



SPEED X PRECISION



Feedback Scale

Magnescale Co., Ltd.

International Sales	: 3-1-4 Edagawa, Koto-ku, Tokyo 135-0051, Japan	TEL.+81(0)3-6632-7924	E-mail : info-mgs-eng@magnescale.com
Magnescale Americas Inc.	: 1 Technology Drive, Suite F217, Irvine, CA 92618, USA	TEL.+1(949)727-4017	E-mail : info-am@magnescale.com
Magnescale Europe GmbH	: Antoniusstrasse 14, 73249 Wernau, Germany	TEL.+49(0)7153-934-291	E-mail : info-eu@magnescale.com
Customer Support	: 45 Suzukawa, Isehara-shi, Kanagawa 259-1146, Japan	TEL.+81(0)463-92-2132	E-mail : info-css@magnescale.com

www.magnescale.com

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Magnescale Co., Ltd.

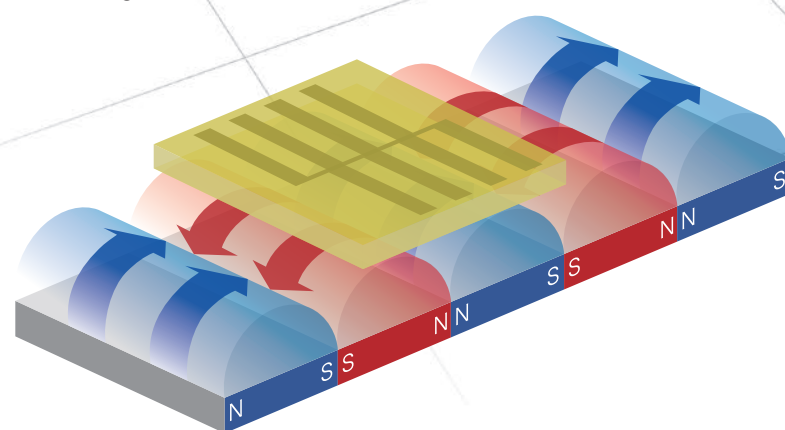
Advanced technology provides precision and durability in tough environments.

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

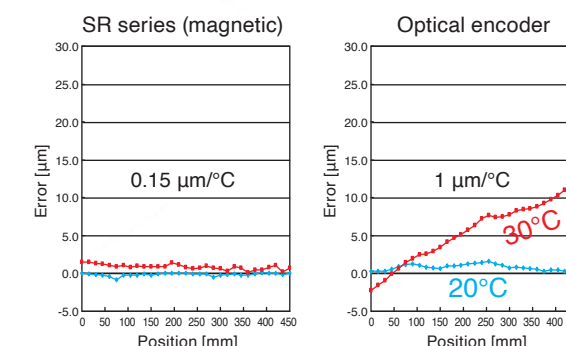
Detection principle

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 to 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.



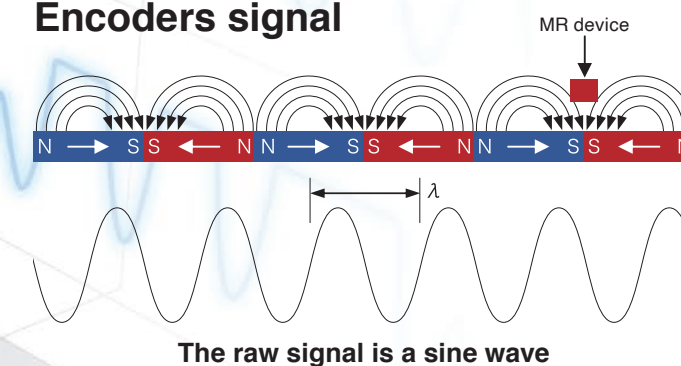
Thermal expansion

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.



Stability

Encoders signal



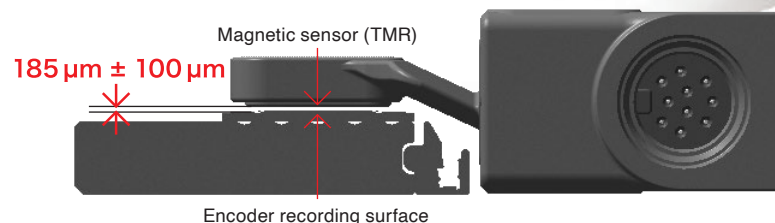
Stronger resistance to harsh environments

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.

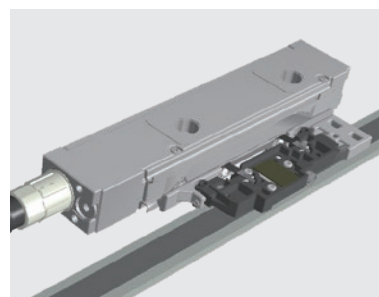


5 nm high-resolution

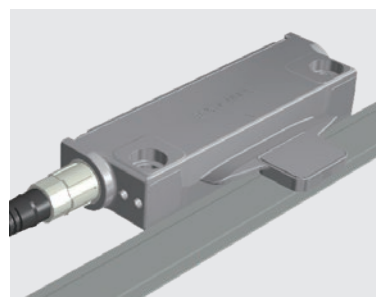
Achieves 5 nm resolution using the latest interpolation technology and a new algorithm

Separate type simple architecture

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



Enclosed type (SR27A)



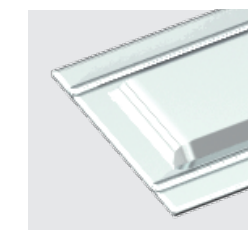
Exposed type (SQ57)

Sealed structure with IP67 grade

The magnetic encoder and reading sensor are fully protected by a 50 μm thin metal cover. High resistance to coolant/water splashing and to sludge/metal chips provides stable operation under harsh environments.



Head

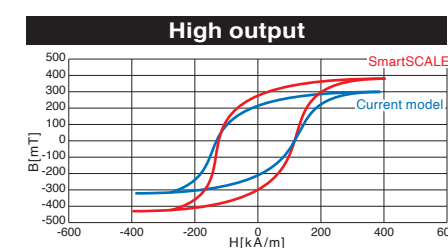


Encoder

New technology

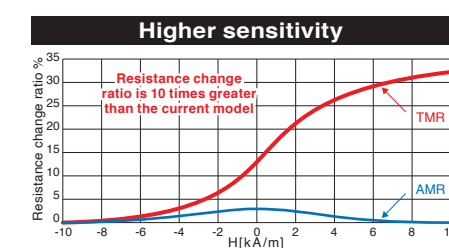
Development of a new magnetic medium

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.



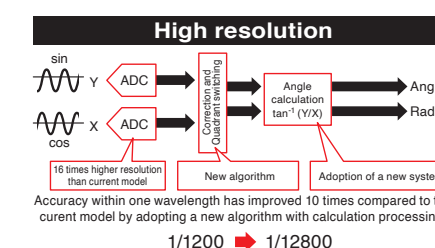
The development of a high sensitivity sensor using a new TMR device

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

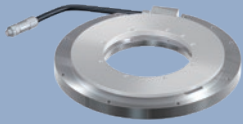
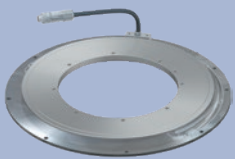
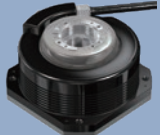
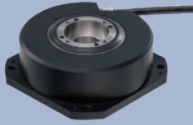



Lineup

	Communication system	Type	Model name		Output signal	Compatible controllers	Effective length	Maximum resolution	Accuracy	Maximum response speed	Protective design grade	Page
Linear encoder	ABS (Absolute)	Exposed	Smart SCALE SQ57		Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC Mitsubishi Electric YASKAWA Electric SIEMENS BiSS-C ⁽⁺¹⁾	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
			Smart SCALE 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	200 m/min	IP67	P10 - 11
		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	IP54 (Air purge not included) IP65 (Air purge included)	P12 - 13
			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

*1 : Please contact our sales department.

*2 : Scheduled to go on sale in 2025.

	Communication system	Type	Model name		Output signal	Compatible controllers	Through hole diameter	Maximum resolution	Accuracy	Maximum response speed	Protective design grade	Page
Angle encoder	ABS (Absolute)	Exposed	RS97-1024E		Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC Mitsubishi Electric SIEMENS	Φ96 mm	23 bit (8,388,608 pulses/revolution) or 25 bit (33,554,432 pulses/revolution)	±2.5 "	5,000 min ⁻¹	IP65	P18 - 19
			RS97-1024N		Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC SIEMENS	Φ180 mm	23 bit (8,388,608 pulses/revolution) or 25 bit (33,554,432 pulses/revolution)	±2.5 "	5,000 min ⁻¹	IP65	P20 - 21
		Enclosed	RU97-2048		Compliant with DRIVE-CLiQ	SIEMENS	A : Φ20 mm B : Φ22 mm	25 bit (33,554,432 pulses/revolution)	±2.5 "	2,000 min ⁻¹ (Maximum mechanical revolutions : 3,000 min ⁻¹)	IP65	P22 - 23
			RU77-4096		Absolute serial bidirectional signal Compliant with EIA-485	FANUC Mitsubishi Electric YASKAWA Electric	Φ20 mm	25 bit (33,554,432 pulses/revolution)	±2.5 "	2,000 min ⁻¹ (Maximum mechanical revolutions : 3,000 min ⁻¹)	IP65	P24 - 25
	INC (Incremental)	Enclosed	RU74		A/B/Reference point Line driver signal Compliant with EIA-422	—	Φ20 mm	360,448 pulses/revolution or 3,600,384 pulses/revolution	±2.5 "	2,000 min ⁻¹	IP65	P26 - 27

