

# Incremental encoders

Insulated through hollow shaft  $\varnothing 0.375...1$  inch

1...8192 pulses per revolution programmable (interpolated system)

## HS35P - Programmable



HS35P with insulated hollow shaft

### Features

- Robust industrial encoder up to IP 67 protection
- Highly versatile fully programmable encoder
- Interchangeable bore size(s) using metal inserts
- Insulating sleeve to prevent high shaft currents from damaging bearings
- Programmable resolution from 1...8192 ppr
- User programmable index pulse width and location
- Programmable from PC or standalone Baumer Programming Tools
- Wide range voltage supply 4.75...30 VDC
- Shock resistant up to 200 g's

### Technical data - electrical ratings

Voltage supply	4.75...30 VDC
Reverse polarity protection	Yes
Consumption w/o load	$\leq 50$ mA (24 VDC) $\leq 180$ mA (5 VDC) + output load, max. 250 mA
Pulses per revolution	1...8192
Sensing method	Optical
Output frequency	$\leq 300$ kHz (TTL) $\leq 160$ kHz (HTL)
Output signals	A, B, Z A, B, Z + complement, $\frac{1}{2}$ cycle index gated with negative B channel
Output stages	Linedriver (TTL, 7272) $V_{out} = 5$ V, short-circuit proof Push-pull (HTL, 7272) $V_{out} = V_{in}$ , short-circuit proof
Programmable parameters	Output resolution in increments of one (can be different for A and B) Output level TTL/HTL Zero pulse width and position Rotational direction CW/CCW
Interference immunity	DIN EN 61000-6-2
Emitted interference	DIN EN 61000-6-3
Approvals	UL approval / file no. E240061, RoHS compliant EU guideline 2011/65/EC, CE

### Technical data - mechanical design

Size (flange)	$\varnothing 3.15''$ ( $\varnothing 80$ mm)
Shaft type	$\varnothing 0.375...1''$ ( $\varnothing 9.525...25.4$ mm) (through hollow shaft isolated)
Bore runout	0.0016" (0.04 mm) TIR max.
Admitted misalignment	0.004" (0.1016 mm) radial TIR (end of shaft) 0.01" (0.254 mm) axial
Protection DIN EN 60529	IP 54, IP 65, IP 67
Operating speed	$\leq 5000$ rpm (see temperature diagram)
Bearing	52100 SAE high carbon steel (ABEC 5)
Starting torque	$\leq 3$ in-oz (77 °F, IP 65) $\leq 0.02$ Nm (+25 °C, IP 65)
Rotor moment of inertia	2.3 oz-in <sup>2</sup> (420 gcm <sup>2</sup> )
Service life	Bearing: typ. 13 billion rev. (89000 h/2500 rpm)
Materials	Housing: aluminium, powder-coated Shaft: stainless steel
Operating temperature	-40...+212 °F (-40...+100 °C), (fixed cable): see temperature diagram
Relative humidity	98 % non-condensing
Resistance	DIN EN 60068-2-6 Vibration 20 g, 60-2000 Hz DIN EN 60068-2-27 Shock 200 g, 6 ms
Connection	MIL-connector, 7-pin MIL-connector, 10-pin Cable (AWG26 wire)
Weight approx.	23 oz., 660 g

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### Part number

HS35P 

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#### Mounting kit

- T1 Tether arm T1, fixed, bolt 3/8"
- T3 Tether arm T3, adjustable, bolt 1/4"
- T4 Tether arm T4, adjustable, bolt 5/16"
- T5 Tether arm T5, adjustable, bolt 3/8"
- T6 Tether arm T6, adjustable, kit, bolts 1/4", 5/16", 3/8"

#### Protection

- 4 IP 54
- 5 IP 65
- 7 IP 67 (dust cap included)

#### Through hollow shaft

- |  |                         |
|--|-------------------------|
| 100 $\varnothing 1.000"$ ( $\varnothing 25.4$ mm)  | M18 $\varnothing 18$ mm |
| 087 $\varnothing 0.875"$ ( $\varnothing 22.23$ mm) | M16 $\varnothing 16$ mm |
| 075 $\varnothing 0.750"$ ( $\varnothing 19.05$ mm) | M15 $\varnothing 15$ mm |
| 062 $\varnothing 0.625"$ ( $\varnothing 15.88$ mm) | M14 $\varnothing 14$ mm |
| 050 $\varnothing 0.500"$ ( $\varnothing 12.7$ mm)  | M12 $\varnothing 12$ mm |
| 037 $\varnothing 0.375"$ ( $\varnothing 9.525$ mm) | M10 $\varnothing 10$ mm |
| M20 $\varnothing 20$ mm                            |                         |

