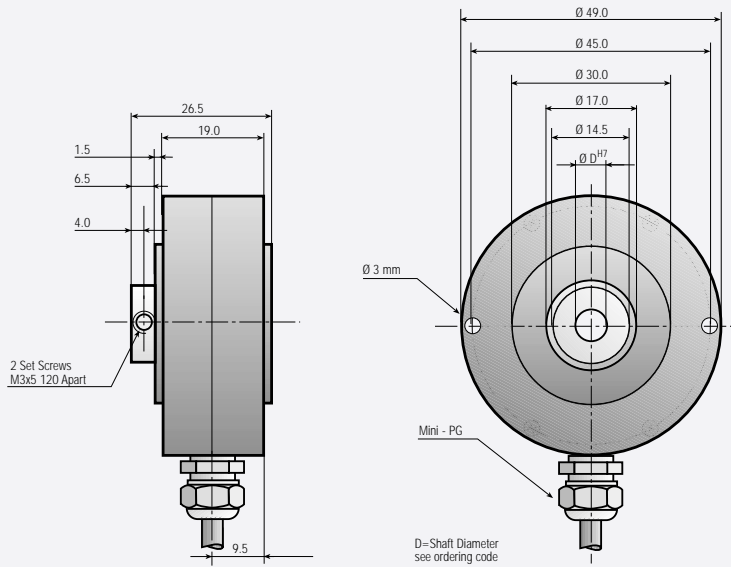
## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 20 N, Radial 15 N
Protection	IP 65
Temperature	-20'... +70' C (-4'... +158' F)
Weight	0.29 lb (130 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available



Drawing available as:  
dxf, iges, step, sld file

**ORDERING CODE**

**IH 490** - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ]  
 a    b    c    d    e    f    g    h                      Pulses Per Revolution

- a Group Function**  
IH=Incremental Hollow Shaft
- b Basic Series Number**  
490
- c Shaft Size D**  
06=6 mm  
AA=1/4"
- d Mechanical Options**  
0=None

- e Connector Type**  
0=2 mtr. (6ft.) Cable
- f Connector Location**  
R=Radial
- g Output Signals**  
3=A+B+0  
6=A+B+0+Compliments
- h Output Circuit Type**  
3=Push Pull 4.75 to 30 VDC

**Note:** Special functions and designs will be designated by a 4 digit code at the end of the part number. Consult factory for further details

**CONNECTIONS**

Function	Cable Colour Code
0 Volt	white
+ Volt	brown
A	green
B	yellow
0	grey
Ā	pink
B̄	blue
0̄	red

# IH 510

INCREMENTAL HOLLOW SHAFT ENCODER

Compact Construction  
Shaft Mounted  
1250 PPR Maximum  
4.75 to 30 Volts, RS 422 Compatible  
200 kHz Maximum Frequency



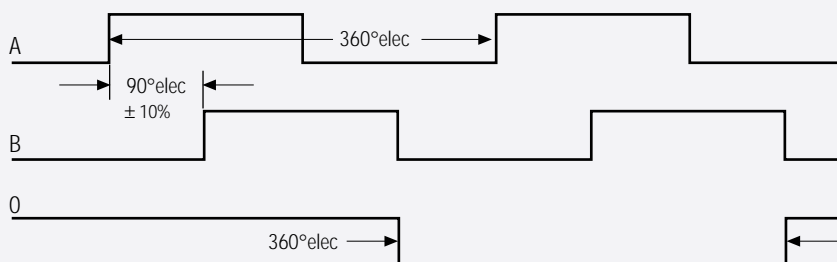
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

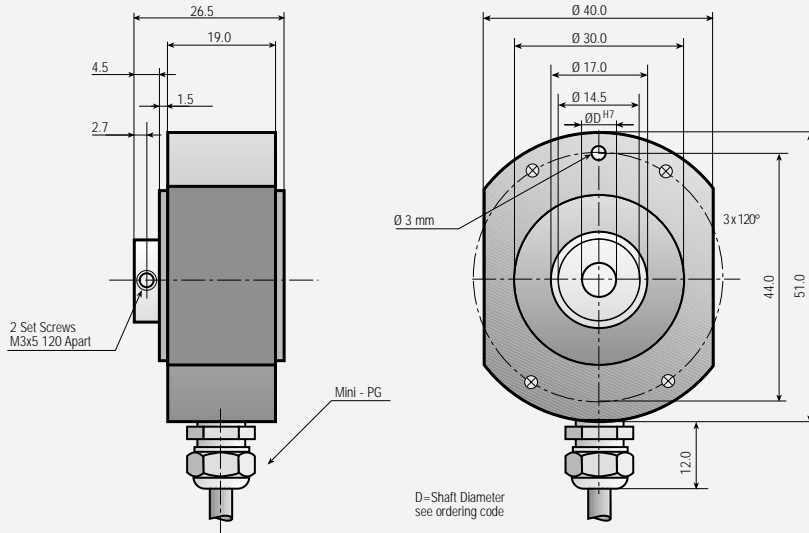
Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 20 N, Radial 15 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F)
Weight	0.29 lb (130 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available

Drawing available as:  
dxf, iges, step, sld file



**ORDERING CODE**

**IH 510** - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ]  
 a b c d e f g h Pulses Per Revolution

<b>a Group Function</b> IH=Incremental Hollow Shaft	<b>e Connector Type</b> 0=2 mtr. (6ft.) Cable
<b>b Basic Series Number</b> 510	<b>f Connector Location</b> R=Radial
<b>c Shaft Size D</b> 06=6 mm AA=1/4"	<b>g Output Signals</b> 3=A+B+0 6=A+B+0+ Compliments
<b>d Mechanical Options</b> 0=None	<b>h Output Circuit Type</b> 3=Push Pull 4.75 to 30 VDC

**Note:** Special functions and designs will be designated by a 4 digit code at the end of the part number. Consult factory for further details

**CONNECTIONS**

Function	Cable Colour Code
0 Volt	white
+ Volt	brown
A	green
B	yellow
0	grey
Ā	pink
B̄	blue
0̄	red

# IH 581

INCREMENTAL HOLLOW SHAFT ENCODER

Industry Standard Size 25

Shaft Mounted

10000 PPR Maximum

4.75 to 30 Volts, RS 422 Compatible

200 kHz Maximum Frequency



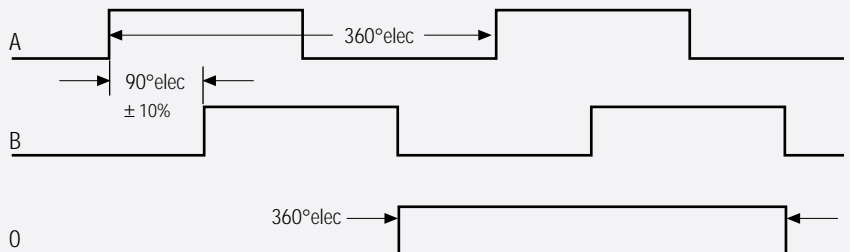
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 20 N, Radial 15 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	0.55 lb (250 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available





# IH 740

INCREMENTAL HOLLOW SHAFT ENCODER

Heavy Duty Construction  
 Shaft Mounted  
 Range of shaft bores (6 – 18 mm)  
 25000 PPR Maximum  
 4.75 to 30 Volts, RS 422 Compatible  
 300 kHz Maximum Frequency



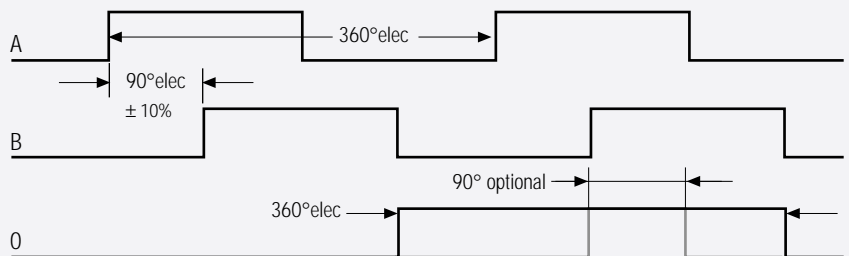
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 40 N, Radial 30 N
Protection	IP 65
Temperature	-20'...+70' C (-4'...+158' F) +100' C (+212' F) Optional
Weight	0.84 lb (380 g)

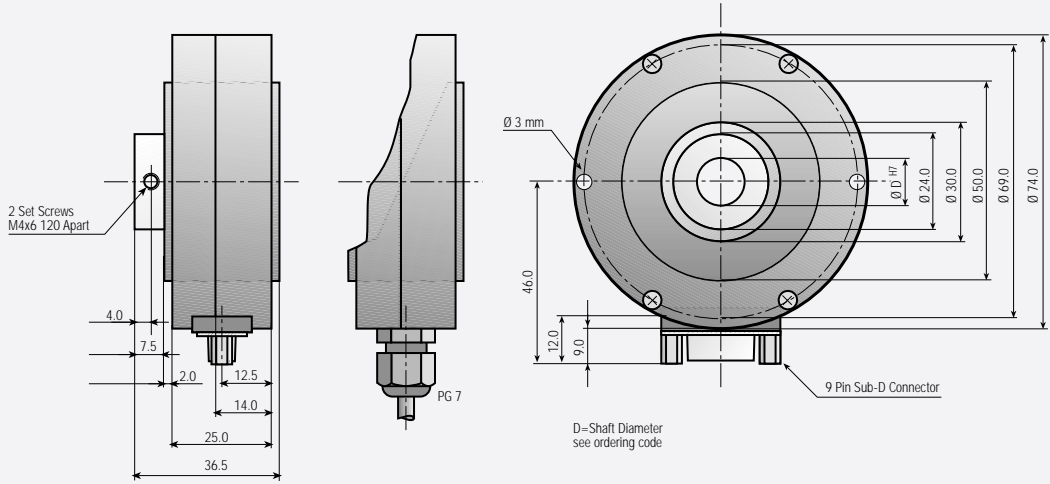
## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
 Complimentary channel also available

