

| HS35

3,5" BLIND - HOLLOW SHAFT ABSOLUTE ENCODERS - ORDINARY & HAZARDOUS LOCATIONS

The HS35 combines the rugged, heavy-duty features usually associated with shafted encoders into a hollow shaft style. Its design includes dual bearings and shaft seals for NEMA 4, 13 and IP65 environmental ratings, a rugged metal housing, and a sealed connector or cable gland. The HS35 accommodates shafts up to 1" in diameter. With optional insulating inserts, it can be mounted on smaller diameter shafts. It can be mounted on a through shaft or a blind shaft with a closed cover to maintain its environmental rating.

GEN²

For **Generation 1**
datasheet [click here](#).



Features

HS35 Rotary Absolute Encoder:

- Robustness and excellent resistance to shocks / vibrations
- High Protection Level IP65 (NEMA 4 & 13)
- High Resolutions Available: Up to 16 bits
- Universal Electronic Circuits from 4.75 to 30 Vdc
- High Performance in Temperatures -40°C to 100°C
- Multiple outputs options: SSI, Parallel, Analog
- Hard anodization available in special features
- Certifications in Hazardous Locations: Non-incendive UL/Atex/IECEx

Applications

- Steel, Glass, Paper mills
- Wood industry
- Wind energy
- Power generators
- Mining drilling
- Gas engines

SPECIFICATIONS

Mechanical

Material		Cover: Die cast Aluminum with Iridite finish Body: Aluminium Shaft: AISI 303 Stainless Steel
Bearings		6807 Series - sealed
Maximum Loads	Axial	50 N
	Radial	80 N
Shaft inertia		2,852 oz-in-sec ² (1") SS 2,8125 oz-in-sec ² (1") BS
Torque ⁽¹⁾		Through shaft version (SS) = 11,3 in-oz (at 1000 min ⁻¹) Blind shaft version (BS) = 8.5 in-oz (at 1000 min ⁻¹)
Permissible Max. Speed		6 000 min ⁻¹
Continuous Max. Speed		4000 min ⁻¹
Encoder Weight (Approx.)		22,92 Oz
Theoretical Mechanical Lifetime 109 turns (Faxial / Fradial)		140x10 ⁹ at 25 N / 40 N 17x10 ⁹ at 50 N / 80 N

⁽¹⁾ The rubber shaft seal is recommended in virtually all installations. The most common exceptions are applications requiring a very low starting torque or those requiring operation at both high temperature and high speed. For these exceptions, a felt shaft seal is recommended. Felt seals require very low starting torque and can virtually eliminate frictional heat. Encoders ordered with felt shaft seals will have an enclosure rating of IP50 and will have less than 1/10th the Starting Torque specified under Mechanical Configurations.

Electrical

Output Signals			Operating Voltage +V	Supply Current (no loads)	Current per Channel	Short Circuit Proof	Overvoltage protection	Reverse Polarity Tolerant	Resolutions category ⁽¹⁾	Operating Temperature Range ^{(2) (3)}
Digital Parallel output ⁽⁴⁾	28/V	HTL	4,75-30V	<75mA	<20mA	Yes	Up to 33V	Yes	Standard	-40°C.. +100°C
									High	-20°C.. +90°C
	28/5	TTL	4,75-30V	<75mA	<10mA	Yes (Except to +V)	Up to 33V	Yes	Standard	-40°C.. +100°C
									High	-20°C.. +90°C
	28/0	Open Collector	4,75-30V	<75mA	<20mA	Yes	Up to 33V	Yes	Standard	-40°C.. +100°C
									High	-20°C.. +90°C
Digital Serial output ⁽⁵⁾	S3	SSI	4,75-30V	<75mA	<20mA	Yes (Except to +V)	Up to 33V	Yes	Standard	-40°C.. +100°C
									High	-20°C.. +90°C
Analog output ⁽⁶⁾	A1	Analog 4..20mA	15-30V	<100mA	<20mA	Yes (Except to +V)	Up to 33V	Yes	16 bits	-40°C.. +85°C
	A2	Analog 0..10V	15-30V	<100mA	<20mA	Yes (Except to +V)	Up to 33V	Yes	16 bits	-40°C.. +85°C
	A3	Analog 0..20mA	15-30V	<100mA	<20mA	Yes (Except to +V)	Up to 33V	Yes	16 bits	-40°C.. +85°C
	A4	Analog 0..5V	15-30V	<100mA	<20mA	Yes (Except to +V)	Up to 33V	Yes	16 bits	-40°C.. +85°C
	A5	Analog 0..24mA	15-30V	<100mA	<20mA	Yes (Except to +V)	Up to 33V	Yes	16 bits	-40°C.. +85°C