Absolute linear encoder
Exposed type

SmartSCALE

SQ57

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



FANUC

Mitsubishi Electric

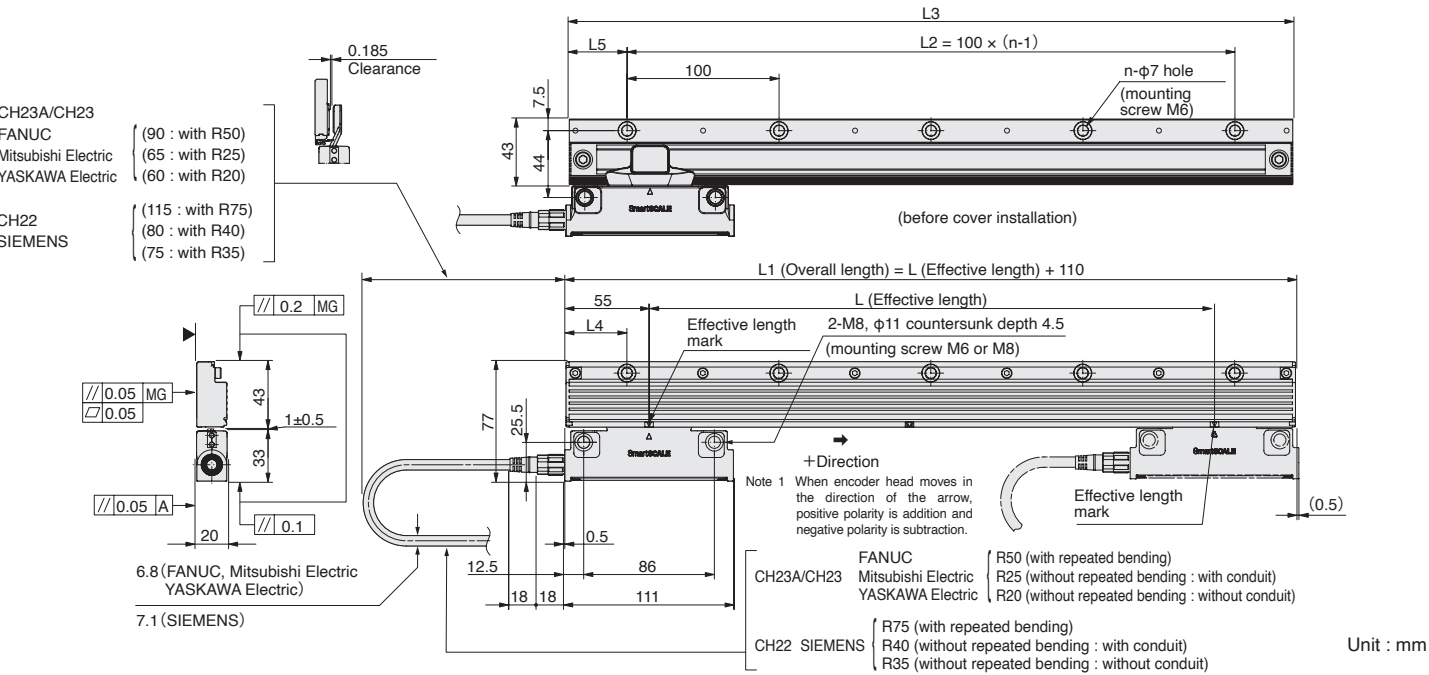
YASKAWA Electric

SIEMENS

BiSS-C*

* Please contact our sales department.

Dimensions



Effective length	Overall length	Mounting pitch					Number of bolts
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	

Effective length	Overall length	Mounting pitch					Number of bolts
L	L1	L2	L3	L4	L5	n	
1,370	1,480	1,400	1,476	40	38	15	
1,470	1,580	1,500	1,576	40	38	16	
1,570	1,680	1,600	1,676	40	38	17	
1,670	1,780	1,700	1,776	40	38	18	
1,770	1,880	1,800	1,876	40	38	19	
1,870	1,980	1,900	1,976	40	38	20	
1,970	2,080	2,000	2,076	40	38	21	
2,070	2,180	2,100	2,176	40	38	22	
2,270	2,380	2,300	2,376	40	38	24	
2,470	2,580	2,500	2,576	40	38	26	
2,670	2,780	2,700	2,776	40	38	28	
2,870	2,980	2,900	2,976	40	38	30	
3,070	3,180	3,100	3,176	40	38	32	
3,270	3,380	3,300	3,376	40	38	34	
3,470	3,580	3,500	3,576	40	38	36	
3,670	3,780	3,700	3,776	40	38	38	
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

Specifications

Model name	SQ57-xxxS□A###	SQ57 -xxxS□BX -xxxS□DX	SQ57-xxxS□F###	SQ57-xxx S□Z▼
Effective length (L: mm)	70 to 3,770 *1			
Thermal expansion coefficient	12 ± 1 × 10 ⁻⁶ /°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 outside
Output signal	Absolute serial bidirectional signal, compliant with EIA-485			Compliant with DRIVE-CLiQ
Compatible controllers	FANUC α/ai interface compatible	Mitsubishi Electric	YASKAWA Electric	SIEMENS AG
Resolution	Selectable from 0.005, 0.01, 0.05, 0.1, 0.5 and 1 μm (Factory set)		Selectable from 0.005 and 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 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/s² (50 Hz to 2,000 Hz)			
Impact resistance	980 m/s² (11 ms)			
Protective design grade	IP67			
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 120 g, Encoder 430 + (2.9×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

*1 For effective length exceeding 3,770 mm, 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

SQ57-xxxS□△###

SQ57-xxxS□Z▼

[xxx] Effective length (cm)

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

Type	Direction	Resolution	Type	Direction	Resolution
S		0.005	T		0.005
A		0.01	F		0.01
B		0.05	G		0.05
C		0.1	H		0.1
D		0.5	J		0.5
E		1	K		1

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

[△] Communication protocol

Type	NC manufacturer	Remarks
A	FANUC	a / ai interface
B	Mitsubishi Electric	Half duplex
D	Mitsubishi Electric	Full duplex
F	YASKAWA Electric	Half duplex
Z	SIEMENS AG	DRIVE-CLiQ

[#] Reference point position
(FANUC, Mitsubishi Electric, YASKAWA Electric)

Type	Reference point position
X	Effective length center
(Absolute 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)

Type	Reference point position : Left from the edge of the effective length
Y	Online diagnostic function not supported
Z	Online diagnostic function support

Cables

CH22-□□□○▽※#

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

Type	Cable length
015	1.5 m
070	7 m
260	26 m

Type	Conduit specification
C	With conduit
N	Without conduit (standard)

[▽] Cable sheath (covering)

Type	Cable specification
S	PU

[※] Encoder side connector : a

Type	Specification	Remarks
M	Encoder head connector	Standard
F	M12 connector (Female) made by Phoenix Contact	Relay/ Waterproofing

[#] Controller side connector : b

Type	Specification	Remarks
None	Open-end*	Encoder side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 12P made by TAJIMI ELECTRONICS Standard
M*	10P made by 3M	Mitsubishi Electric NC, J3
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 JN1 (Male) made by Japan Aviation Electronics Industry	Relay
N	12P R04 (Male) made by TAJIMI ELECTRONICS	Relay (fixed)

* CH23 only

CH23-□□□○▽※#

CH23A-□□□○▽※#
(CH23A : FANUC model only)

[□□□] Cable length

Type	Cable length
010	1 m
005	0.5 m
065	6.5 m
100	10 m

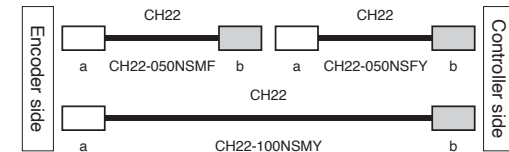
Type	Conduit specification
C	With conduit
N	Without conduit

[▽] Cable sheath

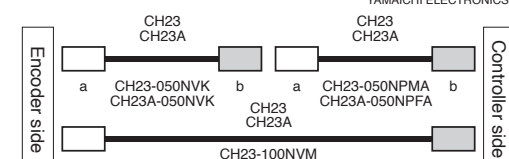
Type	Cable specification
V	PVC (φ6.8) [Encoder side]
C	PU (φ6.8) [Encoder]
P	PVC (φ8) [Controller side]
E	PU (φ8) [Controller side]

[#] Encoder side connector : a

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



CH22-050NSMF example)	CH22-100NSMY example)	CH22-050NSFY example)
Cable length 5 m Without conduit PU sheath Encoder side connector Original of Magnescale Controller side connector M12 (Male) made by Phoenix Contact	Cable length 10 m Without conduit PU sheath Encoder side connector Original of Magnescale Controller side connector RJ45 by YAMAICHI ELECTRONICS	Cable length 5 m Without conduit PU sheath Encoder side connector M12 (Female) made by Phoenix Contact Controller side connector RJ45 made by YAMAICHI ELECTRONICS



CH23-050NVK CH23A-050NVK example)	CH23-100NVM CH23A-100NVF example)	CH23-050NPMA CH23A-050NPFA example)
Cable length 5 m Without conduit PVC sheath Encoder side connector Original of Magnescale Controller side connector 10P JN1 (Male) made by Japan Aviation Electronics Industry	Cable length 10 m Without conduit PVC sheath Encoder side connector Original of Magnescale Controller side connector <CH23> 10P made by 3M <CH23A> 20P made by Honda Tsushin Kogyo	Cable length 5 m Without conduit PVC sheath Encoder side connector 10P JN2 (Female) made by Japan Aviation Electronics Industry Controller side connector <CH23> 10P made by 3M <CH23A> 20P made by Honda Tsushin Kogyo

