Type SCH94FO

- **Hollow Shaft Fiber Optic Encoder - ø 94 mm**
- **Dual Output Option (Digital & Fiber Optic)**
- **Fiber Optic Transmission up to 2,000 meters (~ 1.25 miles)**
- **No Degradation of Encoder Signal from Electrical Disturbances**
- **High Encoder Frequency and Low Transmission Delay**
- **Added Safety by use of two Redundant Fibers**
- **Built-in Transient Suppression Module**

Description

The Scancon **SCH94FO** is a heavy-duty incremental encoder offering Fiber Optic output.

The **SCH94FO** incorporates the rugged design features of Scancon's industry standard SCH94 hollow shaft encoder with the high transmission distance and noise resistant qualities of Fiber Optics.

The result is the industry's first rugged and reliable, dual-output Fiber Optic encoder.

Specifically designed for the Wind Power Industry, the **SCH94FO** provides a safe method for signal transmission from the nacelle to the tower base.

Utilizing both Fiber Optic cable and a built-in Transient Suppression Module (TSM), the encoder protects against signal disruption by electrical disturbances often encountered during wind turbine operation.

The **SCH94FO** encoder is designed to operate with both a Digital output and a Fiber Optic output. The customer may also choose to use only the Fiber Optic output.

The encoder also offers the option of either Red Light transmission or Infrared Light transmission. The Red Light option allows the customer to actually see if the fiber is transmitting when power is applied to the encoder. This option is limited to a transmission distance of 250 meters.

The Infrared Light option allows for a much longer transmission distance (up to 2,000 meters). However, light transmission cannot be viewed directly as with the Red Light option.

The **SCH94FO** encoder is ideal for those applications requiring safe signal transmission over long distances.

Electrical Specifications – General

Code:	Incremental
Resolution:	1 to 12,500 ppr (pulses per revolution)
Supply Voltage:	4.75V to 30V
Current Consumption: (typical)	250 mA @ V_{sup} = 5V 110 mA @ V_{sup} = 15V 70 mA @ V_{sup} = 30V
Frequency Response:	100 kHz
Accuracy:	+/- 0.8 arc-min.
Electrical Protection:	Output short circuit, reverse polarity (on some versions only) and transient surge protected through built-in protection module (see TSM details on website)
Noise Immunity:	Tested to EN61000-6-2 : 2005 (industrial environments) and EN 61000-6-3 : 2007 (residential, commercial, and light-industrial environments) for Electromagnetic compatibility (EMC)

Electrical Specifications – Digital Outputs

Output:	OL7272 Line Driver - HTL, TTL and RS422 compatible
Supply Voltage and Output Specifications for various Output Standards:	TTL: V_{sup} = 5V +/- 10% $V_{high} \geq$ 4.3V @ I_{out} = -16 mA $V_{low} \leq$ 0.5V @ I_{out} = 16 mA RS422: V_{sup} = 5V +/- 10% Min. diff. load (Zo): 100 Ω $V_{diff.} \geq$ 2.9V @ Zo = 100 Ω $V_{high} \geq$ 3.8V @ Zo = 100 Ω $V_{low} \leq$ 0.9V @ Zo = 100 Ω HTL: $V_{sup} \geq$ 9V – 30V $V_{high} \geq V_{sup}$ - 1.8V @ I_{out} = -20mA $V_{low} \leq$ 0.8V @ I_{out} = 20 mA
Output Current:	40 mA max. load per output channel
Output Format:	Two channel (A, B) quadrature with Index (Z) and complementary (A-, B-, Z-) outputs
Phase Sense:	A leads B clockwise (CW) from the shaft end of the encoder
Index:	Gated with Channels A and B high

Optical Specifications – Fiber Optic Outputs

Optical Wavelength:	660 nm (Red) or 850 nm (Infrared)
Transmission Distance:	250 meters (Red Light) 1,000 meters (Infrared Light) 2,000 meters (Infrared Light) - Option

Common Specifications with Fiber Optic Receiver

Compatible Fiber Optic Receiver:	DINJB-RX-INC or equivalent
Update Rate:	1.04 million updates / second ~ 0.96 µsec. / update
Transmission Delay:	≤ 3 µsec. Approx. 1 µsec. must be added per 200 meters of fiber optic cable
Optical Fiber Connectors:	Standard ST Insertion loss ≤ 0.7 dB (≤ 0.4 dB recommended)
Recommended Optical Fiber:	62.5 / 125 µm, multimode (TUG 651)

Mechanical Specifications

Material:	Housing: Aluminum Cap: Aluminum Hollow shaft: Stainless Steel (AISI 303)
Weight:	Encoder: approx. 1120 gr. (39.51 oz)
Bearing Life:	> 1.9 x 10^{10} revolutions at rated load
Shaft Speed:	2,200 rpm max. IP 66 3,000 rpm max. IP 65 - Option
Starting Torque:	< 0.1 Nm (14.16 oz-in) at 25° C
Mass Moment of Inertia:	31 gcm^2 (4.39 x 10^{-4} oz-in-sec^2)
Shaft Loads:	Axial 200 N (45 lbs) max. Radial 400 N (90 lbs) max.