⁽¹⁾ Two resolutions categories available for digital outputs interfaces :

⁽²⁾ Surface encoder temperature

⁽³⁾ UL Listed: -20°C +80°C. Device must be supplied by a Class 2, LPS or SELV limited energy source 250mA.

⁽⁴⁾ Output IC's are available as either Line Driver or NPN Open Collector types. Open Collectors require external pull-up resistors, resulting in higher output source impedance (sink impedance is similar to that of line drivers). In general, use of a Line Driver style output is recommended.

Line Drivers source or sink current and their lower impedance mean better noise immunity and faster switching times.

Warning: Do not connect any line driver outputs permanently to 0V,+V or to any other signal. This may overtime damage the driver. Unused outputs should be isolated and left floating.

Our applications specialists would be pleased to discuss your system requirements and the compatibility of your receiving electronics with Line Driver type outputs.

⁽⁵⁾ SSI interface clock up to 1MHz, depending on cable lenght. Contact factory for details.

⁽⁶⁾ Analog outputs are based on 16bits DAC.

Environmental

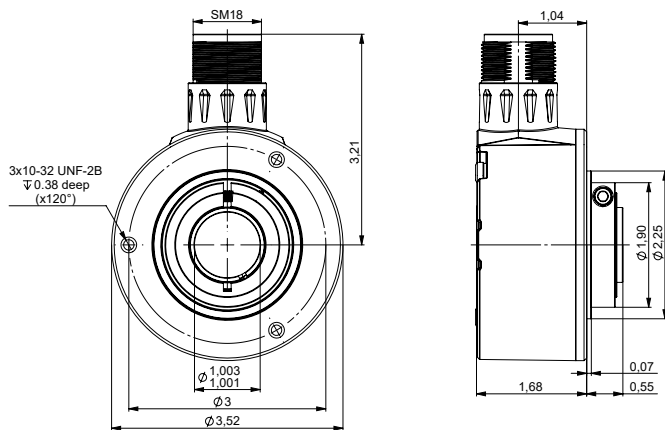
Shocks (EN 60068-2-27)	≤ 500 m.s-2 (during 11 ms)
Vibrations (EN 60068-2-6)	≤ 200 m.s-2 (5...2 000Hz)
EMC	EN 61000-6-2, EN 61000-6-4
Isolation	1 000V eff
Operating Temperature	See Electrical table above
Storage Temperature ⁽¹⁾	-40°C ... +100°C
Protection (EN 60529)	IP 65 (NEMA 4 & 13)
Humidity	93% RH non-condensing at 20 °C

⁽¹⁾ Extended temperature ratings : some models can operate down to -55°C. Extended temperature ranges can affect other performance factors. Consult with factory for more specific information.