Optional Gated Marker Pulse  
 Gated with A+B Shown

Drawing available as:  
dxf, iges, step, sld file



**ORDERING CODE**

**IH 740** - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]  
 a b c d e f g h Pulses Per Revolution

- a Group Function**  
IH=Incremental Hollow Shaft
- b Basic Series Number**  
740
- c Shaft Size D**  
06=6 mm 10=10 mm 12=12mm  
14=14mm 16=16 mm 18=18 mm  
AA=1/4" AB=3/8" AC=1/2" AE=5/8"
- d Mechanical Options**  
0 = None

- e Connector Type**  
0=2 mtr. (6ft.) Cable  
6=9 Pin Sub D 7=12 Pin
- f Connector Location**  
R=Radial
- g Output Signals**  
3=A+B+0  
6=A+B+0+Compliments
- h Output Circuit Type**  
3=Push Pull 4.75 to 30 VDC

**Note:** Special functions and designs will be designated by a 4 digit code at the end of the part number. Consult factory for further details

**CONNECTIONS**

Function	Cable Colour Code	12 Pin Connector
0 Volt	white	1
+ Volt	brown	2
A	green	3
B	yellow	4
0	grey	5
Ā	pink	6
B̄	blue	7
0̄	red	8

# IH 840

INCREMENTAL HOLLOW SHAFT ENCODER

Very Heavy Duty Construction

Shaft Mounted

3600 PPR Maximum

4.75 to 30 Volts, RS 422 Compatible

300 kHz Maximum Frequency



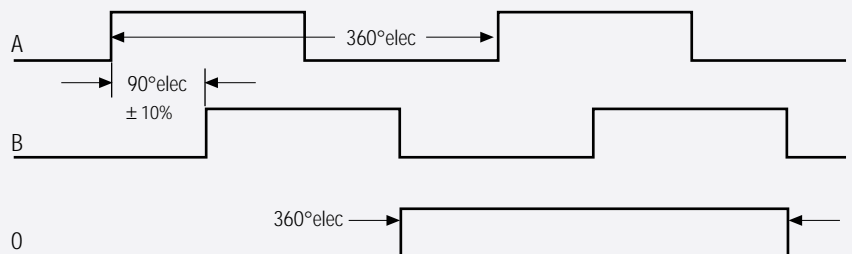
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Plastic (Noryl)
Body	Plastic (Noryl)
Shaft	Plastic (Noryl)
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 20 N, Radial 30 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	0.27 lb (130 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available



# IH 950

INCREMENTAL HOLLOW SHAFT ENCODER

Very Heavy Duty Construction

Shaft Mounted

Range of shaft bores (14 – 30 mm)

25000 PPR Maximum

4.75 to 30 Volts, RS 422 Compatible

300 kHz Maximum Frequency



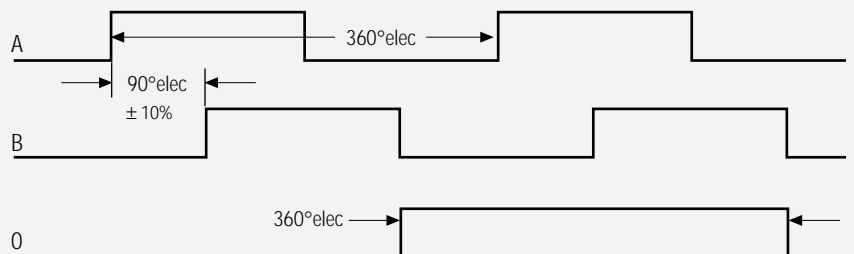
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 50 N, Radial 30 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	1.254 lb (570 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available



# IH 951

INCREMENTAL HOLLOW SHAFT ENCODER

Very Heavy Duty Construction  
Shaft Mounted  
Range of shaft bores (14 – 30 mm)  
25000 PPR Maximum  
4.75 to 30 Volts, RS 422 Compatible  
300 kHz Maximum Frequency



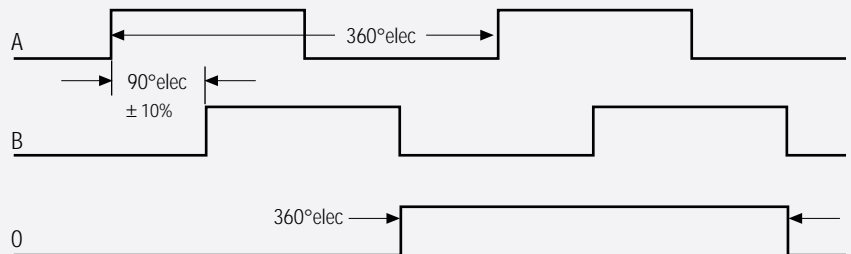
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 50 N, Radial 30 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	1.034 lb (470 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available





# IH 103

INCREMENTAL HOLLOW SHAFT ENCODER

Very Heavy Duty Construction  
 Shaft Mounted  
 Range of shaft bores (30 – 40 mm)  
 50000 PPR Maximum  
 4.75 to 30 Volts, RS 422 Compatible  
 300 kHz Maximum Frequency



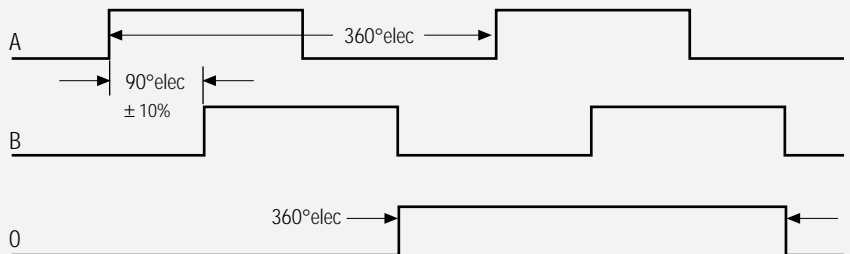
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

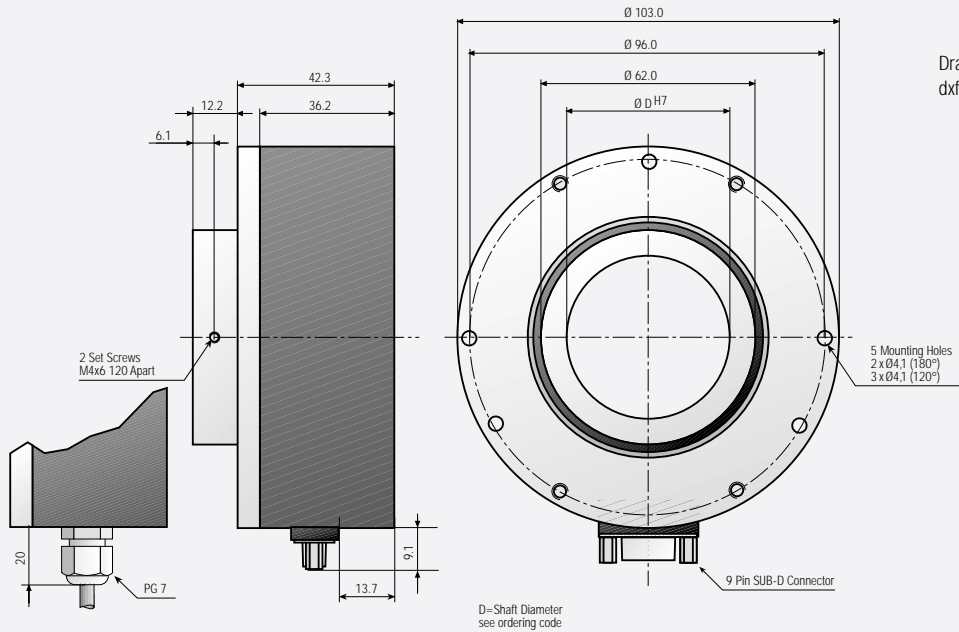
## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.2 Nm
Loading	Axial 60 N, Radial 80 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	1.584 lb (720 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
 Complimentary channel also available



Drawing available as:  
dxf, iges, step, sld file

**ORDERING CODE**

**IH 103** - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ]  
 a b c d e f g h Pulses Per Revolution

- a Group Function**  
IH=Incremental Hollow Shaft
- b Basic Series Number**  
103
- c Shaft Size D**  
26=26 mm 44=44mm  
AQ=1.5" AR=1.625"
- d Mechanical Options**  
0=None

- e Connector Type**  
0=2 mtr. (6ft.) Cable  
6=9 Pin Sub D 7=12 Pin
- f Connector Location**  
R=Radial
- g Output Signals**  
3=A+B+0  
6=A+B+0+Compliments
- h Output Circuit Type**  
3=Push Pull 4.75 to 30 VDC

Note: Special functions and designs will be designated by a 4 digit code at the end of the part number. Consult factory for further details

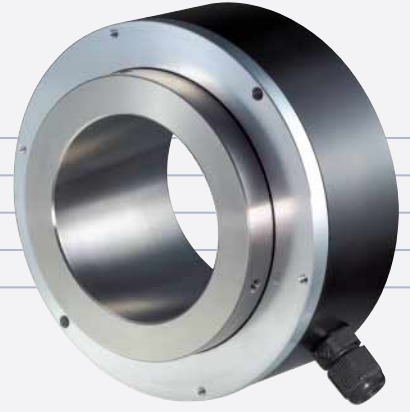
**CONNECTIONS**

Function	Cable Colour Code	9 Pin Connector	12 Pin Connector
0 Volt	white	1	1
+ Volt	brown	2	2
A	green	3	3
B	yellow	4	4
0	grey	5	5
Ā	pink	6	6
B̄	blue	7	7
0̄	red	8	8