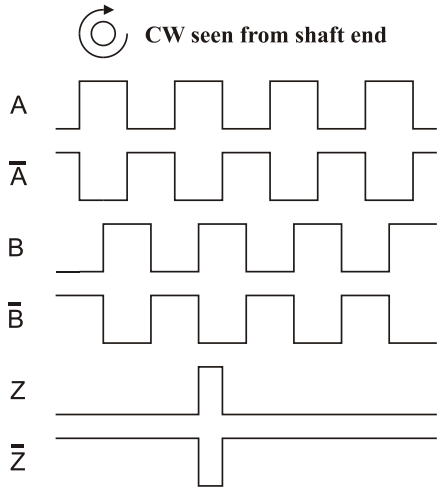
Environmental Specifications

Operating Temperature:	-40° to +85° C
Storage Temperature:	-40° to +85° C
Shock:	100 G / 11 ms
Vibration:	(10-2000 Hz) / 10 G
Bump:	10 G - 16 ms (1000 x 3 axis)
Humidity:	98 % RH without condensation
Enclosure Rating:	IP 66 / Nema 6 (approx.) IP 65 / Nema 4 (approx.) - Option chromitAL TCP passivation
Non-conductive Hollow Bore:	Non-conductive ceramic insert for shaft insulation; up to 2.5 kV

Connection Options

Cable:	8 leads (0.75 mm^2, 19 AWG) twisted pairs; shielded; halogen free
Connector:	12-pin M23 connector

Output waveform



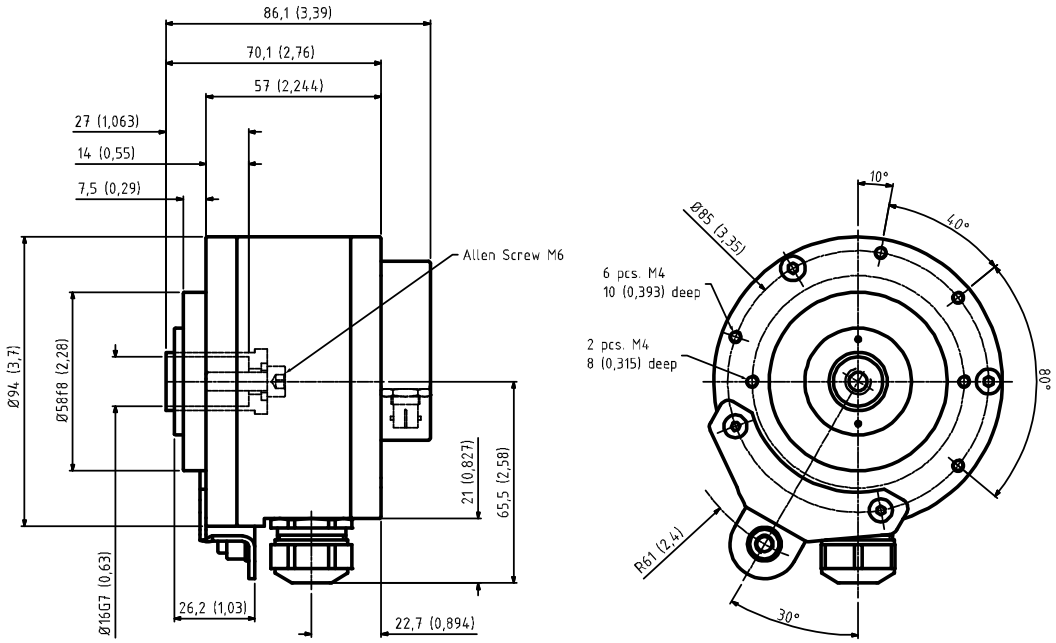
Channel tolerance	**180 e°**	**+/-**	**36 e°**
Phase difference tolerance	**90 e°**	**+/-**	**18 e°**
Z channel tolerance	**90 e°**	**+/-**	**18 e°**

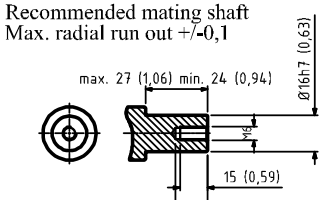
Disk Resolutions (pulses per revolution)

