

SPEED X PRECISION



### Magnescale Co., Ltd.

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Advanced technology provides precision and durability in tough environments.

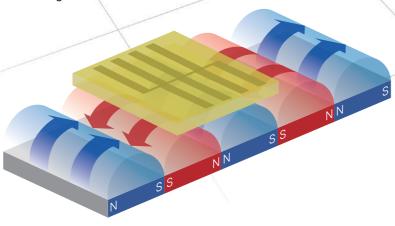
Magnescale is continuously improving its technology to create encoders with the high precision and durability required for machine tool applications. Using advanced magnetic technology, Magnescale encoders operate on a magnetic principle, making them resistant to oil and condensation typically found in machine tools. This ensures consistently stable and precise position detection

# Principle

### **Detection principle**

A thin-film MR device with a high-precision, low-distortion pattern arrangement is used as the reading sensor.

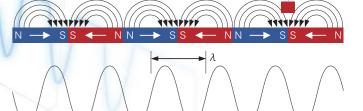
The resistance value of the MR device changes in accordance to magnetic field changes due the relative positions between the sensor and the encoder magnetic media. This change in resistance value is read electronically to detect the amount of positional change.



# Stability

Beyond to Next Stage

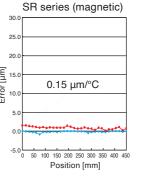
### **Encoders signal**

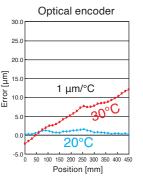


The raw signal is a sine wave

### Thermal expansion

Magnescales have the same linear expansion coefficient as the cast iron used in general machine tool structures. This ensures that the encoders exhibit the same thermal behavior as the equipment they are installed on, maintaining extremely stable positioning even in environments with constant temperature changes. The design of the SR series encoders allows them to be installed close to the axis of movement, achieving high positioning accuracy despite large temperature fluctuations





# Stronger resistance to harsh environments

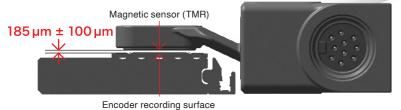
Air purging not necessary

# **SmartSCALE**

## Wide gap and clearance tolerance

Gap between encoder and head: 2 times greater than an enclosed encoder

Clearance tolerance between encoder and head: 5 times greater than an enclosed encoder

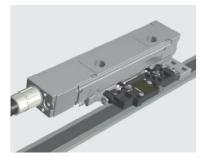


# 5 nm high-resolution

Achieves 5 nm resolution using the latest interpolation technology and a new algorithm

# Separate type simple architecture

Reduced number of mechanical parts to maintain clearance, resulting in high reliability and durability.



Enclosed type (SR27A)



Exposed type (SQ57)

# Sealed structure with IP67 grade

The magnetic encoder and reading sensor are fully protected by a 50  $\mu$ m thin metal cover.

High resistance to coolant/water splashing and to sludge/metal chips provides stable operation under harsh environments.





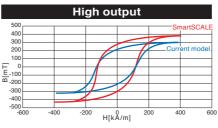
Head

Encoder

# New technology

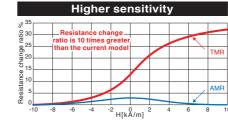
### Development of a new magnetic medium

The output detection signal has improved 30% by changing the composition and consistency of the magnetic medium of the encoder, and by improving the production method.



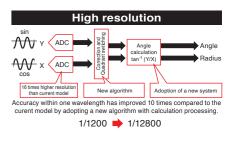
#### The development of a high sensitivity sensor using a new TMR device

Utilizes a low strain sensor enabling 10 times higher sensitivity compared to the current model by the development of a TMR device based on the Spin-Valve method.



### New interpolation calculation method

Achieves 5 nm resolution and higher interpolation accuracy by using a new algorithm



# Lineup

	Communication system	Туре	Model name	Output signal	Compatible controllers	Effective length	Maximum resolution	Accuracy	Maximum response speed	Protective design grade	Page
	ABS (Absolute) near oder	Exposed	Smart <b>SCALE</b> SQ57	Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC Mitsubishi Electric YASKAWA Electric SIEMENS BiSS-C <sup>(+1)</sup>	70 to 3,770 mm	0.005 μm	±(1.5 + 1.5L/1,000) μm L : Effective length mm	200 m/min	IP67	P8 - 9
		Lxposcu	Smart <b>SCALE</b> SQ47	Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC Mitsubishi Electric YASKAWA Electric SIEMENS	90 to 3,740 mm	0.005 μm	±(1.5 + 1.5L/1,000) μm L : Effective length mm	IP54 (Air purge not included)	P10 - 11	
Linear encoder		Enclosed	SR27A	Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLIQ	FANUC Mitsubishi Electric YASKAWA Electric Panasonic(*2) SIEMENS	70 to 2,040 mm	0.01 μm	(3 + 3L/1,000) μmp-p or (5 + 5L/1,000) μmp-p L : Effective length mm	200 m/min	(Air purge	P12 - 13
		Liicioseu	SR67A	Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLIQ	FANUC Mitsubishi Electric SIEMENS	140 to 3,640 mm	0.01 μm	(3 + 3L/1,000) μmp-p or (5 + 5L/1,000) μmp-p L : Effective length mm	200 m/min	IP54 (Air purge not included) IP65 (Air purge included)	P14 - 15
	INC (Incremental)	Enclosed	SR24	A/B/Reference point Line driver signal Compliant with EIA-422	-	70 to 2,040 mm	0.05 μm	(3 + 3L/1,000) μmp-p or (5 + 5L/1,000) μmp-p L : Effective length mm	50 m/min (Resolution : 0.1 μm Minimum phase difference : at 50 ns)	IP54 (Air purge not included) IP65 (Air purge included)	P16 - 17

<sup>\*1 :</sup> Please contact our sales department.

<sup>\*2 :</sup> Scheduled to go on sale in 2025.

	Communication system	Туре	Model name	Output signal	Compatible controllers	Through hole diameter	Maximum resolution	Accuracy	Maximum response speed	Protective design grade	Page
		Exposed	RS97 <sub>-1024</sub> E	Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC Mitsubishi Electric SIEMENS	Ф96 mm	23 bit (8,388,608 pulses/revolution) or 25 bit (33,554,432 pulses/revolution)	±2.5 "	5,000 min <sup>-1</sup>	IP65	P18 - 19
	ABS	LAPOGGG	RS97- <sub>1024</sub> N	Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC SIEMENS	Ф180 mm	23 bit (8,388,608 pulses/revolution) or 25 bit (33,554,432 pulses/revolution)	±2.5 "	2,000 min <sup>-1</sup> (Maximum mechanical IP65 P2	P20 - 21	
Angle encoder	(Absolute)	Enclosed	RU97- <sub>2048</sub>	Compliant with DRIVE-CLiQ	SIEMENS	А : Ф20 mm В : Ф22 mm	25 bit (33,554,432 pulses/revolution)	±2.5 "	(Maximum	IP65	P22 - 23
		Lilologu	RU77 <sub>-4096</sub>	Absolute serial bidirectional signal Compliant with EIA-485	FANUC Mitsubishi Electric YASKAWA Electric	Ф20 mm	25 bit (33,554,432 pulses/revolution)	±2.5 "	2,000 min <sup>-1</sup> (Maximum mechanical revolutions : 3,000 min <sup>-1</sup> )	IP65	P24 - 25
	INC (Incremental)	Enclosed	RU74	A/B/Reference point Line driver signal Compliant with EIA-422	-	Ф20 mm	360,448 pulses/revolution or 3,600,384 pulses/revolution	±2.5 "	2,000 min <sup>-1</sup>	IP65	P26 - 27

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Exposed type

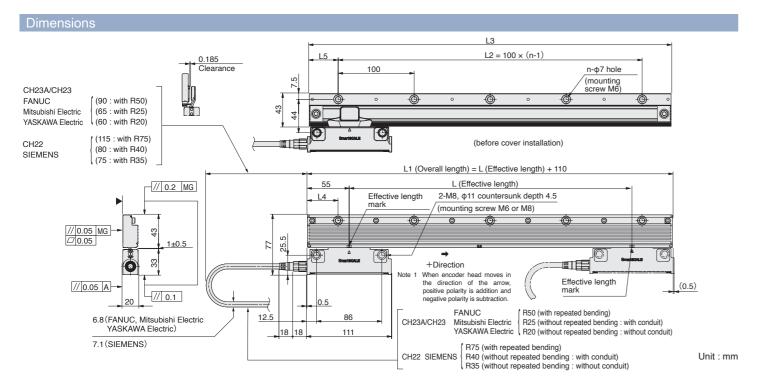


- No air purging is required even in harsh environments.
- · Separate and bearingless construction for long service life
- · Sealed structure with IP67 grade



Smart **SCALE** 

<sup>\*</sup> Please contact our sales department.



Effective length	Overall length		Mounting pitch				
L	L1	L2	L3	L4	L5	n	
70	180	100	176	40	38	2	
120	230	200	226	15	13	3	
170	280	200	276	40	38	3	
220	330	300	326	15	13	4	
270	380	300	376	40	38	4	
320	430	400	426	15	13	5	
370	480	400	476	40	38	5	
470	580	500	576	40	38	6	
570	680	600	676	40	38	7	
620	730	700	726	15	13	8	
670	780	700	776	40	38	8	
770	880	800	876	40	38	9	
870	980	900	976	40	38	10	
970	1,080	1,000	1,076	40	38	11	
1,070	1,180	1,100	1,176	40	38	12	
1,170	1,280	1,200	1,276	40	38	13	
1,270	1,380	1,300	1,376	40	38	14	

gth		Mountir	ng pitch		Number of bolts	Effective length	Overall length	Mounting pitch				Number of bolts
	L2	L3	L4	L5	n	L	L1	L2	L3	L4	L5	n
	100	176	40	38	2	1,370	1,480	1,400	1,476	40	38	15
	200	226	15	13	3	1,470	1,580	1,500	1,576	40	38	16
	200	276	40	38	3	1,570	1,680	1,600	1,676	40	38	17
	300	326	15	13	4	1,670	1,780	1,700	1,776	40	38	18
	300	376	40	38	4	1,770	1,880	1,800	1,876	40	38	19
	400	426	15	13	5	1,870	1,980	1,900	1,976	40	38	20
	400	476	40	38	5	1,970	2,080	2,000	2,076	40	38	21
	500	576	40	38	6	2,070	2,180	2,100	2,176	40	38	22
	600	676	40	38	7	2,270	2,380	2,300	2,376	40	38	24
	700	726	15	13	8	2,470	2,580	2,500	2,576	40	38	26
	700	776	40	38	8	2,670	2,780	2,700	2,776	40	38	28
	800	876	40	38	9	2,870	2,980	2,900	2,976	40	38	30
	900	976	40	38	10	3,070	3,180	3,100	3,176	40	38	32
	1,000	1,076	40	38	11	3,270	3,380	3,300	3,376	40	38	34
	1,100	1,176	40	38	12	3,470	3,580	3,500	3,576	40	38	36
	1,200	1,276	40	38	13	3,670	3,780	3,700	3,776	40	38	38
	1,300	1,376	40	38	14	3,770	3,880	3,800	3,876	40	38	39
_												Unit : mm

MG : Machine guide

For effective length exceeding 3,770 mm, please contact our sales department.

