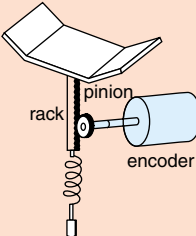




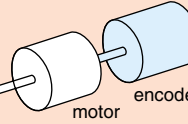

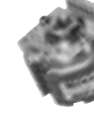


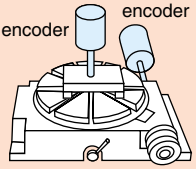
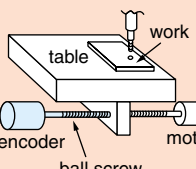
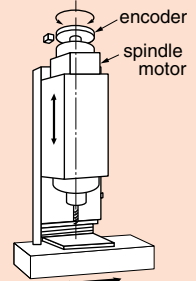




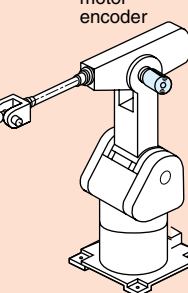


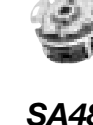

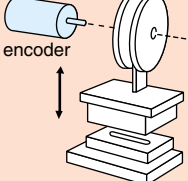




# TYPICAL APPLICATIONS

Application	Recommended Encoder	Application	Recommended Encoder
<b>Measuring Equipment</b>  <b>Industrial Machine</b>  	 <b>OIS28</b> Inc 100 ~ 2,000C/T φ 28×45   <b>OIS38</b> Inc 50 ~ 2,500C/T φ 38×45   <b>OIS66</b> Inc 100 ~ 2,500C/T φ 66×54   <b>OIS68</b> Inc 100 ~ 5,000C/T □ 68×70	<b>Motor Control</b>  	 <b>OIH35</b> Inc 500 ~ 3,000C/T φ 35×31.5   <b>OIH48</b> Inc 100 ~ 6,000C/T φ 48×35   <b>OIS90</b> Inc 90,000 ~ 480,000C/T φ 90×100   <b>OIS80</b> Inc 5,000C/T φ 80×92
<b>Machine Tool</b>      	 <b>OIS85</b> Inc 25,000, 50,000C/T □ 85×70   <b>OAS50</b> Abs 8bit φ 50×60   <b>OAS68</b> Abs 10 ~ 12bit φ 68×71   <b>MIB 0.4</b> Inc 1,024C/T 65×40×37	<b>Industrial Robot</b>  	 <b>SA35</b> Abs Inc MULTI LPS 11/24bit φ 35×41   <b>SA35</b> Abs MULTI LPS 17/33bit φ 35×41   <b>SA48</b> Abs MULTI LPS 17/33bit φ 48×38   <b>SA56</b> Abs Inc MULTI LPS 111/24bit φ 56×39
<b>Press Machine</b>  	 <b>OIS128</b> Inc 25 ~ 5,000C/T 128×167×129   <b>OAS66</b> Abs 360C/T φ 66×60		



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ISO 14001 Certificate on Head office

# ROTARY ENCODERS FA-CODER®

INCREMENTAL  
ABSOLUTE

Intelligent sensor can we call our hollow shaft absolute encoders, for they have been ever more functional in digital data transfer and conversion in a compact package.  
Incremental hollow shaft encoders are lined up for wide selections of resolution, pole number, and size to best fit your motors.

Incremental or absolute, whichever you may take, you can get the latest out of three decades of our encoder production technology.



(Precise standard angle device)