#### Operating temperature

- E -40...+212 °F (-40...+100 °C)

#### Phasing

- B Standard phasing, CCW rotation, A leads B (factory setting)
- D Phasing option, CW rotation, A leads B

#### Connection

- MI07 MIL-connector, 7-pin (at ABZ\_, AB9\_, AB0\_)
- MI10 MIL-connector, 10-pin (at ABZC, AB9C)
- C012 Cable gland with cable and wire end sleeves L=12" (305 mm)
- C018 Cable gland with cable and wire end sleeves L=18" (457 mm)
- C024 Cable gland with cable and wire end sleeves L=24" (610 mm) \*\*

#### Output signals

- ABZC A+B Track + Zero pulse 180° at B low + complements (factory setting at MI10 or cable)
- AB9C A+B Track + Zero pulse 90° at A&B low + complements
- ABZ\_ A+B Track + Zero pulse 180° at B low (factory setting at MI07)
- AB9\_ A+B Track + Zero pulse 90° at A&B low
- AB0\_ A+B Track; no zero pulse

#### Voltage supply / signals

- T Linedriver (TTL): Vin = 4.75...30 VDC, Vout = 5 V (7272), programmable (factory setting)
- H Push-pull (HTL): Vin = 4.75...30 VDC, Vout = Vin (7272), programmable

#### Pulses programmable

- 00001...08192 ppr programmable (1024 ppr factory setting)

\*\* Other cable lengths on request.

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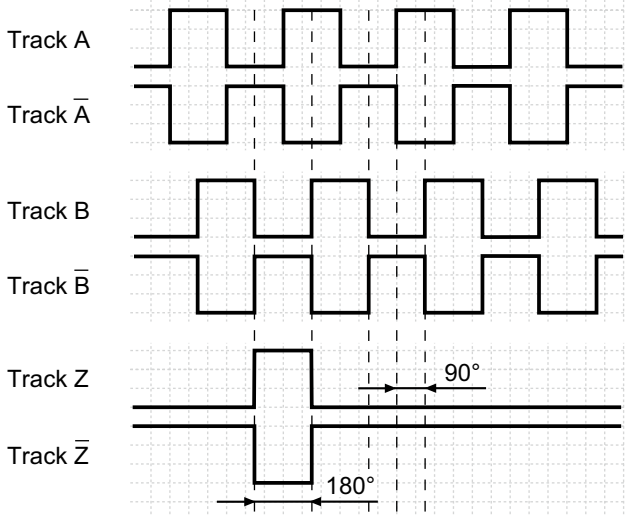
1...8192 pulses per revolution programmable (interpolated system)

## HS35P - Programmable

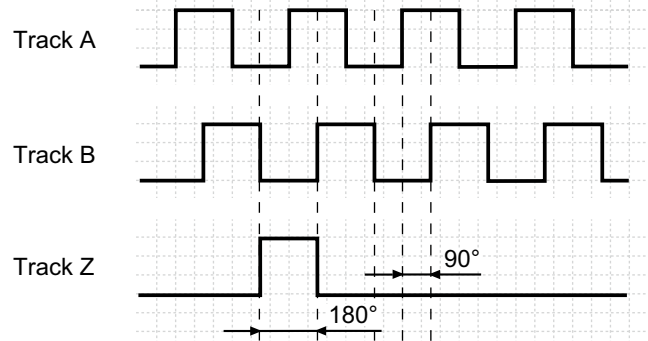
### Output signals

Phasing = B: Counterclockwise rotation (standard) from clamping end.  
Phasing = D: Clockwise rotation (option) from clamping end.