746	**1024**	**2048**	**2500**	**3072**
4096				

Other resolutions manufactured upon request

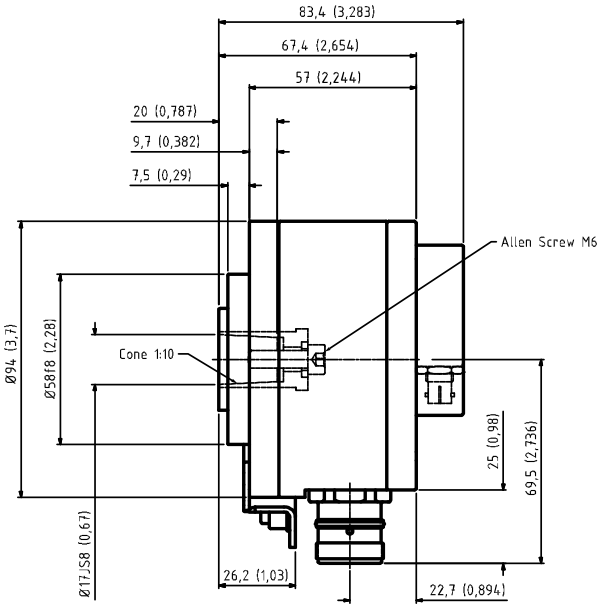
Mechanical Dimensions

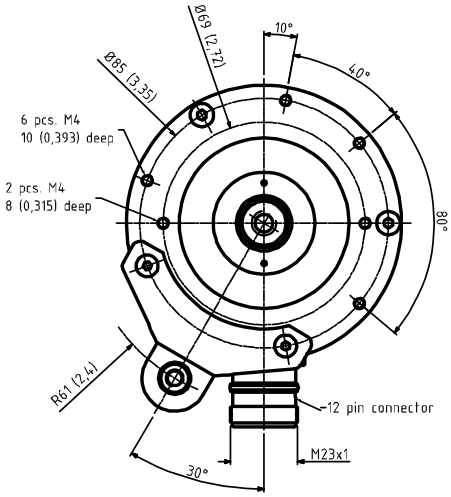




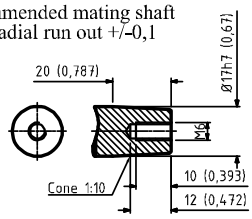
Standard Cable Gland

mm (inches)





Recommended mating shaft
Max. radial run out +/-0,1

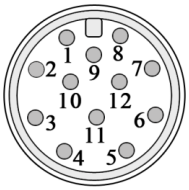


M23 connector

mm (inches)

Output Terminations

M23 Connector	
Pin	**Channel**
1	B -
2	N/C
3	Z
4	Z -
5	A
6	A -
7	N/C
8	B
9	N/C
10	GND
11	N/C
12	Vsup



Connect Cable Shield to mating Connector Housing

GND = Circuit Ground

	Standard Cable	
	Standard Output	**Differential Output**
Channel	**Wire Color**	**Wire Color**
A	Pink	Pink
A -	*Gray**	Gray
B	Green	Green
B -	*Yellow**	Yellow
Z	White	White
Z -	*Brown**	Brown
Vsup	Red	Red
GND	Blue	Blue

** Gray, Yellow, and Brown are internally connected to Circuit Ground*

GND = Circuit Ground

Power Cable

For applications where the Fiber Optic Only (FTR, FSR, FTI or FSI) Output option is chosen, the customer may choose to use the M23 connector or a Power Only Cable to supply power to the encoder.

The M23 connector Power/Ground pin-out is shown above.

The Power Only Cable terminates in a "pigtail" with a Red wire for V_{sup} and a Blue wire for Ground.

Ordering Code

Example: SCH94FO – 3072 – FTI – 17 – 20 – 66 – P02 – S

Type

SCH94FO - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

Pulses per Revolution

See Table

Output

HTL, TTL & RS422	4.75V to 30V *	+ Fiber Optic	(Red Light)	**MTR**
HTL (only)	9V to 30V	+ Fiber Optic	(Red Light)	**MSR**
HTL, TTL & RS422	4.75V to 30V *	+ Fiber Optic	(Infrared Light)	**MTI**
HTL (only)	9V to 30V	+ Fiber Optic	(Infrared Light)	**MSI**
Fiber Optic Only	(Red Light)	4.75V to 30V *		**FTR**
Fiber Optic Only	(Red Light)	9V to 30V		**FSR**
Fiber Optic Only	(Infrared Light)	4.75V to 30V *		**FTI**
Fiber Optic Only	(Infrared Light)	9V to 30V		**FSI**

* ***Not Reverse Polarity Protected***

Hollow Shaft Dia. / **Hollow Shaft Length**

12 mm x 27 mm		**12 - 27**
16 mm x 27 mm		**16 - 27**
17 mm x 20 mm	(1:10 cone shape)	**17 - 20**

IP Rating

IP 65	**65**
IP 66	**66**

Cable Length

Standard cable	(1 meter is standard)	**01**
Standard cable	(specify cable length)	**XX**
Power Only cable *	(specify cable length)	**PXX**
No cable	(*M23 Connector option*)	**00**

* ***For use with Fiber Optic Only outputs***

Cable or Connector

Cable

Side (radial) takeout **S**

Connector

12-pin M23 **CON**