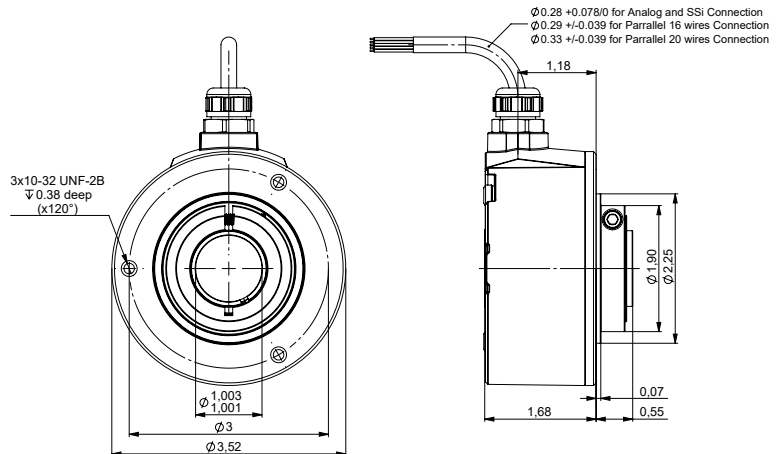
DIMENSIONS

Dimensions in inches

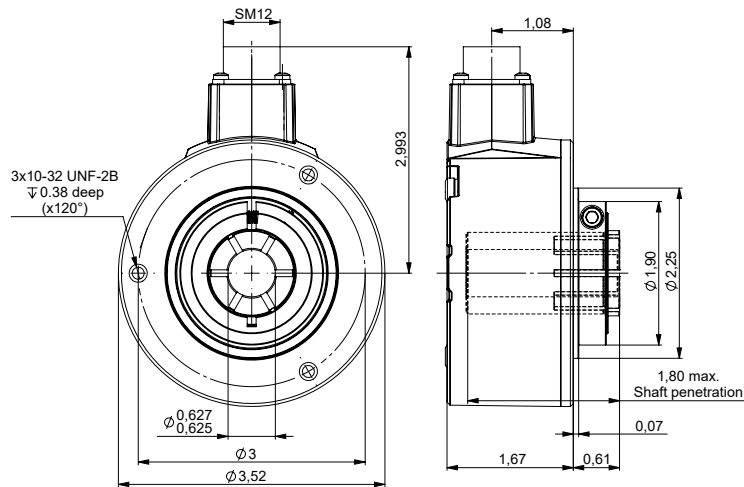
MS Connector Termination



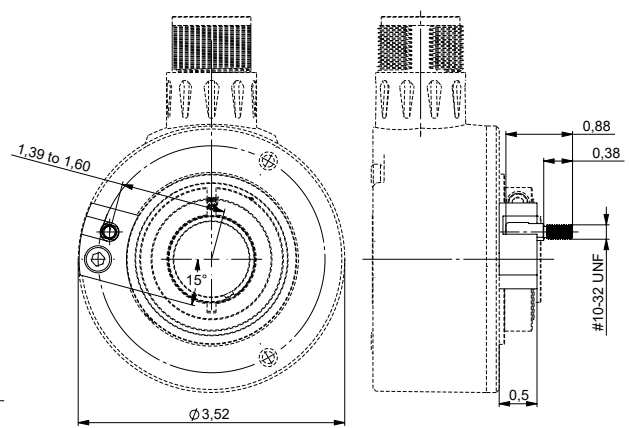
Cable Termination



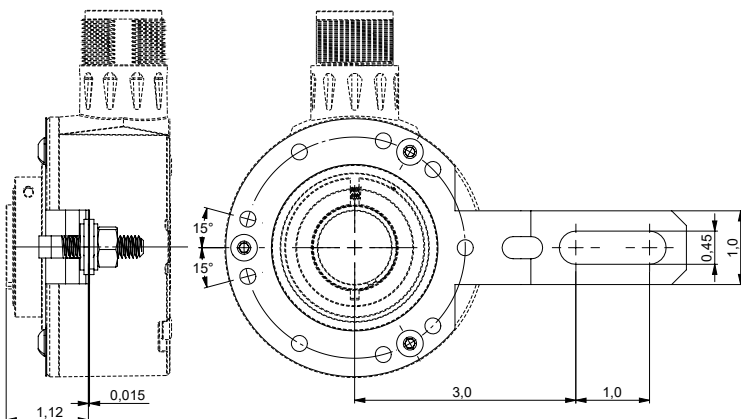
M12 Connector Terminations



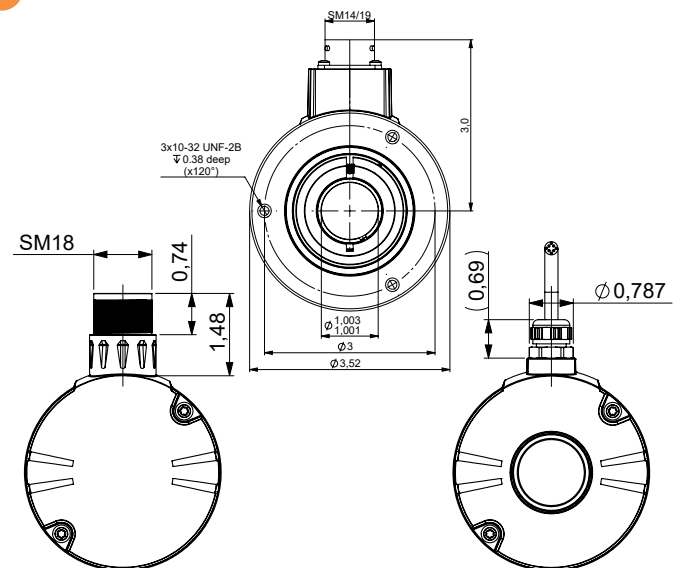
R1 Tether Block and Pin



R2 Tether Arm



CONNECTION DIMENSIONS



Note: The typical hollow shaft product is supported by, and clamped to, the driving shaft. A flexible tether is used to keep the housing from rotating.

PARALLEL Connections

14 Bit	GRAY or NATURAL BINARY code	B13 (msb)	B12	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0 (lsb)	DIR (opt: LATCH or ENABLE)	CASE GROUND	0V	LATCH (opt: DIR or ENABLE)	+V	SHIELD DRAIN
13 Bit		B12 (msb)	B11	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0 (lsb)	0V (opt: ENABLE, DIR or LATCH)						
12 Bit std		B1 1(msb)	B10	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0 (lsb)	n.c.							
M14/19	M14 - 19 pins	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	-
Cable Color	PVC cable 20 wires	WH/BK	WH/ BN	WH/ RD	WH/ OG	WH/ YE	WH/ GN	WH/ BU	WH/ VT	WH/ GY	WH	GY/ BK	GY/ BN	GY/ RD	GY/OG*	OG*	GN	BK	YE*	RD	BARE
Cable Color	PVC cable 16 wires	GR	YE	GY	PK	BU	RD	BK	VT	WH/ BN	WH/ GR	WH/ YE	WH/ GY	-	-	WH/BU	Shield	WH	WH/PK	BN	-

* Optional

ANALOG Connections

A1 A2 A3 A4 A5		A+ OUT	A RETURN	DIR	RESET *	0V	+V	CASE GROUND
M18	M18 Connector 10 Pins	A	H	C	B	F	D	G
M14/19	M14 Connector 19 Pins	A	B	U	C	T	V	S
CABLE COLOR	PVC Cable 9 Wires	YE	WH/YE	OG	BU	BK	RD	GN

* Optional

SSI Connections