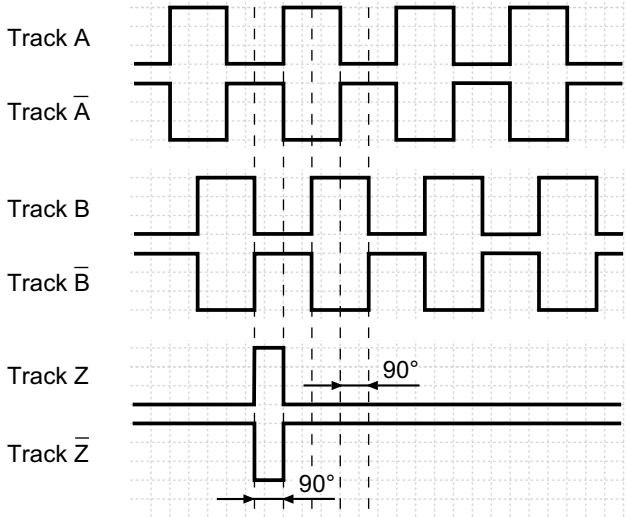
ABZC-Output signals



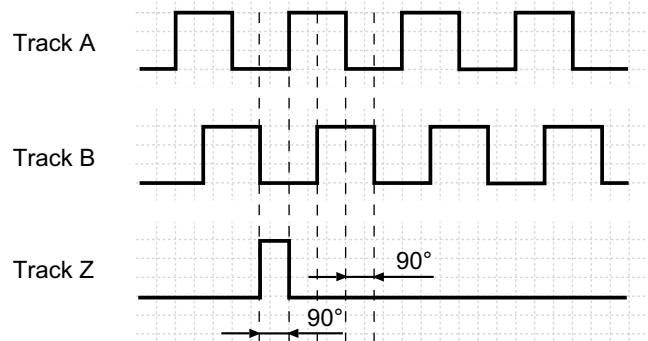
ABZ\_-Output signals



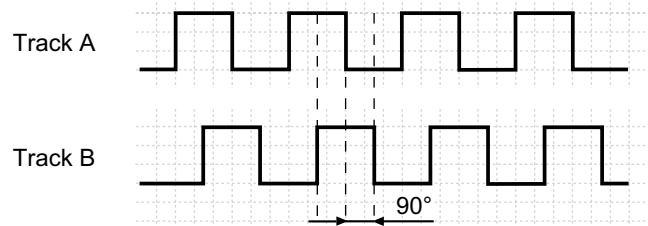
AB9C-Output signals



AB9\_-Output signals



AB0\_-Output signals



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### Trigger level

Outputs	Linedriver (TTL, ET7272)
Output level High	$\geq 2.4$ V
Output level Low	$\leq 0.5$ V
Load	$\leq 40$ mA

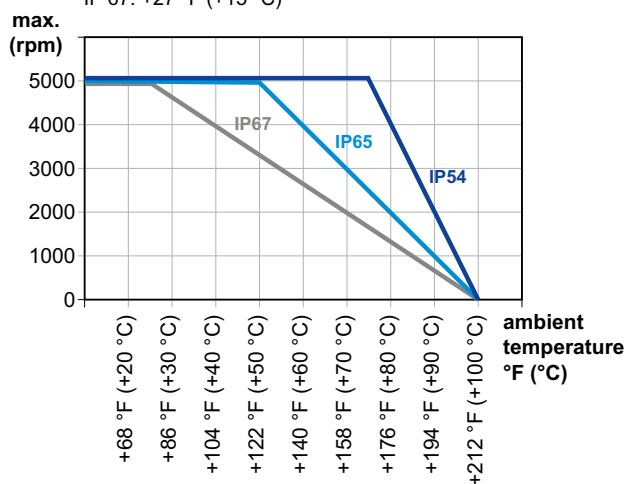
Outputs	Push pull (HTL, ET7272)
Output level High	$\geq U_B - 3$ V
Output level Low	$\leq 1.5$ V
Load	$\leq 40$ mA

### Temperature diagram

ambient temperature + self heating  
 $\leq$  max. operating temperature  $+212$  °F ( $+100$  °C)

#### self-heating per 1000 rpm:

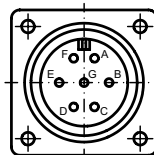
IP 54:  $+9$  °F ( $+5$  °C)  
 IP 65:  $+18$  °F ( $+10$  °C)  
 IP 67:  $+27$  °F ( $+15$  °C)



