

INTECNO



SE22 Mini Encoder

Data Sheet

5V TTL power supply
optical model

Description

SE22 is a high performance, low cost, **hollow shaft** encoder family, very easy for assembly on shaft diameters set ranging from 1.5 mm to 8 mm.

The device provides **one, two (or two plus index) incremental encoding** square wave signals outputs. This component is very suitable for speed and incremental position detection on a wide range of applications requiring high reliability, very good performances, easy and fast assembly and low cost.

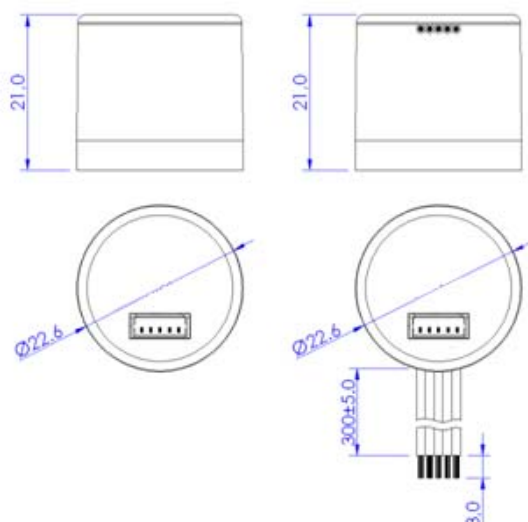
The encoder is available with several resolutions, shaft diameters and output circuits, depending on the application.

This data sheet describes the **standard model**: the 5V power supply, single ended output, optical model.

The encoder is also available with several power supply solutions, i.e. 7V~30V and 5V with line driver output; for harsh environment magnetic models are also available.

The component is available on request with connector or radial cable output.

Dimension (mm)



Encoder Resolution (CPR)	Motor Shaft Ø Diameter (mm)
001	1.50
002	2.00
004	2.30
008	2.50
050	3.00
064	3.175 (1/8")
100	4.00
108	5.00
120	5.80
124	6.00
125	6.35 (1/4")
128	8.00
150	
160	
200	
250	
256	
300	
360	

Features

- Dimensions: 22.6 mm diameter, 21 mm height.
- Quick and easy assembly without touching sensitive components
- Output channels: 1 or 2 (quadrature) + 1 optional index-channel
- Power supply: 5 VDC
- Output type: Pull up (TTL compatible), push-pull , NPN open collector.
- Resolution up to 360 CPR (counts per rotation)
- Maximum shaft diameter: 8 mm
- Operating temperature: -20 °C to +85 °C
- Frequency: 60 kHz
- RoHS compliant

Absolute Maximum Ratings

Parameters	Symbols	Min.	Typ.	Max.	Units	Notes
Storage Temperature	T _S	-40		85	°C	
Operating Temperature	T _A	-20		85	°C	
Humidity exposure				90	%RH	Not condensing
Supply voltage	V _{DC}	-0.5		7	V	

Output voltage	V _{OUT}	-0.5		V _{DC}	V	Pull Up and Push Pull versions
Output current per channel	I _{OUT}	-1.0		8	mA	Open collector version
Vibration				2000	Hz	200 m/s ² RPM

Operating Conditions.

Electrical characteristics are only effective for the range of the operating temperatures.