Absolute linear encoder

Exposed type SmartSCALE

SQ47

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



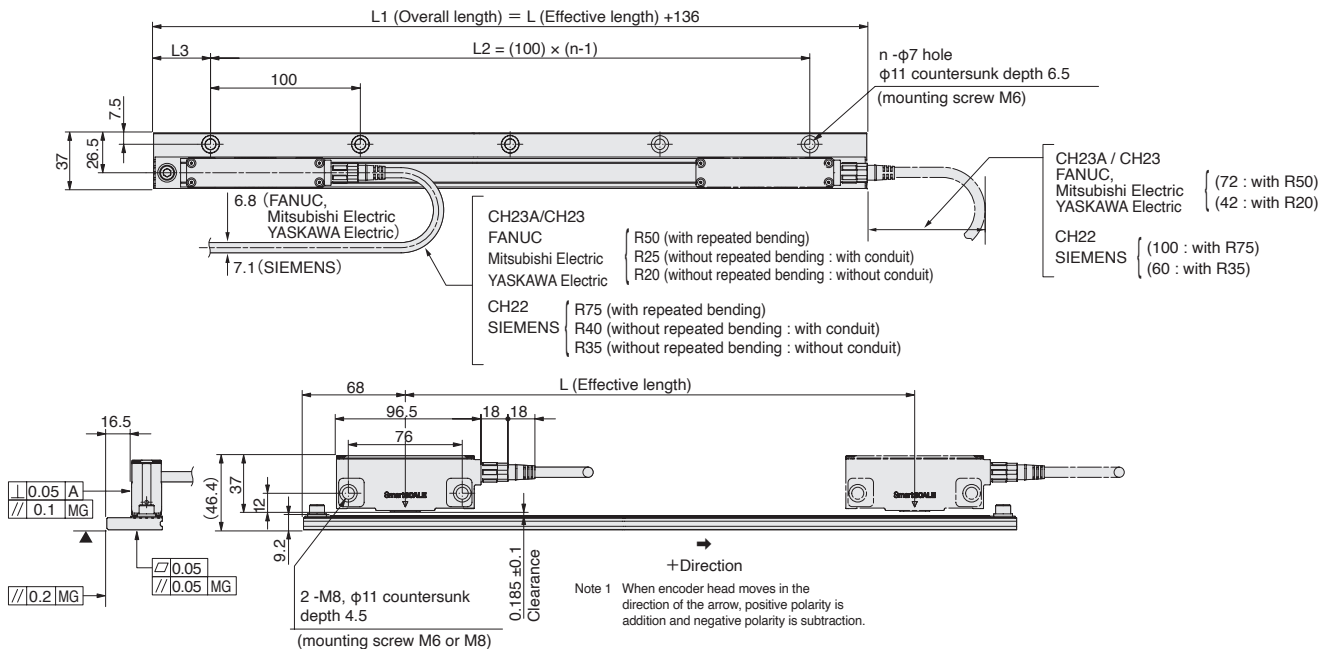
FANUC

Mitsubishi Electric

YASKAWA Electric

SIEMENS

Dimensions



Effective length	Overall length	Mounting pitch			Number of bolts
L	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	Mounting 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	

Unit : mm

MG : Machine guide
For effective length exceeding 3,740 mm, please contact our sales department.

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

Specifications

Model name	SQ47-xxx★S□A###	SQ47 -xxx★S□BX -xxx★S□DX	SQ47-xxx★S□F###	SQ47-xxx★S□Z▼
Effective length (L : mm)	90 to 3,740*1			
Thermal expansion coefficient	12 ± 1 × 10 ⁻⁶ /°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 outside
Output signal	Absolute serial bidirectional signal, compliant with EIA-485			Compliant with DRIVE-CLiQ
Compatible controllers	FANUC α/ai interface compatible	Mitsubishi Electric	YASKAWA Electric	SIEMENS AG
Resolution	Selectable from 0.005, 0.01, 0.05, 0.1, 0.5 and 1 μm (Factory set)		Selectable from 0.005 and 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 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 ² (50 Hz to 2,000 Hz)			
Impact resistance	980 m/s ² (11 ms)			
Protective design grade	IP67			
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

*1 For effective length exceeding 3,740 mm, please contact our sales department.
*2 Three-piece configuration; cannot be used in two-piece configuration.
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Details of model designation

Encoder

SQ47-xxx★S□△##

SQ47-xxx★S□Z▼

[xxx] Effective length (cm)

★ Cable lead-out direction

Type	Lead-out direction
R	Right
L	Left

[S] Accuracy grade
± (1.5+1.5L/1000) μm

L : Effective length (mm)

□ Resolution and direction (μm)

Type	Direction	Resolution	Type	Direction	Resolution
S		0.005	T		0.005
A		0.01	F		0.01
B		0.05	G		0.05
C		0.1	H		0.1
D		0.5	J		0.5
E		1	K		1

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

△ Communication protocol

Type	NC manufacturer	Remarks
A	FANUC	a / ai interface
B	Mitsubishi Electric	Half duplex
D	Mitsubishi Electric	Full duplex
F	YASKAWA Electric	Half duplex
Z	SIEMENS AG	DRIVE-CLiQ

[#] Reference point position

Type	Reference point position
X	Effective length center
(Absolute 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)	
Type	Reference point position : Left from the edge of the effective length
Y	Online diagnostic function not supported
Z	Online diagnostic function support

Cables

CH22-□□□○▽※#

□□□ Cable length
Written by flush right, indication in "m" units, up to 30 m, 0.5 m pitch (Example)

Type	Cable length
015	1.5 m
070	7 m
260	26 m

○ Conduit specification

Type	Conduit specification
C	With conduit
N	Without conduit (standard)

CH23-□□□○▽※#

CH23A-□□□○▽※#
(CH23A : FANUC model only)

□□□ Cable length
(Example)

Type	Cable length
010	1 m
005	0.5 m
065	6.5 m
100	10 m

○ Conduit specification

Type	Conduit specification
C	With conduit
N	Without conduit

▽ Cable sheath

Type	Cable specification
V	PVC (φ6.8) [Encoder side]
C	PU (φ6.8) [Encoder]
P	PVC (φ8) [Controller side]
E	PU (φ8) [Controller side]

▽ Cable seath (covering)

Type	Cable specification
S	PU

※ Encoder side connector : a

Type	Specification	Remarks
M	Encoder head connector	Standard
F	M12 connector (Female) made by Phoenix Contact	Relay/ Waterproofing

[#] Controller side connector : b

Type	Specification	Remarks
None	Open-end*	Encoder side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 12P made by TAJIMI ELECTRONICS Standard
M*	10P made by 3M	Mitsubishi Electric NC, J3
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 JN1 (Male) made by Japan Aviation Electronics Industry	Relay
N	12P R04 (Male) made by TAJIMI ELECTRONICS	Relay (fixed)

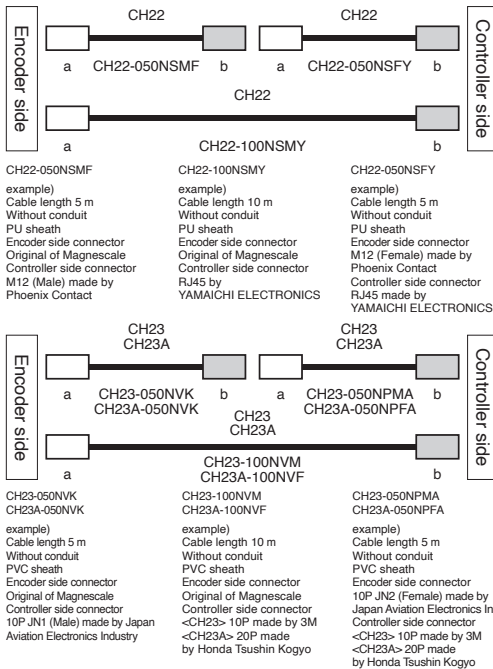
* CH23 only

※ Controller side connector : b

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

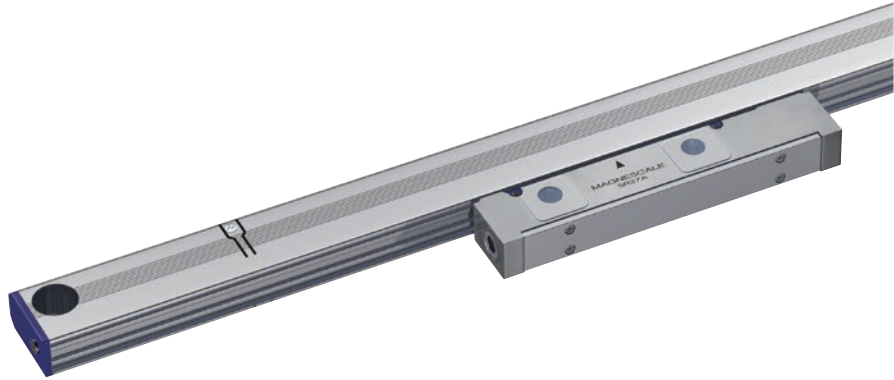
[#] Encoder side connector : a

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



Absolute linear encoder
Enclosed type
SR27A

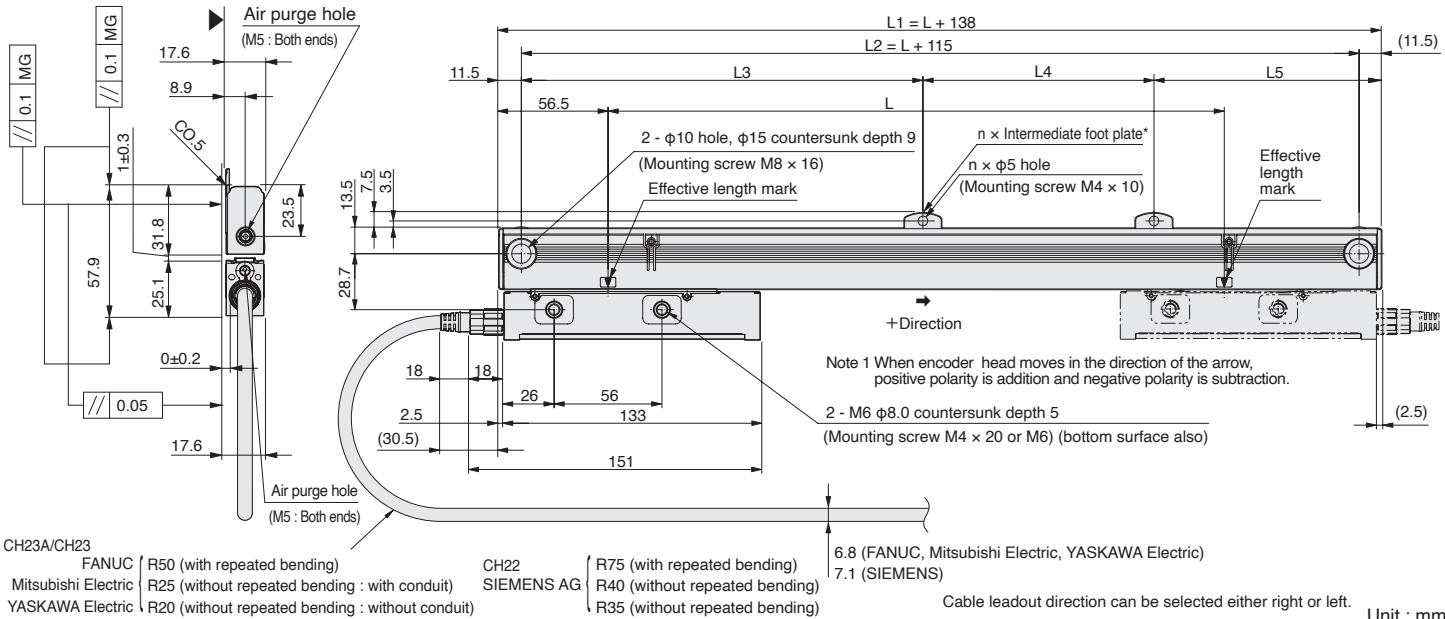
- Slim design allows installation in narrow spaces
- Magnetic system enables use even in environments with condensation, oil, and other adverse coditions
- Same thermal expansion as iron



