



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



LP SERIES | MODEL LP35

LOW PROFILE PROGRAMMABLE ENCODER



Features

- Low profile package saves space
- Excellent resistance to shock and vibration
- 30mm standard through shaft, PEEK reduction hub available
- High protection level of IP66
- High performance in temperatures from -40°C to +100°C
- Resolutions up to 10,000 PPR, incremental or 16 BITS absolute
- Terminal box, M12 or cable output terminations
- Encapsulated electronics
- TTL and HTL electronics
- Reinforced electrical output available on some incremental and absolute models
 - Wiring fault tolerant with terminal box connection
 - Long cable drive capability

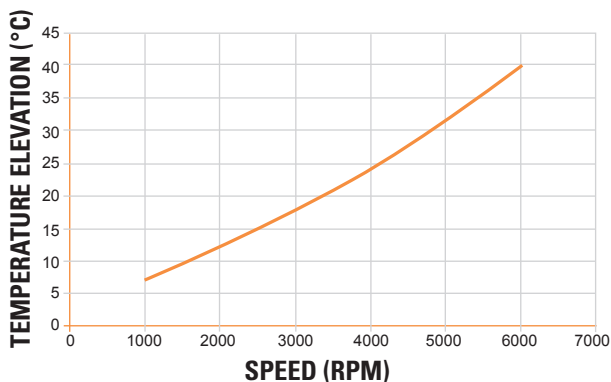
SPECIFICATIONS

Mechanical

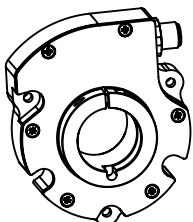
Housing Size	Standard: Ø 90mm X 26mm deep Terminal Box: 128mm tall X 116mm wide X 25mm deep. (See dimensional drawings for detail)
Shaft Size	Hollow Shaft: Ø 1/2" to Ø 1" blind or through Solid Shaft: Ø12 mm x 20 mm with keyway, Ø 3/8" x 7/8" with flat Hollow Shaft w/ Integrated Coupling: 14mm, 20mm, 1/2", 3/4"
Permissible Shaft Loads	Axial: 40 N Radial: 80 N
Shaft Runout	Hollow Shaft: 0.1 mm [0.004"] TIR Solid Shaft: 0.02 mm [0.001"] TIR Hollow Shaft w/ Integrated Coupling: N/A
Static/ Dynamic Torque	30 / 300 mN.m [4.2/ 42 oz-in] @ 25°C
Bearings	6807 - Sealed
Material	Cover: Clear anodized aluminum Body: Clear anodized aluminum Shaft: AISI 303 stainless steel
Bearing Life L_{10h} (Theoretical Mechanical Lifetime)	> 18.10 ⁹ turns / 100000 hours
Continuous Max. Speed	6000 RPM, (Reference Chart 1. Speed vs Temperature)
Shaft Moment of Inertia	< 84000 g.mm ² [11.9 x 10 ⁻³ oz*in*sec ²]
Weight (approx.)	Terminal Box: 790g M12 or cable: 450g

Chart 1. Speed vs Temperature

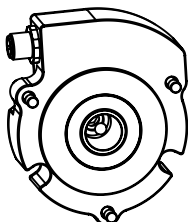
(Temperature on this chart to be added to ambient temperature. Do not exceed maximum temperature on datasheet.)



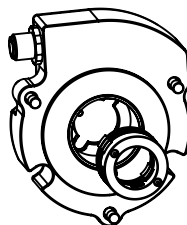
Cable or M12 Connection Shaft Options



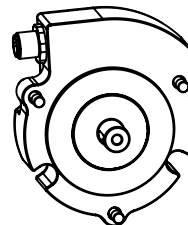
Through Hollow Shaft



Blind Hollow Shaft



Shaft with Integrated coupling



Solid Shaft

Electrical

	Absolute	Incremental
Output Format	SSI compatible (RS422)	Two channels in quadrature + index and complements
Resolution	Up to 16 BITS	Up to 10,000 CPT
Encoder Accuracy	±0.1°	
Supply Voltage Vcl	5-30 Vdc	Cable or M12: 5-30V (28/V) and 4.75-30V (28/5) Terminal Box: 11-30V (28/VR), 5-30V (28/V) and 4.75-30V (28/5)
Supply Current (No Loads)	75mA Typ	Cable or M12: 75mA Terminal Box: 100mA (28/VR), 75mA (28/V and 28/5)
Current Per Channel Pair	40mA max	Cable or M12: 40mA Terminal Box: 60mA (28/VR), 40mA (28/V and 28/5)
Voltage / Output	28/SI: SSI RS485 w/o parity 28/SR: SSI RS485 reinforced w/o parity Terminal Box version only	28/V: Line driver 5-30 V In/Out; PushPull 28/5: Line driver with 5 V (TTL) regulated output 28/VR: Push Pull 11-30V reinforced. Terminal Box version only
Short Circuit Proof	28/SI: Yes (except to V+) 28/SR: Yes	Cable or M12: Yes (28/V) and Yes (except to Vcl) (28/5) Terminal Box: Yes (28/VR), (28/V) and (28/5) except to Vcl
Reverse Polarity Tolerant	Yes	
Wiring Fault Tolerant & Overvoltage Prot.	28/SI: No 28/SR: Yes	Cable or M12: No Terminal Box: Yes Up to 60Vdc (28/VR) and No (28/V and 28/5)
Frequency Response	Cable or M12: Up to 1MHz Terminal Box: Up to 300kHz (28/VR), Up to 1MHz (28/V and 28/5)	
Output Terminations	Cable, M12 or Terminal Box	
EMC	EN 61000-6-2 : 2005, see user manual for details EN 61000-6-4 : 2017 + A1 : 2011, see user manual for details	
Isolation	1000V	

Environmental

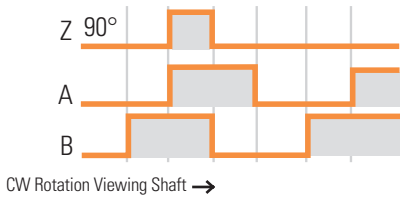
Protection Class (sealing)	IP66	
Temperature Range	Cable or M12: -40°C +100°C Terminal Box: -40°C +85°C (28/VR), -40°C +100°C (28/V and 28/5)	
Mechanical Resistance	Shock	(EN60068-2-27): $\leq 3000\text{m.s}^{-2}$ (5 ms, half sine) (300 G's)
	Vibration	(EN60068-2-6): $\leq 200\text{m.s}^{-2}$ (55 ... 2 000 Hz) (20 G's)
Humidity	98% RH without condensation	