# IH 120

INCREMENTAL HOLLOW SHAFT ENCODER

Very Heavy Duty Construction  
 Shaft Mounted  
 Range of shaft bores (40 – 65 mm)  
 50000 PPR Maximum  
 4.75 to 30 Volts, RS 422 Compatible  
 300 kHz Maximum Frequency



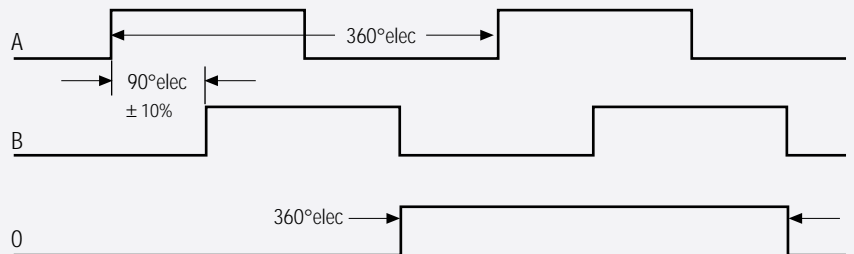
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75-30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	4000 RPM (max)
Torque	> 0.2 Nm
Loading	Axial 60 N, Radial 80 N
Protection	IP 54
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	1.584 lb (720 g)

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
 Complimentary channel also available





---

---

---

---

---

---







---

---

# ABSOLUTE ENCODER OVERVIEW

Absolute encoders are commonly used in the industry to measure Absolute Position, which differs from incremental encoders that measure relative position or relative movement. Absolute encoders have a unique digital output representative of each shaft position. Absolute encoders produce a parallel „word“ of data that can be read directly and rapidly by most modern control systems. An absolute encoder also has the added benefit of retaining its position information even in the event of power loss.

The Single-Turn Absolute Encoder will measure Absolute Position of a shaft that rotates within a 0 Degree to 360 Degree range of movement. The count will recycle back to a Zero Count once a full 360 Degree revolution has been completed. The Single-Turn Absolute Encoder is mainly used in applications where the shaft rotation is cyclic between 0 to 360 degrees.

	AS 580	AS 700	AS 900	AH 580	AH 740	AH 950
						
<b>Outside Diameter</b>	58 mm	70 mm	90 mm	58 mm	74 mm	95 mm
<b>Available Shaft/ Hollow Shaft Sizes</b>	4 mm      1/4" 6 mm      3/8"	10 mm      1/2" 12 mm	10 mm 12 mm	6 mm      3/8" 10 mm      1/2" 12 mm	6 mm      1/4" 10 mm      3/8" 12 mm      1/2" 14 mm	6 mm      1/4" 10 mm      3/8"
<b>Mechanical Options</b>	stainless steel	stainless steel	—	—	stainless steel	stainless steel
<b>Connector Location</b>	axial radial	axial radial	axial radial	axial radial	radial	radial
<b>Output Signals</b>	Binary Code Gray Code	Binary Code Gray Code	Binary Code Gray Code	Binary Code Gray Code	Binary Code Gray Code	Binary Code Gray Code
<b>Output Circuit Type</b>	8-30 VDC Push Pull	8-30 VDC Push Pull	8-30 VDC Push Pull	8-30 VDC Push Pull	8-30 VDC Push Pull	8-30 VDC Push Pull
<b>Pulses Per Revolution</b>	up to 13 Bits	up to 13 Bits	up to 13 Bits	up to 12 Bits	up to 12 Bits	up to 13 Bits
<b>Page</b>	40	42	44	46	48	50

# AS 580

ABSOLUTE SHAFT ENCODER

Industry Standard Size 25

Syncro Flange Mounting

Up to 13 Bits (8192) Maximum

5 Volt TTL or 8 to 30 Volts

Gray Code or Binary Code

Optional Reset



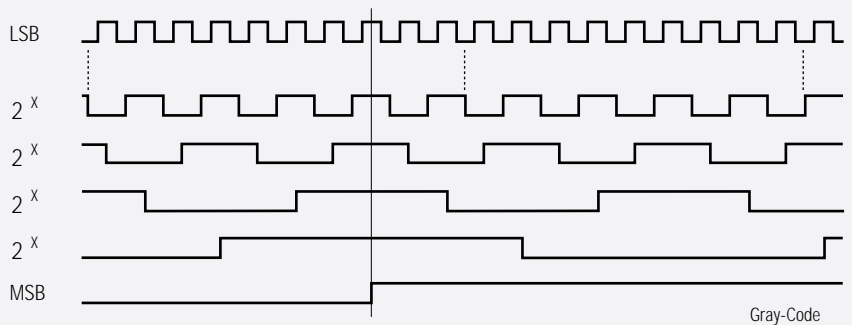
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 Volt or 8 to 30 V DC
Current Consumption	100 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.05 Nm
Loading	Axial 40 N, Radial 30 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	0.7 lb (320 g)

## OUTPUT SIGNALS







# AS 700

ABSOLUTE SHAFT ENCODER

Heavy Duty Construction

IP65 Protection

Up to 13 Bits (8192) Maximum

8 to 30 Volts or RS 422A Compatible

Gray Code or Binary Code

Optional Reset



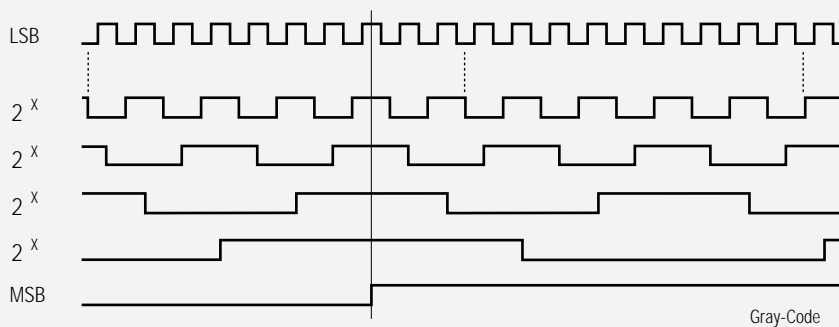
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 Volt or 8 to 30 V DC
Current Consumption	100 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	500 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.1 Nm
Loading	Axial 60 N, Radial 50 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	0.99 lb (450 g)

## OUTPUT SIGNALS





# AS 900

ABSOLUTE SHAFT ENCODER Heavy Duty Construction  
 IP65 Protection  
 Up to 13 Bits (8192) Maximum  
 Gray Code or Binary Code



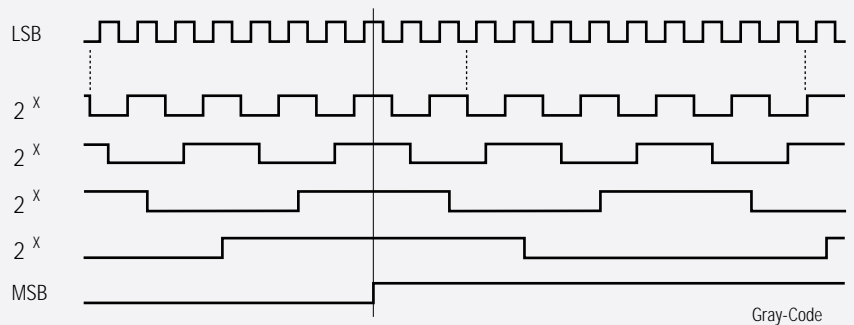
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 Volt or 8 to 30 V DC
Current Consumption	120 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Steel
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.1 Nm
Loading	Axial 60 N, Radial 50 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	1.91 lb (850 g)

## OUTPUT SIGNALS





# AH 580

Industry Standard Size 25  
 Shaft Mounted  
 Up to 12 Bits (4096) Maximum  
 5 Volt TTI or 8 to 30 Volts  
 Gray Code or Binary Code



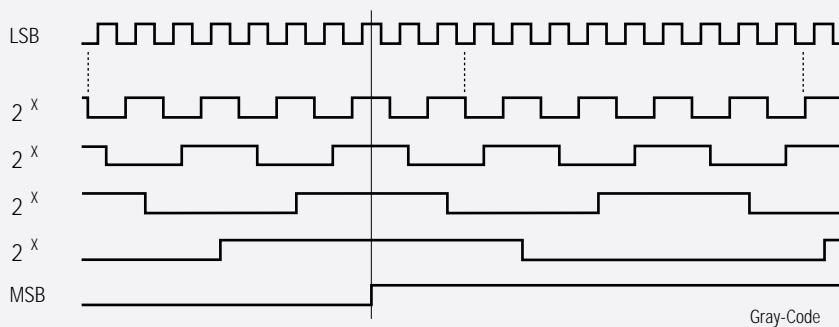
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 Volt or 8 to 30 V DC
Current Consumption	100 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	100 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 20 N, Radial 15 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	0.55 lb (250 g)

## OUTPUT SIGNALS





# AH 740

ABSOLUTE HOLLOW SHAFT ENCODER

- Heavy Duty Construction
- Shaft Mounted
- Range of shaft bores (6 – 14 mm)
- Up to 12 Bits (8192) Maximum
- 5 Volt TTL or 8 to 30 Volts
- Gray Code or Binary Code



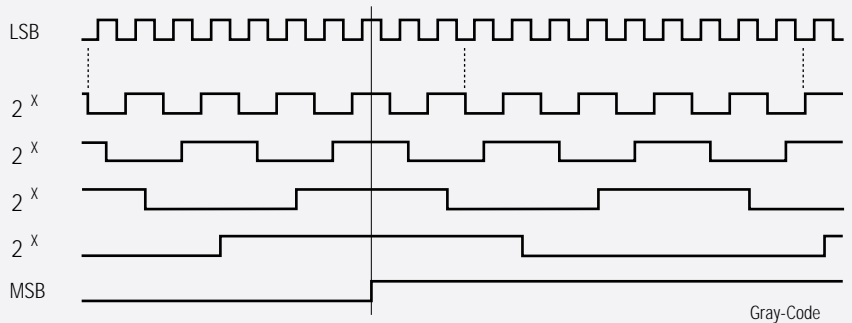
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 Volt or 8 to 30 V DC
Current Consumption	100 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 40 N, Radial 30 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	0.84 lb (380 g)