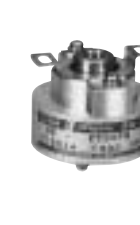


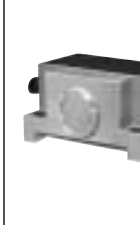





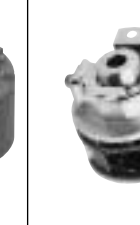
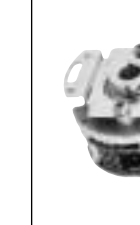
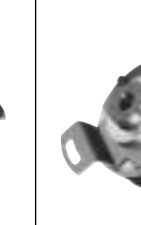
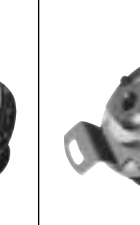
**WARRANTY**  
Tamagawa Seiki warrants that this product is free from defects in material or workmanship under normal use and service for a period of one year from the date of shipment from its factory. This warranty, however, excludes incidental and consequential damages caused by careless use of the product by the user. Even after the warranty period, Tamagawa Seiki offers repair service, with charge, in order to maintain the quality of the product. The MTBF (mean time between failures) of our product is quite long; yet, the predictable failure rate is not zero. The user is advised, therefore, that multiple safety means be incorporated in your system or product so as to prevent any consequential troubles resulting from the failure of our product.

All specifications are subject to change without notice.

'01.5  
T12-1423N3. 2,000. 2001.5

# SPECIFICATION OVERVIEW

Inc Incremental Signal  
 Abs Absolute Signal  
 SINE Sine Signal  
 UVW Commutation Signal  
 SINGLE Single-turn Signal  
 MULTI Multi-turn Signal  
 LPS Serial Data Transfer