- FANUC
- Mitsubishi Electric
- YASKAWA Electric
- Panasonic*
- SIEMENS

* Scheduled to launch in 2025

Dimensions



CH23A/CH23	FANUC	R50 (with repeated bending)
	Mitsubishi Electric	R25 (without repeated bending : with conduit)
	YASKAWA Electric	R20 (without repeated bending : without conduit)
	CH22	SIEMENS AG
		R75 (with repeated bending)
		R40 (without repeated bending)
		R35 (without repeated bending)

Effective length	Overall length	Mounting pitch					Number of intermediate foot plates
L	L1	L2	L3	L4	L5	n	
70	208	185	—	—	—	0	
120	258	235	—	—	—	0	
170	308	285	—	—	—	0	
220	358	335	—	—	—	0	
270	408	385	—	—	—	0	
320	458	435	—	—	—	0	
370	508	485	—	—	—	0	
420	558	535	—	—	—	0	
470	608	585	—	—	—	0	
520	658	635	—	—	—	0	
570	708	685	—	—	—	0	
620	758	735	—	—	—	0	
670	808	785	392.5	—	392.5	1	
720	858	835	417.5	—	417.5	1	

Effective length	Overall length	Mounting pitch					Number of intermediate foot plates
L	L1	L2	L3	L4	L5	n	
770	908	885	442.5	—	442.5	1	
820	958	935	467.5	—	467.5	1	
920	1,058	1,035	517.5	—	517.5	1	
1,020	1,158	1,135	567.5	—	567.5	1	
1,140	1,278	1,255	627.5	—	627.5	1	
1,240	1,378	1,355	677.5	—	677.5	1	
1,340	1,478	1,455	727.5	—	727.5	1	
1,440	1,578	1,555	520	520	515	2	
1,540	1,678	1,655	550	550	555	2	
1,640	1,778	1,755	585	585	585	2	
1,740	1,878	1,855	620	620	615	2	
1,840	1,978	1,955	650	650	655	2	
2,040	2,178	2,155	720	720	715	2	

MG: Machine guide * Intermediate foot plate: One location when L ≥ 670 mm, two locations when L ≥ 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).

Specifications

Model name	SR27A - xxx○□AX###	SR27A - xxx○□BX SR27A - xxx○□DX	SR27A- xxx○□F###	SR27A - xxx○AZY
Effective length (L: mm)	70 to 2,040			
Thermal expansion coefficient	12 ±1 × 10 ⁻⁶ /°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, 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 serial bidirectional signal, compliant with EIA-485			Compliant with DRIVE-CLiQ
Compatible controllers	FANUC α/ai interface compatible	Mitsubishi Electric	YASKAWA Electric	SIEMENS AG
Resolution	Selectable from 0.005*, 0.01, 0.05, 0.1, 0.5 and 1 μm (Factory set)	Selectable from 0.005*, 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 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 ² (50 Hz to 3,000 Hz)			
Impact resistance	350 m/s ² (11 ms)			
Protective design grade	IP54 (Air purge not included), IP65 (Air purge included)			
Power supply voltage	DC +4.75 to +5.25 V			DC +17 to +30.8 V
Maximum power consumption	1.3 W or less (4.75V or 5.25V)			1.75 W or less (17 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. 0.39 kg + 1.53 kg/m or less			
Compatible cables (types without relay connectors)	CH23A-***NVF 13 m	CH23-***NVM 13 m	CH23-***NVG 13 m	CH22-***NSMY 30 m
Compatible cables (types with relay connectors)	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

*1 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 - xxx○□△#

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

Type	Accuracy grade
A	(5 +5L/1,000) μmp-p
S	(3 +3L/1,000) μmp-p

L: Effective length (mm)

Type	Direction	Resolution	Type	Direction	Resolution	Type	Direction	Resolution*
A		0.01	F		0.01	L		λ/32768
B		0.05	G		0.05			
C	+	0.1	H	—	0.1	+		
D		0.5	J		0.5	M		λ/4096
E		1	K		1			

Mitsubishi Electric : A, B, C only
YASKAWA Electric : A, B, L, M only
SIEMENS AG : A only
* λ : 320 μm

Type	NC manufacturer	Remarks
A	FANUC	α/ai interface
B	Mitsubishi Electric	Half duplex
D	Mitsubishi Electric	Full duplex
F	YASKAWA Electric	Relay
Z	SIEMENS AG	DRIVE-CLiQ

Type	Reference point position
X	Effective length center
Y	Fixed to 10mm from left end of effective length

SIEMENS AG : Y only
Mitsubishi Electric : X only
Please contact our representative for custom positions.

Cables

CH22 - □□□○▽※#

Type	Cable length
015	1.5 m
070	7 m
260	26 m

Type	Conduit specification
C	With conduit
N	Without conduit (standard)

CH23 - □□□○▽※#

CH23A - □□□○▽※#
(CH23A : FANUC model only)

Type	Cable length
010	1 m
005	0.5 m
065	6.5 m
100	10 m

Type	Conduit specification
C	With conduit
N	Without conduit

Type	Cable specification
V	PVC (φ6.8) [Encoder side]
C	PU (φ6.8) [Encoder]
P	PVC (φ8) [Controller side]
E	PU (φ8) [Controller side]

Encoder side connector : a

Type	Specification	Remarks
M	Encoder head connector	Standard
F	M12 connector (Female) made by Phoenix Contact	Relay/ Waterproofing

Controller side connector : b

Type	Specification	Remarks
None	Open-end*	Encoder side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 12P made by TAJIMI ELECTRONICS Standard
M*	10P made by 3M	Mitsubishi Electric NC, J3
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 JN1 (Male) made by Japan Aviation Electronics Industry	Relay
N	12P R04 (Male) made by TAJIMI ELECTRONICS	Relay (fixed)

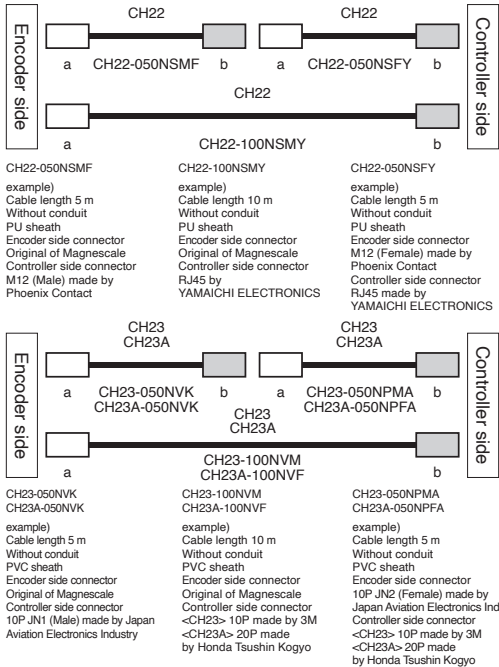
* CH23 only

Encoder side connector : b

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

Encoder side connector : a

Type	Specification	Remarks
None	Original of Magnescale	Standard
A	10P JN1 (Male) made by Japan Aviation Electronics Industry	Relay
C	12P R04-9125JF8.5 made by TAJIMI ELECTRONICS	Relay (fixed)



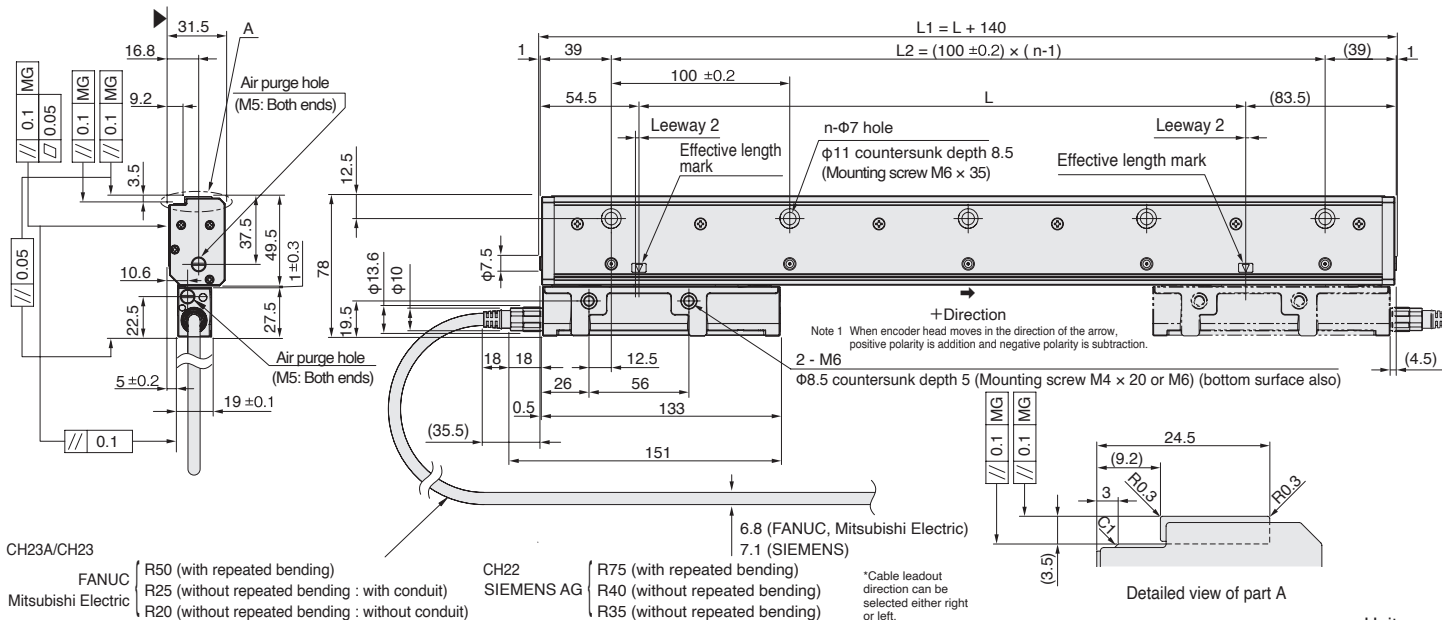
Absolute linear encoder
Enclosed type
SR67A

- 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



FANUC Mitsubishi Electric SIEMENS

Dimensions



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

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).