## OUTPUT SIGNALS







# AH 950

ABSOLUTE HOLLOW SHAFT ENCODER

Industry Standard Size 25  
Syncro Flange Mounting  
Up to 13 Bits (8192) Maximum  
5 Volt TTL or 8 to 30 Volts  
Gray Code or Binary Code



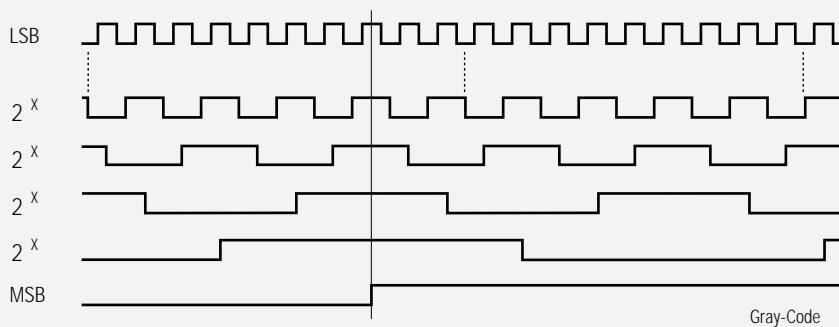
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 Volt or 8 to 30 V DC
Current Consumption	100 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.05 Nm
Loading	Axial 40 N, Radial 30 N
Protection	IP 65
Temperature	-20°...+70° C (-4°...+158° F) +100° C (+212° F) Optional
Weight	0.7 lb (320 g)

## OUTPUT SIGNALS







# MULTI-TURN ENCODER OVERVIEW

The Multi-Turn Absolute Encoder will measure Absolute Position of multiple shaft revolutions. The count will recycle back to zero once the maximum number of turns has been exceeded. The Multi-Turn Absolute Encoder is mainly used in applications where it requires many shaft revolutions to reach a final position. Some typical applications are: Large Over-Head Gantry Cranes, and Automated Storage and Retrieval Systems.

	<i>MS 650</i>	<i>MH 750</i>
		
<b>Type-Size</b>	65 mm	75 mm
<b>Available Shaft/ Hollow Shaft Sizes</b>	standard	10 – 50,8 mm
<b>Mechanical Options</b>	—	—
<b>Connector Location</b>	radial	radial
<b>Output Signals</b>	SSI	SSI
<b>Output Circuit Type</b>	RS 422	RS 422 or RS 485
<b>Pulses Per Revolution</b>	13 x 12	13 x 12
<b>Page</b>	54	56

# MS 650

MULTITURN-ENCODER SSI Small and Compact

- Multi-Turn
- SSI (Synchronous Serial Interface)
- Programmable Encoder Parameters
- Standard Interchangeable Mounting Flanges



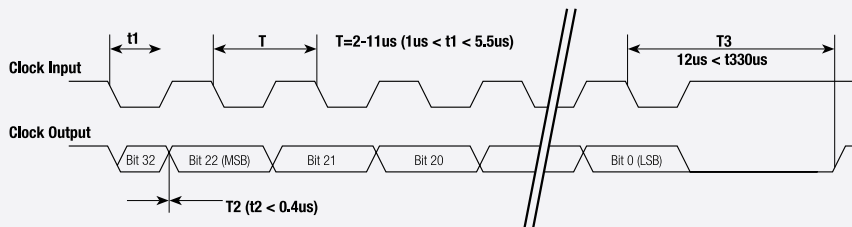
## ELECTRICAL SPECIFICATIONS

Encoder Capacity	max. 25 Bit
Steps/Revolution	8192 Steps/Rev
Number of Revolutions	4096 Revolution
Supply Voltage	11 - 27 V DC
Power Dissipation (No Load)	< 4 Watt
Programming via RS485	IBM Compatible EPROG Software, PT 100 Programming Terminal
Output Code (programmable)	Binary, BCD, Gray, Shifted Gray, Excess3, Shifted Excess3
Clock Input	Opto Coupler Isolated
Clock Frequency	95 kHz - 1 MHz
Transmission Cable Length	Dependent on Cable Cross Section, Shielding, Clock Frequency etc...
Data Output	RS422 (2 wire)
Output Format	Standard, Tree Format, with Repetition
Pin Configuration	Upon Request

## MECHANICAL SPECIFICATIONS

Max. Rotational Speed	6000 RPM
Max. Load on Shaft	40 N Axial, 60 N Radial (at end of shaft)
Lifetime on Bearings	3.9 x 10 <sup>10</sup> Revolutions at:
· Operational Speed	3000 RPM
· Load on Shaft	20 N Axial, 30 N Radial (at end of shaft)
· Operating Temperature	60°C (140°F)
Weight	0.7 kg (1.5 lb.)
Max. Angular Acceleration	≤ 10 <sup>4</sup> rad/s <sup>2</sup>
Momentum of Inertia	2.5 x 10 <sup>6</sup> kg m <sup>2</sup>
Startup Momentum at 20°C (68°F)	2 Ncm
Vibration (50-2000 Hz Sinusoidal)	
DIN IEC 68-2-6	≤ 100 m/s <sup>2</sup> (10g)
Shock (11ms) DIN IEC 68-2-27	≤ 100 m/s <sup>2</sup> (100g)
Standard Connector	12 pin Contact Connector - Axial

## OUTPUT SIGNALS





# MH 750

PROGR. MULTITURN HOLLOWSHAFT ENCODER

Programable Absolute Multiturn Hollow-Shaft

SSI-Interface

25 Bits (13 Bit/Rev. x 12 Bits Rev.)

10-30 Volts DC RS422 or RS485

Hollow-Shafts 10 – 50,8 mm



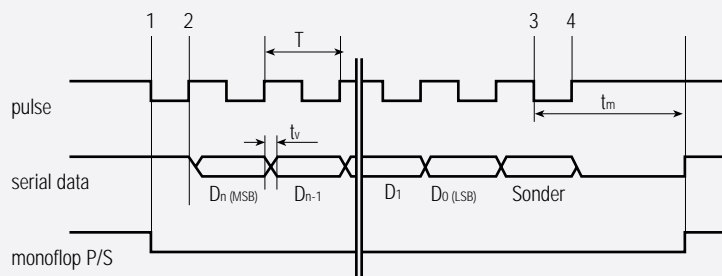
## ELECTRICAL SPECIFICATIONS

Supply Voltage	10 - 30 V DC
Current Consumption	60 mA (max)
Output Circuit	RS422 or RS485
Codes Available	Gray or Binary
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.05 Nm
Loading	Axial 40 N, Radial 30 N
Protection	IP 65
Temperature	-20°...+70°C (-4°...+158°F) +100°C (+212°F) Optional
Weight	depends on Shaftsize (700-1200g)

## OUTPUT SIGNALS









# 1. CERTIFICATE OF CONFORMITY



- 2. Certificate No. 01 E. 130787X
- 3. This certificate is issued for Shaft Encoder  
Type X700
- 4a. Manufactured by W+S Meßsystem GmbH, Humboldtstraße 11, D-78549 Spaichingen, Germany.
- 4b. and submitted by Same as manufacture
- 5. This electrical apparatus and any acceptable variation thereto is specified in the Appendix to this certificate and the documents therein referred to.
- 6. UL International Demko A/S being an Approval Certification Body in accordance with Article 14 of the Council Directive of the European Communities of 18th December 1975, document 76/117/EEC, confirms that the apparatus has been found to comply with the harmonized European Standards:  
EN 50014:1992 E  
EN 50018:1994 E
- 7. The apparatus marking shall include one of the codes:
  - EEx d I
  - EEx d IIC T6 (Tamb. 60°C)
  - EEx d IIC T4 (Tamb. 100°C)
- 8. The supplier of the electrical apparatus referred to in this certificate has the responsibility to ensure that the apparatus conforms to the specification laid down in the Appendix to this certificate and has satisfied routine verifications and tests specified therein.
- 9. The apparatus may be marked with the Distinctive Community Mark specified in Annex II to the Council Directive of 16 January 1984, document 84/47/EEC. A facsimile of this mark is printed at the top of this certificate. The marking of the equipment shall be visible, legible and durable.

On behalf of UL International Demko A/S Herlev, 17. September 2001

*Stein Lumby*  
Certification Manager

UL International Demko A/S  
Lyksøer 8, P.O. Box 514  
DK-2730, Herlev, Denmark  
Telephone: +45 44850500  
Fax: +45 44850500

This certificate is only allowed to be rendered in its entirety and without any alterations



# (1) PRODUCTION QUALITY ASSURANCE NOTIFICATION



- [2] Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 94/9/EC
- [3] Notification Number: 02 ATEX Q133816
- [4] Equipment or Protective System or Components as listed Manufacture of Shaft Encoders with the following protection principles: Flameproof Enclosure "d"
- [5] Applicant: W + S Meßsysteme GmbH, Humboldtstraße 11, 78549 Spaichingen, Germany
- [6] Manufacturer: Same as applicant
- [7] UL International Demko A/S notified body number 0539 for Annex VI in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, notifies to the applicant that the actual manufacturer has a production quality system which complies to Annex VI of the Directive.
- [8] This notification is based on audit report No. Q133816-01 dated 2002-11-27. This notification can be withdrawn if the manufacturer no longer satisfies the requirements of Annex VI. The Manufacturer is obliged to inform UL International Demko A/S of any changes in their ISO 9001:2000 registration or other aspects upon which this notification has been given. Results of periodical re-assessment of the quality system are a part of this notification.
- [9] This notification is valid until: 2003-11-27 and can be withdrawn if the Manufacturer does not satisfy the production quality assurance re-assessment.
- [10] According to Article 10[1] of the Directive 94/9 EC the CE marking shall be followed by the identification number 0539 identifying the notified body involved in the production control stage.