OUTPUT WAVEFORMS

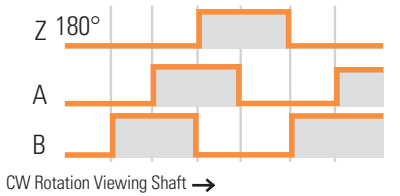
Waveform AA/ BB/ 00/ Channel B before A Clockwise (US convention is A leads B CCW)

Incremental Waveform

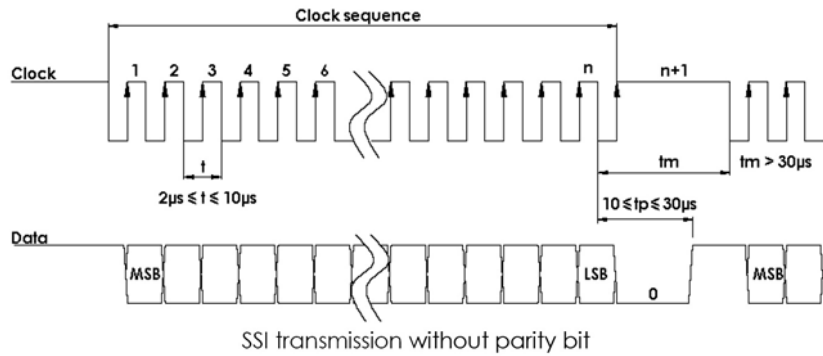
INDEX GATED WITH A & B HIGH (CODE Q28)



INDEX GATED WITH B LOW (CODE Q29)



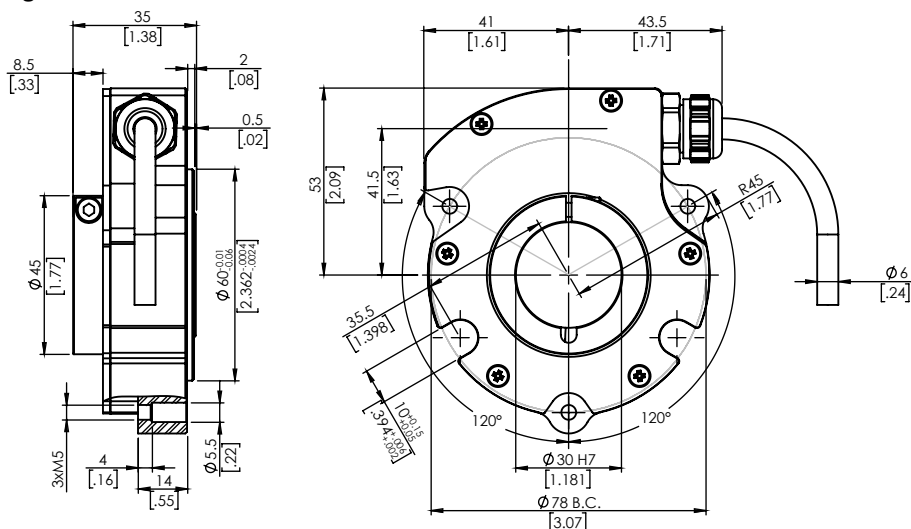
Absolute SSI Waveform



DIMENSIONS^(A)

All dimensions are in millimeters [inches]

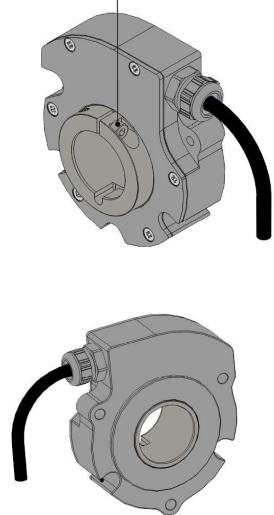
Through hollow shaft



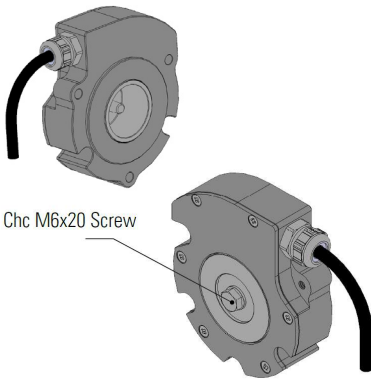
NOTE:

CHc : Hexagonal Socket head cap screws HC : Hexagonal socket set screws

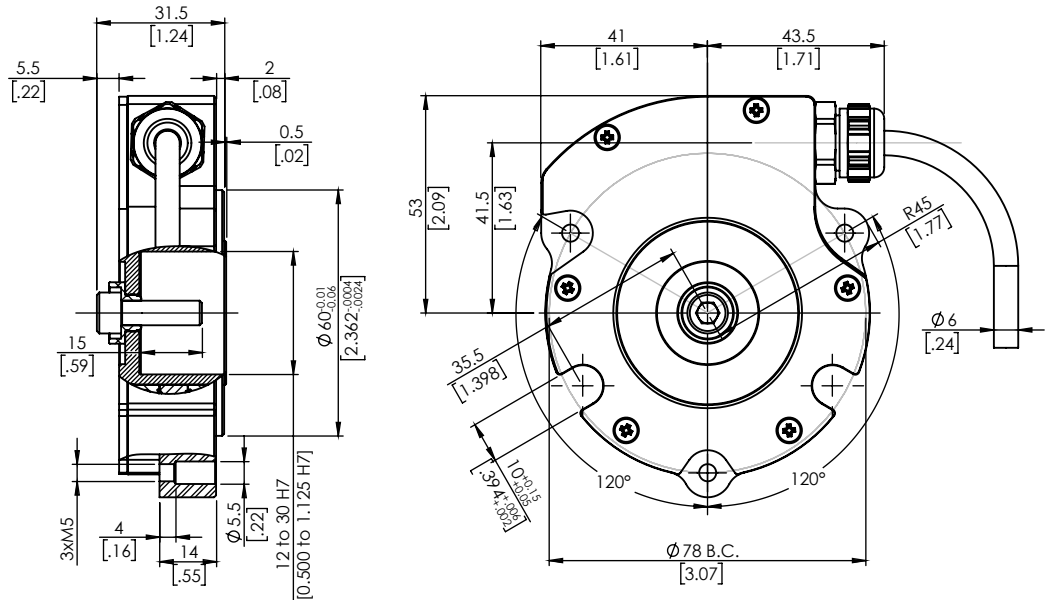
CHc M4 Screw (SW3)