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

Unit: mm

Specifications

Model name	SR67A - xxx○□AX###	SR67A - xxx○□BX SR67A - xxx○□DX	SR67A - xxx○AZY
Effective length (L : mm)	140 to 3,640		
Thermal expansion coefficient	12±1 × 10 ⁻⁶ /°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 length 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 signal, compliant with EIA-485		Compliant with DRIVE-CLiQ
Compatible controllers	FANUC α/ai interface compatible	Mitsubishi 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)	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 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 ² (50 Hz to 2,000 Hz)		
Impact resistance	450 m/s ² (11 ms)		
Protective design grade	IP54 (Air purge not included), IP65 (Air purge included)		
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)		1.75 W or less (17 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	CH23-***NVK + CH23-***NPMA 30 m	CH22-***NSMF + CH22-*** NSFY 30 m

*1 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 - xxx○□△#

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

Type	Accuracy grade
A	(5 + 5 L/1,000) μmp-p
S	(3 + 3 L/1,000) μmp-p

L: Effective length(mm)

Type	Direction	Resolution	Type	Direction	Resolution
A		0.01	F		0.01
B		0.05	G		0.05
C	+	0.1	H	-	0.1
D		0.5	J		0.5
E		1	K		1

Mitsubishi Electric : A, B, C only
SIEMENS AG : A only

Type	NC manufacture	Remarks
A	FANUC	α / ai interface
B	Mitsubishi Electric	Half duplex
D	Mitsubishi Electric	Full duplex
Z	SIEMENS AG	DRIVE-CLiQ

Type	Reference point position
X	Effective length center
Y	Fixed to 10mm from left end of effective length

SIEMENS AG: Y only
Mitsubishi Electric: X only
Please contact our representative for custom positions.

Cables

CH22 - □□□○▽※#

Type	Cable length
015	1.5 m
070	7 m
260	26 m

Type	Conduit specification
C	With conduit
N	Without conduit (standard)

CH23 - □□□○▽※#

CH23A - □□□○▽※#
(CH23A : FANUC model only)

Type	Cable length
010	1 m
005	0.5 m
065	6.5 m
100	10 m

Type	Conduit specification
C	With conduit
N	Without conduit

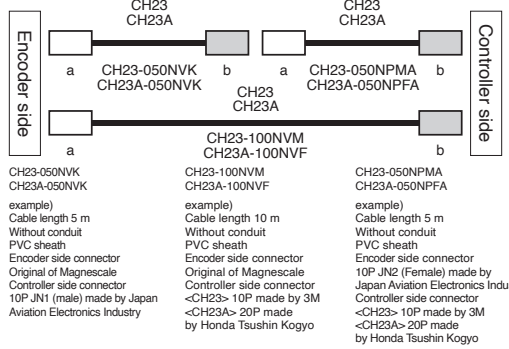
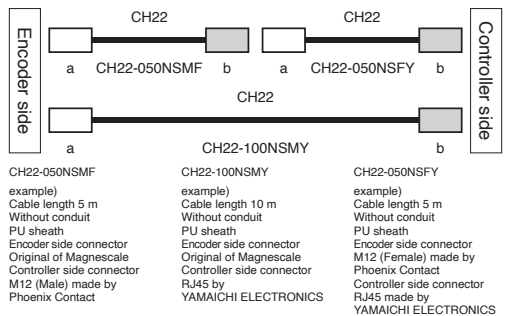
Type	Cable specification
V	PVC (Φ6.8) [Encoder side]
C	PU (Φ6.8) [Encoder]
P	PVC (Φ8) [Controller side]
E	PU (Φ8) [Controller side]

Type	Specification	Remarks
M	Encoder head connector	Standard
F	M12 connector (Female) made by Phoenix Contact	Relay/ Waterproofing

Type	Specification	Remarks
None	Open-end	Encoder side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 12P made by TAJIMI ELECTRONICS
M*	10P made by 3M	Mitsubishi Electric NC, J3
F	20P straight case made by Honda Tsushin Kogyo	FANUC
J	Horizontal drawing case 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	Remarks
None	Original of Magnescale	Standard
A	10P JN2 (Female) made by Japan Aviation Electronics Industry	Relay
C	12P R04-9125JF8.5 made by TAJIMI ELECTRONICS	Relay (fixed)

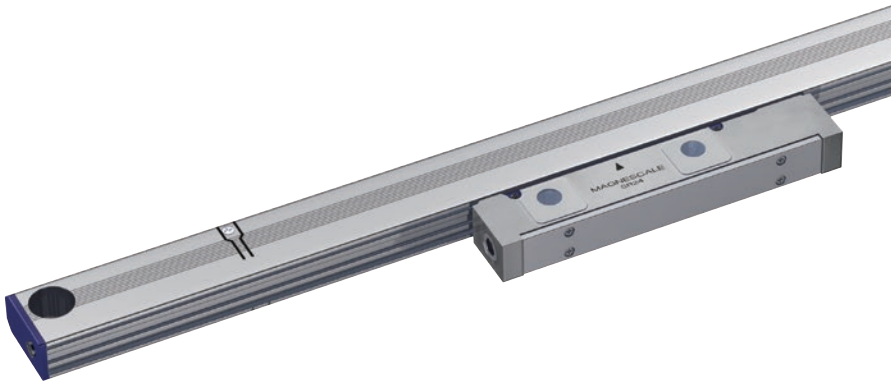
Type	Specification	Remarks
None	Original of Magnescale	Standard
A	10P JN1 (Male) made by Japan Aviation Electronics Industry	Relay
C	12P R04-9125JF8.5 made by TAJIMI ELECTRONICS	Relay (fixed)



Incremental linear encoder
Enclosed type

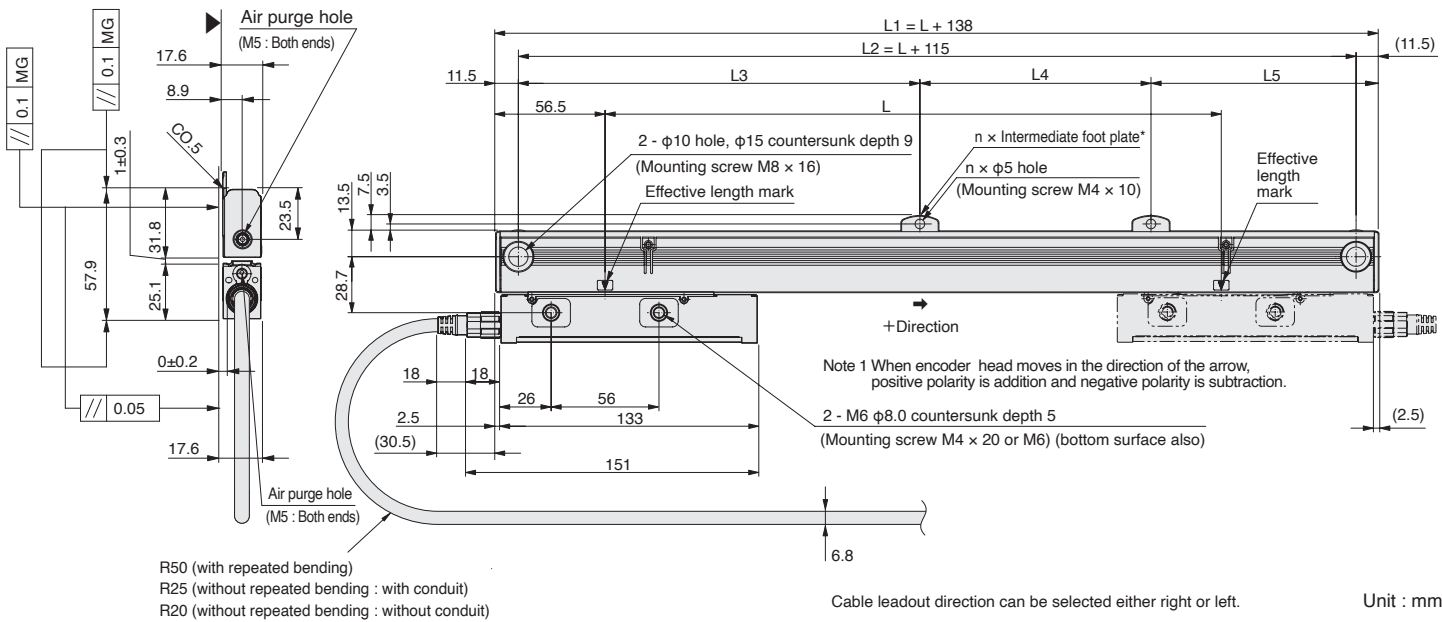
SR24

- 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



A/B/Refelence point

Dimensions (Cable lead-out direction : Left)



Effective length	Overall length	Mounting pitch					Number of intermediate foot plates
L	L1	L2	L3	L4	L5	n	
70	208	185	—	—	—	0	
120	258	235	—	—	—	0	
170	308	285	—	—	—	0	
220	358	335	—	—	—	0	
270	408	385	—	—	—	0	
320	458	435	—	—	—	0	
370	508	485	—	—	—	0	
420	558	535	—	—	—	0	
470	608	585	—	—	—	0	
520	658	635	—	—	—	0	
570	708	685	—	—	—	0	
620	758	735	—	—	—	0	
670	808	785	392.5	—	392.5	1	
720	858	835	417.5	—	417.5	1	

Effective length	Overall length	Mounting pitch					Number of intermediate foot plates
L	L1	L2	L3	L4	L5	n	
770	908	885	442.5	—	442.5	1	
820	958	935	467.5	—	467.5	1	
920	1,058	1,035	517.5	—	517.5	1	
1,020	1,158	1,135	567.5	—	567.5	1	
1,140	1,278	1,255	627.5	—	627.5	1	
1,240	1,378	1,355	677.5	—	677.5	1	
1,340	1,478	1,455	727.5	—	727.5	1	
1,440	1,578	1,555	520	520	515	2	
1,540	1,678	1,655	550	550	555	2	
1,640	1,778	1,755	585	585	585	2	
1,740	1,878	1,855	620	620	615	2	
1,840	1,978	1,955	650	650	655	2	
2,040	2,178	2,155	720	720	715	2	

MG : Machine guide * Intermediate foot plate : One location when L ≥ 670 mm, two locations when L ≥ 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).