On behalf of UL International Demko A/S Herlev, 2002-12-10

*Stein Lumby*  
Stein Lumby  
QRS Department Manager

UL International Demko A/S  
Lyksøer 8, P.O. Box 514  
DK-2730, Herlev, Denmark  
Telephone: +45 44850500  
Fax: +45 44850500

Notification: 02 ATEX Q133816  
This notification may only be reproduced in its entirety and without any change



# (1) EC-TYPE EXAMINATION CERTIFICATE



- [2] Equipment or Protective System intended for use in Potentially Explosive Atmospheres Directive 94/9/EC
- [3] EC-Type Examination Certificate Number: DEMKO 02 ATEX 133213X
- [4] Equipment or Protective System: X700 Shaft Encoder
- [5] Manufacturer: W + S Meßsysteme GmbH
- [6] Address: Humboldtstraße 11, 78549 Spaichingen, Germany
- [7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.
- [8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive. The examination and test results are recorded in confidential report no. 133213
- [9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with: EN 50014: 1997 E incl. A1+A2 EN 50018: 2000 E incl.
- [10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.
- [11] This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.
- [12] The marking of the equipment or protective system shall include the following:

I/II 2 G D EEx d IIC T6 (Tamb +60°C) T4 (Tamb + 100°C)  
EEx d I

On behalf of UL International Demko A/S Herlev, 2003-01-16

*Karna Christensen*  
Karna Christensen  
Certification Manager

UL International Demko A/S  
Lyksøer 8, P.O. Box 514  
DK-2730, Herlev, Denmark  
Telephone: +45 44850500  
Fax: +45 44850500

Certificate: 02 ATEX 133213  
This certificate may only be reproduced in its entirety and without any change, schedule included



# HARSH AND HAZARDOUS AREA ENCODER OVERVIEW



This type of encoder is designed for use in potentially explosive atmospheres and in severe environments where superior environmental protection is required. Our complete range of Harsh and Hazardous encoder designed and tested and certified to withstand ingestion protection rating of IP67.

A hazardous area can be defined as. "An area in which a flammable substance in the form of gas or vapour or dust, when mixed with air, is present in such proportions that it can explode when in contact with an ignition source (Electrical Equipment).

Our Explosion Proof Encoders (IX700 Series & AX700 Series) are certified under the ATEX Directive for use in Zone 0 (Division 1), Zone 1(Division 1) and Zone 2 (Division 2) locations.

	<i>IX 700</i>	<i>AX 700</i>	<i>IP 700</i>	<i>AP 700</i>
				
<b>Type-Size</b>	70 mm	70 mm	70 mm	70 mm
<b>Available Shaft/ Hollow Shaft Sizes</b>	10 mm 12 mm	10 mm 12 mm	10 mm 12 mm	10 mm 12 mm
<b>Mechanical Options</b>	—	—	—	—
<b>Connector Location</b>	axial	axial	axial	axial
<b>Output Signals</b>	A+B+O A+B+O+Complim.	Binary Code Gray Code	A+B+O A+B+O+Complim.	Binary Code Gray Code
<b>Output Circuit Type</b>	4,75-30 VDC Push Pull	8-30 VDC Push Pull	4,75-30 VDC Push Pull	8-30 VDC Push Pull
<b>Pulses Per Revolution</b>	1-50000	up to 12 Bit	1-50000	up to 12 Bit
<b>Page</b>	<i>60</i>	<i>62</i>	<i>64</i>	<i>66</i>

# IX 700



INCREMENTAL FLAMEPROOF ENCODER

EEx dI / IIC T6 (Tamb 60°C)

IP 66/67 – M/S

Heavy Duty Construction

5000 Pulses/Rev., 300 kHz max.

4,75 – 30 Volts, RS 422 Compatible



## APPROVALS / CERTIFICATIONS

Certification Number	DEMKO 02 ATEX 133213X
	EX I/II G D
EN 50014	1197 E incl. A1+A2
EN 50018	2000E
EEx d IIC T6	(Tamb +60°C)
EEx d IIC T4	(Tamb +100°C)
	EEx d I

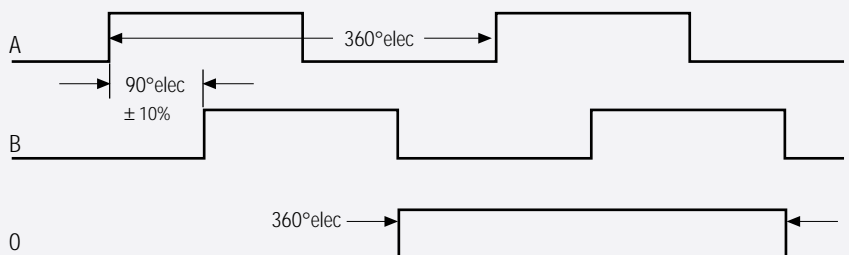
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75 - 30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection:	100 %
Cable	Mechanically and Chemically Resistant Flame Retardant – Screened

## MECHANICAL SPECIFICATIONS

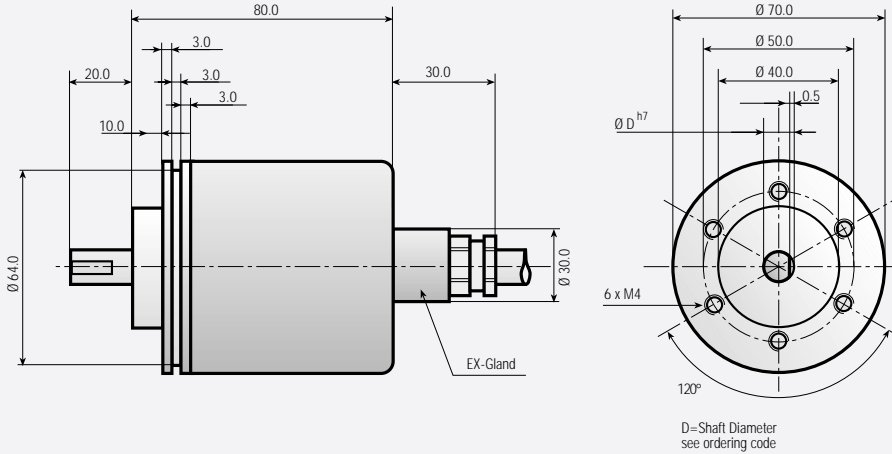
Cover	316 Stainless Steel
Body	316 Stainless Steel
Shaft	316 Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.4 Nm
Loading	Axial 60 N, Radial 50 N
Protection	IP 66/67 – M/S
Temperature	-20°...+70°C (-4°...+158°F)
Weight	(2.866 lb) 1300 g

## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available

Drawing available as:  
dxf, iges, step, sld file



**ORDERING CODE**

**IX 700** - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ]  
 a b c d e f g h Pulses Per Revolution

- a Group Function**  
IX=Incremental Explosion Proof
- b Basic Series Number**  
700
- c Shaft Size D**  
10=10 mm 12=12 mm
- d Mechanical Options**  
0= None

- e Connector Type**  
0=2 mtr. (6 ft.) Cable
- f Connector Location**  
A=Axial
- g Output Signals**  
3=A+B+0  
6=A+B+0+ Compliments
- h Output Circuit Type**  
3=Push Pull 4.75 to 30 VDC

Note: Special functions and designs will be designated by a 4 digit code at the end of the part number. Consult factory for further details

**CONNECTIONS**

Function	Cable Number Code
0 Volt	#1
+ Volt	#2
A	#3
B	#4
0	#5
$\bar{A}$	#6
$\bar{B}$	#7
$\bar{0}$	#8

# AX 700

ABSOLUTE FLAMEPROOF ENCODER EEx d I/II C T6 (Tamb 60°C)  
 IP 66/67 – M/S  
 Heavy Duty Construction  
 Up to 12 Bits (4096)  
 5 Volt TTL or 8 to 30 Volts  
 Gray Code or Binary Code



## APPROVALS/CERTIFICATIONS

Certification Number	DEMKO 02 ATEX 133213X
	EX I/II G D
EN 50014	1197 E incl. A1+A2
EN 50018	2000E
EEx d IIC T6	(Tamb +60°C)
EEx d IIC T4	(Tamb +100°C)
	EEx d I

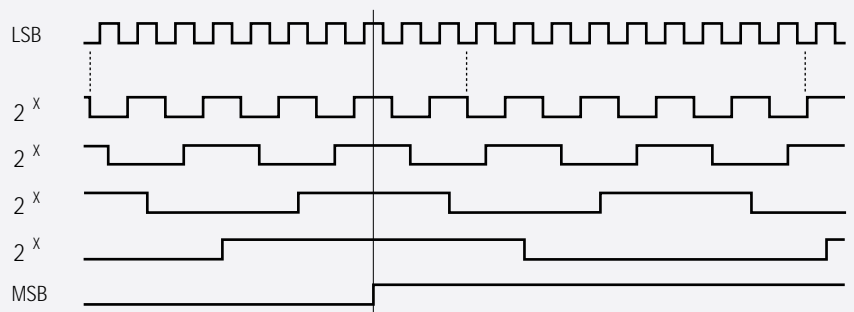
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 Volt TTL or 8 to 30 V DC
Current Consumption	100 mA max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection:	100 %
Cable	Mechanically and Chemically Resistant Flame Retardant – Screened

## MECHANICAL SPECIFICATIONS

Cover	316 Stainless Steel
Body	316 Stainless Steel
Shaft	316 Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.4 Nm
Loading	Axial 60 N, Radial 50 N
Protection	IP 66/67 – M/S
Temperature	-20'...+70°C (-4'...+158°F)
Weight	(2.866 lb) 1300 g