### Terminal assignment

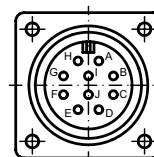
#### MI07: MIL-connector, 7-pin

Connector	Assignment
Pin A	Track A
Pin B	Track B
Pin C	Track Z
Pin D	+Vs
Pin E	–
Pin F	0 V
Pin G	Housing



#### MI10: MIL-connector, 10-pin

Connector	Assignment
Pin A	Track A
Pin B	Track B
Pin C	Track Z
Pin D	+Vs
Pin E	–
Pin F	0 V
Pin G	Housing
Pin H	Track A complement
Pin I	Track B complement
Pin J	Track Z complement



#### Cable gland (AWG26 wire)

Core colour	Assignment
green	Track A
grey	Track B
pink	Track Z
red	+Vs
blue	0 V
transparent	Shield/Housing
brown	Track A complement
black	Track B complement
white	Track Z complement

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### Accessories

#### Connectors and cables

11150977	NAC 25E 7-pin Mil Spec Mating Connector (Stock in US)
11150863	CNAC 25E0500 7-pin Mil Spec Mating Connector + cable L = 5 m (Stock in US)
11150865	CNAC 25E1000 7-pin Mil Spec Mating Connector + cable L = 10 m (Stock in US)
11150978	NAC 29H 10-pin Mil Spec Mating Connector (Stock in US)
11151376	CNAC 29H0200 10-pin Mil Spec Mating Connector + cable L = 2 m (Stock in US)
11150869	CNAC 29H0500 10-pin Mil Spec Mating Connector + cable L = 5 m (Stock in US)
11150871	CNAC 29H1000 10-pin Mil Spec Mating Connector + cable L = 10 m (Stock in US)
11151328	CNAC 29H1500 10-pin Mil Spec Mating Connector + cable L = 15 m (Stock in US)
11150872	CNAC 29H2500 10-pin Mil Spec Mating Connector + cable L = 25 m (Stock in US)
11128642	NAC 25E 7-pin Mil Spec Mating Connector
11078440	CNAC 25E 7-pin Mil Spec Mating Connector + cable L = 10 feet (3.05 m)
11078442	CNAC 25E 7-pin Mil Spec Mating Connector + cable L = 20 feet (6.10 m)
11078446	CNAC 25E 7-pin Mil Spec Mating Connector + cable L = 30 feet (9.15 m)
11126235	NAC 29H 10-pin Mil Spec Mating Connector
11078307	CNAC 29H 10-pin Mil Spec Mating Connector + cable L = 10 feet (3.05 m)
11078427	CNAC 29H 10-pin Mil Spec Mating Connector + cable L = 20 feet (6.10 m)
11078428	CNAC 29H 10-pin Mil Spec Mating Connector + cable L = 30 feet (9.15 m)

#### Mounting accessories

11076339	Torque arm T1, fixed length, for bolt 3/8" with plastic clip and screws
11075692	Torque arm T3, adjustable length, for bolt 1/4" with plastic clip and screws
11075690	Torque arm T4, adjustable length, for bolt 5/16" with plastic clip and screws
11071506	Torque arm T5, adjustable length, for bolt 3/8" with plastic clip and screws
11167978	Torque arm T6, adjustable length, kit for bolts 1/4", 5/16" and 3/8" with plastic clip and screws
11084462	Reducer insert HS35 $\varnothing 0.375"$ ( $\varnothing 9.525$ mm)
11078636	Reducer insert HS35 $\varnothing 0.50"$ ( $\varnothing 12.7$ mm)
11080114	Reducer insert HS35 $\varnothing 0.625"$ ( $\varnothing 15.875$ mm)
11078639	Reducer insert HS35 $\varnothing 0.75"$ ( $\varnothing 19.05$ mm)

#### Mounting accessories

11078654	Reducer insert HS35 $\varnothing 0.87"$ ( $\varnothing 22.225$ mm)
11087744	Reducer insert HS35 $\varnothing 10$ mm
11087745	Reducer insert HS35 $\varnothing 12$ mm
11087746	Reducer insert HS35 $\varnothing 14$ mm
11148651	Reducer insert HS35 $\varnothing 15$ mm
11087747	Reducer insert HS35 $\varnothing 16$ mm
11087748	Reducer insert HS35 $\varnothing 18$ mm
11087750	Reducer insert HS35 $\varnothing 20$ mm
11075459	Dust cap HS35
11080884	Protective cage HS35