Note · The surface indicated by the ▲ marks is the installation surface

Model name
Effective length (L: mm)
Thermal expansion coefficie
Accuracy (at 20°C)
Reference point
Output signal
Compatible controllers
Resolution
Maximum response spee
Functional safety
Product Safety
Product Environment
Operating temperature
Storage temperature
Vibration resistance
Impact resistance
Protective design grade
Power supply voltage  Maximum power consumption
Consumption current
Mass
Compatible cables
(types without relay connector Maximum cable length
Compatible cables (types with relay connectors)
Maximum cable length
*1 For effective length exceeding *2 Three-piece configuration; can Magnescale reserves the right to o
Details of model dea
Encoder
$SQ57-xxxS \square \triangle ##$
SQ57-×××S□Z▼
3Q37- <u>xxx3</u> <u>1</u> 2▼
[xxx] Effective length (cm)
Cables
CH22 - □□□□○▽*
[□□□]Cable length
Written by flush right, indication in "m" units,
up to 30 m, 0.5 m pitch (Example) [O]Conduit specific
Type Cable length Type Conduit spec
015 1.5 m C With conduit 070 7 m N Without conduit 080 26 m
200   20 111
CH23-□□□○▽*
CH23 - □□□□○▽∗ CH23 A- □□□□○▽∗
(CH23A : FANUC mode
[□□□] Cable length
(Example) [O] Conduit specific  Type Cable length Type Conduit spe
010 1 m C With cond 005 0.5 m N Without co
065 6.5 m 100 10 m
[∇]Cable sheath
Type Cable specification  V PVC (Φ6.8) [Encoder side]  C PU (Φ6.8) [Encoder ]
PU (Ф8.8) [Encoder] P PVC (Ф8) [Controller side] E PU (Ф8) [Controller side]

cy grade		LIII) "	Coolu	tion and	ullecti		
/1000) μm		Туре	Direction	Resolution	Type	Direction	Resolution
		S		0.005	T		0.005
e length (mm	1)	Α	1	0.01	F		0.01
		В	1	0.05	G		0.05
		C	+	0.03	Н	-	0.03
		D	1	0.5	J		0.5
		E	1	1	K		1
eath (covering	))			Electric : S			: S, A only E only
Cable specifica	ation						
PU							
side connecto	or:a						
pecification					Rer	marks	
ncoder head						ndard	
112 connector (F	emale) made	by Pho	enix Co	ontact	Rela	ay/ Wate	rproofing
er side connec	ctor : b						
pecification							
pecification					Her	narks	
pen-end							
pen-end J45 connector					Adop	ts NC mad	hine tool
pen-end J45 connector J45 connector (wa	ater proof) made b	y YAMA	ICHI EL	ECTRONIC	Adop S Rel	ts NC mad	hine tool
pen-end J45 connector J45 connector (wa I12 connector )	ater proof) made b (Male) made b	y YAMA	ICHI EL enix Co	ECTRONIC ontact	Adop S Rel	ts NC mad	
pen-end J45 connector J45 connector (wa I12 connector (	ater proof) made b (Male) made b tor : b	y YAMA y Phoe	ICHI EL	ECTRONICS ontact	Adop S Rel Rela	ts NC mac ay ay/ Wate	erproofing
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pen-end J45 connector J45 connector (wa I12 connector )	ater proof) made b (Male) made b tor : b	y YAMA y Phoe	ICHI EL	emarks	Adop S Rela Rela	ay Wate	erproofing by Japan
pen-end J45 connector (was 112 connector i 112 connector i 113 connector i 114 connector i 115 connector i 115 connector i 116 connector i 117 side connector i 118 connector i 119 connector	tor: b  Encoder side of Aviation Electro	y YAMA y Phoe	Re should	emarks be 10P JN2 12P made b	Adop S Rel Rela	ay Wate	by Japan
pen-end J45 connector (wa J45 connector (wa J12 connector (  r side connec ification  -end*	ater proof) made b (Male) made b tor : b Encoder side or Aviation Electro Standard	by YAMA y Phoe	Re should	emarks be 10P JN2 12P made b	Adop S Rel Rela	ay Wate	by Japan
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pen-end J45 connector J45 connector (wa I12 connector i r side connec ification I-end* made by 3M traight case ma lade by Molex	ater proof) made b (Male) made b tor : b Encoder side or Aviation Electro Standard de by Honda Tsi	by YAMA by Phoe	Re should ustry or	emarks be 10P JN2 12P made b Mitsubishi FANUC YASKAWA	Related Francisco	ts NC made ay ay/ Wate	by Japan
pen-end J45 connector J45 connector (wa J45 conn	ater proof) made b (Male) made b tor : b Encoder side or Aviation Electro Standard de by Honda Tsi Japan LLC se made by HIRC	oy YAMA ny Phoe onnector nics Ind ushin K	Re should ustry or ogyo	emarks be 10P JN2 12P made b Mitsubishi FANUC YASKAW/	Related Francisco	ts NC made ay ay/ Wate	by Japan
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ipen-end J45 connector J45 connector J45 connector J45 connector J12 connector J12 connector J12 connector J13 connector J14 connector J15 connector J16 connector J16 connector J16 connector J16 connector J16 connector J16 connector J17 connector J18 con	ater proof) made b Male) made b  tor : b  Encoder side or Aviation Electro Standard  de by Honda Ts: Japan LLC se made by HIRI gapan Aviation Electro by TAJIMI ELE  ector : a  nescale made by Japan	py YAMA yy Phoe  onnector  nics Ind  ushin K  OSE Ele  ronics InCTRON	Renix Co	emarks be 10P JN2 12P made b Mitsubishi FANUC YASKAW, FANUC Relay Relay (fixe	Adoption Adoption Adoption Adoption Adoption Adoption Adoption Address	is NC made ay yay! Water as in made in ELECT in the NC, J	by Japan FRONICS

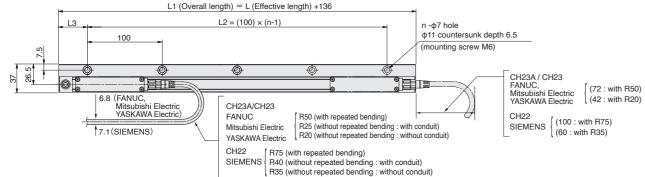
	SQ57-×××S□A###	SQ57 -×××S□BX -×××S□DX	SQ57-×××S□F###	SQ57-××× S□Z <b>▼</b>
L: mm)		70 to 3	3,770 *1	
coefficient		12 ± 1 × 10 <sup>-6</sup> /°C	(encoder alone)	
C)		± (1.5 + 1.5L/1000) μm	L : Effective length mm	
	Center, or user-selected position (Factory set)	Fixed to center	Center, or user-selected position (Factory set)	10 mm from left end of the effective length to the left outside
	Absolute se	erial bidirectional signal, compliant v	vith EIA-485	Compliant with DRIVE-CLiQ
ollers	FANUC α/αi interface compatible	Mitsubishi Electric	YASKAWA Electric	SIEMENS AG
	Selectable from 0.005, 0.0 (Facto		Selectable from 0.00 (Factory s	· ·
nse speed		200	m/min	
,		IEC 61508, EN/BS 62061 SIL 2 EN/BS/ISO 13849-1 Cat. 3 / PL d EN/BS 61800-5-2		
	FCC Part15 Subpa	art B Class A ICES-003 Class A	Digital Device EN/BS 61000-6-2	, EN/BS 61000-6-4
nent		EN/BS	63000	
rature		0 to -	+50 °C	
ture		-20 to	+60 °C	
ice		250 m/s² (50 l	Hz to 2,000 Hz)	
9		980 m/s	<sup>2</sup> (11 ms)	
grade		IF	P67	
tage		DC +4.75 to +5.25 V		DC +17 to +30.8 V
onsumption		1.35 W (TYP)		2.1 W (TYP) (24 V)
rent		270 mA (TYP)		85 mA (TYP) (24 V)
		Sensor head 120 g, Encoder 43	0 + (2.9×Effective length (mm) ) g	
es connectors) ength	CH23A-***NVF 11 m	CH23-***NVM 11 m	CH23-***NVG 11 m	CH22-***NSMY 30 m
es nnectors) ength	CH23A-***NVK + CH23A-***NPFA 30 m	CH23-***NVK + CH23-***NPMA 30 m	CH23-***NVK + CH23-***NVGA + CH23-***NVGA 30 m *2	CH22-***NSMF + CH22-*** NSFY 30 m
del desig				
<u></u> <u>△###</u> <u>Z</u> ▼	±(1.5+1.5L/1000) μm  L: Effective length (mm)	Poe   Direction   Resolution   Type   Direction   Type   Direction	pe NC manufacturer Rermarks A FANUC a / a interface B Mitsubishi Electric Half duplex D Mitsubishi Electric Half duplex F YASKAWA Electric Half duplex Z SIEMENS AG DRIVE-CLIQ I tetter  [▼]    (FAN)   (FAN)   (Associated by the second by the	telerence point position  IUC, Mitsubishi Electric, YASKAWA Electric)  Type Reference point position  X Effective length center  Ute position Distance from left end of effective length  Joishi Electric: X only  reference point from the left end of effective  h is greater than 1000, the left two digits are  s of the alphabet  Reference point position: Left from  the edge of the effective length  Y Online diagnostic function support
] <u>○ ∨ * #</u>	[*]Encoder side connector : a  Type Specification  M Encoder head connector  F M12 connector (Female) made by I		CH22  a CH22-050NSMF b a  CH22  Ge a CH22-100NSMN	CH22  CH22-050NSFY b  Ch22-050NSFY b  Ch22-050NSFY b
onduit specification Conduit specificati With conduit Without conduit (stand	Type Specification  None Open-end  V P 145 connector made by VAMAL	Remarks  CHI ELECTRONICS Adopts NC machine tool  AMAICHI ELECTRONICS Relay  hoenix Contact Relay (Waterproofing)	CH22-GONSMF CH22-100NSMY example) Cable length 5 m Without conduit PU sheath Encoder side connector Original of Magnescale Controller side connector Chriginal of Magnescale Controller side connector M12 (Male) made by Phoenix Contact CH22-100NSMY example)  CH22-100NSMY example) Without conduit PU sheath Encoder side connector Original of Magnescale Controller side connector M12 (Male) made by YAMAICHI ELECTRON	Controller side connector
Conduit specification Without conduit Without conduit	Type   Specification   Encoder side conn.	YASKAWA Electric Electric FANUC s Industry Relay RONICS Relay (fixed)	CH23A CH23A CH23A CH23A CH23A CH23A-100NVM CH23A-100NVF CH23A-00NVK CH23A-00NVK CH23A-00NVF example) example) cable length 5 m Cable length 10 m	CH23 CH23A  CH23A-050NPMA b CH23A-050NPFA  CH23-050NPMA c CH23-050NPMA c CH23-050NPMA c CH23A-050NPFA example) Cable length 5 m
on oder side] der ] oller side] ler side]	[#] Encoder side connector : a  Type Specification  None Original of Magnescale  A 10P JN2 (Female) made by Japan Avi  C 12P R04-9125JF8.5 made by TAJIII.	Remarks Standard ation Electronics Industry Relay	Without conduit PVC sheath Encoder side connector Original of Magnescale Controller side connector Original of Magnescale Controller side connector Original of Magnescale Controller side connector CH29.11 (Male) made by Japan Aviation Electronics Industry CH23A> 20P made by Honda Tsushin Kogy	Without conduit PVC sheath Encoder side connector 10P JN22 (Female) made by Japan Aviation Electronics Industry SM Controller side connector <ch23-10p 3m<="" by="" made="" td=""></ch23-10p>

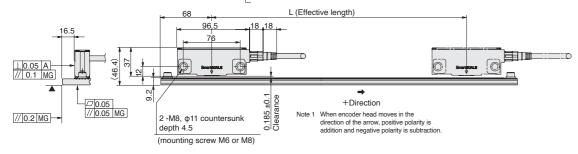
SQ57 -×××S□BX

Exposed type SmartSCALE

- · No air purging is required even in harsh environments.
- · Separate and bearingless construction for long service life
- · Sealed structure with IP67 grade







Effective length	Overall length	Mountir	Number of bolts	
I	L1	L2 L3		n
90	226	200	13	3
140	276	200	38	3
190	326	300	13	4
240	376	300	38	4
290	426	400	13	5
340	476	400	38	5
440	576	500	38	6
540	676	600	38	7
590	726	700	13	8
620	756	700	28	8
640	776	700	38	8
740	876	800	38	9
840	976	900	38	10
940	1,076	1,000	38	11
1,040	1,176	1,100	38	12
1,140	1,276	1,200	38	13
1,240	1,376	1,300	38	14

Effective length	Overall length	Mountin	ng pitch	Number of bolts
L	L1	L2	L3	n
1,340	1,476	1,400	38	15
1,440	1,576	1,500	38	16
1,540	1,676	1,600	38	17
1,640	1,776	1,700	38	18
1,740	1,876	1,800	38	19
1,840	1,976	1,900	38	20
1,940	2,046	2,000	38	21
2,040	2,176	2,100	38	22
2,240	2,376	2,300	38	24
2,440	2,576	2,500	38	26
2,640	2,776	2,700	38	28
2,840	2,976	2,900	38	30
3,040	3,176	3,100	38	32
3,240	3,376	3,300	38	34
3,440	3,576	3,500	38	36
3,640	3,776	3,700	38	38
3,740	3,876	3,800	38	39
				I Init · mm

MG: Machine guide

For effective length exceeding 3,740 mm, please contact our sales department.