A1 A2 A3 A4 A5		DATA +	DATA -	CLK +	CLK -	DIR	ENABLE*	0V	+V	CASE GROUND	SHIELD DRAIN
M18	M18 Connector 10 Pins	A	H	B	I	C	J	F	D	G	—
M14/19	M14 Connector 19 Pins	A	B	C	D	R	P	T	V	S	—
CABLE COLOR	PVC Cable 9 Wires	YE	WH/YE	BU	WH/BU	OG	WH/OG	BK	RD	GN	BARE

* Optional

Functions

DIR: Standard is CW increasing when viewed from the shaft end, with pin DIR normally HI (pulled up internally to +V, or N/C). To reverse the count direction, pin DIR must be pulled LO (0V COMMON).

RESET: Pin Reset is normally LO (pulled DOWN internally to +V, or N/C). Encoder position code is reset to 0° for digital parallel /SSI outputs and to 180° for analog outputs if pin DIR is HI (to +V) for minimum 250ms.

LATCH: Encoder outputs are active and provide continuous parallel position information when Pin LATCH is HI (pulled up internally to +V, or N/C). When pin LATCH is LO (0V COMMON) the encoder outputs are latched at the logic state that is present when the latch is applied and will stay latched until pin LATCH is no longer LO (0V COMMON).

Er outputs are active and provide continuous parallel position information when pin ENABLE is HI (pulled up internally to +V, or N/C). When pin ENABLE is LO (0V COMMON) the encoder outputs are switched off (tristated in high impedance) and will stay switched off until pin ENABLE is no longer LO (0V COMMON).

M18 Connector is a MS3102R18-1P, 10-pin connector on the encoder body and mates to an MS3106F18-1S connector or can be used with a standard cable/connector assembly, BEI P/N 924-31186-18XX (Where XX = 10, 20 30 or 50 for a 10, 20, 30, or 50 foot length). This is the preferred connector for SSI output.