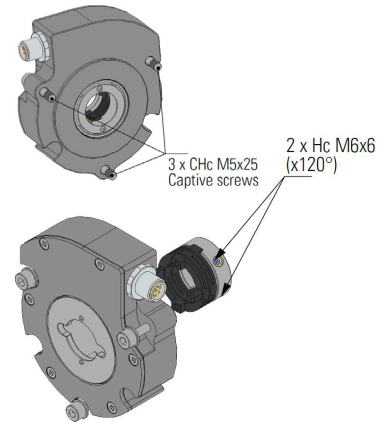
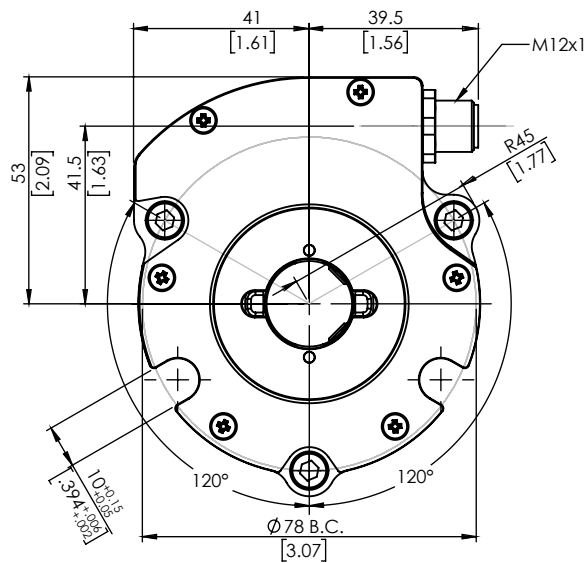
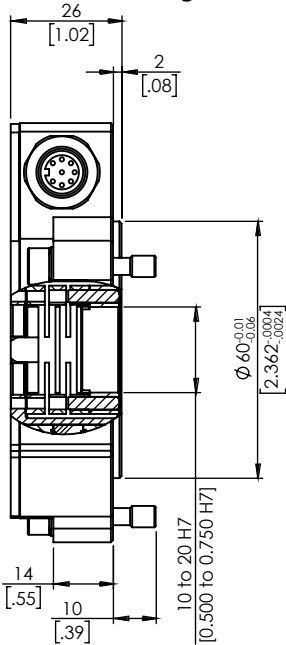
Blind hollow shaft



Chc M6x20 Screw

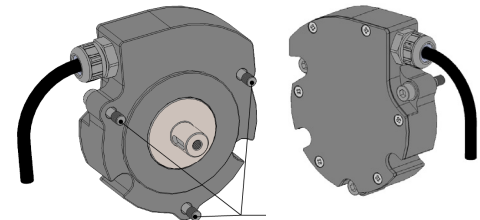
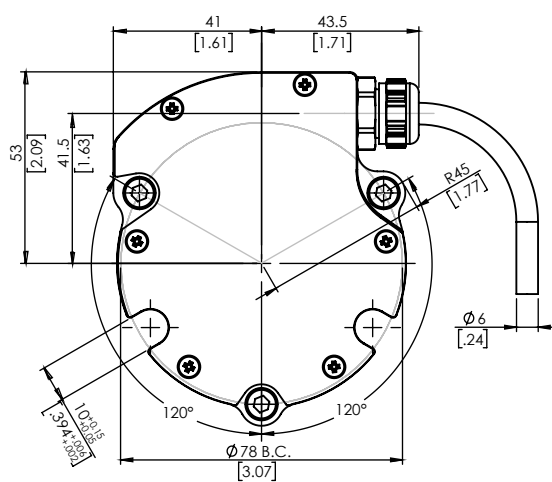
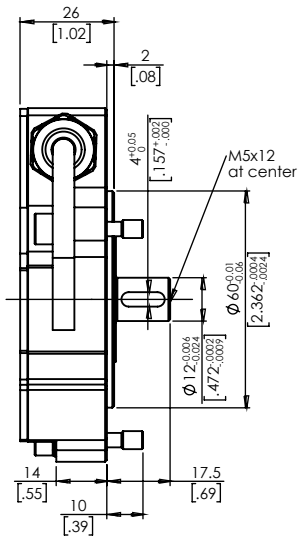


Shaft with integrated coupling

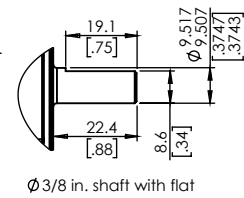


3 x Chc M5x25 Captive screws
2 x Hc M6x6 (x120°)