#### Programming accessories

11120547	PC Programming Tool Z-PA-EI-P
11120657	Handheld Programming Tool Z-PA-EI-H

Note: Please order connection cable (see accessories)

# Incremental encoders

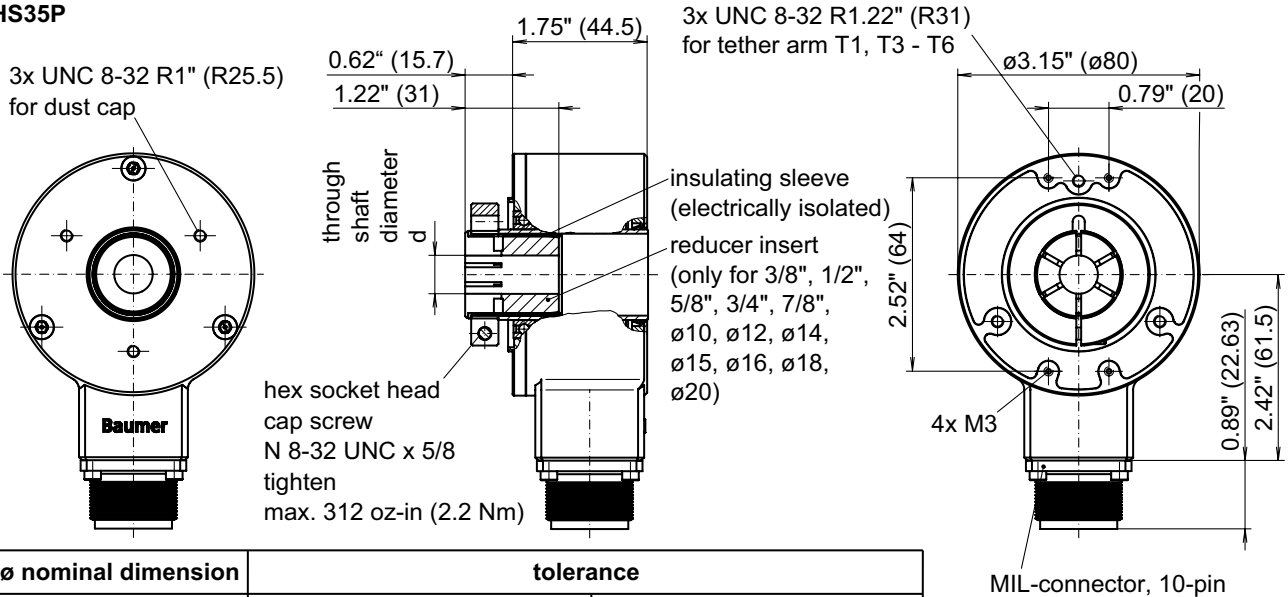
## Insulated through hollow shaft $\varnothing 0.375...1$ inch

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## HS35P - Programmable

### Dimensions

#### HS35P



$\varnothing$ nominal dimension		tolerance						
		hollow shaft encoder				recommended customer shaft		
inch (in ")	metric (in mm)		inch (in 1/1000")	metric (in $\mu$ m)		inch (in 1/1000")	metric (in $\mu$ m)	
1.000"	25.400	G7	+1.10 +0.28	+28 +7	h6	0 -0.51	0 -13	
0.875"	22.225	G7	+1.10 +0.28	+28 +7	h6	0 -0.51	0 -13	
0.750"	19.050	G7	+1.10 +0.28	+28 +7	h6	0 -0.51	0 -13	
0.625"	15.875	G7	+0.94 +0.24	+24 +6	h6	0 -0.43	0 -11	
0.500"	12.700	G7	+0.94 +0.24	+24 +6	h6	0 -0.43	0 -11	
0.375"	9.525	G7	+0.79 +0.20	+20 +5	h6	0 -0.35	0 -9	
0.787"	20	H8	+1.30 0	+33 0	g6	-0.28 -0.79	-7 -20	
0.709"	18	H8	+1.06 0	+27 0	g6	-0.24 -0.67	-6 -17	
0.630"	16	H8	+1.06 0	+27 0	g6	-0.24 -0.67	-6 -17	
0.591"	15	H8	+1.06 0	+27 0	g6	-0.24 -0.67	-6 -17	
0.551"	14	H8	+1.06 0	+27 0	g6	-0.24 -0.67	-6 -17	
0.472"	12	H8	+1.06 0	+27 0	g6	-0.24 -0.67	-6 -17	
0.394"	10	H8	+1.06 0	+27 0	g6	-0.20 -0.55	-5 -14	