M14/19 Connector is a MS3112E14-19P, 19-pin connector on the encoder body and mates to an MS3116J14-19S or equivalent.

Digital Parallel output

Figure 1 -
Gray Code

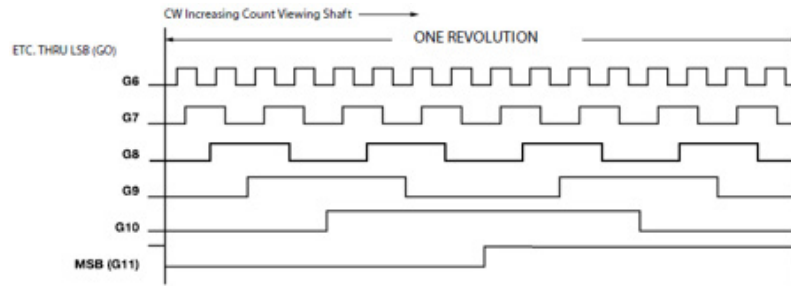


Figure 2 -
Natural Binary

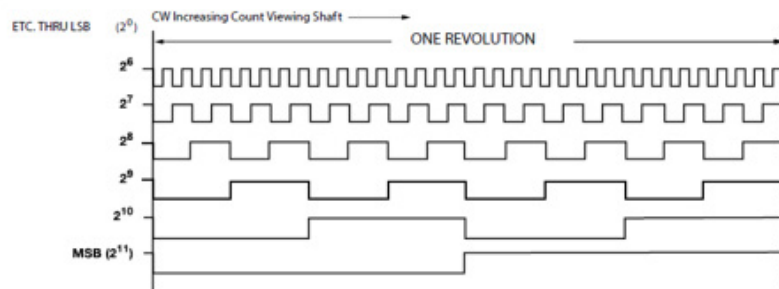


Figure 3 -

Digital Serial output

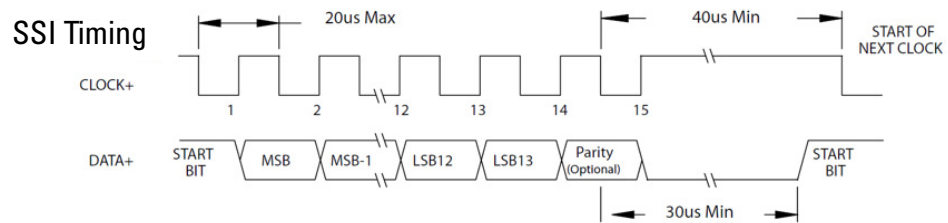
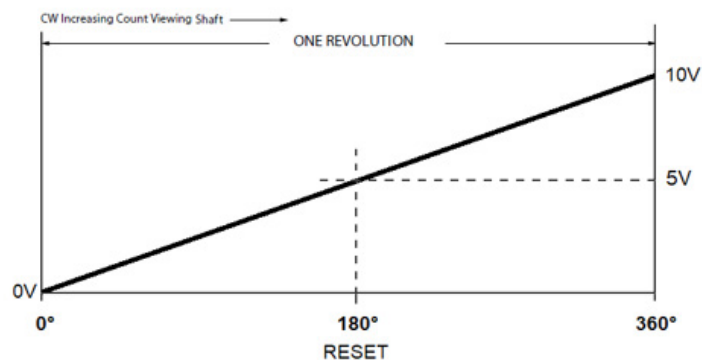


Figure 4 -
A2 - example

Analog output



ORDERING OPTIONS

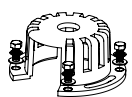
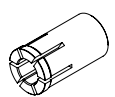
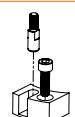
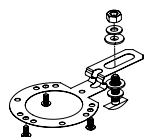
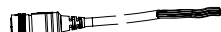
Items highlighted with this are standard Express Encoders and ship in few days. in North America