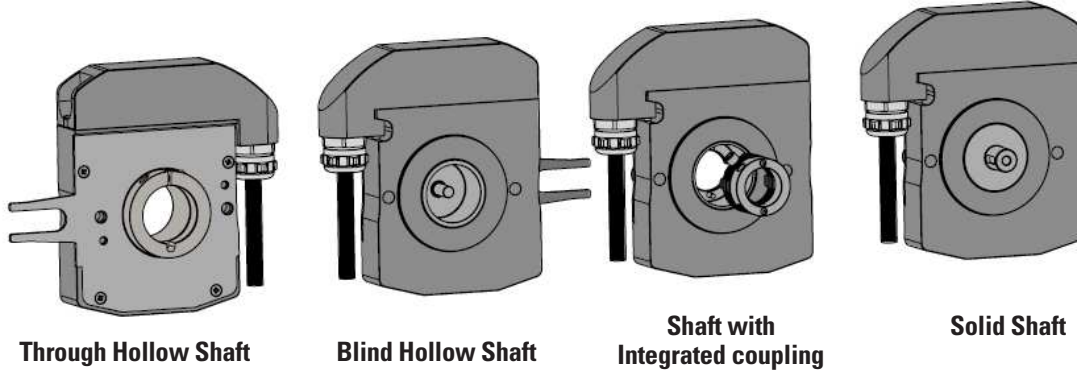
Solid shaft



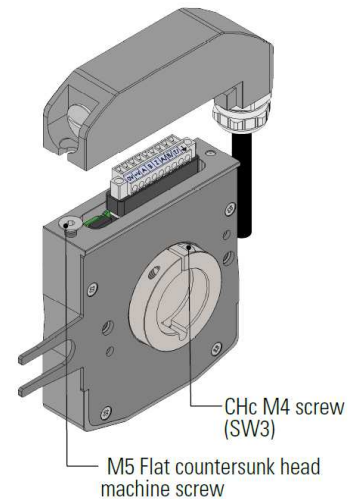
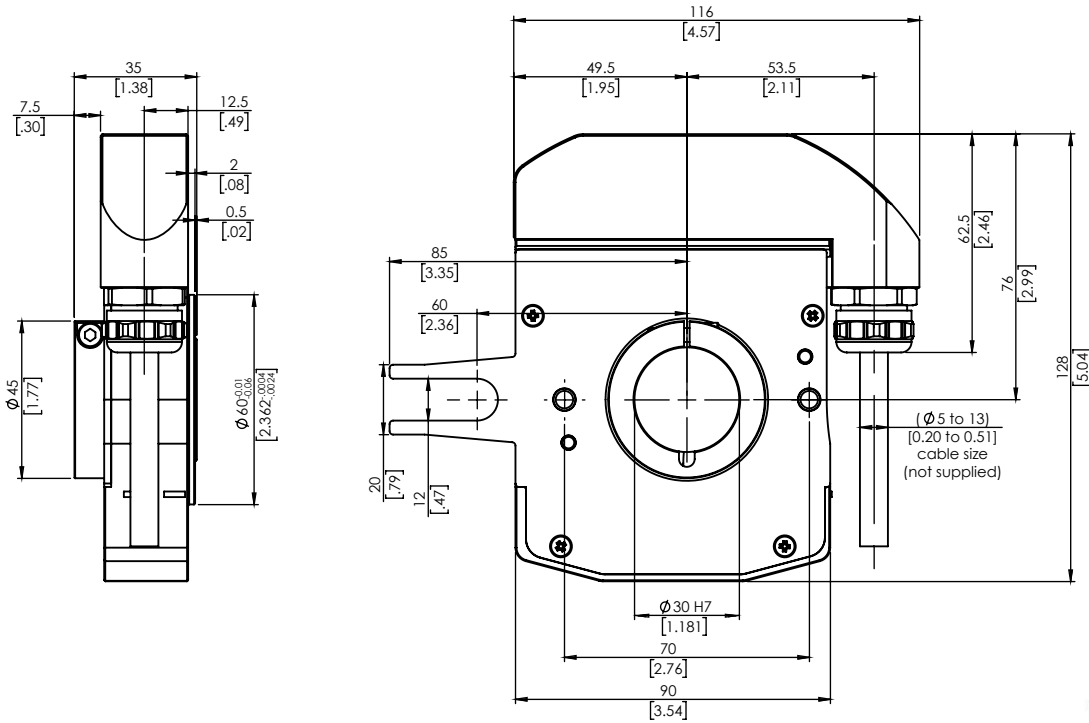
3x Chc M5x25 Captive screws



$\phi 3/8$ in. shaft with flat

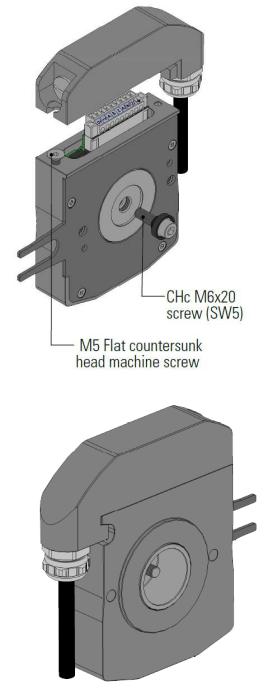
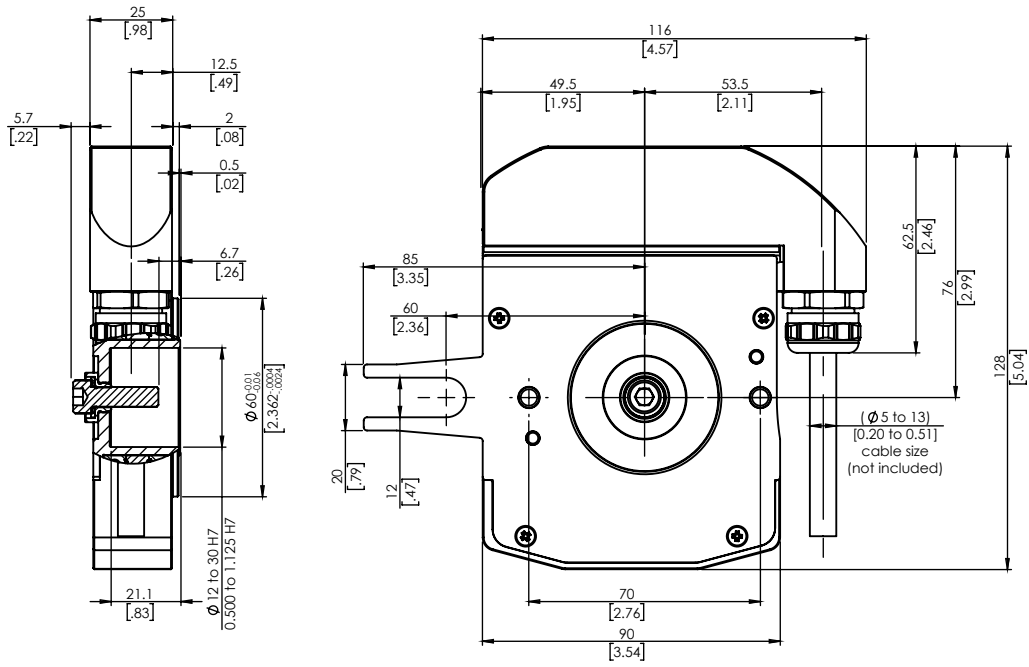