## OUTPUT SIGNALS



Gray Code



# IP 700



INCREMENTAL ENCODER IP66/IP67 – M/S IP 66/67 – M/S

Heavy Duty Construction

5000 Pulses/Rev., 300 kHz max.

4,75 – 30 Volts, RS 422 Compatible



## APPROVALS/CERTIFICATIONS

EN 50014	1197 E incl. A1 + A2
EN 50018	2000 E

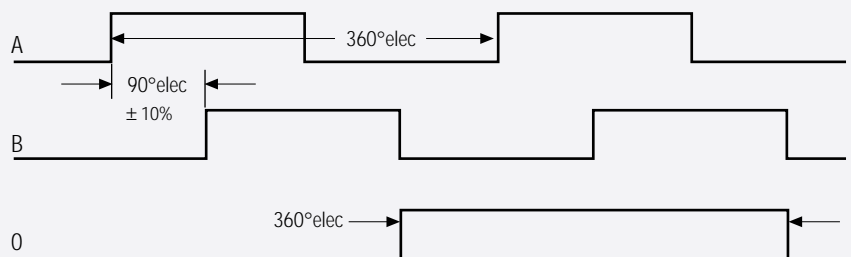
## ELECTRICAL SPECIFICATIONS

Supply Voltage	4.75 - 30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection:	100 %
Cable	Mechanically and Chemically Resistant Screened

## MECHANICAL SPECIFICATIONS

Cover	316 Stainless Steel
Body	316 Stainless Steel
Shaft	316 Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.4 Nm
Loading	Axial 60 N, Radial 50 N
Protection	IP 66/67 – M/S
Temperature	-20'...+70°C (-4'...+158°F)
Weight	(2.866 lb) 1300 g

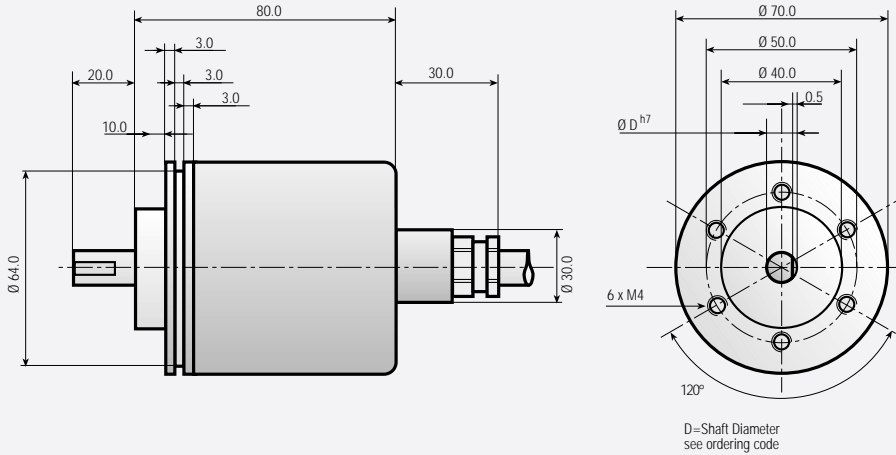
## OUTPUT SIGNALS



A Leads B in the CW Direction (facing shaft)  
Complimentary channel also available



Drawing available as:  
dxf, iges, step, sld file



**ORDERING CODE**

**IP 700** -         -

a      b      c      d      e      f      g      h      Pulses Per Revolution

- a Group Function**  
IP=Incremental Encoder IP66/IP67
- b Basic Series Number**  
700
- c Shaft Size D**  
10=10 mm  
12=12 mm
- d Mechanical Options**  
0=None

- e Connector Type**  
0=2 mtr. (6ft.) Cable
- f Connector Location**  
A=Axial
- g Output Signals**  
3=A+B+0  
6=A+B+0+Compliments
- h Output Circuit Type**  
3=Push Pull 4.75 to 30 VDC

Note: Special functions and designs will be designated by a 4 digit code at the end of the part number. Consult factory for further details

**CONNECTIONS**

Function	Cable Colour Code
0 Volt	white
+ Volt	brown
A	green
B	yellow
0	grey
$\bar{A}$	pink
$\bar{B}$	blue
$\bar{0}$	red

# AP 700

ABSOLUTE ENCODER IP66/IP67 – M/S IP 66/67 – M/S

CENELEC & IEC Approvals  
 Heavy Duty Construction  
 Up to 12 Bits (4096)  
 5 Volt TTL or 8 to 30 Volts  
 Gray Code or Binary Code



## APPROVALS/CERTIFICATIONS

EN 50014	1197 E incl. A1 + A2
EN 50018	2000 E

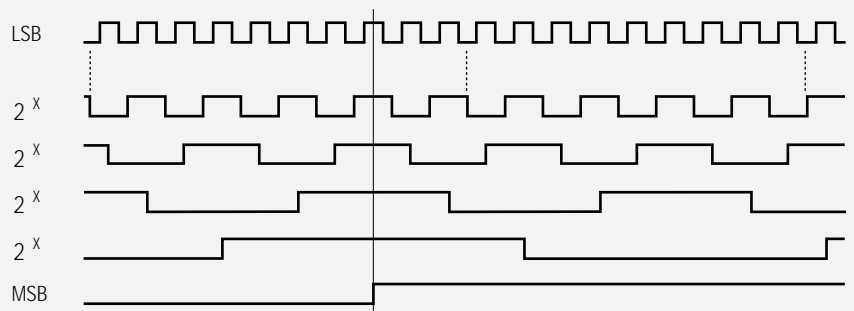
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 Volt TTL or 8 to 30 VDC
Current Consumption	100 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection:	100 %
Cable	Mechanically and Chemically Resistant Flame Retardant – Screened

## MECHANICAL SPECIFICATIONS

Cover	316 Stainless Steel
Body	316 Stainless Steel
Shaft	316 Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.4 Nm
Loading	Axial 60 N, Radial 50 N
Protection	IP 66/67 – M/S
Temperature	-20'...+70°C (-4'...+158°F)
Weight	(2.866 lb) 1300 g

## OUTPUT SIGNALS



Gray Code





# SPECIAL FUNCTION ENCODER OVERVIEW

Special function encoders are essentially four encoders in one package. This type of encoder provides four different types of signals simultaneously: traditional incremental encoder signals, Directional activated signals, direction flag signal as well as a Doubled Incremental Signal (X2) and a Quadrupled Encoder Signal (X4). Used in applications where space is limited, and multiple functions are required.

## XS 410



<b>Outside Diameter</b>	41 mm	
<b>Available Shaft/ Hollow Shaft Sizes</b>	6 mm	1/4"
<b>Mechanical Options</b>	—	
<b>Connector Location</b>	axial	
<b>Output Signals</b>	A+PL+PR+DR A+B+O+PR+PL+DR+X2+X4	
<b>Output Circuit Type</b>	8 - 30 V DC Push Pull	
<b>Pulses Per Revolution</b>	max. 1024x4	

Page 70

# XS 410

SPECIAL FUNCTION SHAFT ENCODER

Compact Construction  
 IP54 (Optional IP65 Protection)  
 Direction Output Signal  
 4096 PPR Maximum  
 200 kHz Maximum Frequency



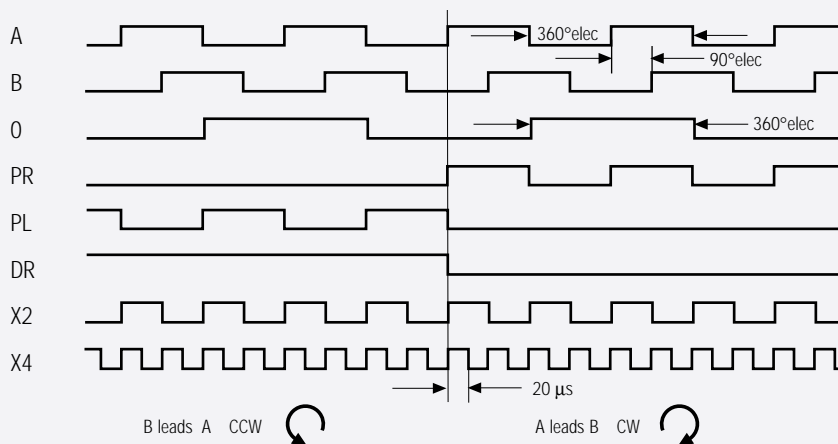
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 Volt TTL or 8 to 30 V DC
Current Consumption	40 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 40 N, Radial 30 N
Protection	IP 54
Temperature	-20'...+70'C (-4'...+158'F) +100'C (+212'F) Optional
Weight	0.27 lb (130 g)

## OUTPUT SIGNALS









# COMMUTATION ENCODER OVERVIEW

New applications have opened up for motor and drive system manufactures, thanks to our newly designed Commutation Signal Encoders. Motor manufacturers no longer need to use a Resolver, they can use our Commutation Encoder which has both Incremental Signals and Commutation Signals as part of a mixed system. The concept is to use the Commutation Signals to steer the motor and the Incremental Signals for precision speed control feedback.

Motor applications are the most demanding type of applications for any encoder. the encoder is expected to operate at high frequencies under extreme temperatures, high shaft and high vibration. To achieve this would have been impossible without spending an enormous amount of time and money on our new product. Because of our commitment we can now offer our leading edge technology to this highly demanding industrial sector.