· The surface indicated by the ▲ marks is the installation surface

Specifications				
Model name	SQ47-××× <b>★</b> S□A###	SQ47 -×××★S□BX -×××★S□DX	SQ47-×××★S□F###	SQ47-×××★S□Z▼
Effective length (L : mm)		90 to 3	3,740*1	
Thermal expansion coefficient		12 ± 1 × 10 <sup>-6</sup> /°C	(encoder alone)	
Accuracy (at 20 °C)		± (1.5 + 1.5L/1000) μm	L : Effective length mm	
Reference point	Center, or user-selected position (Factory set)	Fixed to center	Center, or user-selected position (Factory set)	10 mm from left end of the effective length to the left outsic
Output signal	Absolute se	erial bidirectional signal, compliant v	vith EIA-485	Compliant with DRIVE-CLiQ
Compatible controllers	FANUC α/αi interface compatible	Mitsubishi Electric	YASKAWA Electric	SIEMENS AG
Resolution	Selectable from 0.005, 0.0 (Facto	5 and 0.01 μm set)		
Maximum response speed		200 ו	m/min	
Functional safety		IEC 61508, EN/BS 62061 SIL 2 EN/BS/ISO 13849-1 Cat. 3 / PL d EN/BS 61800-5-2		
Product Safety	FCC Part15 Subpa	art B Class A ICES-003 Class A	Digital Device EN/BS 61000-6-2	, EN/BS 61000-6-4
Product Environment		EN/BS	63000	
Operating temperature		0 to +	-50 °C	
Storage temperature		-20 to	+60 °C	
Vibration resistance		250 m/s <sup>2</sup> (50 H	Hz to 2,000 Hz)	
Impact resistance		980 m/s <sup>2</sup>	2 (11 ms)	
Protective design grade		IP	67	
Power supply voltage		DC +4.75 to +5.25 V		DC +17 to +30.8 V
Maximum power consumption		1.35 W (TYP)		2.1 W (TYP) (24 V)
Consumption current		270 mA (TYP)		85 mA (TYP) (24 V)
Mass		Sensor head 110 g, Encoder 350	+ (2.5 × Effective length (mm) ) g	
Compatible cables (types without relay connectors) Maximum cable length	CH23A-***NVF 11 m	CH23-***NVM 11 m	CH23-***NVG 11 m	CH22-***NSMY 30 m
Compatible cables (types with relay connectors) Maximum cable length	CH23A-***NVK + CH23A-***NPFA 30 m	CH23-***NVK + CH23-***NPMA 30 m	CH23-***NVK + CH23-***NVGA + CH23-***NVGA 30 m *2	CH22-***NSMF + CH22-*** NSFY 30 m

Magnescale reserves the right to change product specifications without prior notice.

### Details of model designation

Encoder

 $SQ47-xxx \bigstar S \square \triangle ###$ 

SQ47-×××★S□Z▼

[xxx]Effective length (cm)

[★] Cable lead-out directi								
Туре	Lead-out direction							
R	Right							
L	Left							

[S] Accuracy grade ± (1.5+1.5L/1000) um L : Effective length (mm)

[∇] Cable seath (covering

В	_	0.05	G	_	0.0
С		0.1	Н	_	0
D		0.5	J		0
Е		1	K		

 $[\,\Box\,]$  Resolution and direction (µm)

Type Direction Resolution Type Direction Resolution

0.005

0.005 T 0.01 F

YASKAWA Electric, SIEMENS AG: S, A only Mitsubishi Electric: S, A, B, C, D, E only

$[\triangle]$	Communication p	orotocol	[#]Reference point position				
Type	NC manufacturer	Remarks		(FANUC, Mitsubishi Electric, YASKAWA Electric			
Α	FANUC	α / αi interface		Type	Reference point position		
В	Mitsubishi Electric	Half duplex	]	Х	Effective length center		
D	Mitsubishi Electric	Full duplex		(Absolute position) Distance from left end of effect			
F	YASKAWA Electric	Half duplex	Mitsubishi Electric: X only				
Z	SIEMENS AG	DRIVE-CLIQ	If the reference point from the left end of effective length is greater than 1000, the left two digits are				

X Effective length center

bsolute position) Distance from left end of effective length Mitsubishi Electric: X only
If the reference point from the left end of effective
length is greater than 1000, the left two digits are
letters of the alphabet

▼ Reference point position (SIEMENS AG) Reference point position : Left from

the edge of the effective length Online diagnostic function not supported Online diagnostic function support

CH22 - □□□□▽\*#

[□□□]Cable length Written by flush right, indication in "m" units, up to 30 m, 0.5 m pitch

Cables

Unit: mm

[O]Conduit specification | Type | Cable length | Type | Conduit specification | 015 | 1.5 m | C | With conduit | N | Without conduit (standard) | N | Without

CH23 - □ □ □ ○ ▽ \* # CH23 A-  $\square$   $\square$   $\square$   $\square$   $\square$   $\vee$  \* #

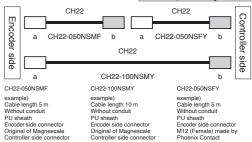
Cable length | Type | Cable length | Type | Conduit specification | C | With conduit | N | Without conduit |

[∇]Cable sheath					
Type	Cable specification				
V	PVC (Φ6.8) [Encoder side]				
С	PU (Φ6.8) [Encoder ]				
P	PVC (Φ8) [Controller side]				
E	PU (Φ8) [Controller side]				

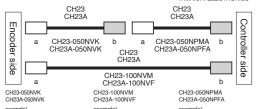
Type	Specification	Remarks				
M	Encoder head connector	Standard				
F	M12 connector (Female) made by Phoenix Contact	Relay/ Waterproofing				
[#]Contr	oller side connector : b					
[#]Controller side connector : b						
(#]Contr	oller side connector : b Specification	Remarks				
		Remarks				
Туре	Specification	Remarks  Adopts NC machine tool				
Type None	Specification Open-end					

Controller side connector : b						
уре	Specification	Remarks				
Z			ctor should be 10P JN2 (Female) made by Japan industry or 12P made by TAJIMI ELECTRONICS			
lone		Standard				
M*	10P made by 3M		Mitsubishi Electric NC, J3			
F	20P straight case ma	de by Honda Tsushin Kogyo	FANUC			
G*	6P made by Molex	Japan LLC	YASKAWA Electric			
J	Horizontal drawing cas	se made by HIROSE Electric	FANUC			
K	10P JN1 (Male) made by J	lapan Aviation Electronics Industry	Relay			
N	12P R04 (Male) made	by TAJIMI ELECTRONICS	Relay (fixed)			
CH23 only						
	-					

Type	Specification	Remarks
None	Original of Magnescale	Standard
Α	10P JN2 (Female) made by Japan Aviation Electronics Industry	Relay
С	12P R04-9125JF8.5 made by TAJIMI ELECTRONICS	Relay (fixed)



without conduit PU sheath Encoder side connector Original of Magnescale Controller side connector



Encoder side connector
Original of Magnescale
Controller side connector
10P JN1 (Male) made by Japan
Aviation Electronics Industry

example) Cable length 10 m

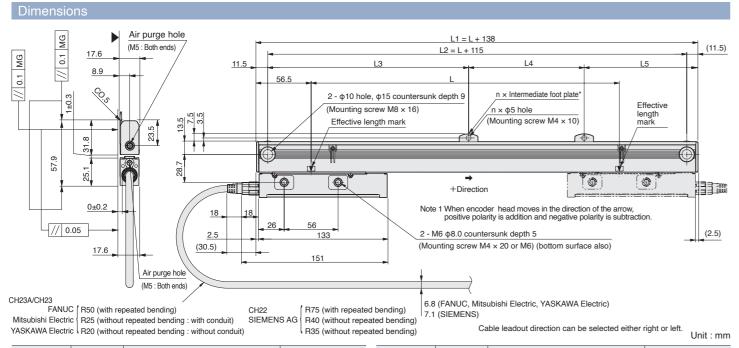
Encoder side connector 10P JN2 (Female) made by Japan Aviation Electronics In Controller side connector <CH23> 10P made by 3M <CH23A> 20P made by Honda Tsushin Kogyo

- · Slim design allows installation in narrow spaces
- Magnetic system enables use even in environments with condensation, oil, and other adverse coditions
- · Same thermal expansion as iron



Mitsubishi Electric

\* Scheduled to launch in 2025



	Effective length	Overall length		Mountir	ng pitch		Number of intermediate foot plates	Effective length	Overall length		Mountir	ng pitch		Number of intermediate foot plates
	L	L1	L2	L3	L4	L5	n	L	L1	L2	L3	L4	L5	n
_	70	208	185	_	_	_	0	770	908	885	442.5	-	442.5	1
	120	258	235	_	_	_	0	820	958	935	467.5	_	467.5	1
	170	308	285	_	_	_	0	920	1,058	1,035	517.5	_	517.5	1
	220	358	335	_	_	_	0	1,020	1,158	1,135	567.5	_	567.5	1
	270	408	385	_	_	_	0	1,140	1,278	1,255	627.5	_	627.5	1
	320	458	435	_	_	_	0	1,240	1,378	1,355	677.5	_	677.5	1
	370	508	485	_	_	_	0	1,340	1,478	1,455	727.5	_	727.5	1
	420	558	535	_	_	_	0	1,440	1,578	1,555	520	520	515	2
	470	608	585	_	_	_	0	1,540	1,678	1,655	550	550	555	2
	520	658	635	_	_	_	0	1,640	1,778	1,755	585	585	585	2
	570	708	685	_	_	_	0	1,740	1,878	1,855	620	620	615	2
	620	758	735	_	_	_	0	1,840	1,978	1,955	650	650	655	2
	670	808	785	392.5	_	392.5	1	2,040	2,178	2,155	720	720	715	2
	720	858	835	417.5	-	417.5	1							Unit: mm

MG: Machine guide \* Intermediate foot plate: One location when  $L \ge 670$  mm, two locations when  $L \ge 1440$  mm

Notes • The surface indicated by the ▲ marks is the installation surface.

· Movement outside the effective length (L) will damage the encoder head. It is recommended that the mechanical movable length (stroke) be set to 10 mm or more to the inside of both ends of the effective length (L).