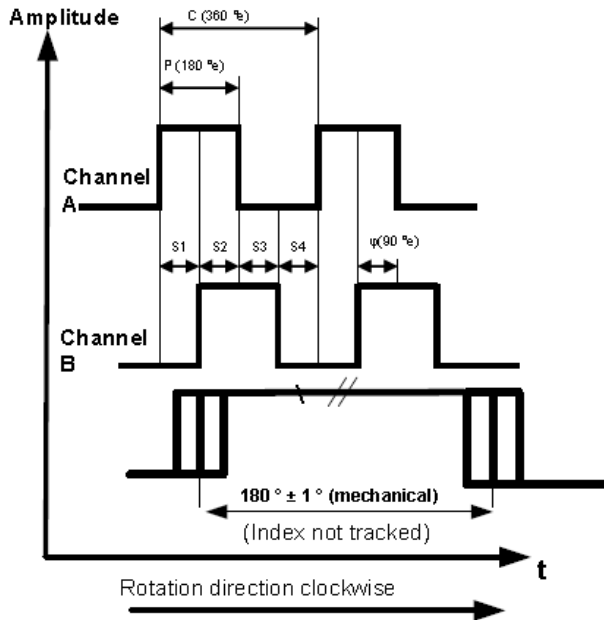
Typical values at 25°C and V_{dc} = 5 V

Parameters	Symbols	Min.	Typ.	Max.	Units	Notes
Operating Temperature	T _A	-20	25	85	°C	
Supply voltage	V _{DC}	4.5	5.0	5.5	V	
Supply current (pull up and Open collector version)	I _{DC}		20	40	mA	
Supply current (push pull version)	I _{DC}			150	mA	
Load capacitance	C _L			100	pF	
Output frequency	f		30	60	kHz	RPM x CRP/60 x 10 ⁻³
A, B & index channels						
High level output voltage (pull up version)	V_{OH}	2.4		V_{DC}	V	I_{OH} = -0.2 mA; V_{DC} = 5 V
Low level output voltage(pull up version)	V_{OL}			0.4	V	I_{OL} = 8 mA
Rise time (pull up version)	Tr		800/(5)*		ns/(μs)*	C_L = 25 pF
Fall time (pull up version)	Tf		800/(1)*		ns/(μs)*	C_L = 25 pF
High level output voltage (push pull version)	V _{OH}		3.8		V	I _{OH} = -32 mA
Low level output voltage(push pull version)	V _{OL}		0.55		V	I _{OL} = 32 mA
Rise time (push pull version)	Tr		50		ns	C _L = 25 pF, R _L = 500 ohm
Fall time (push pull version)	Tf		50		ns	C _L = 25 pF, R _L = 500 ohm
Max collector voltage (open collector version)	V _C			30	V	
Max collector current (open collector version)	I _C			50	mA	per channel
High level output voltage (open collector version)	V _{OH}			V _C – 0.7V	V	I _{OH} = -0.2 mA, R _L = 3300 ohm, V _C = 24 V
Low level output voltage(open collector version)	V _{OL}			0.7	V	I _{OH} = 0.7 mA, R _L = 3300 ohm, V _C = 24 V
Rise time (open collector version)	Tr		5		μs	C _L = 25 pF
Fall time (open collector version)	Tf		1		μs	C _L = 25 pF

(*) only for 1,2,4,8 CPR and Index channel

Channels A & B Encoding Characteristics

Parameter	Symbol	Nominal	Max. Error	Unit
Pulse Width Error	ΔP	16	75	$^{\circ}e$
Phase Error	$\Delta \phi$	12	60	$^{\circ}e$
Position Error	ΔQ	0	1.3	$^{\circ}m$



Channel A leads Channel B when the shaft rotates clockwise, viewed from the encoder top side

Definition of terms

Counts per Rotation (CPR):

The number of bar and window pairs or increments per revolution of the code wheel.

One Cycle (C):

360 electrical degrees ($^{\circ}e$), one period of the signal, caused by one pair of bar and window.

Pulse Width (P):

The number of electrical degrees that an output is high during one cycle. This value is nominally 180 $^{\circ}e$.

Pulse Width Error (ΔP): The deviation of pulse width, in electrical degree, from its ideal value of 180 $^{\circ}e$.

State Width (S):

The number of electrical degrees between a transition in the output of channel A and the neighbouring transition in the output of channel B. There are 4 states per cycle, each nominally 90 $^{\circ}e$.

Phase (ϕ):

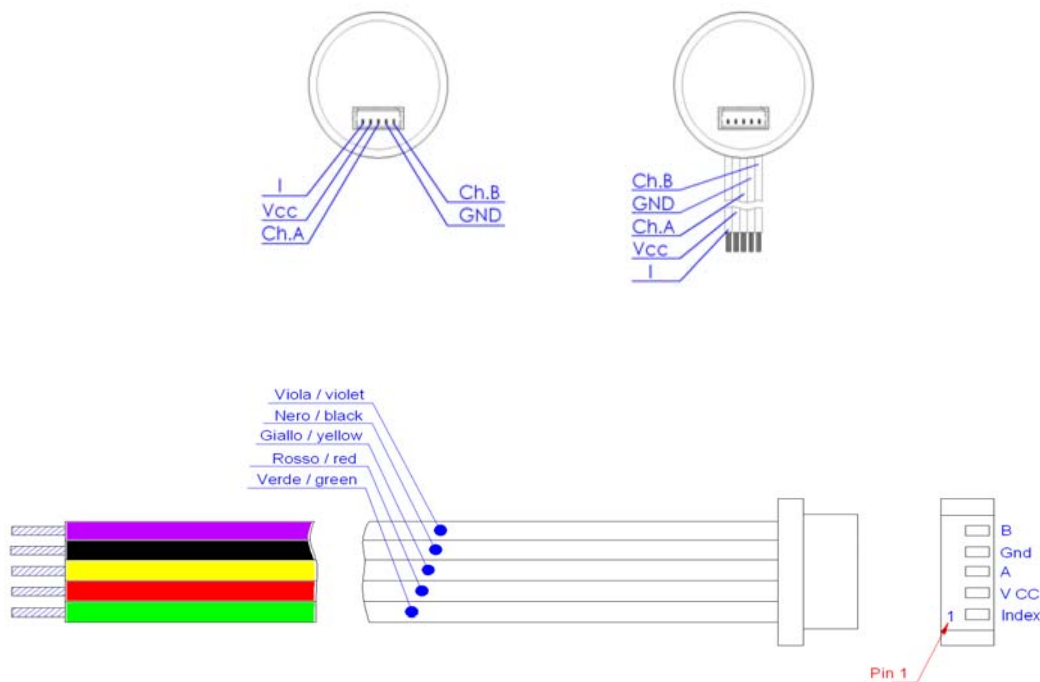
The number of electrical degrees between the centre of the high state of channel A and the center of the high state of channel B. This value is nominally 90 $^{\circ}e$.