	CH 580	CH 840
		
<b>Type-Size</b>	58 mm	84 mm
<b>Available Shaft/ Hollow Shaft Sizes</b>	6 mm 13 mm	15 mm
<b>Mechanical Options</b>	—	—
<b>Connector Location</b>	radial	radial
<b>Output Signals</b>	A+B+O+U+V+W A+B+O+U+V+W+Complim.	A+B+O+U+V+W A+B+O+U+V+W+Complim.
<b>Output Circuit Type</b>	5-15 V DC 10-30 V DC	A+B+O+U+V+W A+B+O+U+V+W+Complim.
<b>Pulses Per Revolution</b>	1-2048	1-2048
<b>Page</b>	74	76

# CH 580

COMMUTATION HOLLOW SHAFT ENCODER

Compact Construction  
 Shaft Mounted  
 2048 PPR Maximum  
 DC Motor Commutation Signals  
 300 kHz Maximum Frequency



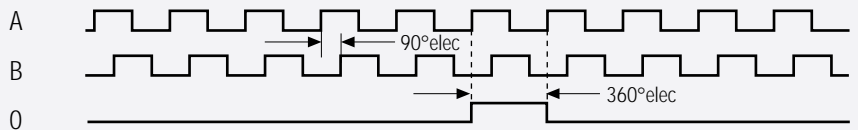
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5 - 15 V DC or 10 - 30 V DC
Current Consumption	100 mA (max)
Output Circuit	TTL or Push-Pull, RS 422A
Impulse Frequency	300 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

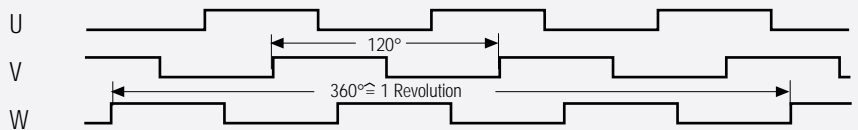
## MECHANICAL SPECIFICATIONS

Cover	Aluminium
Body	Aluminium
Shaft	Stainless Steel
Speed	10,000 RPM (max)
Torque	> 0.06 Nm
Loading	Axial 20 N, Radial 30 N
Protection	IP 65
Temperature	-20'...+70' C (-4'...+158' F) +100' C (+212' F) Optional
Weight	0.374 lb (170 g)

## OUTPUT SIGNALS



A leads B in the CW Direction (facing shaft)



Commutation signal shown in the CW direction



# CH 840

COMMUTATION HOLLOW SHAFT ENCODER

Heavy Duty Construction  
 Shaft Mounted (with Key Way)  
 2048 PPR Maximum  
 DC Motor Commutation Signals  
 200 kHz Maximum Frequency



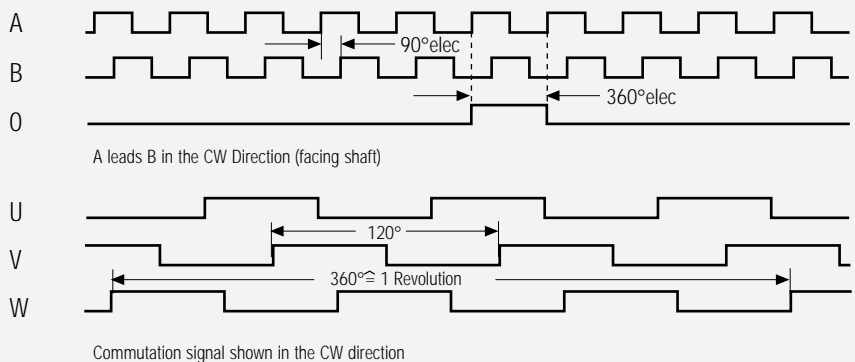
## ELECTRICAL SPECIFICATIONS

Supply Voltage	5- 15 Volt or 10- 30 VDC
Current Consumption	100 mA (max)
Output Circuit	Push-Pull, RS 422A
Impulse Frequency	200 kHz (max)
Logic Level (high)	Vcc - 0.7 Volt
Logic Level (low)	0.25 Volt (max)
Short Circuit Protection	100 %

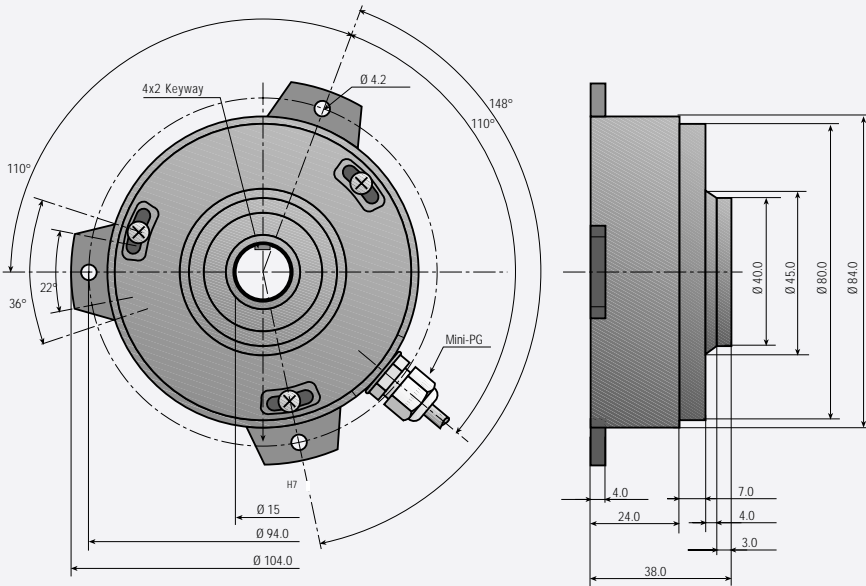
## MECHANICAL SPECIFICATIONS

Cover	Plastic (Noryl)
Body	Plastic (Noryl)
Shaft	Plastic (Noryl)
Speed	6000 RPM (max)
Torque	> 0.04 Nm
Loading	Axial 20 N, Radial 30 N
Protection	IP 65
Temperature	-20'...+70' C (-4'...+158' F) +100' C (+212' F) Optional
Weight	0.27 lb (130 g)

## OUTPUT SIGNALS



Drawing available as:  
dxf, iges, step, sld file



**ORDERING CODE**

**CH 840** - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] - [ ] [ ] [ ] [ ] [ ] [ ]  
 a b c d e f g h Pulses Per Revolution

- |  |   |
|--|---|
| <b>a Group Function</b><br>CH=Commutation Hollow Shaft | <b>e Connector Type</b><br>0=2 mtr. Cable                             |
| <b>b Basic Series Number</b><br>840                    | <b>f Connector Location</b><br>R=Radial                               |
| <b>c Shaft Size D</b><br>15=15 mm                      | <b>g Output Signals</b><br>A=A+B+O+U+V+W<br>B=A+B+O+U+V+W+Compliments |
| <b>d Mechanical Options</b><br>0= None                 | <b>h Output Circuit Type</b><br>6=5 to 15 VDC 7=10 to 30 VDC          |

Note: Special functions and designs will be designated by a 4 digit code at the end of the part number. Consult factory for further details

**CONNECTIONS**

Function	Cable Colour Code	Function	Cable Colour Code
0 Volt	white		
+ Volt	brown		
A	green	$\bar{A}$	black
B	yellow	$\bar{B}$	violet
O	grey	$\bar{O}$	grey/pink
U	pink	$\bar{U}$	red/blue
V	blue	$\bar{V}$	white/green
W	red	$\bar{W}$	brown/green

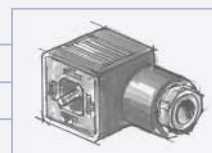


# ACCESSORIES

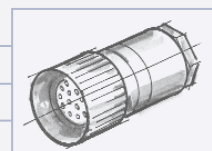
FLANGES, BRACKETS, MEASURING WHEELS &  
FLEXIBLE COUPLINGS

## CONNECTORS

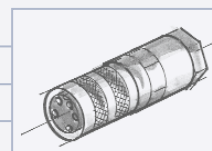
<b>CON-015</b>	<b>Material</b>	Plastic
	<b>Pins</b>	3+GND
	<b>Length</b>	1.3"
	<b>Protection</b>	IP 65



<b>CON-003 (12 Pin)</b> <b>CON-005 (16 Pin)</b>	<b>Material</b>	Brass
	<b>Pins</b>	12 or 16
	<b>Length</b>	2.4"
	<b>Protection</b>	IP 65



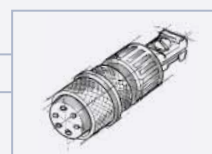
<b>CON-012</b>	<b>Material</b>	Brass
	<b>Pins</b>	5
	<b>Length</b>	2.5"
	<b>Protection</b>	IP 40



<b>CON-000</b>	<b>Material</b>	Plastic/Metal
	<b>Pins</b>	9
	<b>Length</b>	2.0"
	<b>Protection</b>	IP 40

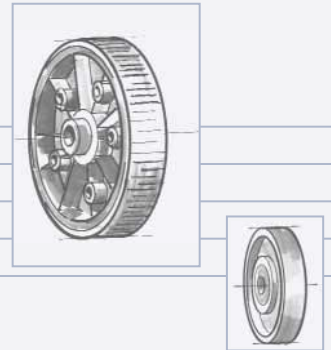


<b>CON-007 (6 Pin)</b> <b>CON-009 (7 Pin)</b>	<b>Material</b>	Aluminium
	<b>Pins</b>	6 or 7
	<b>Length</b>	1.3"



MEASURING WHEELS

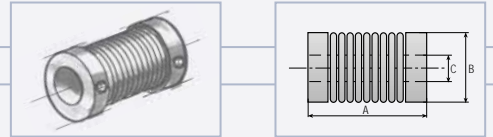
Type	Circumference	Material	D	B
VGM 201	200 mm	Smooth Plastic	6 mm	12 mm
VGM 202	200 mm	Ribbed Plastic	6 mm	12 mm
VGM 203	200 mm	Aluminium	6 mm	15 mm
VGM 501	500 mm	Aluminium	12 mm	25 mm
VGM 503	500 mm	Smooth Plastic	12 mm	25 mm
VGM 504	500 mm	Ribbed Plastic	12 mm	25 mm