Opcomodiono				
Model name	SR27A-×××○□AX###	SR27A-×××○□BX SR27A-×××○□DX	SR27A- ×××○□F###	SR27A - ×××○AZY
Effective length (L: mm)				
Thermal expansion coefficient		12 ±1 ×	10 <sup>-6</sup> /°C	
Accuracy (at 20°C)	(3	+ 3L/1,000) μmp-p or (5 +5L/1,0	00) μmp-p, L: Effective length (m	m)
Reference point	Center, or user-selected position (Factory set) Fixed to center Center, or user-selected position (Factory set)			Fixed to 10 mm from left end of effective length
Output signal	Absolute ser	ial bidirectional signal, compliant	with EIA-485	Compliant with DRIVE-CLiQ
Compatible controllers	FANUC α/αi interface compatible	Mitsubishi Electric	YASKAWA Electric	SIEMENS AG
Resolution	Selectable from 0.005*1, 0.01, 0.05, 0.1, 0.5 and 1 µm (Factory set)	Selectable from 0.005*1, 0.01, 0.05 and 0.1 µm (Factory set)	Selectable from 0.01, 0.05, λ / 32768 and λ / 4096 μm (Factory set)	0.01 μm (Factory set)
Maximum response speed		200	m/min	
Functional safety		IEC 61508, EN/BS 62061 SIL 2 EN/BS/ISO 13849-1 Cat. 3 / PL d EN/BS 61800-5-2		
Product Safety	FCC Part15 Subpart B Cl	ass A ICES-003 Class A Digita	al Device EN/BS 61000-6-2, E	:N/BS 61000-6-4
Product Environment		EN/BS	63000	
Operating temperature		0 to -	-50°C	

Product Safety	FCC Part15 Subpart B Cl	ass A ICES-003 Class A Digita	al Device EN/BS 61000-6-2, E	EN/BS 61000-6-4					
Product Environment		EN/BS 63000							
Operating temperature		0 to +50°C							
Storage temperature		-20 to	+55°C						
Vibration resistance		150 m/s² (50 Hz to 3,000 Hz)							
Impact resistance		350 m/s	<sup>2</sup> (11 ms)						
Protective design grade		IP54 (Air purge not included	d), IP65 (Air purge included)						
Power supply voltage		DC +17 to +30.8 V							
Maximum power consumption		1.3 W or less (4.75V or 5.25V)							
Consumption current	250	mA (with 5 V controller connec	etion)	75 mA (with 24 V controller connectio					
Mass		Approx. 0.39 kg +	1.53 kg/m or less						
Compatible cables (types without relay connectors) Maximum cable length	CH23A-***NVF 13 m	CH23-***NVM 13 m	CH23-***NVG 13 m	CH22-***NSMY 30 m					
Compatible cables (types with relay connectors) Maximum cable length	CH23A-***NVK + CH23A-***NPFA 30 m	CH23-***NVK + CH23-***NPMA 30 m	CH23-***NVK + CH23-***NVGA + CH23-***NVGA 30 m *2	CH22-***NSMF + CH22-*** NSF 30 m					

<sup>\*1</sup> For resolution of 0.005 µm, please contact our sales department. \*2 Three-piece configuration; cannot be used in two-piece configuration. Magnescale reserves the right to change product specifications without prior notice.

### Details of model designation

#### Encoder

 $SR27A - \times \times \times \bigcirc \Box \triangle \sharp$ 

 $[\mathsf{xxx}] \, \mathsf{Effective \ length \ (cm)}$ Refer to the table in "Dimensions"

[O] Accuracy grade						
Type	Accuracy grade					
Α	(5 +5L/1,000) μmp-p					
S	(3 +3L/1,000) μmp-p					
L. F#tiv Ith ()						

µmp-p	U		
2)	Е		
")	Mitsu	bishi E	Electri

SIEMENS AG : A only

\* λ: 320 μm

1	В		0.05	G		0.05	L		N/32/68
1	С	+	0.1	Н	-	0.1		+	
1	D		0.5	J		0.5	М		λ/4096
	Е		1	K		1			70-1000
	Mitsubishi Electric : A, B, C only								

0.01 F 0.01

 $[\Box]$  Resolution and direction ( $\mu m$ )

Type Direction Resolution Resolution Type Direction Resolution Type Di

ре	NC manufacturer	Remarks	Type	Reference	
	FANUC	α/αi interface	Type	point position	
}	Mitsubishi Electric	Half duplex	Χ	Effective length center	
)	Mitsubishi Electric	Full duplex	Υ	Fixed to 10mm from left	
	YASKAWA Electric		'	end of effective length	
	SIEMENS AG	DRIVE-CLIQ	SIEMENS AG : Y only		
				: Flastia . V aul.	

SIEMENS AG : Y only Mitsubishi Electric : X only Please contact our representative

Cables

CH22-□□□○▽\*#

[□□□]Cable length Written by flush right, up to 30 m, 0.5 m pitch

[O]Conduit specification 

CH23 - □ □ □ ○ ▽ \* # CH23 A-  $\square$   $\square$   $\square$   $\bigcirc$   $\triangledown$  \* #

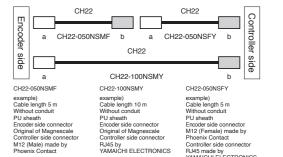
Cable le	ngth			
(Exampl	e)	[O]Conduit spec		
Type	Cable length		Туре	Conduit spec
010	1 m		С	With condu
005	0.5 m		N	Without co
065	6.5 m			
100	10 m			

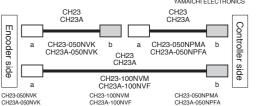
[▽]Cable	sheath
Type	Cable specification
V	PVC (Φ6.8) [Encoder side]
С	PU (Φ6.8) [Encoder ]
Р	PVC (Φ8) [Controller side]
E	PU (Φ8) [Controller side]

Type	Cable specification	
S	PU	
*]Encod	ler side connector : a	
Type	Specification	Remarks
M	Encoder head connector	Standard
F	M12 connector (Female) made by Phoenix Contact	Relay/ Waterproofing
#1Contr	oller eide eennester i b	•
	oller side connector : b	
Туре	Specification	Remarks
	Specification Open-end	Remarks
Туре	Specification	Remarks  Adopts NC machine tool
Type None	Specification Open-end	
Type None Y	Specification Open-end RJ45 connector made by YAMAICHI ELECTRONICS	Adopts NC machine tool

Type	Specification	F	Remarks		
7		Encoder side connector shou	Encoder side connector should be 10P JN2 (Female) made by Japan		
	Open-end*	Aviation Electronics Industry or 12P made by TAJIMI ELECTRONICS			
None		Standard			
M*	10P made by 3M		Mitsubishi Electric NC, J3		
F	20P straight case ma	de by Honda Tsushin Kogyo	FANUC		
G*	6P made by Molex	Japan LLC	YASKAWA Electric		
J	Horizontal drawing cas	se made by HIROSE Electric	FANUC		
K	10P JN1 (Male) made by J	Japan Aviation Electronics Industry	Relay		
N	12P R04 (Male) made	by TAJIMI ELECTRONICS	Relay (fixed)		
* CH23 only					

Type	Specification	Remarks
None	Original of Magnescale	Standard
Α	10P JN2 (Female) made by Japan Aviation Electronics Industry	Relay
С	12P R04-9125JF8.5 made by TAJIMI ELECTRONICS	Relay (fixed)





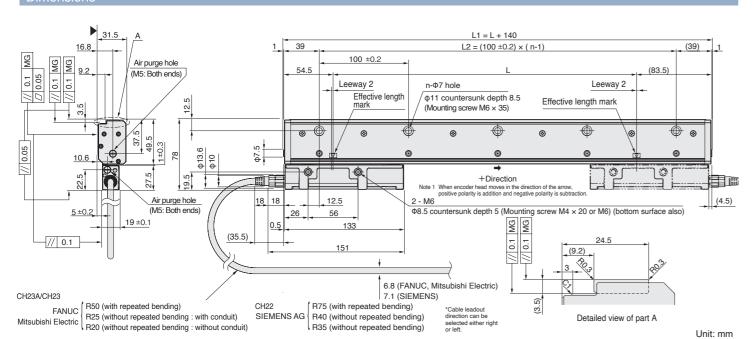
Encoder side connector
Original of Magnescale
Controller side connector
10P JN1 (Male) made by Japan
Aviation Electronics Industry

example) Cable length 10 m

Encoder side connector 10P JN2 (Female) made by Japan Aviation Electronics Ir Controller side connector <CH23> 10P made by 3M <CH23A> 20P made by Honda Tsushin Kogyo

- · High rigidity provides resistance to shock and vibration
- Magnetic system allows use even in environments with condensation, oil, and other adverse conditions
- Same thermal expansion as iron





Effective length	Overall length	Mounting pitch	Number of bolts
L	L1	L2	n
140	280	200	3
240	380	300	4
340	480	400	5
440	580	500	6
540	680	600	7
640	780	700	8
740	880	800	9
840	980	900	10
940	1,080	1,000	11
1,040	1,180	1,100	12
1,140	1,280	1,200	13
1,240	1,380	1,300	14
1,340	1,480	1,400	15
1,440	1,580	1,500	16

Effective length	Overall length	Mounting pitch	Number of bolts
L	L1	L2	n
1,540	1,680	1,600	17
1,640	1,780	1,700	18
1,740	1,880	1,800	19
1,840	1,980	1,900	20
2,040	2,180	2,100	22
2,240	2,380	2,300	24
2,440	2,580	2,500	26
2,640	2,780	2,700	28
2,840	2,980	2,900	30
3,040	3,180	3,100	32
3,240	3,380	3,300	34
3,440	3,580	3,500	36
3,640	3,780	3,700	38
0,040	5,700	0,700	Unit : mm

MG: Machine guide

Notes • The surface indicated by the ▲ marks is the installation surface.

· Movement outside the effective length (L) will damage the encoder head. It is recommended that the mechanical movable length (stroke) be set to 10 mm or more to the inside of both ends of the effective length (L).

Specifications							
Model name	SR67A - ×××○□AX###	SR67A-xxxQAZY					
Effective length (L : mm)	140 to 3,640						
Thermal expansion coefficient		12±1 × 10 <sup>-6</sup> /°C					
Accuracy (at 20 °C)	(3+3L/1,000) μmp-p (effective length 140 to 3	,040 mm) or (5+5L/1,000) µmp-p (effective leng	th 140 to 3,640 mm), L: Effective length (mm)				
Reference point	Center, or user-selected position (Factory set)	Fixed to center	Fixed to 10 mm from left end of effective length				
Output signal	Absolute serial bidirectional si	ignal, compliant with EIA-485	Compliant with DRIVE-CLiQ				
Compatible controllers	FANUC α/αi interface compatible	Mitsubishi Electric	SIEMENS AG				
Resolution	Selectable from 0.005*1, 0.01, 0.05, 0.1, 0.5 and 1 $\mu m$ (Factory set)	Selectable from 0.005*1, 0.01, 0.05 and 0.1 $\mu m$ (Factory set)	0.01 μm (Factory set)				
Maximum response speed		200 m/min					
Functional safety	IEC 61508, EN/BS 62061 - EN/BS/ISO 13849-1 Cat. 3 EN/BS 61800-5-2						
Product Safety	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN/BS 61000-6-2, EN/BS 61000-6-4						
Product Environment	EN/BS 63000						
Operating temperature		0 to +50°C					
Storage temperature		-20 to +55°C					
Vibration resistance		250 m/s <sup>2</sup> (50 Hz to 2,000 Hz)					
Impact resistance		450 m/s <sup>2</sup> (11 ms)					
Protective design grade	IP54 (A	Air purge not included), IP65 (Air purge inc	cluded)				
Power supply voltage	DC +4.75	to +5.25 V	DC +17 to +30.8 V				
Maximum consumption current	1.3 W or less (4.75 V or 5.25 V) 1.9 W or less (30.8 V)						
Consumption current	250 mA (with 5 V controller connection) 75 mA (with 24 V controller connection)						
Mass		Approx. 0.9kg+ 5.2kg/m or less					
Compatible cables (types without relay connectors) Maximum cable length	CH23A-***NVF 13 m	CH23-***NVM 13 m	CH22-***NSMY 30 m				
Compatible cables (types with relay connectors) Maximum cable length	CH23A-***NVK + CH23A-***NPFA 30 m	CH22-***NSMF + CH22-*** NSFY 30 m					

<sup>\*1</sup> For resolution of 0.005 µm, please contact our sales department.

Magnescale reserves the right to change product specifications without prior notice.

### Details of model designation

#### Encoder

 $SR67A - \times \times \times \bigcirc \square \triangle \#$ 

[xxx] Effective length (cm) Refer to the table in

[O]Accuracy grade						
Type	Accuracy grade					
Α	(5 + 5 L/1,000) μmp-p					
S	(3 + 3 L/1,000) μmp-p					

	(3 + 3 🗀 1,000)	
S	(3 + 3 L/1,000)	μтр-р
. [#00	tive length/mm)	

L/1,000)	μтр-р	
gth(mm)		

[□]Resolution and direction (μm)						[△] Communication protocol			
Type	Direction	Resolution	Type	Direction	Resolution		Type	NC manufacture	Remarks
Α		0.01	F		0.01		Α	FANUC	α / αi interface
В		0.05	G		0.05		В	Mitsubishi Electric	Half duplex
С	+	0.1	Н	-	0.1		D	Mitsubishi Electric	Full duplex
D		0.5	J		0.5		Z	SIEMENS AG	DRIVE-CLiQ
E		1	K		1				
Mitsubishi Electric : A, B, C only									

0.5	J	]	0.5	Z	SIEMENS AG	DRIVE-CLiQ	
1	K		1				
: A, B, C	only						

Туре	Reference point position
Х	Effective length center
Υ	Fixed to 10mm from left end of effective length

Mitsubishi Electric: X only Please contact our represe for custom positions.