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# Incremental encoders

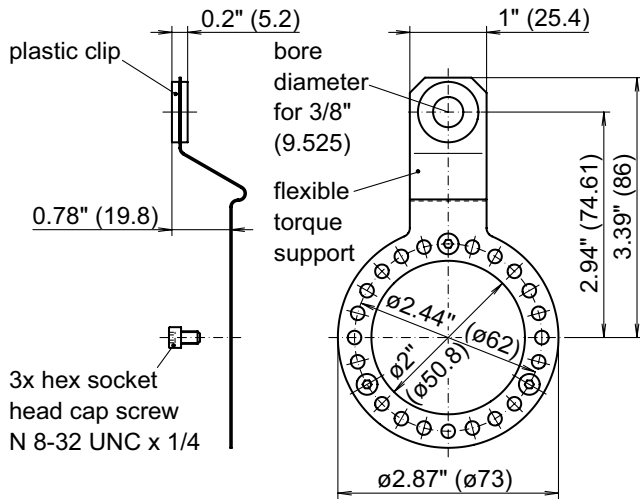
Insulated through hollow shaft  $\varnothing 0.375...1$  inch

1...8192 pulses per revolution programmable (interpolated system)

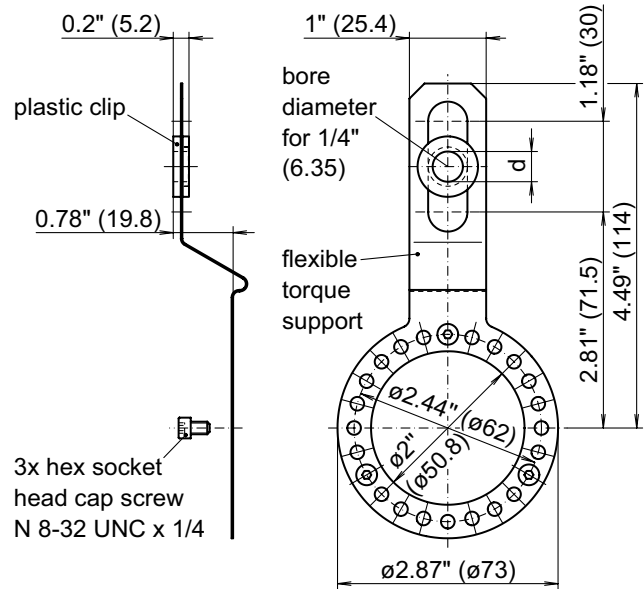