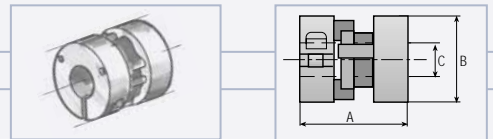
D: Ø Shaft/Bore  
B: Surface Width

FLEXIBLE COUPLINGS

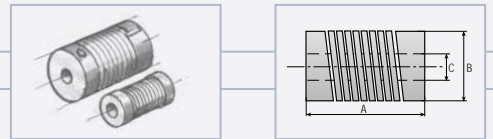
Bellows Coupling	Type	VGK 3520
	A	35
	B	20
	C	6-14



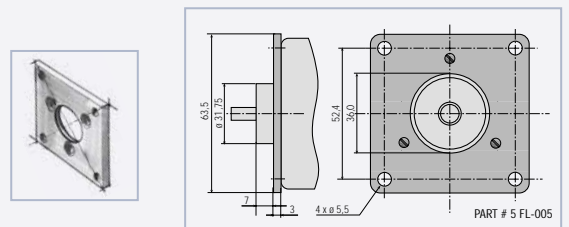
Precision Coupling	Type	VGK 2525
	A	25
	B	25
	C	12



Spring Coupling	Type	VGK 5028	VGK 3516
	A	50	35
	B	28	16
	C	6-24	6-12

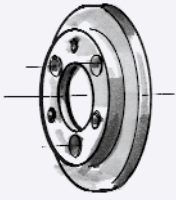


SQUARE FLANGES (IS 581)

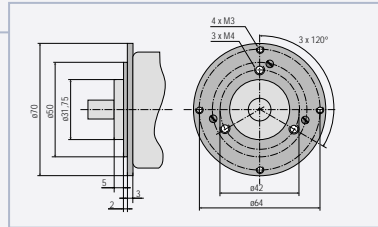




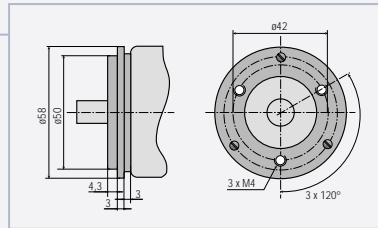
**ROUND FLANGES (IS 581)**



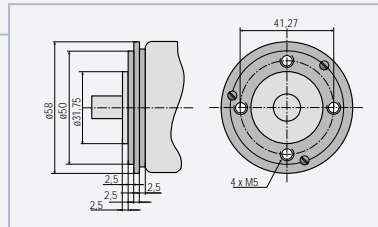
**FLA-002**



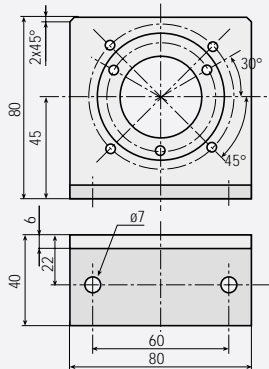
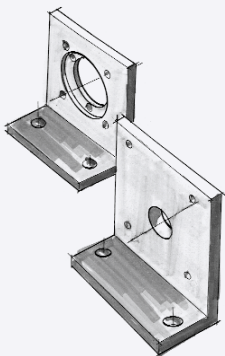
**FLA-003**



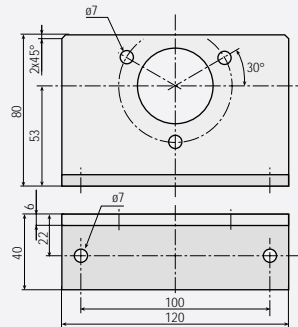
**FLA-004**



**MOUNTING BRACKETS**



MBR-001 for Series IS 580/581 & AS 580



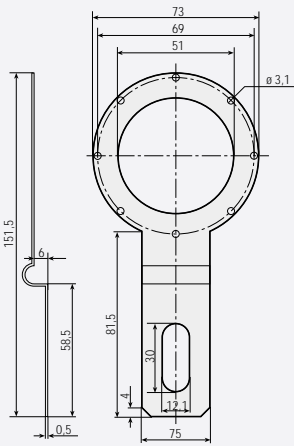
MBR-002 for Series IS 900 & AS 900

other flanges and accessoires available on request

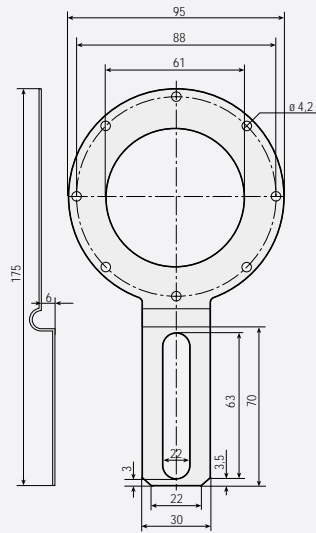


THETHER KITS

TEH-740

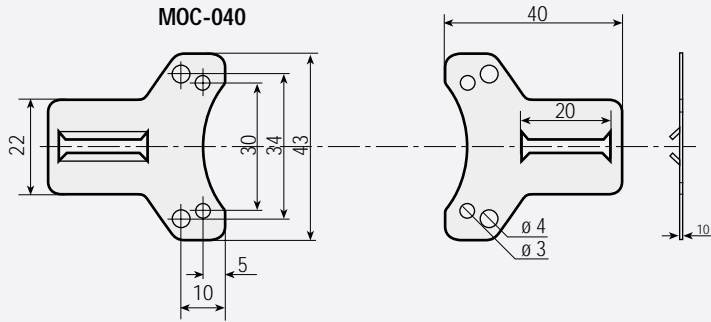


TEH-950



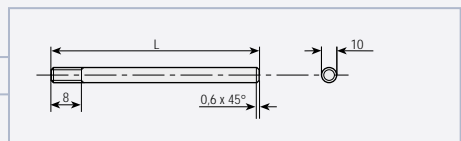
MOUNTING CLIP & PIN

MOC-040



Art. No. L (mm)

MOP-055	55
MOP-050	50
MOP-045	45

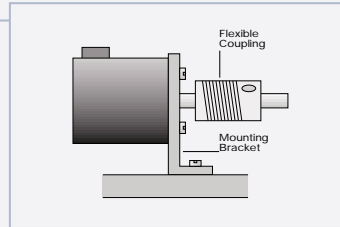


# MECHANICAL INSTALLATION

## RECOMMENDED MECHANICAL INSTALLATION

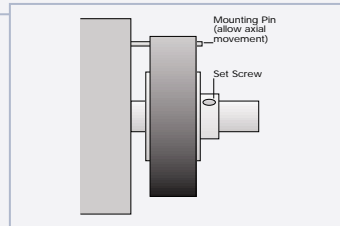
### 1. Shaft Encoders

- mount encoder to mounting bracket.
- install coupling to shaft encoder.
- align encoder and coupling to drive shaft.
- mount bracket to machine assembly.
- check alignment is correct.
- tighten all screws.



### 2. Hollow Shaft Encoders

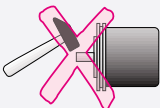
- mount pin to machine assembly.
- install encoder to shaft of the machine.
- use mounting pin to stop encoder from rotating.
- check if mounting pin allows axial movement of the optical encoder.
- check alignment is correct.
- tighten all set screws.



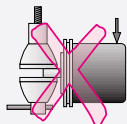
## CAUTION

All encoders produced by the GESgroup are designed to be reliable, rugged and easy to install. Should you require clarification on any of these instructions, please contact the nearest GESgroup company (See back cover page).

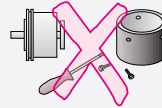
**Caution! Any of these actions my cause damage to the product.**



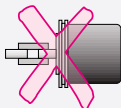
Do not shock the encoder



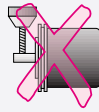
Do not subject the encoder to axial or radial stress



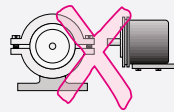
Do not dismantle the encoder



Do not use a rigid coupling



Do not tool the encoder or its shaft



Do not use makeshift techniques to mount the encoder



[WWW.GLOBALENCODER.COM](http://WWW.GLOBALENCODER.COM)



#### Germany

#### W+S Meßsysteme

W+S Meßsysteme GmbH  
Humboldtstraße 11  
78549 Spaichingen

Tel. +49 (0)7424 502740  
Fax +49 (0)7424 502741  
Freecall 0800 encoder  
[www.globalencoder.com](http://www.globalencoder.com)  
[info.de@globalencoder.com](mailto:info.de@globalencoder.com)



#### United Kingdom

#### W+S Measuring Systems

W+S Measuring Systems Ltd.  
Queens House  
The Square  
Corwen LL21 0DG

Tel. +44 (0)1490 413 550  
Fax +44 (0)1490 413 014  
[www.globalencoder.com](http://www.globalencoder.com)  
[info.uk@globalencoder.com](mailto:info.uk@globalencoder.com)



#### Canada

#### Industrial Encoder Corporation

Industrial Encoder Corporation  
7-320 Vansickle Road  
St. Catharines, Ontario L2R 6P7

Tel. +1 905 984 3256  
Fax +1 905 984 5017  
Toll Free 1 888 277 6205  
[www.globalencoder.com](http://www.globalencoder.com)  
[info.ca@globalencoder.com](mailto:info.ca@globalencoder.com)



#### France

#### ISS Industrial Sensors & Solutions

ISS Industrial  
Sensors & Solutions S.à.r.l.  
1a, rue des Frères Lumière  
67201 Strasbourg Eckbolsheim

Tel. +33 (0)388 595 110  
Fax +33 (0)388 595 111  
[www.globalencoder.com](http://www.globalencoder.com)  
[info.fr@globalencoder.com](mailto:info.fr@globalencoder.com)