#### Cables

CH22-□□□○▽\*#

[□□□]Cable length Written by flush right, indication in "m" units up to 30 m, 0.5 m pitch

ampie)			[O]Con	duit specification
ype	Cable length		Type	Conduit specificatio
)15	1.5 m		С	With conduit
70	7 m		N	Without conduit (standa
260	26 m			

CH23-		
CH23 A-	□□□○▽∗#	
[000]	(CH23A : FANUC model only	)

Cable le	ngth						
(Example	le)	[O]Con	duit specification				
Type	Cable length	Type	Conduit specification				
010	1 m	С	With conduit				
005	0.5 m	N	Without conduit				
065	6.5 m						
100	10 m						

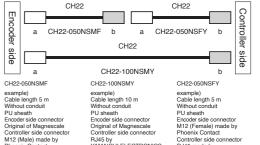
[∇]Cable sheath					
Type	Cable specification				
V	PVC (Φ6.8) [Encoder side]				
С	PU (Φ6.8) [Encoder ]				
Р	PVC (Φ8) [Controller side]				
E	PU (Φ8) [Controller side]				

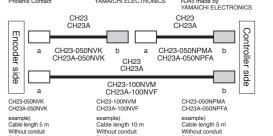
Type	Cable specification						
S	PU						
(*]Encod	der side connector : a						
Type	Specification	Remarks					
M	Encoder head connector	Standard					
F	M12 connector (Female) made by Phoenix Contact	Relay/ Waterproofing					
Type	roller side connector : b  Specification	Remarks					
		Domorko					
None	Open-end						
Υ	RJ45 connector made by YAMAICHI ELECTRONICS	Adopts NC machine tool					
Z	RJ45 connector (water proof) made by YAMAICHI ELECTRONICS	Relay					
F	M12 connector (Male) made by Phoenix Contact	Relay/ Waterproofing					

SIEMENS AG:

Type	Specification	F	Remarks				
Z	Open-end*		Encoder side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 12P made by TAJIMI ELECTRONICS				
None		Standard					
M*	10P made by 3M		Mitsubishi Electric NC, J3				
F	20P straight case made t	y Honda Tsushin Kogyo	FANUC				
J	Horizontal drawing case	made by HIROSE Electric	FANUC				
K	10P JN1 (Male) made by Japa	an Aviation Electronics Industry	Relay				
N	12P R04 (Male) made by	Relay (fixed)					
* CH2	3 only						
UHZ	3 Offity						

Type	Specification	Remarks
None	Original of Magnescale	Standard
Α	10P JN2 (Female) made by Japan Aviation Electronics Industry	Relay
С	12P R04-9125JF8.5 made by TAJIMI ELECTRONICS	Relay (fixed)





Encoder side connector 10P JN2 (Female) made by Japan Aviation Electronics Ir Controller side connector <CH23> 10P made by 3M <CH23A> 20P made by Honda Tsushin Kogyo Encoder side connector Original of Magnescale Controller side connector 10P JN1 (male) made by Japan Aviation Electronics Industry

- · Slim design allows installation in narrow spaces
- Magnetic system enables use even in environments with condensation, oil, and other adverse coditions
- · Same thermal expansion as iron



Cable leadout direction can be selected either right or left.

### A/B/Refelence point

#### Air purge hole L1 = L + 138 (M5 : Both ends) L2 = L + 115 n x Intermediate foot plate 2 - φ10 hole, φ15 countersunk depth 9 Effective (Mounting screw M8 × 16) n × φ5 hole length mark (Mounting screw M4 × 10) Effective length mark <del>(</del>🔷) ( D **(1)** +Direction 0±0.2 Note 1 When encoder head moves in the direction of the arrow, positive polarity is addition and negative polarity is subtraction. // 0.05 (2.5) 2 - M6 φ8.0 countersunk depth 5 (Mounting screw M4 × 20 or M6) (bottom surface also) 17.6 Air purge hole R50 (with repeated bending)

Effective length	Overall length		Mountin	ng pitch		Number of intermediate foot plates	Effective length	Overall length		Mountir	ng pitch		Number of intermediate foot plates
L	L1	L2	L3	L4	L5	n	L	L1	L2	L3	L4	L5	n
70	208	185	_	_	_	0	770	908	885	442.5	_	442.5	1
120	258	235	_	_	_	0	820	958	935	467.5	_	467.5	1
170	308	285	_	_	_	0	920	1,058	1,035	517.5	_	517.5	1
220	358	335	_	_	_	0	1,020	1,158	1,135	567.5	_	567.5	1
270	408	385	_	_	_	0	1,140	1,278	1,255	627.5	_	627.5	1
320	458	435	_	_	_	0	1,240	1,378	1,355	677.5	_	677.5	1
370	508	485	_	_	_	0	1,340	1,478	1,455	727.5	_	727.5	1
420	558	535	_	_	_	0	1,440	1,578	1,555	520	520	515	2
470	608	585	_	_	_	0	1,540	1,678	1,655	550	550	555	2
520	658	635	_	_	_	0	1,640	1,778	1,755	585	585	585	2
570	708	685	_	_	_	0	1,740	1,878	1,855	620	620	615	2
620	758	735	_	_	_	0	1,840	1,978	1,955	650	650	655	2
670	808	785	392.5	_	392.5	1	2,040	2,178	2,155	720	720	715	2

MG : Machine guide \* Intermediate foot plate : One location when  $L \ge 670$  mm, two locations when  $L \ge 1440$  mm

Notes • The surface indicated by the ▲ marks is the installation surface.

720

835 417.5 - 417.5

R25 (without repeated bending : with conduit)

R20 (without repeated bending : without conduit)

· Movement outside the effective length (L) will damage the encoder head. It is recommended that the mechanical movable length (stroke) be set to 10 mm or more to the inside of both ends of the effective length (L).

Specifications	
Model name	SR24-x×x○□ <b>♦</b> ###
Effective length (L: mm)	70 to 2,040
Thermal expansion coefficient	12 ±1 × 10 <sup>-6</sup> /°C
Accuracy (at 20°C)	(3 + 3L/1,000) μmp-p or (5 + 5L/1,000) μmp-p, L : Effective length (mm)
Reference point	Center point, Multi-point (40 mm pitch), User-selected point (1 mm pitch)
Output signal	A/B/Reference point, line driver signal, compliant with EIA-422
Resolution	Selectable from 0.05, 0.1, 0.5 and 1 μm (Factory set)
Maximum response speed	50 m/min (Resolution : 0.1 μm, Minimum phase difference: at 50 ns)
Product Safety	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN/BS 61000-6-2, EN/BS 61000-6-4
Product Environment	EN/BS 63000
Operating temperature	0 to +50 °C
Storage temperature	-20 to +55 °C
Vibration resistance	150 m/s <sup>2</sup> (50 Hz to 3,000 Hz)
Impact resistance	350 m/s <sup>2</sup> (11 ms)
Protective design grade	IP54 (Air purge not included), IP65 (Air purge included)
Power supply voltage	DC +4.75 to +5.25 V (with connectiong terminal)
Maximum power consumption	1.3 W or less (4.75 V to 5.25 V)
Consumption current	250 mA (with 5 V controller connection)
Mass	Approx. 0.39 kg + 1.53 kg/m or less
Compatible cables (types without relay connectors) Maximum cable length	CH23-***NV 13 m
Compatible cables (types with relay connectors) Maximum cable length	CH23-***NVU + CH23-NPUW + CH23-NPZW 30 m*1

<sup>\*1</sup> Three-piece configuration; cannot be used in two-piece configuration. Magnescale reserves the right to change product specifications without prior notice.

### Details of model designation

Encoder SR24 - ××× ○ □ ◆ ###

[xxx]Effective length (cm)

[O] Accuracy grade						
Type Accuracy grade						
Α	(5 + 5L/1,000) μmp-p					
S (3 + 3L/1,000) μmp-p						
L : Effective length (mm)						

[	□]Res	solution an	d direction	n (μm)		
	Туре	Direction	Resolution	Type	Direction	Resolution
	В		0.05	G		0.05
	С	_	0.1	Н	_	0.1
	D	+	0.5	J	_	0.5
Г	E		1	K		1

[###]Reference point	position (Arbitrary position can be specified)
Туре	Reference point position
X	Center of effective length
Υ	Multi-point

[�]Minimum phase difference

Type	Priase dilierence (ris)	Type	Friase dilierence (ris)	Type	Priase dilierence (ris)
Α	50	F	300	L	1,250
В	100	G	400	М	2,500
С	150	Н	500	N	3,000
D	200	J	650		
Е	250	K	1,000		

Note : No setting for the following combinations Resolution 0.05  $\mu m$  / Minimum phase difference 1000 to 3000 ns Resolution 0.1, 0.5  $\mu m$  / Minimum phase difference 3000 ns

		_		_	_		
$\sim 1$	H23		1 🖂		( )	abla	* #
\ , I	1/0	- 1	111		\ /	\/	'X' ##

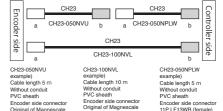
(Example)

/ре	Cable length	Type	Conduit specification
10	1 m	C	With conduit
05	0.5 m	N	Without conduit
65	6.5 m		
00	10 m		
	lo obooth		

▽]Cable	sheath
Type	Cable specification
V	PVC (Φ6.8 ) [Encoder side]
С	PU (Φ6.8 ) [Encoder ]
Р	PVC (Φ8) [Controller side]
E	PU (Φ8) [Controller side]

[*] Controller	side connector : b			
Specification	Re	marks	記	号
Earth wire			Without	With
Open-end	Encoder side connector should be 11P LF	13WB (female) made by HIROSE Electric	Z	_
Ореп-епи	Standard		None	_
D-Sub 9P			D	_
10P made b	y 3M	Mitsubishi Electric NC, J3	L	_
20P straight case	e made by Honda Tsushin Kogyo	FANUC	Е	P
20P horizontal dra	wing case made by HIROSE Electric	FANUC	Н	R
11P LF13WB (r	nale) made by HIROSE Electric	Relay	U	_

[#] Encoder side connector : a		
Specification	Remarks	Type
Original of Magnescale	Standard	None
11P LF13WB (female) made by HIROSE Electric	Relay	W



Unit: mm

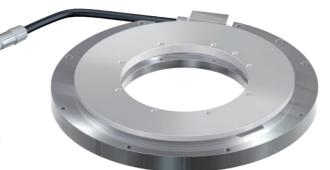
Unit: mm

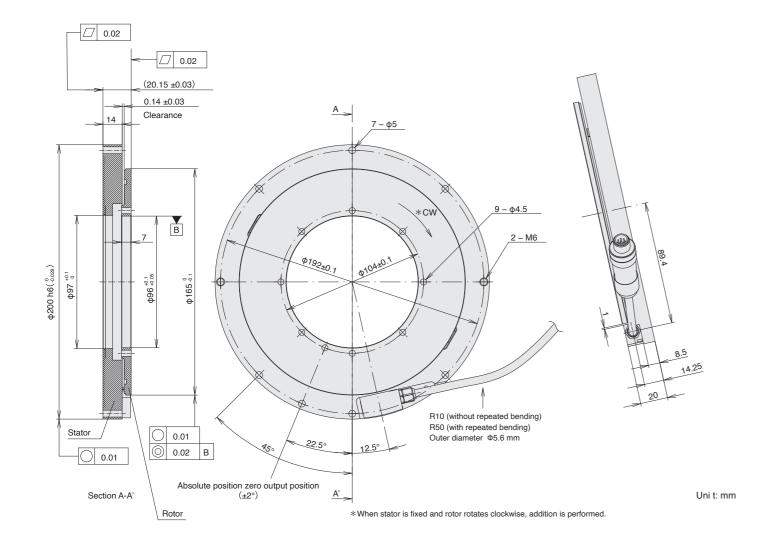
### Exposed type

· Magnetic system allows use even in environments with condensation, oil, and other adverse conditions