## HS35P - Programmable

### Dimensions

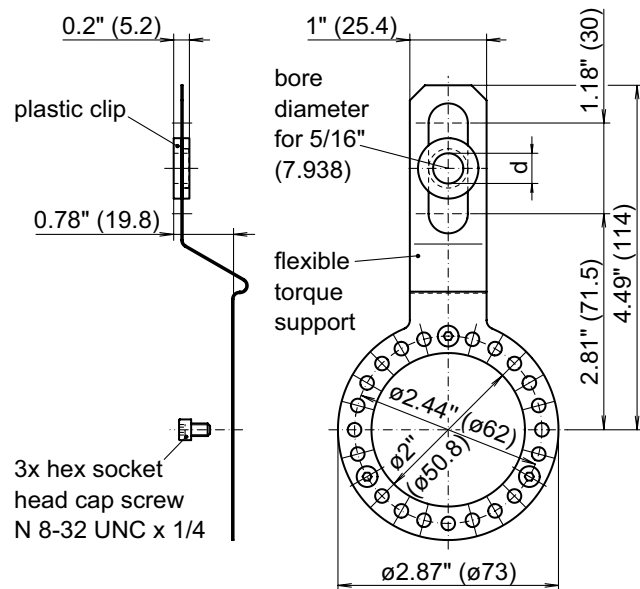
**Tether arm T1**



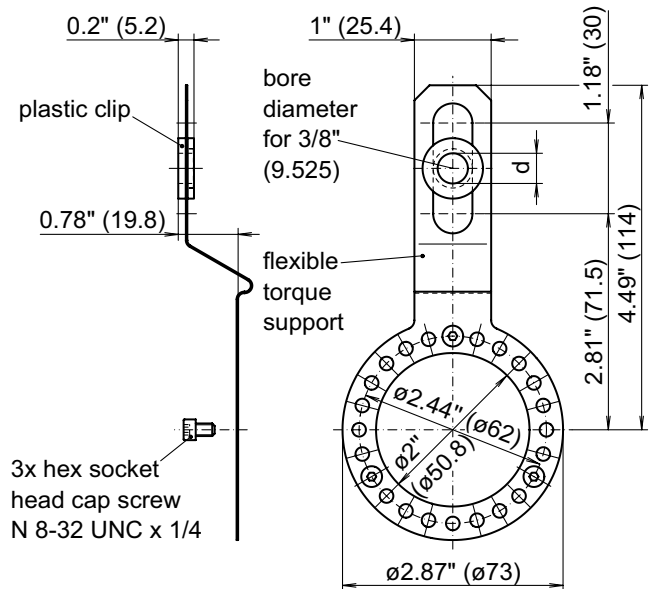
**Tether arm T3**



**Tether arm T4**



**Tether arm T5**





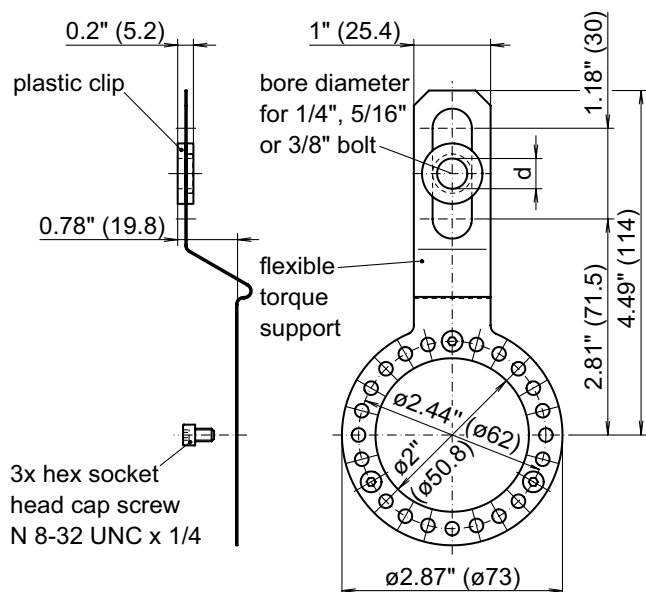
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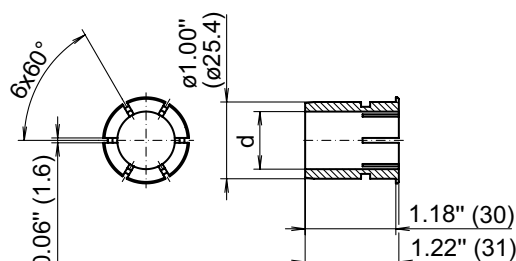
## HS35P - Programmable