Specifications

Model name	SR24-xxx○□◆###
Effective length (L: mm)	70 to 2,040
Thermal expansion coefficient	12 ±1 × 10 ⁻⁶ /°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 ² (50 Hz to 3,000 Hz)
Impact resistance	350 m/s ² (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

*1 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○□◆###

[xxx] Effective length (cm)

[○]Accuracy grade

Type	Accuracy grade
A	(5 + 5L/1,000) μmp-p
S	(3 + 3L/1,000) μmp-p

L : Effective length (mm)

[□]Resolution and direction (μm)

Type	Direction	Resolution	Type	Direction	Resolution
B		0.05	G		0.05
C	+	0.1	H	-	0.1
D		0.5	J		0.5
E		1	K		1

[#]Reference point position (Arbitrary position can be specified)

Type	Reference point position
X	Center of effective length
Y	Multi-point

[◆]Minimum phase difference

Type	Phase difference(ns)	Type	Phase difference(ns)	Type	Phase difference(ns)
A	50	F	300	L	1,250
B	100	G	400	M	2,500
C	150	H	500	N	3,000
D	200	J	650		
E	250	K	1,000		

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

CH23 - □□□○▽※#

[□□□]Cable length (Example)

Type	Cable length
010	1 m
005	0.5 m
065	6.5 m
100	10 m

[○]Conduit specification

Type	Conduit specification
C	With conduit
N	Without conduit

[▽]Cable sheath

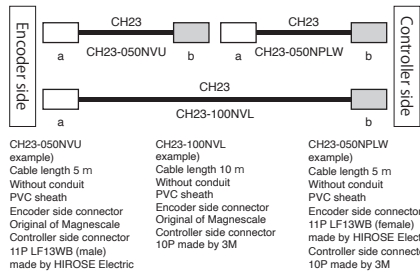
Type	Cable specification
V	PVC (φ6.8) [Encoder side]
C	PU (φ6.8) [Encoder]
P	PVC (φ6) [Controller side]
E	PU (φ6) [Controller side]

[#] Controller side connector : b

Specification	Remarks	記号
Earth wire		Without With
Open-end	Encoder side connector should be 11P LF13WB (female) made by HIROSE Electric	Z —
	Standard	None —
D-Sub 9P		D —
10P made by 3M	Mitsubishi Electric NC, J3	L —
20P straight case made by Honda Tsushin Kogyo	FANUC	E P
20P horizontal drawing case made by HIROSE Electric	FANUC	H R
11P LF13WB (male) made by HIROSE Electric	Relay	U —

[#] Encoder side connector : a

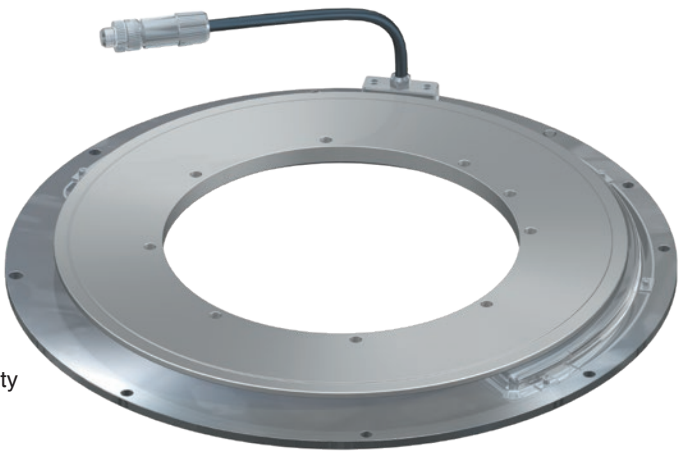
Specification	Remarks	Type
Original of Magnescale	Standard	None
11P LF13WB (female) made by HIROSE Electric	Relay	W



Absolute angle encoder
Exposed type

RS97-1024N

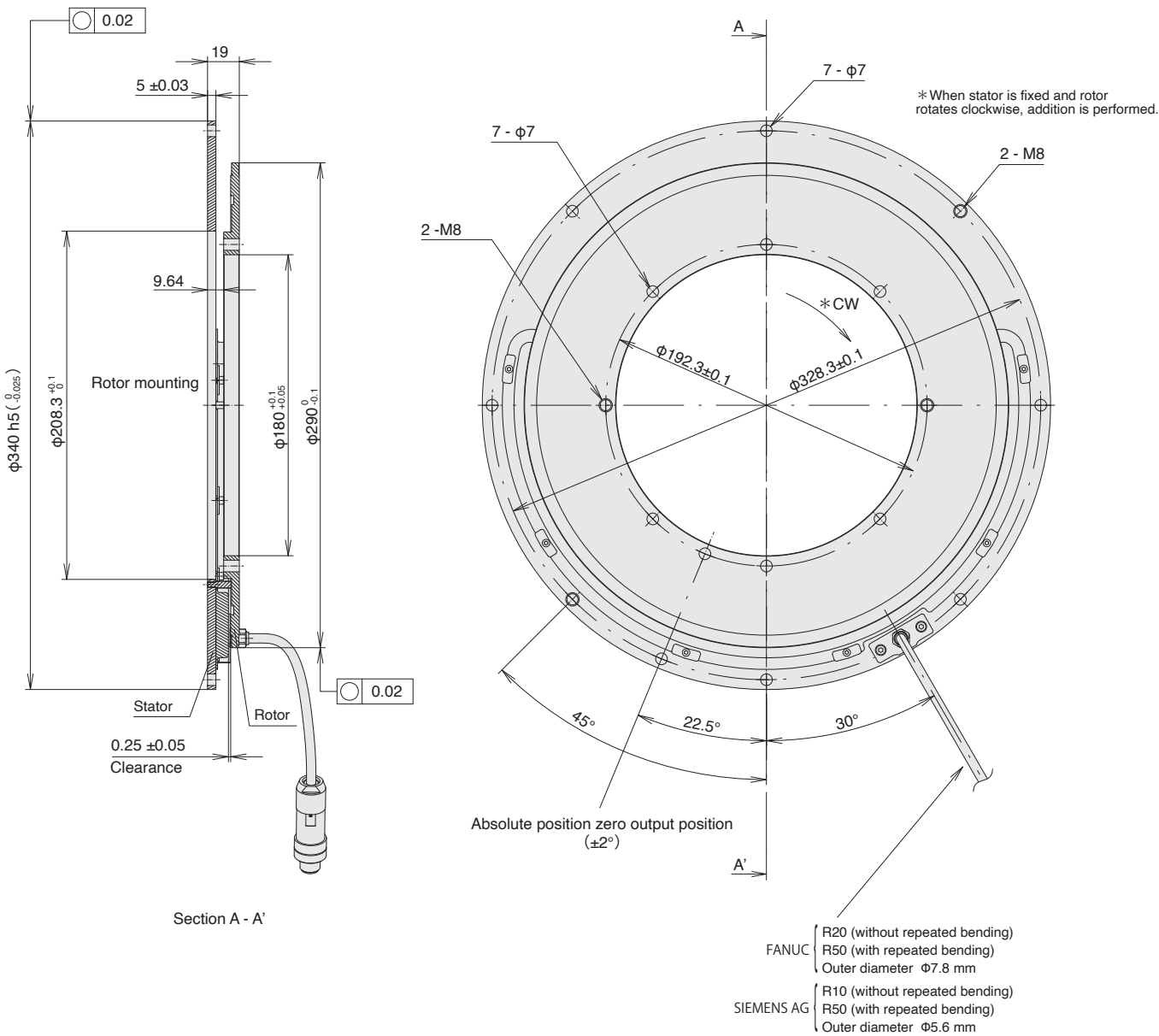
- Magnetic system enables use even in environments with condensation, oil, and other adverse conditions
- 180 mm diameter through-hole allows for design and mounting flexibility
- Dual head configuration reduces the effect of axial runout



FANUC

SIEMENS

Dimensions



Specifications

Model name		RS97-1024N□A■	RS97-1024NGZ■
Output wave number	1,024 waves/revolution		
Through hole diameter	φ180 mm		
Accuracy (at 20°C)	±2.5"		
Output signal	Absolute serial bidirectional signal, compliant with EIA-485		
Compatible controllers	FANUC		Compliant with DRIVE-CLiQ
Resolution	23 bits (8,388,608 pulses/revolution) or 25 bits (33,554,432 pulses/revolution)		SIEMENS AG
Maximum response revolutions	5,000 min ⁻¹		23 bits (8,388,608 pulses/revolution)
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 ² (50 Hz to 2,000 Hz)		
Impact resistance	1,000 m/s ² (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	1.35 W or less (4.75 V) 1.3 W or less (5.25 V)		2.8 W or less (17 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 Electronics Industry		SACC-M12MS-8Q H made by Phoenix Contact
Moment of inertia	8.8 × 10 ⁻³ kg·m ² or less		
Mass	Approx. 3.4 kg (rotor: 0.6 kg / stator: 2.8 kg) or less		
Compatible cables (types without relay connectors) Maximum cable length	CH23A-***NPFA 30 m		CH22-***NSFY 30 m
Compatible cables (types with relay connectors) Maximum cable length	CH23A-***NPKA + CH23A-***NPFA 30 m		CH22-***NSFF + CH22-***NSFY 30 m