• 96 mm diameter through-hole allows for design and mounting flexibility

• Dual head configuration reduces the effect of axial runout





Specifications						
Model name	RS97-1024E□A <b>■■</b>	RS97-1024EGD <b>■■</b>	RS97-1024EGZ			
Output wave number						
Through hole diameter		1,024 waves/revolution  Φ96 mm				
Accuracy (at 20°C)		±2.5"				
Output signal	Absolute serial bidirectional s	ignal, compliant with EIA-485	Compliant with DRIVE-CLiQ			
Compatible controllers	FANUC	Mitsubishi Electric	SIEMENS AG			
Resolution	23 bits (8,388,608 pulses/revolution) or 25 bits (33,554,432 pulses/revolution)	23 bits (8,388,608	pulses/revolution)			
Maximum response revolutions		5,000 min <sup>-1</sup>				
Functional safety	-	-	IEC 61508, EN/BS 62061 SIL 2 EN/BS/ISO 13849-1 Cat. 3 / PL d EN/BS 61800-5-2			
Product Safety	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN/BS 61000-6-2, EN/BS 61000-6-4					
Product Environment	EN/BS 63000					
Operating temperature	0 to +60°C					
Storage temperature		-10 to +60°C				
Vibration resistance		150 m/s <sup>2</sup> (50 Hz to 2,000 Hz)				
Impact resistance		1,000 m/s <sup>2</sup> (11 ms)				
Protective design grade		IP65				
Power supply voltage	DC +4.75	to +5.25 V	DC +17 to +30.8 V			
Maximum consumption current	1.25 W or le 1.2 W or le	,	2.8 W or less (17 V) 3.3 W or less (30.8 V)			
Consumption current	330 mA (with 5 V co	ontroller connection)	150 mA (with 24 V controller connection)			
Output connector	JN1HS10PL4S made by Japa	n Aviation Elecronics Industry	SACC-M12MS-8QH made by Phoenix Contact			
Moment of inertia		9 x 10 <sup>-4</sup> kg·m² or less				
Mass	App	orox. 2 kg (rotor: 0.2 kg/ stator: 1.7 kg) or l	ess			
Compatible cables (types without relay connectors) Maximum cable length	CH23A-***NPFA 30 m	CH23-***NPMA 30 m	CH22-***NSFY 30 m			
Compatible cables (types with relay connectors) Maximum cable length	CH23A-***NPKA + CH23A-***NPFA 30 m	CH23-***NPKA + CH23-***NPMA 30 m	CH22-***NSFF + CH22-***NSFY 30 m			

Magnescale reserves the right to change product specifications without prior notice.

### Details of model designation

Encoder RS97-1024E □ △ ■ ■

[E]Rotor inner diameter

[□] Resolution Type Resolution G 23 bit

[△] Communication protocol Type NC manufacturer Remarks
A FANUC a interface
D Mitsubishi Electric Half duplex
Z SIEMENS AG DRIVE-CLIQ

[■■]Head cable length Type Head cable length
01 1 m

Cables

[000]

Cable length (Example)

CH22-□□□○▽\*#

[□□□]Cable length Written by flush right, indication in "m" units, up to 30 m, 0.5 m pitch

Type Cable length

15 1.5 m

070 7 m

Conduct specification

C With conduit

N Without conduit 260 26 m

 $\texttt{CH23-} \square \square \square \bigcirc \triangledown * \#$ 

CH23 A-  $\square$   $\square$   $\square$   $\bigcirc$   $\triangledown$  \* #

Type Cable length Type Conduit specification

Type Cable specification
P PVC (Φ8) [Controller side]
E PU (Φ8) [Controller side]

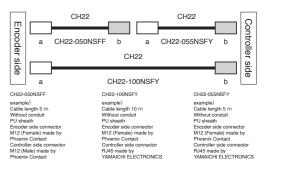
M Encoder head connector
F M12 connector (Female) made by Phoenix Contact

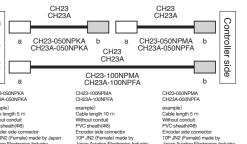
Type	Specification	Remarks
None	Open-end	
Y	RJ45 connector made by YAMAICHI ELECTRONICS	Adopts NC machine tool
Z	RJ45 connector (water proof) made by YAMAICHI ELECTRONICS	Relay
F	M12 connector (Male) made by Phoenix Contact	Relay/ Waterproofing

Туре	Specification	Remarks
None	Open-end	
Υ	RJ45 connector made by YAMAICHI ELECTRONICS	Adopts NC machine tool
Z	RJ45 connector (water proof) made by YAMAICHI ELECTRONICS	Relay
F	M12 connector (Male) made by Phoenix Contact	Relay/ Waterproofing

Type	Specification		Remarks
7		Encoder side connector should to	oe 10P JN2 (Female) made by Japan
2	Open-end	Aviation Electronics Industry or 2	2P made by TAJIMI ELECTRONICS
None		Standard	
M	10P made by 3M		Mitsubishi Electric NC, J3
F	20P straight case ma	de by Honda Tsushin Kogyo	FANUC
J	Horizontal drawing ca	se made by HIROSE Electric	FANUC
K	10P JN1 (Male) made by Japan Aviation Electronics Industry		Relay
N	12P R04 (Male) made by TAJIMI ELECTRONICS		Relay (fixed)

Type	Specification
Α	10P JN2 (Female) made by Japan Aviation Electron





Exposed type

RS97-1024N

 Magnetic system enables use even in environments with condensation, oil, and other adverse conditions

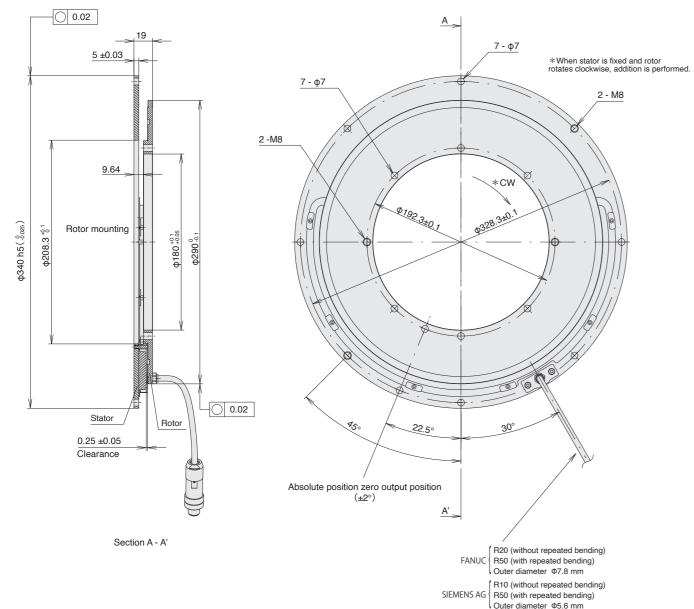
- 180 mm diameter through-hole allows for design and mounting flexibility
- Dual head configuration reduces the effect of axial runout



**FANUC** 

SIEMENS

#### Dimensions



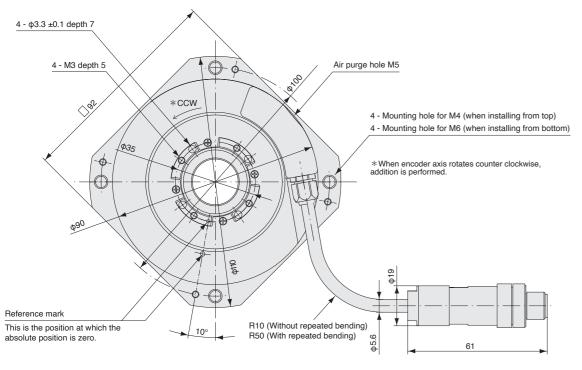
Specifications RS97-1024N□A■■ RS97-1024NGZ Model name 1,024 waves/revolution Output wave number Through hole diameter φ180 mm ±2.5" Accuracy (at 20°C) Absolute serial bidirectional signal, compliant with EIA-485 Output signal Compatible controllers **FANUC** Compliant with DRIVE-CLiQ 23 bits (8,388,608 pulses/revolution) or Resolution SIEMENS AG 25 bits (33,554,432 pulses/revolution) Maximum response revolutions 5,000 min<sup>-1</sup> 23 bits (8,388,608 pulses/revolution) IEC 61508, EN/BS 62061 SIL 2 **Functional Safety** EN/BS/ISO 13849-1 Cat. 3 / PL d EN/BS 61800-5-2 **Product Safety** FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN/BS 61000-6-2, EN/BS 61000-6-4 EN/BS 63000 Product Environment Operating temperature 0 to +60°C -10 to +60°C Storage temperature 150 m/s<sup>2</sup> (50 Hz to 2,000 Hz) Vibration resistance 1,000 m/s<sup>2</sup> (11 ms) Impact resistance Protective design grade DC +4.75 to +5.25 V DC +17 to +30.8 V Power supply voltage 1.35 W or less (4.75 V) 2.8 W or less (17 V) Maximum consumption current 1.3 W or less (5.25 V) 3.3 W or less (30.8 V) Consumption current 300 mA (with 5 V controller connection) 150 mA (with 24 V controller connection) Output connector JN1HS10PL2 made by Japan Aviation Elecronics Industry SACC-M12MS-8Q H made by Phoenix Contact Moment of inertia  $8.8 \times 10^{-3} \text{ kg} \cdot \text{m}^2$  or less Mass Approx. 3.4 kg (rotor: 0.6 kg / stator: 2.8 kg) or less Compatible cables CH23A-\*\*\*NPFA CH22-\*\*\*NSFY (types without relay connectors) 30 m Maximum cable length Compatible cables CH23A-\*\*\*NPKA + CH23A-\*\*\*NPFA CH22-\*\*\*NSFF + CH22-\*\*\*NSFY (types with relay connectors) 30 m 30 m Maximum cable length Magnescale reserves the right to change product specifications without prior notice. Details of model designation Encoder [△]Communication protoco 「■■] Head cable length [N] Rotor inner diameter ∏1 Resolution Type Resolution 180 mm Type NC manufacturer Type Head cable length RS97-1024N□△■■ G 23 bit A FANUC α interface 01 1 m Z SIEMENS AG DRIVE-CLiQ 02 2 m Cables Type Cable specifica CH22 CH22 CH22-□□□□▽\*# a CH22-050NSFF b a CH22-055NSFY [□□□]Cable length Type Specification CH22 M Encoder head connector
F M12 connector (Female) made by Phoenix Contact Written by flush right Standard indication in "m" units, up to 30 m, 0.5 m pitch CH22-100NSFY Type Cable length C With conduit specification C With conduit Type Specification None Open-end
Y RJ45 connector made by YAMAICHI ELECTRONICS Adopts NC machine tool RJ45 connector (water proof) made by YAMAICHI ELECTRONICS R M12 connector (Male) made by Phoenix Contact Ri 260 26 m CH23 A- □ □ □ □ ○ ▽ \* # CH23A-050NPKA b CH23A-050NPFA [□□□]
Cable length
(Example) J 20P straight case made by Honda Tsushin Kogyo FANUC K Horizontal drawing case made by HROSE Electric FANUC N 10P JN (Male) made by Japan Ariation Electricoris Industry 12P R04 (Male) made by TaJIIM ELECTRONICS Relay (fixed) [O]Conduit specificatio | Type | Cable length | Type | Conduit specification | 010 | 1 m | C | With conduit | N | Without conduit | CH23A-100NPFA CH23A-050NPKA [#] Encoder side connector : a 100 10 m Type Specification F
A 10P JN2 (Female) made by Japan Aviation Electronics Industry Type Cable specification
P PVC (Φ8) [Controller side]
E PU (Φ8) [Controller side]