### Dimensions

#### Tether arm T6

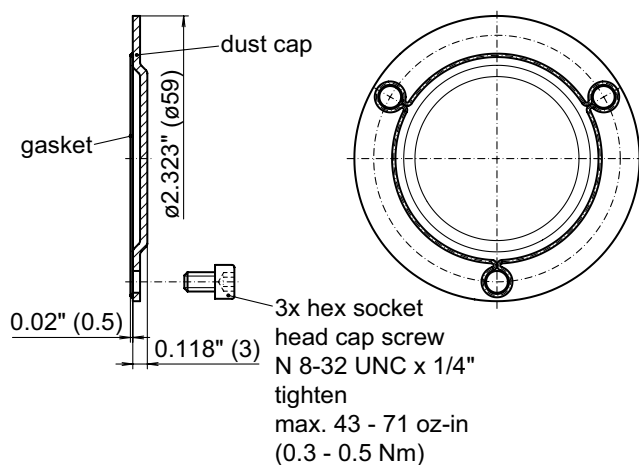


#### Reducer inserts

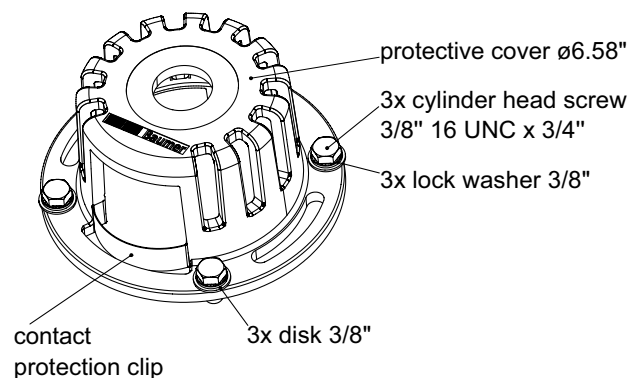


$\varnothing$ nominal dimension		tolerance			
inch (in ")	metric (in mm)		inch (in 1/1000")	metric (in $\mu$ m)	
0.875"	22.225	G7	+1.10 +0.28	+28 +7	
0.750"	19.050	G7	+1.10 +0.28	+28 +7	
0.625"	15.875	G7	+0.94 +0.24	+24 +6	
0.500"	12.700	G7	+0.94 +0.24	+24 +6	
0.375"	9.525	G7	+0.79 +0.20	+20 +5	
0.787"	20	H8	+1.30 0	+33 0	
0.709"	18	H8	+1.06 0	+27 0	
0.630"	16	H8	+1.06 0	+27 0	
0.551"	15	H8	+1.06 0	+27 0	
0.551"	14	H8	+1.06 0	+27 0	
0.472"	12	H8	+1.06 0	+27 0	
0.394"	10	H8	+1.06 0	+27 0	

#### Dust cap HS35



#### Protective cage HS35





# Incremental encoders

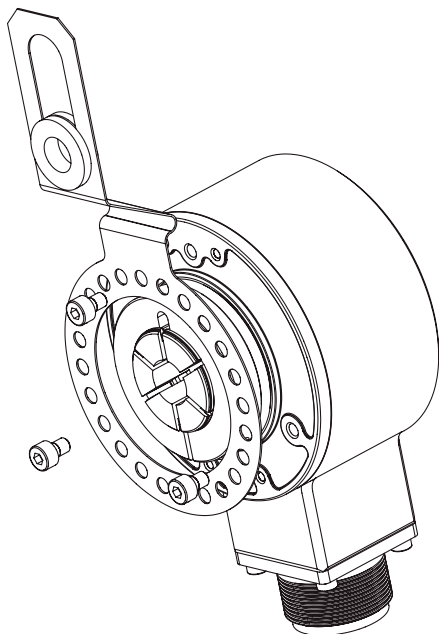
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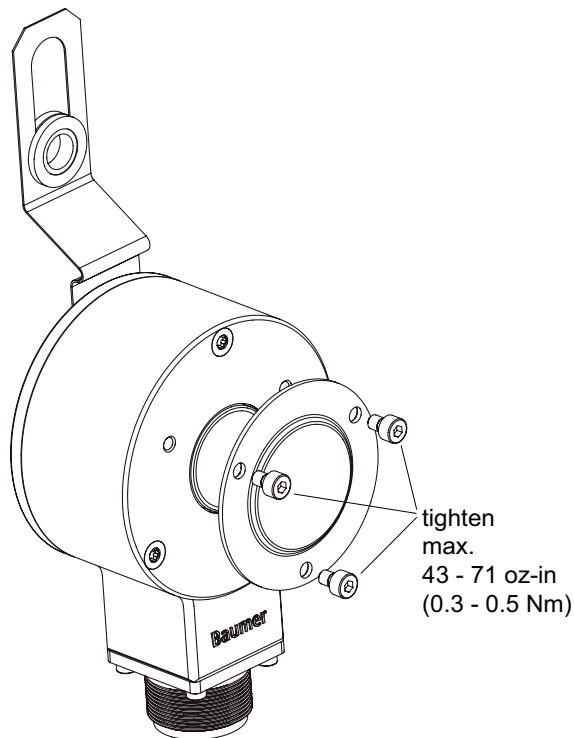
## HS35P - Programmable

### Dimensions

Example fitting tether arm



Example fitting dust cap



Example fitting protective cover