Encoder	X	HS35	F	100	R1	SS	12	GC	28V/V	CW	SM14/19			S
X: Express Encoder Blank: Standard Leadtime														
Type														
HS35: Hollow Shaft, 3,5" Encoder Diameter														
Housing Configuration														
F: Standard														
Shaft Bore														
100: 1.00" 87: 0.875" 75: 0.75" 62: 0.625" 50: 0.50" etc. Metric bores available														
Tether														
R1: Tether Block and Pin R2: Tether Arm Others tether configurations available														
Shaft Seal Configuration														
SS: Through Shaft, Rubber Seals														
Number of Bits														
12: 12 Bits, 4096 Counts 13: 13 Bits, 8192 Counts 14: 14 Bits, 16384 Counts 15: 15 Bits, 32768 Counts 16: 16 Bits, 65536 Counts														
Code Type														
GC: Gray Code NB: Natural Binary (* Leave Blank for A1-A5)														
Voltage / Output														
28V: 5-28Vin/out 28/5: 5-28Vin/5Vout 28/OC: 5-28Vin/OCout S3: SSI A1: 4-20mA A2: 0-10V A3: 0-20mA A4: 0-5V A5: 0-24mA														
Direction of Count														
CW: Clockwise Increasing Count CCW: Counter Clockwise Increasing Count														
Output Termination														
SM18: MS3102R18-1P SM14/19: MS3112E14-19P (19 Pin) SCS: Shielded/Jacketed 20 wires Cable with Cable Seal. Length of Cable is specified in inches. (i.e. SCS18 = 18 inches) SC3: Shielded/Jacketed 16 wires Cable with Cable Seal. Length of Cable is specified in inches. (i.e. SC318 = 18 inches) (See Connections Section)														
Hazardous Area Ratings														
Blank: None NI: Non-Incendive Contact factory for voltage options														
Special Features														
S: Special Features specified on Purchase Order. -S at the end of the model number is used to define a variety of non-standard features such as hard anodization, special shaft lengths, voltage options, or special testing. Please consult the factory to discuss your special requirements.														

AGENCY APPROVALS & CERTIFICATIONS

Harardous Area Ratings	Agency		Ratings and Markings	File Number
Blank		CE	EN 55011: Electromagnetic Disturbance (EMI) EN 61000-6-2: Electromagnetic Compatibility (EMC)	-
NI Non-Incendive		UL	Class I, Div. 2, Groups A, B, C, D Class II, Div. 2, Groups F, G	E78446
		DEMKO	Ex II 3 G Ex ec IIC T3 Gc	DEMKO 24 ATEX Pending
		IEC/IECEx	Ex ec IIC T3 Gc -40°C ≤ Ta ≤ +85°C	IECEx UL 24.Pending

ACCESSORIES

Description	Part Number	
Protection Cover kit Hardware included 	23145-002 = Protective cover, pilot dia. 6.38", without fasteners 26068-001 = Protective cover, pilot dia. 6.58", with fasteners	
Reduction sleeve 	Imperial sizes shaft bore, PEEK ⁽¹⁾ 9434/E8 = 1" 9434/E7 = 0.875" 9434/E6 = 0.75" 9434/E5 = 0.625" 9434/E4 = 0.5" ⁽¹⁾ Except 9434/E8: GF Polycarbonate	Metric sizes shaft bore, PEEK 9434/I25 = 25mm 9434/I20 = 20mm 9434/I15 = 15mm 9434/I12 = 12mm
R1 Tether Block and Pin Hardware included 	31215-003 = 382323-001 Tether block + dia. 0.25" x lg. 0.75" pin (cap screw 10-32 UNF x 5/8 included) 31215-006 = 382323-001 Tether block + dia. 0.25" x lg. 0.75" pin + Collet clamp (cap screw 10-32 UNF x 5/8 included)	
Tether arm kit Hardware included 	31187-016 = R2 tether kit 31187-012 = R11 tether kit 31187-015 = R14 tether kit Other stator coupling configurations available on request	
Connector Mates 	MS3106F18-1S = Mates to standard M18 style, 10pin conn. MS31xxFxx14-19S = Mates to standard M14/19 style, 19pin conn.	
Connector Cable Assemblies 	31186-1810 = M18, 10pin, 10 ft length 31186-1820 = M18, 10pin, 20 ft length 31186-1850 = M18, 10pin, 50 ft length 31219-1410 = M14/19, 19 pin, 10 ft length 31219-1420 = M14/19, 19 pin, 20 ft length 31219-1450 = M14/19, 19 pin, 50 ft length	

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