Through hollow shaft

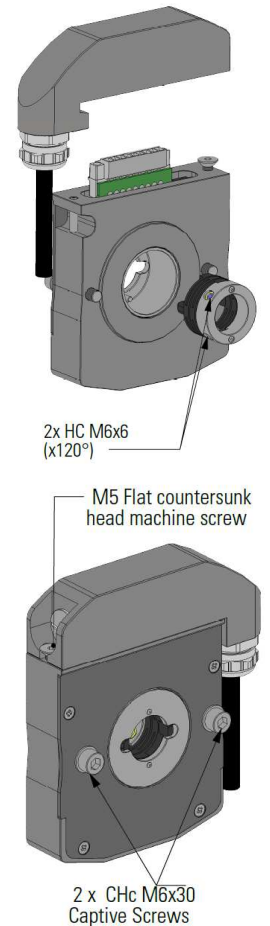
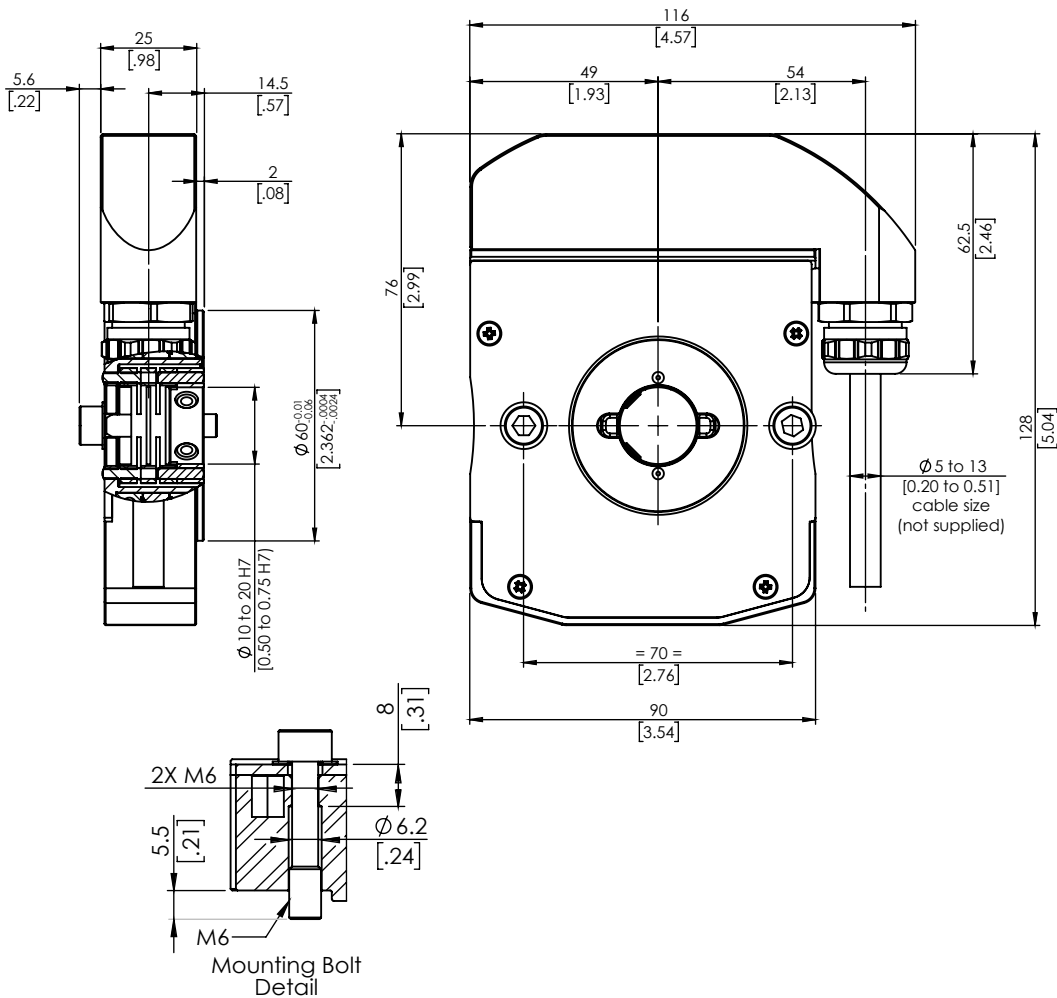