	Inc INCREMENTAL											Abs ABSOLUTE										
Typical Applications	Instrumentation Devices Industrial Machines			Machine Tools Press Machines			Motor Control Applications				Machine Tools	Measuring Equipments Machine Tools		Machine Tools	Press Machine	Motor Control, For Robots						
Features	Small Size	Industrial Standard Low Cost	Wide range of resolution	Flange Mount	Ultra Rugged Model	High Resolution <span style="color: #00AEEF;">UVW</span>	Ultra High Resolution	Hollow Shaft <span style="color: #00AEEF;">UVW</span> <span style="color: #00AEEF;">SINE</span>	Hollow Shaft <span style="color: #00AEEF;">UVW</span> <span style="color: #00AEEF;">SINE</span>	<span style="color: #00AEEF;">UVW</span>	Magnetic Encoder	Small Size	Rugged Model	Rigid Model Specially divided	Ultra Rugged Model with Strove Signal	Small Wattage Motors.			Middle Wattage Motor.			
Series Name Outer Diameter (mm)	<b>OIS28</b> (TS5150)	<b>OIS38</b> (TS5300)	<b>OIS66</b> (TS5100)	<b>OIS68</b> (TS5000)	<b>OIS128</b> (TS5080)	<b>OIS85</b> (TS5170)	<b>OIS90</b> (TS5410)	<b>OIH35</b> (TS5200N305)	<b>OIH48</b> (TS5200N500)	<b>OIS80</b> (TS5146)	<b>MIB0.4</b> (TS5270)	<b>OAS50</b> (TS5610)	<b>OAS68</b> (TS5620)	<b>OAS66</b> (TS1857)	<b>OAS66</b> (TS5607)	<b>SI35</b> (TS5668N20)	<b>SA35</b> (TS5667N120)	<b>SA48</b> (TS5667N420)	<b>SA56</b> (TS5645)		(TS5647 TS5648)	
Appearance																						
Pilot Diameter (mm)	φ 18	φ 20	φ 30	φ 50	—	φ 75	φ 50	—	—	φ 75	—	φ 32	φ 50.8	φ 60		—	—	—	—	—	—	
Shaft Diameter (mm)	φ 5	φ 6	φ 5	φ 10	φ 16	Coupling φ 15	φ 16	Hollow Shaft φ 6	Hollow Shaft φ 8	Coupling φ 15	—	φ 10		φ 10		Hollow Shaft φ 6			Hollow Shaft φ 8			
Body Length (mm)	45	45	54	70	167	70	100	31.5	35	92	60(W)×40(D)×37(H)	60	71	71	66	26	41	38	39	39		
Resolution	<span style="color: #00AEEF;">Inc</span> 100, 500, 1,024, 2,000C/T	<span style="color: #00AEEF;">Inc</span> 100 ~ 2,500C/T	<span style="color: #00AEEF;">Inc</span> 100 ~ 2,500C/T	<span style="color: #00AEEF;">Inc</span> 100, ~ 5,000C/T	<span style="color: #00AEEF;">Inc</span> 25 ~ 5,000C/T	<span style="color: #00AEEF;">Inc</span> 2,5000 ~ 50,000C/T <span style="color: #00AEEF;">UVW</span> 2C/T	<span style="color: #00AEEF;">Inc</span> 90,000 ~ 480,000C/T	<span style="color: #00AEEF;">Inc</span> 500 ~ 3,000C/T <span style="color: #00AEEF;">UVW</span> 2, 3, 4C/T	<span style="color: #00AEEF;">Inc</span> 1,000 ~ 6,000C/T <span style="color: #00AEEF;">UVW</span> 2, 3, 4C/T	<span style="color: #00AEEF;">Inc</span> 5,000C/T <span style="color: #00AEEF;">UVW</span> 2C/T	1,024C/T When the spur wheel has 256 teeth (Module = 0.4)	<span style="color: #00AEEF;">Abs</span> 8bit/turn Gray Code	<span style="color: #00AEEF;">Abs</span> 10 ~ 12bit/turn Pure Binary <span style="color: #00AEEF;">Inc</span> 0 ~ 359C/T	<span style="color: #00AEEF;">Abs</span> 8 ~90 Specially divided	<span style="color: #00AEEF;">Abs</span> 360C/T BCD	<span style="color: #00AEEF;">Abs</span> 17bit Pure Binary	<span style="color: #00AEEF;">Abs</span> 17bit Pure Binary <span style="color: #00AEEF;">MULTI</span> 16bit	<span style="color: #00AEEF;">Abs</span> 17bit Pure Binary <span style="color: #00AEEF;">MULTI</span> 16bit	<span style="color: #00AEEF;">Abs</span> 11bit Pure Binary <span style="color: #00AEEF;">MULTI</span> 13bit <span style="color: #00AEEF;">Inc</span> 2,048C/T	<span style="color: #00AEEF;">Abs</span> 20bit/TS5648 16bit/TS5647 <span style="color: #00AEEF;">MULTI</span> Pure Binary 16bit/TS5648 16bit/TS5647		