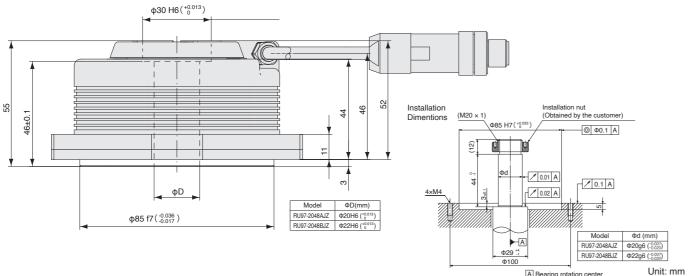
Unit: mm

- · Magnetic system enables use even in environments with condensation, oil, and other adverse conditions
- · Internal coupling allows for design and mounting flexibility



22





S					

Model name	RU97-2048AJZ■■ RU97-2048BJZ■■
Output wave number	2,048 waves/revolution
Through hole diameter	A∶φ20 mm, B∶φ22 mm
Accuracy (at 20°C)	±2.5"
Output signal	Compliant with DRIVE-CLiQ, single turn absolute type
Compatible controllers	SIEMENS AG
Resolution	25 bit (33,554,432 pulses/revolution)
Maximum response revolutions	2,000 min <sup>-1</sup>
Maximum mechanical revolutions	3,000 min <sup>-1</sup>
Functional safety	IEC 61508, EN/BS 62061 SIL 2 EN/BS/ISO 13849-1 Cat. 3 / PL d EN/BS 61800-5-2
Product Safety	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN/BS 61000-6-2, EN/BS 61000-6-4
Product Environment	EN/BS 63000
Operating temperature	0 to +60°C
Storage temperature	-10 to +60°C
Vibration resistance	150 m/s <sup>2</sup> (50 Hz to 2,000 Hz)
Impact resistance	1,000 m/s <sup>2</sup> (11 ms)
Protective design grade	IP65
Power supply voltage	DC +17 to +30.8 V
Maximum consumption current	1.6 W or less (17 V or 30.8 V)
Consumption current	65 mA (with 24 V controller connection)
Moment of inertia	9.4×10 <sup>-5</sup> kg⋅m² or less
Starting torque (at 20°C)	0.08 N·m or less
Mass	Approx. 1.2 kg or less
Compatible cables (types without relay connectors) Maximum cable length	CH22-***NSFY 30 m
Compatible cables (types with relay connectors) Maximum cable length	CH22-***NSFF + CH22-***NSFY 30 m

Type Drum inner diameter

A Φ20 mm B Φ22 mm

### Details of model designation

$\overline{}$			
$\vdash$	ncc	)(16)	₽r

[J] Resolution 25 bit [Z] SIEMENS AG DRIVE-CLIQ

[■■]Head cable length			
lead cable length			
m			
? m			
m			

#### Cables

CH22 -  $\square$   $\square$   $\square$   $\bigcirc$   $\triangledown$  \* #

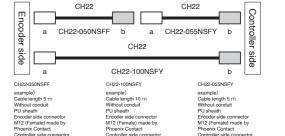
[□□□] Cable length Written by flush right,

	n in "m" units	
	m, 0.5 m pit	ch
Example	e)	[C
_		

kampie)			[O] Conduit specification		
уре	Cable length	П	Type	Conduit specification	
015	1.5 m		С	With conduit	
070	7 m		N	Without conduit	

S	PU	
*1Fnco	der side connector : a	
Type	Specification	Remarks
M	Encoder head connector	Standard
F	M12 connector (Female) made by Phoenix Contact	Relay/Waterproofing

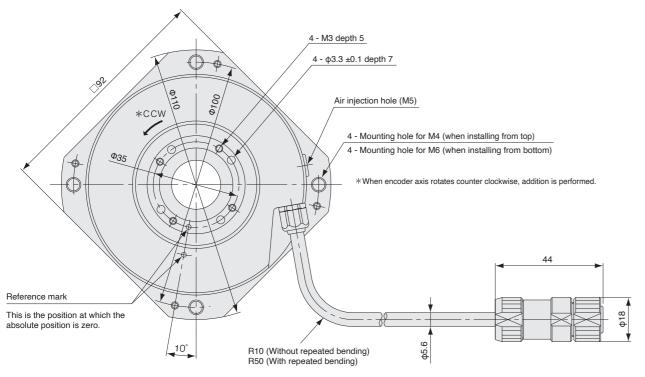
[#]Contro	oller side connector : b	
Type	Specification	Remarks
None	Open-end	
Y	RJ45 connector made by YAMAICHI ELECTRONICS	Adopts NC machine tool
Z	RJ45 connector (water proof) made by YAMAICHI ELECTRONICS	Relay
F	M12 connector (Male) made by Phoenix Contact	Relay/Waterproofing

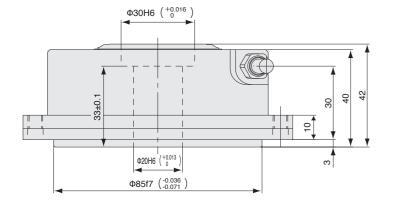


- · Space saving can be achieved with a thickness of up to 42 mm.
- Magnetic system enables use even in environments with condensation, oil, and other adverse conditions
- Internal coupling allows for design and mounting flexibility



YASKAWA Electric





Installation Dimentions  $(M20 \times 1)$ © Φ0.1 A ✓ 0.1 A -A

Model name	RU77-4096A□A★○○	RU77-4096A□B★○○ RU77-4096A□D★○○	RU77 - 4096A□F★○○		
Output wave number		4,096 waves/revolution			
Through hole diameter		ф20 mm			
Accuracy (at 20°C)		±2.5"			
Output signal	Absolute	serial bidirectional signal, compliant with	EIA-485		
Compatible controllers	FANUC	Mitsubishi Electric	YASKAWA Electric		
Maximum resolution	25 bit (33,554,432	2 pulses/revolution)	21 bit (2,097,152 pulses/revolution)		
Maximum response revolutions		2,000 min <sup>-1</sup>			
Maximum mechanical revolutions		3,000 min <sup>-1</sup>			
Product Safety	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN/BS 61000-6-2, EN/BS 61000-6-4				
Product Environment	EN/BS 63000				
Operating temperature	0 to +60°C				
Storage temperature	-10 to +60°C				
Vibration resistance	150 m/s <sup>2</sup> (50 Hz to 2,000 Hz)				
Impact resistance	1,000 m/s² (11 ms)				
Protective design grade		IP65			
Power supply voltage	DC	DC +4.75 to +5.25 V (with connectiong terminal)			
Consumption current	200 mA (at 120Ω termination)				
Moment of inertia	9.4 × 10 <sup>-5</sup> kg·m² or less				
Starting torque (at 20°C)	0.1 N·m or less				
Mass		Approx. 1.2 kg or less			
Standard compatible cable	CH33A-***, CE28A-***	CH33-***,	CE28-***		
Maximum cable length	CH33A-***: 30 m, CE28A-***: 15 m				

main cable length Max.1 m, extension cable : CH33 / CH33A \*Max cable length (main + extension) : 30 m

[★]Connector

[∇] Cable seath (covering

#### Details of model designation

#### Encoder

RU77-4096A□△★○○

Type	Resolution	Number of pulses/revolution	Number of partitions	
Α	Approx. 2.5°/1,000	131,072	1/32	
В	Approx. 1°/1,000	262,144	1/64	
С	Approx. 7°/10,000	524,288	1/128	
D	Approx. 3.5°/10,000	1,048,576	1/256	
E	Approx. 2°/10,000	2,097,152	1/512	
F	Approx. 1°/10,000	4,194,304	1/1,024	
G	Approx. 4.5°/100,000	8,388,608	1/2,048	
Н	Approx. 2°/100,000	16,777,216	1/4,096	
J	Approx. 1°/100,000	33,554,432	1/8,192	
J Approx. 1*/100,000   33,554,432   1/8,192 *YASKAWA Electric: D.F only				

Type	Number of wires NC manufacturer		
Α	Full duplex	FANUC ainterface	
В	Half duplex	Mitsubishi Electric	
D	Full duplex	Mitsubishi Electric	
F	Half duplex	YASKAWA Electric	

Type	Cable length	
03	0.3 m	
05	0.5 m	
10	1 m	
15	1.5 m	
20	2 m	
25	2.5 m	
30	3 m	
40	4 m	
50	5 m	
60	6 m	
70	7 m	
80	8 m	
90	9 m	

[OO]Cable length

CH33- $\square$  $\bigcirc$  $\triangledown$ \*#

CH33 A-  $\square$   $\square$   $\bigcirc$   $\triangledown$  \* #

[□□] Cable length Written by flush right, indication in "m" units, up to 30 m, 1 m pitch

Cable

xample)		[O]Conduit		
Type Cable length		Туре	Conduit	
07	7 m	С	With conduit	
26	26 m	N	Without conduit	

CE28 -  $\Box$   $\Box$   $\odot$  \*

CE28 A- □ □ □ ○ \*

(Example) [O] Conduit

Type Cable length
070 7 m
090 9 m
130 13 m

[O] Conduit

Type Conduit
C With conduit
N Without conduit

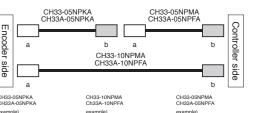
[□□□]Cable length Written by flush right, indication in "10cm" units.

up to 14m,1m pitch

[%] COURT	Olici Side confilector . b	
Type	Specification	Remarks
None	Open-end	Standard
M	10P made by 3M	Mitsubishi Electric NC, J3, J4
F	20P straight case made by Honda Tsushin Kogyo	FANUC
G	6P made by Molex Japan LLC	YASKAWA Electric
J	Horizontal drawing case made by HIROSE Electric	FANUC
K	10P IN1 (Male) made by Janan Aviation Flortmoire Industry	Relay

[*]Controller side connector : b					
Type	Specification	Remarks			
None	Open-end	Standard			
M	10P made by 3M	Mitsubishi Electric NC, J3, J4			
F	20P made by Honda Tsushin Kogyo	FANUC			
G	6P made by Molex Japan LLC	YASKAWA Electric			
J	10P (JB1) made by Japan Aviation Electronics Industry	RU77 cable extention			
K	10P (JN1) made by Japan Aviation Electronics Industry	RU77 cable extention			



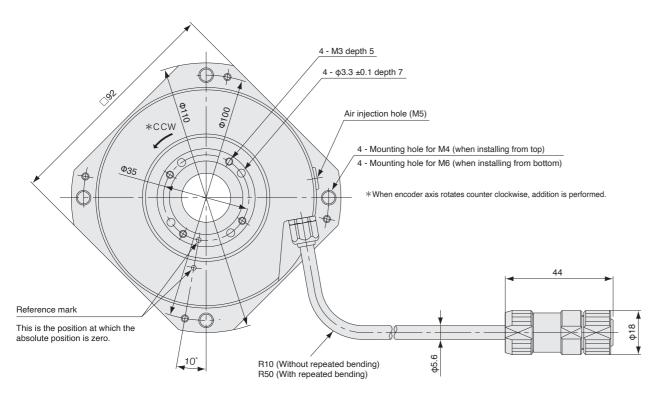


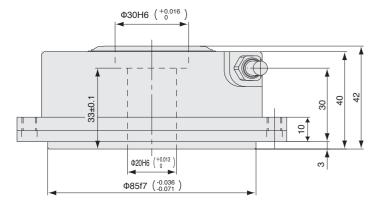
Unit: mm

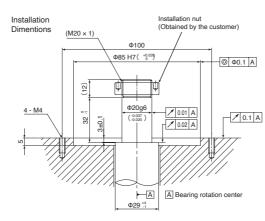
- Space saving can be achieved with a thickness of up to 42 mm.
- Magnetic system enables use even in environments with condensation, oil, and other adverse conditions
- Internal coupling allows for design and mounting flexibility



### A/B/Refelence point







Specifications		
	RU74-4096AA◆G○○	RU74-4096AC <b>♦</b> G○○
Model name	RU74-4096AB♦G○○	RU74-4096AD <b>♦</b> G○
Output wave number	4,096 wave	s/revolution

Through hole diameter	φ20 mm			
Accuracy (at 20°C)	±2.5"			
Output signal	A/B/Reference point, line driver signal, compliant with EIA-422			
Compatible controllers	Controller of each company (connected to A/B quadrature and reference point signal receiver)			
Maximum resolution	Approx.1/1,000° Approx.1/10,000°			
Maximum response revolutions	2,000 min <sup>-1</sup> 267 min <sup>-1</sup>			