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

Details of model designation

Encoder

RS97-1024N□△■

[N] Rotor inner diameter
180 mm

[□] Resolution

Type	Resolution
G	23 bit
J	25 bit

[△] Communication protocol

Type	NC manufacturer	Remarks
A	FANUC	α interface
Z	SIEMENS AG	DRIVE-CLiQ

[■] Head cable length

Type	Head cable length
01	1 m
02	2 m
03	3 m

Cables

CH22 - □□□○▽*#

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

Type	Cable length
015	1.5 m
070	7 m
260	26 m

[○] Conduit specification

Type	Conduit specification
C	With conduit
N	Without conduit

[▽] Cable sheath (covering)

Type	Cable specification
S	PU

[*] Encoder side connector : a

Type	Specification	Remarks
M	Encoder head connector	Standard
F	M12 connector (Female) made by Phoenix Contact	Relay/ Waterproofing

[#] Controller side connector : b

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

CH23A - □□□○▽*#

[□□□] Cable length

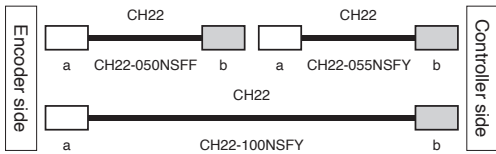
Type	Cable length
010	1 m
005	0.5 m
065	6.5 m
100	10 m

[○] Conduit specification

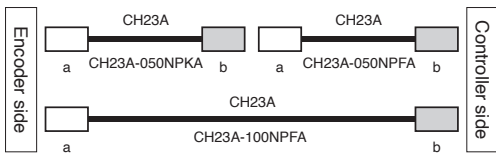
Type	Conduit specification
C	With conduit
N	Without conduit

[▽] Cable sheath

Type	Cable specification
P	PVC (φ8) [Controller side]
E	PU (φ8) [Controller side]



Type	Specification	Remarks
CH22-050NSFF	example) Cable length 5 m Without conduit PU sheath Encoder side connector M12 (Female) made by Phoenix Contact Controller side connector RJ45 made by Phoenix Contact	
CH22-100NSFY	example) Cable length 10 m Without conduit PU sheath Encoder side connector M12 (Female) made by Phoenix Contact Controller side connector RJ45 made by YAMAICHI ELECTRONICS	
CH22-055NSFY	example) Cable length 5 m Without conduit PU sheath Encoder side connector M12 (Female) made by Phoenix Contact Controller side connector RJ45 made by YAMAICHI ELECTRONICS	

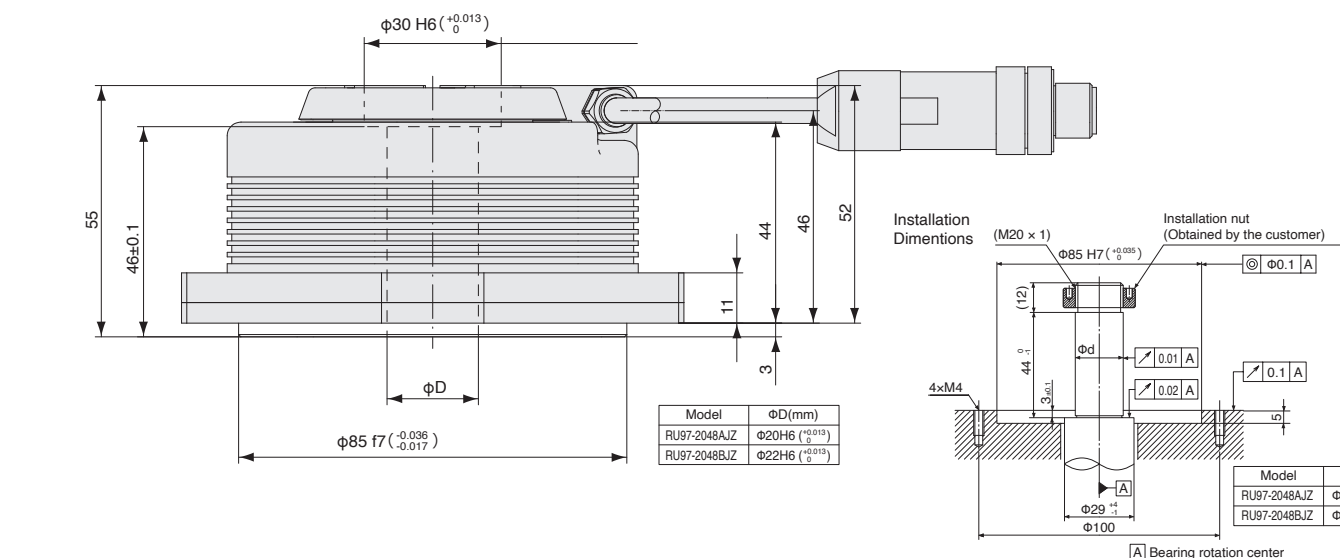


Type	Specification	Remarks
CH23A-050NPKA	example) Cable length 5 m Without conduit PVC sheath (φ8) Encoder side connector 10P JN2 (Female) made by Japan Aviation Electronics Industry Controller side connector 10P JN1 (Male) made by Japan Aviation Electronics Industry	
CH23A-100NPFA	example) Cable length 10 m Without conduit PVC sheath (φ8) Encoder side connector 10P JN2 (Female) made by Japan Aviation Electronics Industry Controller side connector 20P made by Honda Tsushin Kogyo	
CH23A-050NPFA	example) Cable length 5 m Without conduit PVC sheath (φ8) Encoder side connector 10P JN2 (Female) made by Japan Aviation Electronics Industry Controller side connector 20P made by Honda Tsushin Kogyo	

RU97₋₂₀₄₈

-

Dimensions



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 ⁻¹
Maximum mechanical revolutions	3,000 min ⁻¹
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 ² (50 Hz to 2,000 Hz)
Impact resistance	1,000 m/s ² (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 ⁻⁵ kg·m ² 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

Details of model designation

CH22-050NSFF example)	CH22-100NSFY example)	CH22-050NSFY example)
Cable length 5 m	Cable length 10 m	Cable length 5 m
Without PU sheath	Without PU sheath	Without PU sheath
Encoder side connector M12 (Female) made by Phoenix Contact	Encoder side connector M12 (Female) made by Phoenix Contact	Encoder side connector M12 (Female) made by Phoenix Contact
Controller side connector M12 (Male) made by Phoenix Contact	Controller side connector RM4 made by YAMACHI ELECTRONICS	Controller side connector RM4 made by YAMACHI ELECTRONICS

RU77-4096

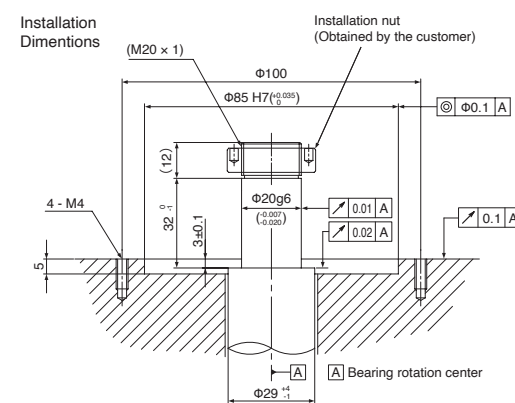
-
- A black, cylindrical industrial component, likely a force transducer, with a hexagonal base and a central bore. The component is shown from a top-down perspective, highlighting its robust, industrial design. The central bore is surrounded by a flange with several mounting holes. A cable is visible extending from the top of the unit.

YASKAWA Electric

Technical drawing of the encoder body and cable assembly. The drawing shows a top-down view of the encoder body with various dimensions and features. Key dimensions include a square mounting hole of 92mm, a central bore of 10mm, and a cable diameter of 5.6mm. Features include 4 M3 screws (depth 5), 4 mounting holes for M4 (top) and M6 (bottom), and an air injection hole (M5). A note indicates that when the encoder axis rotates counter-clockwise, addition is performed. The cable is shown with a 10-degree bend radius (R10) and a 50mm length (R50).

Dimensions and features shown in the drawing:

- 4 - M3 depth 5
- 4 - $\phi 3.3 \pm 0.1$ depth 7
- Air injection hole (M5)
- 4 - Mounting hole for M4 (when installing from top)
- 4 - Mounting hole for M6 (when installing from bottom)
- *When encoder axis rotates counter clockwise, addition is performed.
- Reference mark
- This is the position at which the absolute position is zero.
- 10°
- R10 (Without repeated bending)
- R50 (With repeated bending)
- 44
- $\phi 5.6$



Model name	RU77 - 4096A□A★○○	RU77 - 4096A□B★○○ RU77 - 4096A□D★○○	RU77 - 4096A□F★○○
Output wave number	4,096 waves/revolution		
Through hole diameter	φ20 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 pulses/revolution)		21 bit (2,097,152 pulses/revolution)
Maximum response revolutions	2,000 min ⁻¹		
Maximum mechanical revolutions	3,000 min ⁻¹		
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 ² (50 Hz to 2,000 Hz)		
Impact resistance	1,000 m/s ² (11 ms)		
Protective design grade	IP65		
Power supply voltage	DC +4.75 to +5.25 V (with connectiong terminal)		
Consumption current	200 mA (at 120Ω termination)		
Moment of inertia	9.4 × 10 ⁻⁵ kg·m ² 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	CH33-*** : 30 m, CE28*** : 15 m	