NOTE:
CHc : Hexagonal Socket head cap screws HC : Hexagonal socket set screws

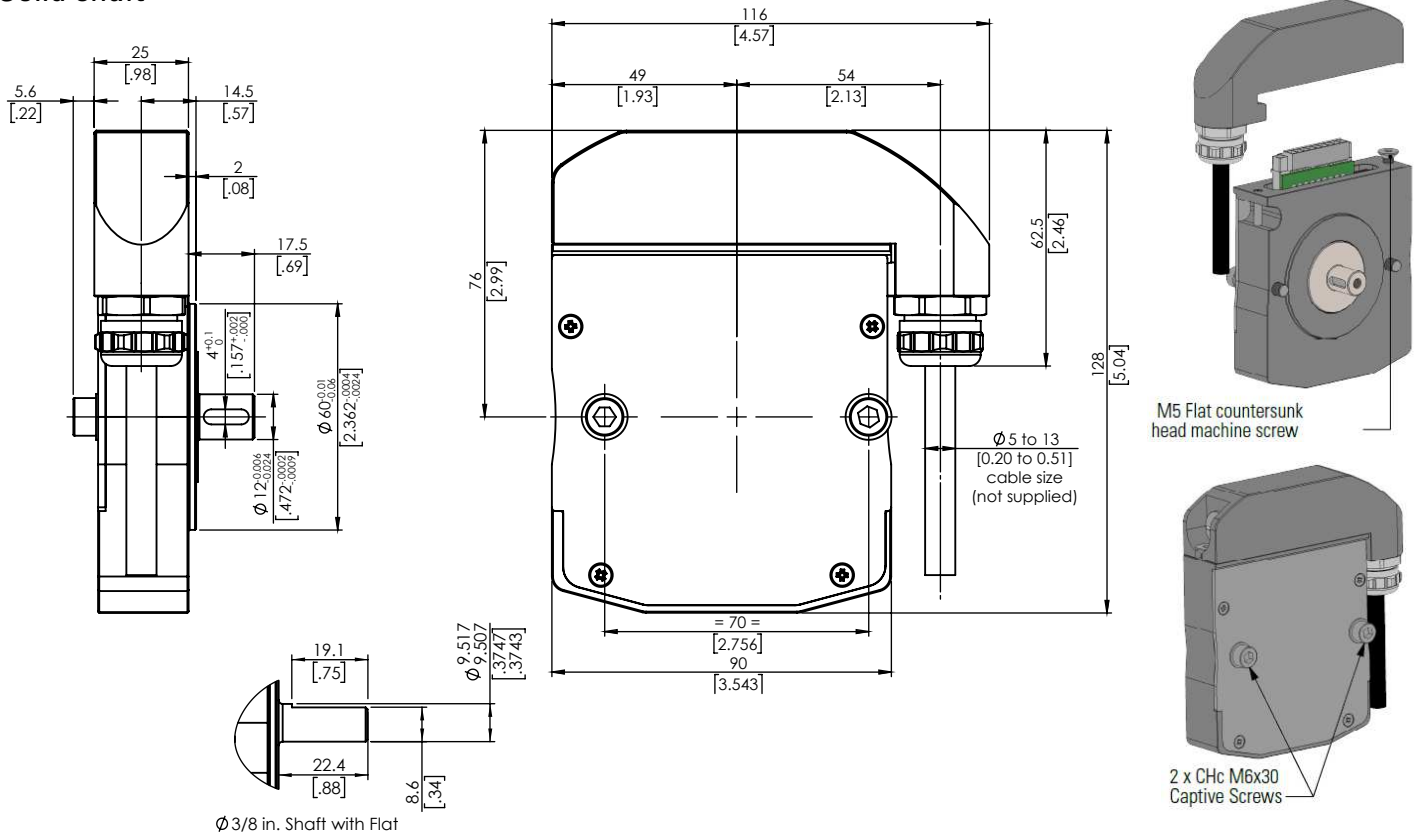
Blind hollow shaft



Shaft with integrated coupling

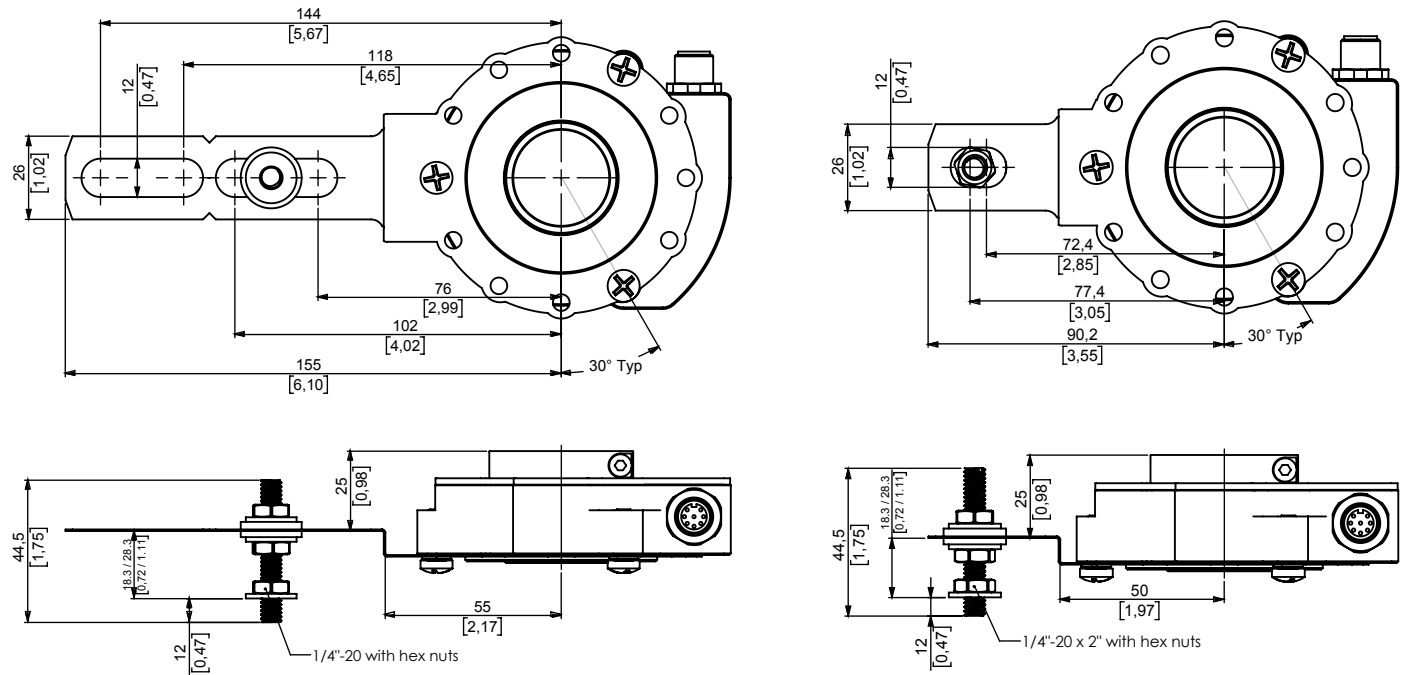


Solid shaft



TETHER OPTIONS FOR STANDARD CABLE OR M12 CONNECTOR

Other options available, consult factory. Tethers come with all the hardware shown.

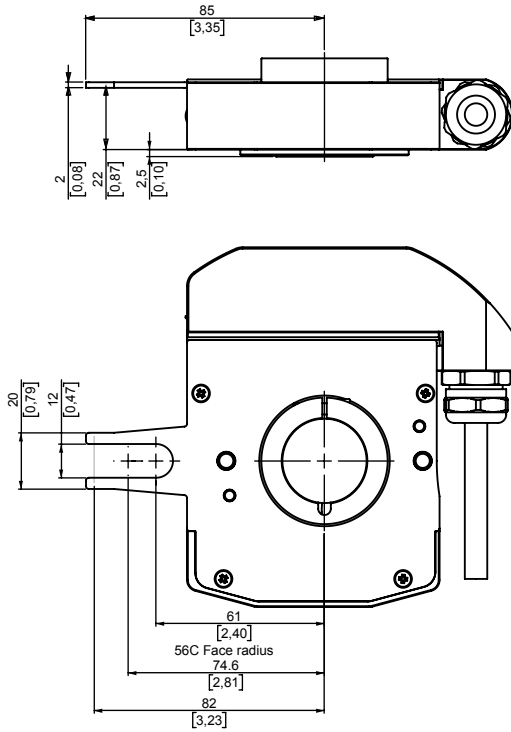


T2- Long tether arm with 1/4"-20 adj. hardware – M9445/053-02

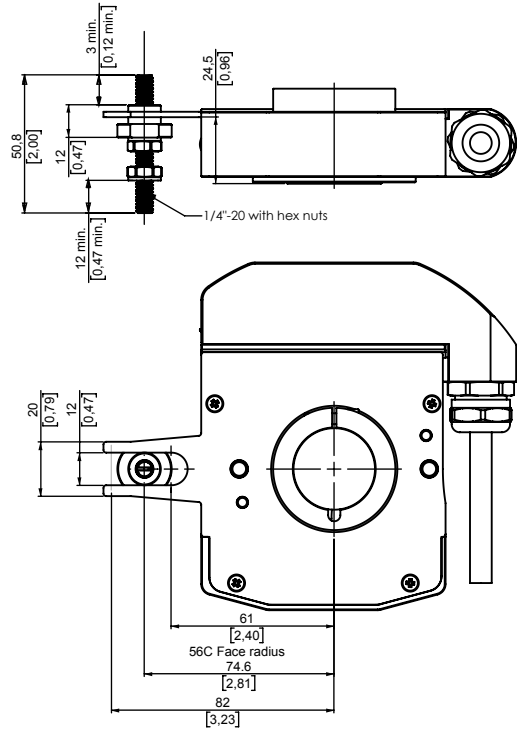
T3-Short tether arm with 1/4"-20 adj. hardware (fits 56C) – M9445/058-02