3,000 min<sup>-1</sup>

EN/BS 63000

	FCC Part15 Subpart B Class A
Product Safety	ICES-003 Class A Digital Device
	FN/BS 61000-6-2 FN/BS 61000-6-4

Operating temperature	0 to +60 °C
Storage temperature	-10 to +60 °C
Vibration resistance	150 m/s² (50 Hz to 2,000 Hz)
Impact resistance	1,000 m/s² (11 ms)
Protective design grade	IP65
Power supply voltage	DC +4.75 to +5.25 V (with connectiong terminal)
Consumption current	200mA (at 120Ω termination)
Moment of inertia	9.4×10⁻⁵ kg⋅m² or less
Starting torque (at 20°C)	0.1 N·m or less

0.1 N·m or less Mass Approx. 1.2kg or less Standard compatible cable CE28-\*\*\*

Maximum cable length CE28-\*\*\* : 15 m

### Magnescale reserves the right to change product specifications without prior notice.

### Details of model designation

Maximum mechanical revolutions

Product Environment

Encoder RU74-4096A□◆G○○

[□] Resolution, direction of rotation, and polarity						
Туре	Resolution	Direction of rotation / Direction Number of pulses/revolution Number of divisions				
Α	Approx. 1°/1,000	CW / +	360,448	88		
В	Approx. 1°/1,000	CCW/+	360,448	88		
С	Approx. 1°/10,000	CW / +	3,600,384	879		
D	Approx. 1°/10,000	CCW/+	3,600,384	879		

Type	Minimum phase difference	Response revolutions (min)		Tuma	Minimum phase	Response revolutions (min
Туре		Approx.1°/1,000	Approx.1°/10,000	Type	difference	Approx.1°/1,000
Α	50	2,000	267	Н	500	266
В	100	1,332	133	J	650	205
С	150	888	89	K	1,000	133
D	200	666	67			
Е	250	533				
F	300	444				
G	400	333				

[G]Connector	Metal	water	proofing	(JB1)

[OO]Cable length		
-	Type	Cable length
-	03	0.3 m
J	05	0.5 m
	10	1 m
	15	1.5 m
]	20	2 m
1	25	2.5 m
1	30	3 m
1	40	4 m
]	50	5 m
	60	6 m
	70	7 m
	80	8 m
	90	9 m

### Cables

CE28 -  $\square$   $\square$   $\square$   $\bigcirc$  \*

[□□□]Cable length Written by flush right, indication in "10 cm" units,

up to 1	4 m,1 m pitch
Type	Cable length
070	7 m
090	9 m
130	13 m

[O]Cor	nduit	[*]Controller
Type	Conduit	Specification
С	With conduit	Earth wire
N	Without conduit	Open-end
N	Without conduit	Open-end

L	[%] Controller side confilector		
nduit	Specification	Remarks	1
th conduit	Earth wire		Withou
thout conduit	Open-end	Standard	None
	10P made by 3M	Mitsubishi Electric NC, J3	L
	20P made by Honda Tsushin Kogyo	FANUC	Е

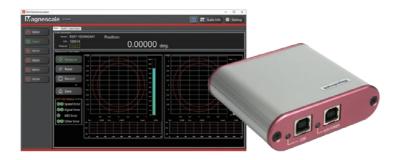
Unit: mm

### Accessories

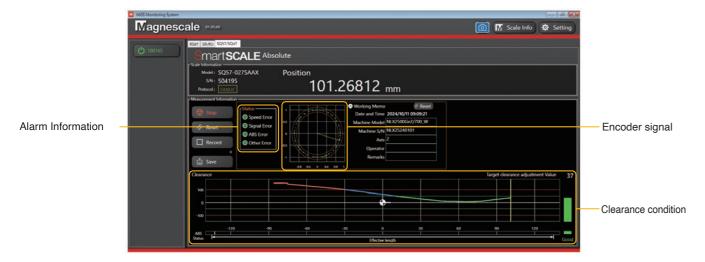
### **Signal Diagnostic Tool**

### AC20-B100

- ·Observation of encoder internal conditions using dedicated software (MGS Monitoring System)
- · Encoder signals (Lissajous waveforms), clearances, and failure diagnostics can be checked.
- ·Encoder status can be checked even without power supply from the equipment.
- ·Encoder installation and adjustment can be performed while checking the signal status.



■Specialized software (screen image when connected to SQ47 and SQ57)



#### ■ Specifications

Model name	AC20-B100
Connection with the computer	USB 2.0 Full Speed
Mass	150 g
Dimensions	82 (W) × 75 (D) × 24 (H) mm

A USB 2.0 compatible hub is required when using a USB 3.0 port

#### ■ Compatible encoder

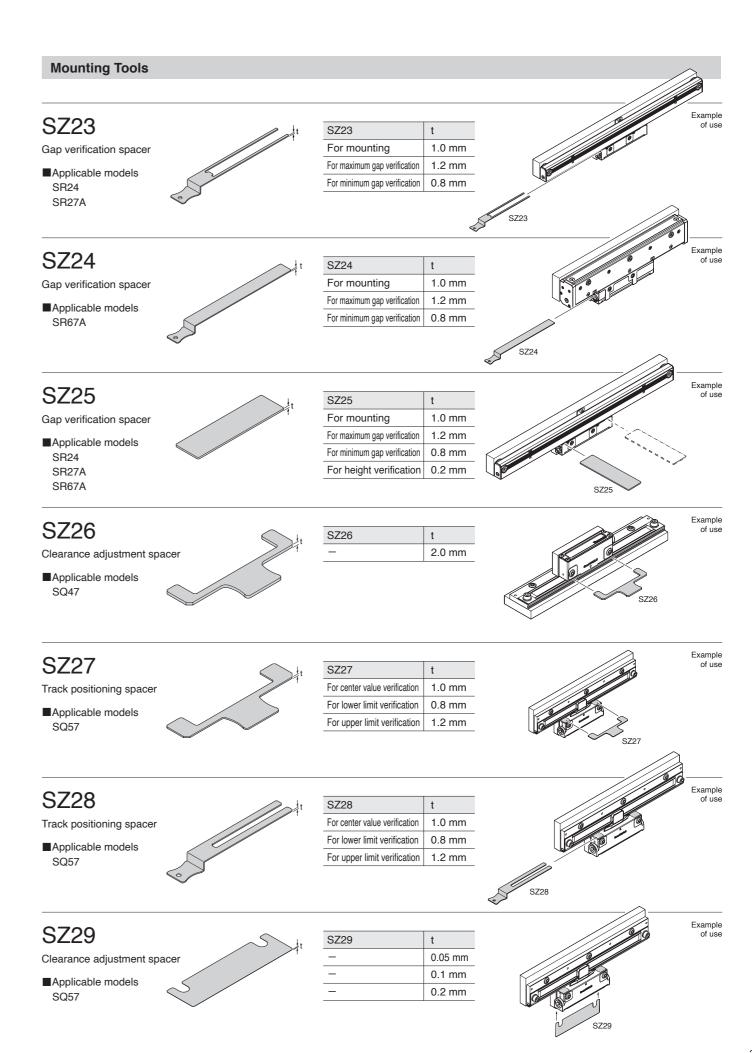
Linear encoder	SQ57, SQ47, SR27A, SR67A
Angle encoder	RS97, RU97, RU77

Special cable is required. Contact our sales representative.

### ■Operating environment

CPU	Intel Core i3 or higher is recommended*
RAM	1 GB or higher is recommended*
OS	Windows 7 (32 bit / 64 bit editions) Windows 8 (32 bit / 64 bit editions) Windows 10 (32 bit / 64 bit editions)
Display	1,280 × 800 pixels or higher is recommended*

 $^{\star}$  It must satisfy the required specification of OS.

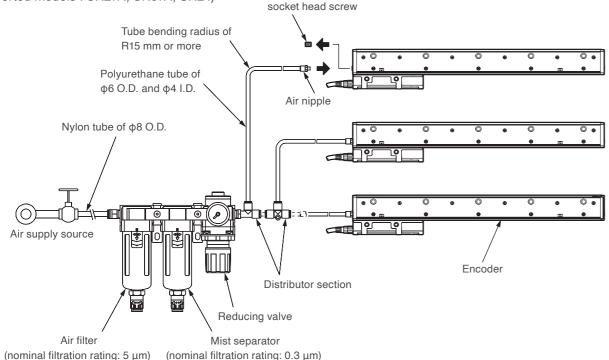


## Technology

### Air purging

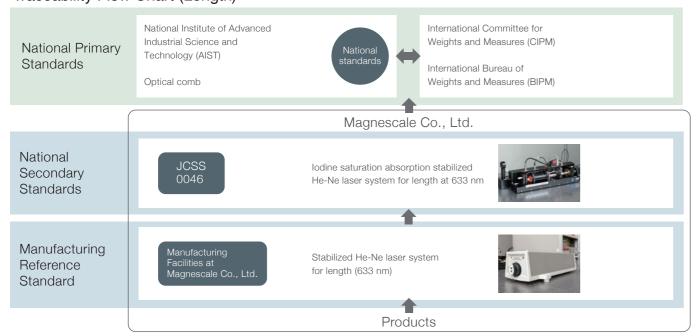
If encoder is used in a dusty or misty environment, it is recommended that air is introduced into the encoder to alleviate any unwanted effects. Attach air nipples to M5 holes for air introduction that are provided at both ends of the encoder to supply air into the encoder. When introducing air into the encoder, supply air via an air filter (nominal filtration rating: 5 μm), mist separator (nominal filtration rating: 0.3 μm), and a regulator to remove dust, dirt, and mist. As a guide, the amount of air supplied to the encoder is 10 - 20  $\ell$ /min.

(Supported models: SR27A, SR67A, SR24)



# Traceability

### Traceability Flow Chart (Length)



# Quality

### No compromise for high-accuracy products

The total quality control system that operates throughout the entire design and production process ensures products with enhanced safety, high quality, and high reliability that match our customers' requirements. The company is certified for length calibration in compliance with the traceability system required by the "Weights and Measures Act," and has been granted ISO 9001 certification, which is the international standard for quality assurance. In addition, we have introduced the highest level EMC (Electromagnetic Compatibility) testing equipment to address the noise problem that is becoming increasingly regulated around the world, and we are taking all possible measures to control quality.



Our products comply with CE/UKCA requirements, have acquired UL certifications and meet other international standards and regulations.

#### We have met:

- CE/UKCA Marking (EMC Directives) EMI: EN/BS 61000-6-4, EMS: EN/BS 61000-6-2
- CE/UKCA Marking (RoHS Directives) EN/BS 63000
- FCC regulation FCC Part 15 Subpart B Class A
- · ICES regulation ICES-003 Class A

for Products with built-in AC power supply: • UL/cUL 61010-1 • EN/BS 61010-1

for Products with Laser:

• DHHS (21CFR1040.10) • EN/BS 60825-1 • JIS C 6802

· Safety of Machinery - If the product is used in equipment subject to conformity to the electrical equipment of machinery (EN60204-1), please take measures to ensure conformity to that standard before use.

\* Please note that some products may have different standards or may not have been certified in all areas, so please check with our sales department before purchasing

# **Functional Safety**

Recently, great importance has been placed on human safety around industrial machines and machine tools. In 2010, the European Machinery Directive mandated compliance with functional safety for electrical equipment used in the safety systems of machines subject to the Machinery Directory. These safety demands are anticipated to spread across many additional regions and industries in the future. Magnescale leads the competition with its lineup of feedback scale that have acquired third-party functional safety certification in order to meet global demands for safety.

Certification standards

IEC 61508, EN/BS 62061 SIL 2 EN/BS/ISO 13849-1 Cat. 3 / PL d EN/BS 61800-5-2

Models that have acquired certification

- Angle encoders RS97-1024EGZ series RS97-1024NGZ series RU97-2048 Z series
- SQ57-Z series SQ47-Z series SR27A-AZ series SR67A-AZ series
- Linear encoders

<sup>\*</sup> Consult our sales representative for details