Max. Frequency Response	80kHz	200kHz	125kHz	125kHz	25kHz	1.5MHz	500kHz	200kHz		250kHz	200kHz	10kHz		20kHz	2.5kHz	13MHz		13MHz	<span style="color: #00AEEF;">Abs</span> 170kHz <span style="color: #00AEEF;">Inc</span>	52MHz(TS5648) 3.2MHz(TS5647)		
Supply Voltage (DC)	+5V ±5%	+5V-12V +5V ±5%	DC + 5V, +12V ±5%	+5V, +12V ±5%	+24V ±20%	+5V ±5%	+5V ±5%	+5V ±5%			+5V +5% -10%	+5V ±5%		+24V ±5%	+12V ±10%	+5V ±5%		+5V ±5%		+5V +5% -10%		
Supply Current (Max.) Note(1)	100mA	100mA	200mA	200mA	300mA	250mA	500mA	200mA		300mA	300mA	120mA	250mA	150mA	300mA	110mA	150mA	150mA		250mA		
Output Circuit	Open Collector	Open Collector	Line Driver	Line Driver Open Collector	Line Driver Open Collector	Voltage Oomplementaly	Line Driver	Line Driver			Line Driver	Open Collector	Line Driver	Emitter Follower	Open Collector	Line Driver			Line Driver			
Allowable Shaft Load Note(2)	Radial	21.6N (2.2kgf)			98N (10kgf)	392N (40kgf)	19.6N (2kgf)	98N (10kgf)	Allowable Mounting Misalignment (Max.)			19.6N (2kgf)	—	98N (10kgf)		98N (10kgf)	98N (10kgf)	—	Allowable Mounting Misalignment (Max.)		Allowable Mounting Misalignment (Max.)	
	Axial	12.7N (1.3kgf)	10.8N (1.1kgf)	12.7N (1.3kgf)	49N (5kgf)		9.8N (1kgf)	49N (5kgf)	Radial 0.05mm TIR, Axial 0.2mm, Angular 0.1°			9.8N (1kgf)	—	49N (5kgf)		49N (5kgf)	49N (5kgf)	—	Radial 0.05mm TIR, Axial 0.1mm, Anglar 0.1°		Radial 0.05mm TIR, Axial 0.2mm, Anglar 0.1°	
Starting Torque (Max.)	2.9×10 <sup>-3</sup> N·m (30gf·cm)	4.4×10 <sup>-3</sup> N·m (45gf·cm)	2.9×10 <sup>-3</sup> N·m (30gf·cm)	9.8×10 <sup>-3</sup> N·m (1kgf·cm)	0.2N·m (2kgf·cm)	2.0×10 <sup>-2</sup> N·m (200gf·cm)	9.8×10 <sup>-3</sup> N·m (1kgf·cm)	5.9×10 <sup>-3</sup> N·m (60gf·cm)	9.8×10 <sup>-3</sup> N·m (100gf·cm)	2.0×10 <sup>-3</sup> N·m (200gf·cm)	—	9.8×10 <sup>-3</sup> N·m (100gf·cm)		2.0×10 <sup>-3</sup> N·m (200gf·cm)	9.8×10 <sup>-3</sup> N·m (1kgf·cm)	—	5.9×10 <sup>-3</sup> N·m (60gf·cm)	9.8×10 <sup>-3</sup> N·m (100gf·cm)	5.9×10 <sup>-3</sup> N·m (60gf·cm)	4.9×10 <sup>-3</sup> N·m (50gf·cm)		
Protection Index	IP = 50			IP = 52	IP = 57	IP = 54	IP = 52	IP = 40		IP = 52	IP = 50	IP = 50	IP = 52	IP = 53	IP = 54	Open			Open			
Operating Temperature	0 ~ +60°C	-10 ~ +70°C 0 ~ +60°C(Line Driver)	-10 ~ +70°C	-10 ~ +70°C	0 ~ +50°C	-10 ~ +85°C	-10 ~ +75°C	-20 ~ +85°C		-10 ~ +75°C	-10 ~ +80°C	-10 ~ +70°C		-10 ~ +60°C	0 ~ +50°C	-10 ~ +85°C		-10 ~ +85°C		-10 ~ +70°C		
Vibration Note(3)	49m/S <sup>2</sup> (5G)			98m/S <sup>2</sup> (10G)		49m/S <sup>2</sup> (5G)	98m/S <sup>2</sup> (10G)	49m/S <sup>2</sup> (5G)		98m/S <sup>2</sup> (10G)	5 ~ 500Hz Full Amplitude 1.5mm	49m/S <sup>2</sup> (5G)	98m/S <sup>2</sup> (10G)	176m/S <sup>2</sup> (18G)	49m/S <sup>2</sup> (5G)	98m/S <sup>2</sup> (10G)		98m/S <sup>2</sup> (10G)		49m/S <sup>2</sup> (5G)		
Shock Note(4)	490m/S <sup>2</sup> (50G)			980m/S <sup>2</sup> (100G)		1,960m/S <sup>2</sup> (200G)	980m/S <sup>2</sup> (100G)	490m/S <sup>2</sup> (50G)	980m/S <sup>2</sup> (100G)		294m/S <sup>2</sup> (30G)	490m/S <sup>2</sup> (50G)	980m/S <sup>2</sup> (100G)	980m/S <sup>2</sup> (100G)	147m/S <sup>2</sup> (15G)	1,960m/S <sup>2</sup> (200G)		1,960m/S <sup>2</sup> (200G)		980m/S <sup>2</sup> (100G)		
Mass (Max.)	0.2kg	0.25kg	0.5kg	1kg	7kg	1kg	3kg	0.2kg	0.3kg	0.8kg	0.5kg (Without Spur wheel)	0.5kg	1.5kg	0.6kg	0.6kg (Without Cable)	0.03kg (Without Cable)	0.06kg (Without Cable)	0.08kg (Without Cable)	0.5kg (Without Cable)	0.6kg (Without Cable)		

Notes (1) Supply Current : With no load (2) Shaft Load : Recommended to apply 20% of the specification (3) Vibration : 2hours per each 3axis (4) Shock : 3times per each 3axis