Phase Error ($\Delta \phi$): The deviation of phase, in electrical degree, from its ideal value of 90 $^{\circ}e$.

Position Error (ΔQ):

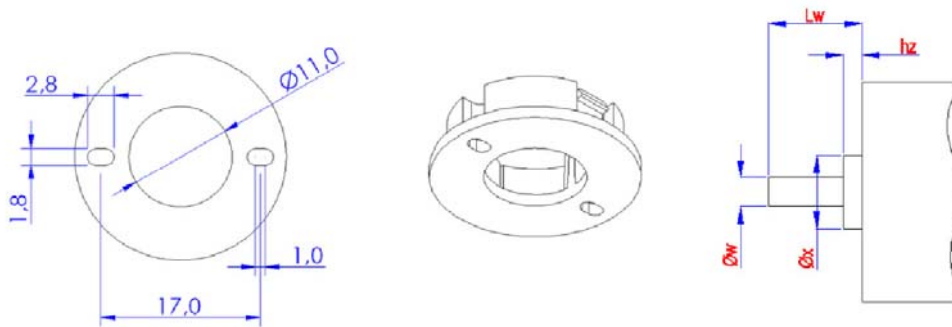
The angular difference between the actual angular shaft position and the position indicated by the encoder cycle count.

Electrical interface



Mechanical notes

Parameters	Value	Tolerance	Units
Outer dimensions	Φ 22.6 x 21	Ref.	mm
Shaft diameter ϕ_w	1.50-2.00-2.30-2.50-3.00- 3.175 (1/8")- 4.00-5.00-5.80- 6.00 -6.35 (1/4") -8.00	± 0.01	mm
Required shaft length L_w	9.5	± 1.0	mm
Max allowable axial shaft play	0.6	---	mm
Max allowable radial shaft play	0.025	---	mm
Max permissible eccentricity between the encoder base plate and the shaft	0.12	---	mm
Max radial run out of the shaft	0.025	---	mm
Mounting screw size (DIN 84)	M1.6	---	---
Tightening torque of the screws	15	Ref.	Ncm
Screws wheel base	17.0	± 1.0	mm
Mounting boss diameter ϕ_x	11.0	+0 / -0.03	mm
Max mounting boss height h_z	1.5	-0.1	mm
Mating connector (Molex)	pins 5x50079-8000 housing 1x51021-0500	---	---
Total weight	10.0	Ref.	g
Moment of inertia of the hub with the code wheel	80	Ref.	gmm ²
Protection grade according to DIN 40500	IP40	---	---



Ordering code:

EXAMPLE: SE22-100-6.00-2-CPU-S

SE 22	XXX	XXX	X	XXX	S
Encoder Resolution (CPR)	Motor shaft diameter (mm)	Number of channels	Output circuitry	Version model	
001	1.50	1 = 1 Channel	CPU = Connectore out 2K7 pull-up output	S = (standard-optical-5V-single ended)	
002	2.00	2 = 2 Channels	CPP = Connector out push-pull output		
004	2.30	3 = 3 Channels	COC = Connector out open collector output		
008	2.50		WPU = Wired out 2.7K pull-up output		
050 Nota (1)	3.00		WPP = Wired out Push-pull output		
064 Nota (1)	3.17 (1/8")		WOC = Wire out open collector output		
100	4.00				
108	5.00				
120	5.80				
124	6.00				
128	6.35 (1/4")				
150	8.00				
160					
200					
250					
256					
300					
360					

NOTE: red bold type data show the preferred encoder configurations, that is: the ones in stock and ready to be shipped.

Notes:

- Note (1): 1 channel only
- √ Other encoder resolutions on request
- √ Cable 300 mm long (UL1061 / AWG28), standard

WARNING: please, handle with care, in order to avoid damage due to electro static current

Intecno SRI deserves the right to implement modifications, corrections, and development to products and catalogs without notice.