TETHER OPTIONS FOR TERMINAL BOX OUTPUT



T4- Standard Fork is provided for all blind or through hollow shaft versions



T5- M9445/059-01 Standard Fork + 56C Face Pin



TERMINATIONS

Connection Incremental

Termination	Connection Ordering Code	Description	-	+	A	B	Z	A/	B/	Z/	Case Ground
M12	M12	EUR M12 - 8 pins	1	2	3	4	5	6	7	8	Connector Body
Cable	SG	PVC Jacket	BLK	RED	YEL	BLU	ORN	WHT/ YEL	WHT/ BLU	WHT/ ORN	GRN
Terminal Box	T	Terminal box - 9 pins	1	2	3	4	5	6	7	8	9

Other cable types available- Consult factory

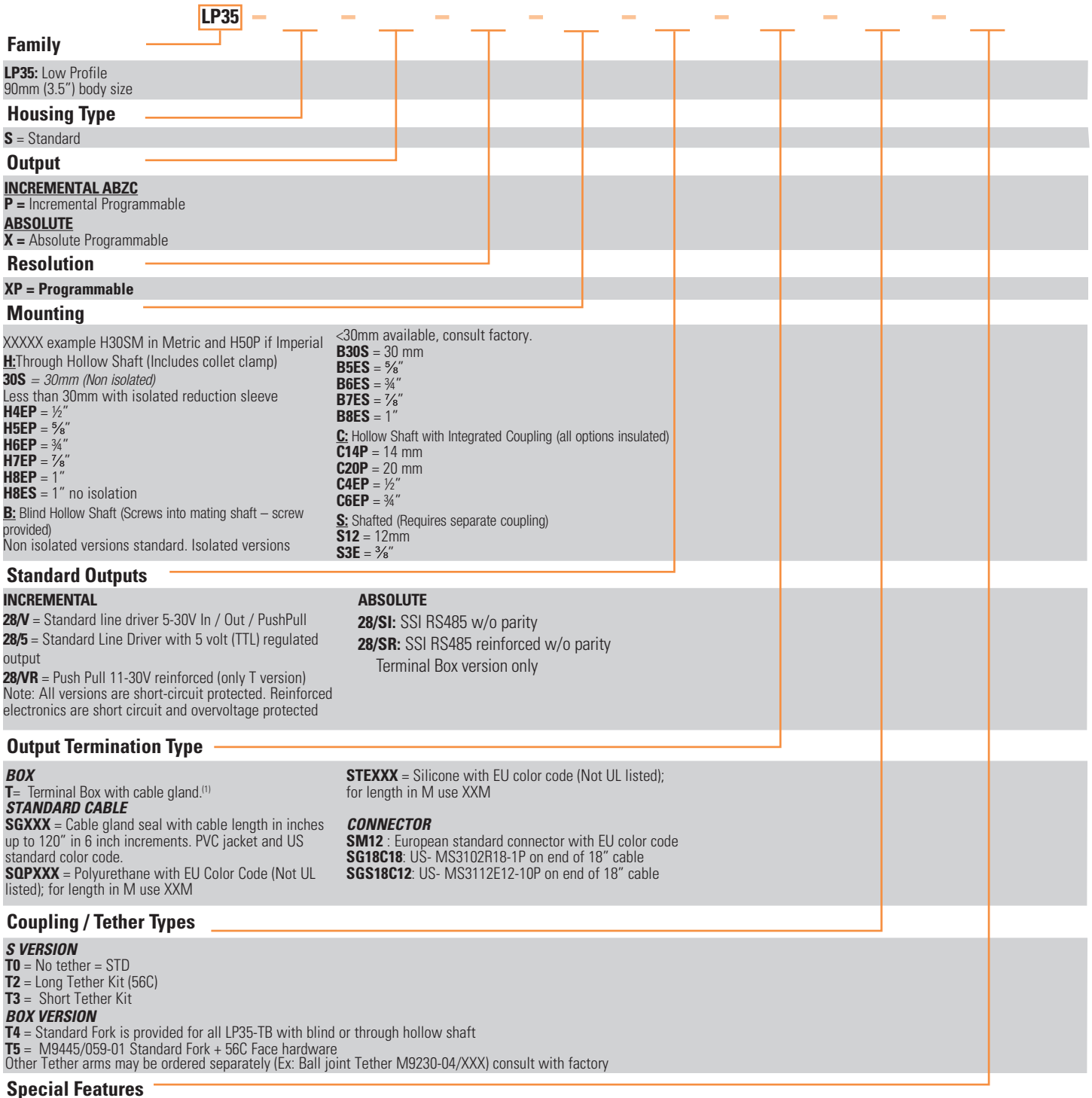
Connection Absolute SSI

Termination	Connection Ordering Code	Description	-	+	Clk+	Clk-	Data+	Data-	Reset	NC	Case Ground
M12	M12	EUR M12 - 8 pins	1	2	3	4	5	6	7	N/A	Connector Body
Cable	SG	PVC Jacket	BLK	RED	BLU	WHT/ BLU	YEL	WHT/ YEL	ORN	N/A	GRN
Terminal Box	T	Terminal box - 9 pins	1	2	3	4	5	6	7	8	9



ORDERING OPTIONS - NORTH AMERICAN LP35 MODELS

Use this diagram, working from left to right to construct your model number (Example : LP35-S-P-XP-H30S-28/V-SGXXX- T0)



NOTE: ⁽¹⁾"T" Code changes the form from approximately 90mm (3.5") round to a rectangle that is approximately 128mm (5") high by 116mm wide (4.5")



HOW TO USE THE PROGRAMMABLE FEATURE



- Download the software and drivers on BEI Sensors website <http://www.beisensors.com/programmable-encoders.html> Choose the « LP Series : Programmable Resolution Incremental and Absolute Encoders »
- Prior to using the software programming cable, the USB programming tool must be installed on the PC. OS requirements: Windows XP or higher.
- Administrator rights may be required for driver software installation.

Overview of General Programming Procedure

Connect the terminal box, M12 connector or encoder wires from the encoder to the programming tool.



Double check wiring before inserting USB plug into PC.

Connect the programming tool to a PC.

Launch LP series PC programming tool software.

The software detects the encoder type and then gives access to the relevant encoder parameters

Change the encoder parameters as needed

End the programming sequence by clicking on the Program button.

Disconnect the encoder

Incremental

- Once the program has recognized a valid connection between the programming tool and the computer, then the encoder and the programming tool, two green check marks will appear in the upper right hand corner.
 - Select the resolution – this is the number of cycles per turn that the encoder will generate. Also sometimes referred to as counts or CPT.
 - Phase advance determines whether the encoder sequence of the data channels: whether A leads B Clockwise (CW) or Counterclockwise (CCW).
 - You have a choice of three different index track widths: 90° (1/4 cycle), 180° (1/2 cycle) or 360° (Full Cycle)
 - You can also choose the relationship between the index and the other data tracks.
- Once you have the encoder set the way you want it, end the programming sequence by a click on the Program button.



Absolute

- Once the program has recognized a valid connection between the programming tool and the computer, then the encoder and the programming tool, two green check marks will appear in the upper right hand corner.
- Select the resolution – this is the number of counts per turn, expressed as Bits, that the encoder will generate. For example 10 = 10 Bits = 1024 counts, 12 = 12 Bits = 4096 counts
- Evolution code determines whether the encoder will increase or decrease counts when turned in the clockwise CW direction
- You will also have a choice of whether to count in Natural Binary or Gray Code. For most common applications Gray Code is preferred as it is more immune to noise and propagation delays.
- You also have an opportunity to set the “zero” or starting point at the current location of the encoder by clicking the RESET button.
- Once you have the encoder set the way you want it, end the programming sequence by a click on the Program button.



Incremental with Commutation Track Version

- Once the program has recognized a valid connection between the programming tool and the computer, then the encoder and the programming tool, two green check marks will appear in the upper right hand corner.
 - Select the resolution – this is the number of cycles per turn that the encoder will generate. Also sometimes referred to as counts or CPT.
 - Next, choose the number of commutation pair poles from one to 16
 - Phase advance determines whether the encoder sequence of the data channels: whether A leads B Clockwise (CW) or Counterclockwise (CCW). This also affects the direction of the commutation cycles as well.
 - You have a choice of three different index track widths: 90° (1/4 cycle), 180° (1/2 cycle) or 360° (Full Cycle)
 - You can also choose the relationship between the index and the other data tracks.
- Once you have the encoder set the way you want it, end the programming sequence by a click on the Program button.



AGENCY APPROVALS & CERTIFICATIONS

UL International France S.A.

Espace Technologique, Bâtiment Explorer Route
de l'Orme F-91190 SAINT-AUBIN France

T:: +33 1 60 19 88 00

F:: +33 1 60 19 88 80



Proc. Cont. Eq.
E477663



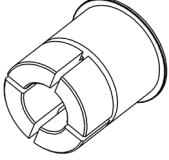
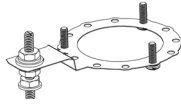
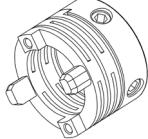
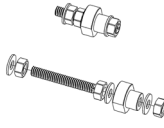
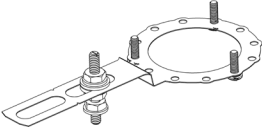

GENERAL NOTES

^(A) For detailed installation instructions and recommend screw torques refer to the User's Manual



ACCESSORIES

The following accessories are included with your LP series encoder and defined by your part number selection.

 <p>Bore Reduction Sleeve</p>	<p>9418/H20 = 20 mm bore 9418/H8E = 1 in. bore 9418/H7E = 7/8 in. bore 9418/H6E = 3/4 in. bore 9418/H5E = 5/8 in. bore 9418/H4E = 1/2 in. bore 9418/H3E = 2/8 in. bore</p>	 <p>Short Tether Arm Kit</p>	<p>M9455/058 = short tether, 8 x 1 mm rod M9455/058-01 = short tether, 3/8"-16 rod M9445/053-02 = short tether, 1/4"-20 rod</p>
 <p>Integrated Coupling Kit (includes flex, hub and set screws)</p>	<p>M9410/009-14 = 14 mm M9410/009-20 = 20 mm M9410/009-E3 = 1/4 in. M9410/009-E4 = 1/2 in. M9410/009-E6 = 5/8 in.</p>	 <p>Tether Pin Kit</p>	<p>M9445/059 = 10 x 1.5 mm rod and hardware M9445/059-01 = 3/8"-16 rod and hardware M9445/059-02 = 1/4"-20 rod and hardware</p>
 <p>Long Tether Arm Kit</p>	<p>M9445/053 = long tether, 8 x 1 mm rod M9445/053-01 = long tether, 3/8"-16 rod M9445/053-02 = long tether, 1/4"-20 rod</p>	 <p>Key for 12mm slot</p>	<p>9435/006 = 4X4X12 mm key</p>

Sensata Technologies, Inc. ("Sensata") data sheets are solely intended to assist designers ("Buyers") who are developing systems that incorporate Sensata products (also referred to herein as "components"). Buyer understands and agrees that Buyer remains responsible for using its independent analysis, evaluation and judgment in designing Buyer's systems and products. Sensata data sheets have been created using standard laboratory conditions and engineering practices. Sensata has not conducted any testing other than that specifically described in the published documentation for a particular data sheet. Sensata may make corrections, enhancements, improvements and other changes to its data sheets or components without notice.

Buyers are authorized to use Sensata data sheets with the Sensata component(s) identified in each particular data sheet. HOWEVER, NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER SENSATA INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY THIRD PARTY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT, IS GRANTED HEREIN. SENSATA DATA SHEETS ARE PROVIDED "AS IS". SENSATA MAKES NO WARRANTIES OR REPRESENTATIONS WITH REGARD TO THE DATA SHEETS OR USE OF THE DATA SHEETS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ACCURACY OR COMPLETENESS. SENSATA DISCLAIMS ANY WARRANTY OF TITLE AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUIET ENJOYMENT, QUIET POSSESSION, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS WITH REGARD TO SENSATA DATA SHEETS OR USE THEREOF.

All products are sold subject to Sensata's terms and conditions of sale supplied at www.sensata.com SENSATA ASSUMES NO LIABILITY FOR APPLICATIONS ASSISTANCE OR THE DESIGN OF BUYERS' PRODUCTS. BUYER ACKNOWLEDGES AND AGREES THAT IT IS SOLELY RESPONSIBLE FOR COMPLIANCE WITH ALL LEGAL, REGULATORY AND SAFETY-RELATED REQUIREMENTS CONCERNING ITS PRODUCTS, AND ANY USE OF SENSATA COMPONENTS IN ITS APPLICATIONS, NOTWITHSTANDING ANY APPLICATIONS-RELATED INFORMATION OR SUPPORT THAT MAY BE PROVIDED BY SENSATA.

Mailing Address: Sensata Technologies, Inc., 529 Pleasant Street, Attleboro, MA 02703, USA.

CONTACT US

Americas

+1 (800) 350 2727 – Option 1
sales.beisensors@sensata.com
Europe, Middle East & Africa
+33 (3) 88 20 8080
position-info.eu@sensata.com

Asia Pacific

sales.isasia@list.sensata.com
China +86 (21) 2306 1500
Japan +81 (45) 277 7117
Korea +82 (31) 601 2004
India +91 (80) 67920890
Rest of Asia +886 (2) 27602006
ext 2808