Incremental angle encoder
Enclosed type

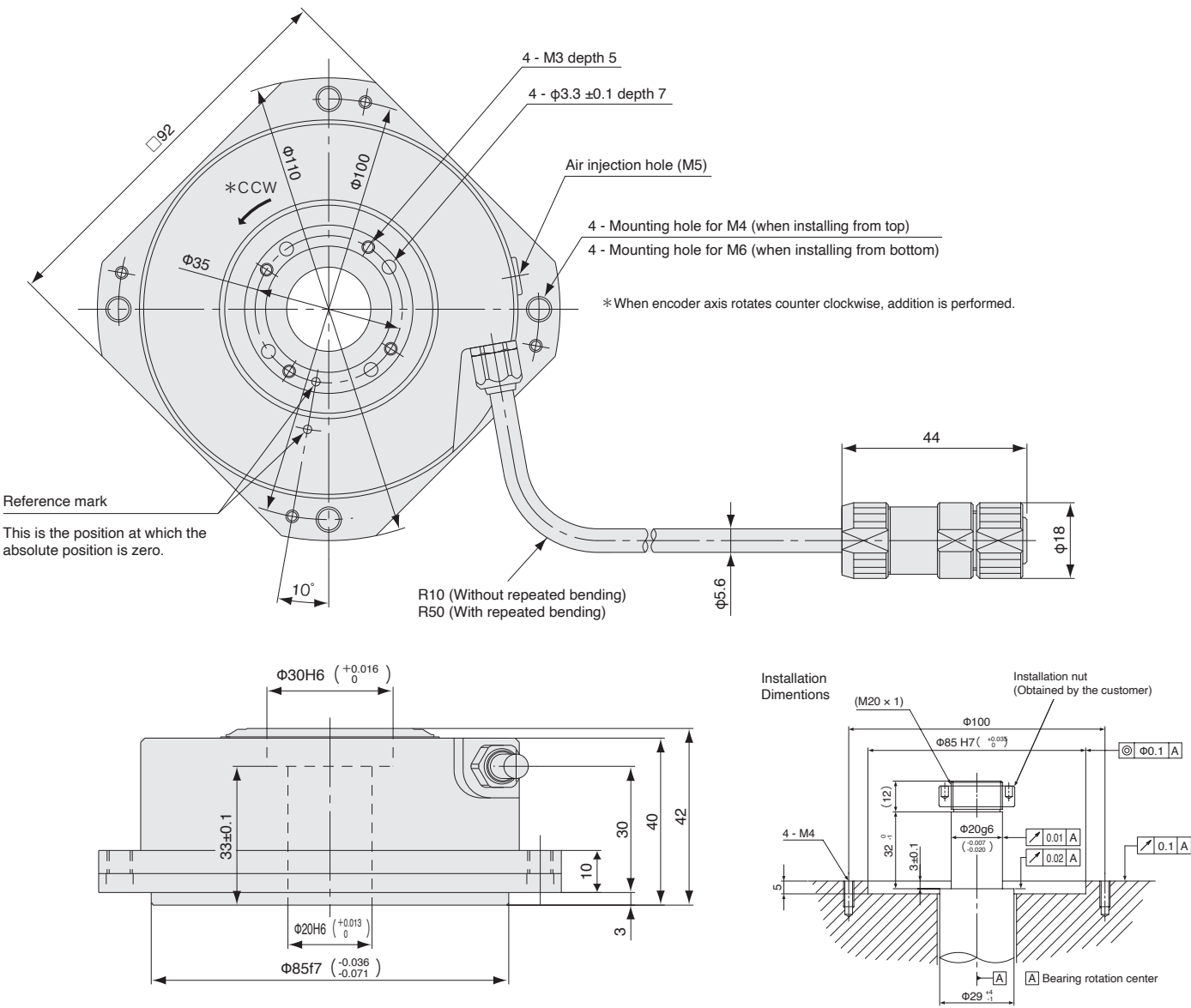
RU74

- 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/Reference point

Dimensions



Unit: mm

Specifications

Model name	RU74-4096AA◆G○○ RU74-4096AB◆G○○	RU74-4096AC◆G○○ RU74-4096AD◆G○○
Output wave number	4,096 waves/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 ⁻¹	267 min ⁻¹
Maximum mechanical revolutions	3,000 min ⁻¹	
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 ² (50 Hz to 2,000 Hz)	
Impact resistance	1,000 m/s ² (11 ms)	
Protective design grade	IP65	
Power supply voltage	DC +4.75 to +5.25 V (with connecting terminal)	
Consumption current	200mA (at 120Ω termination)	
Moment of inertia	9.4×10 ⁻⁵ kg·m ² or less	
Starting torque (at 20°C)	0.1 N·m or less	
Mass	Approx. 1.2kg or less	
Standard compatible cable	CE28-***	
Maximum cable length	CE28-*** : 15 m	

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

Details of model designation

Encoder

RU74-4096A□◆G○○

[□] Resolution, direction of rotation, and polarity

Type	Resolution	Direction of rotation / Direction	Number of pulses/revolution	Number of divisions
A	Approx. 1°/1,000	CW / +	360,448	88
B	Approx. 1°/1,000	CCW / +	360,448	88
C	Approx. 1°/10,000	CW / +	3,600,384	879
D	Approx. 1°/10,000	CCW / +	3,600,384	879

[G] Connector Metal water proofing (JB1)

[○○] Cable length

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

[◆] Minimum phase difference

Type	Minimum phase difference	Response revolutions (min)	Type	Minimum phase difference	Response revolutions (min)
A	50	2,000	H	500	266
B	100	1,332	J	650	205
C	150	888	K	1,000	133
D	200	666			
E	250	533			
F	300	444			
G	400	333			

Cables

CE28 - □□□□※

[○] Conduit

Type	Conduit
C	With conduit
N	Without conduit

[※] Controller side connector

Specification	Remarks	Type
Earth wire		Without With
Open-end	Standard	None
10P made by 3M	Mitsubishi Electric NC, J3	L
20P made by Honda Tsushin Kogyo	FANUC	E P
10P (JB1) made by Japan Aviation Electronics Industry	RU7* extension cable	J

[□□□] Cable length
Written by flush right,
indication in "10 cm" units,
up to 14 m, 1 m pitch
(Example)

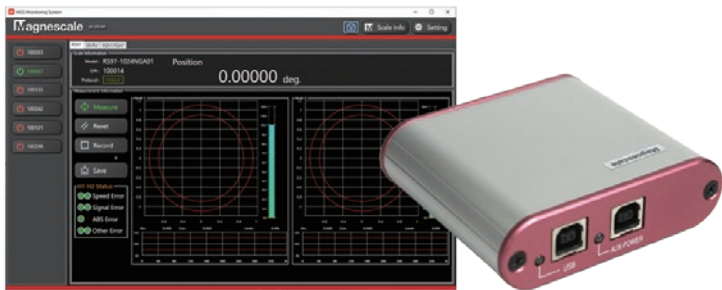
Type	Cable length
070	7 m
090	9 m
130	13 m

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*

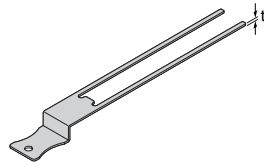
* It must satisfy the required specification of OS.

Mounting Tools

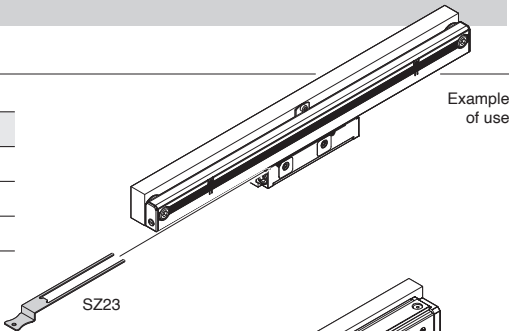
SZ23

Gap verification spacer

- Applicable models
SR24
SR27A



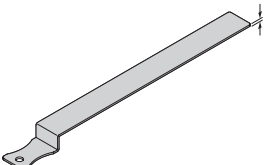
SZ23	t
For mounting	1.0 mm
For maximum gap verification	1.2 mm
For minimum gap verification	0.8 mm



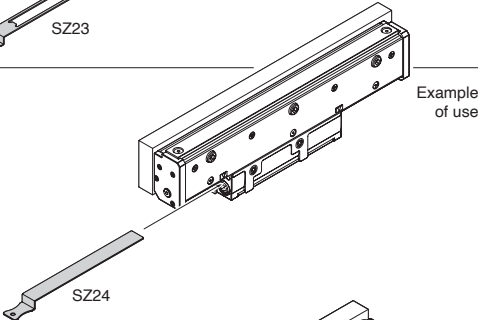
SZ24

Gap verification spacer

- Applicable models
SR67A



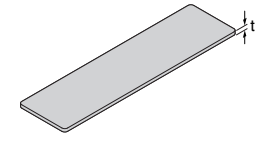
SZ24	t
For mounting	1.0 mm
For maximum gap verification	1.2 mm
For minimum gap verification	0.8 mm



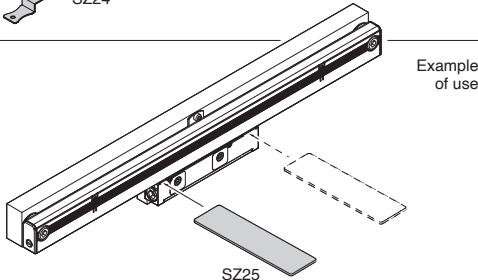
SZ25

Gap verification spacer

- Applicable models
SR24
SR27A
SR67A



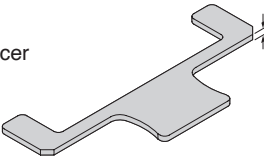
SZ25	t
For mounting	1.0 mm
For maximum gap verification	1.2 mm
For minimum gap verification	0.8 mm
For height verification	0.2 mm



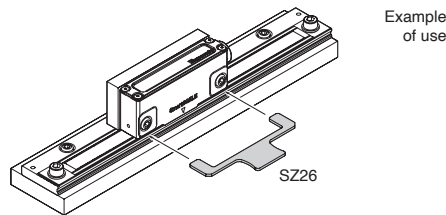
SZ26

Clearance adjustment spacer

- Applicable models
SQ47



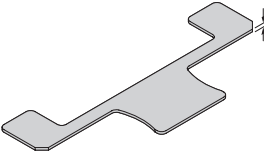
SZ26	t
—	2.0 mm



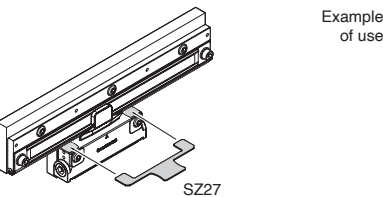
SZ27

Track positioning spacer

- Applicable models
SQ57



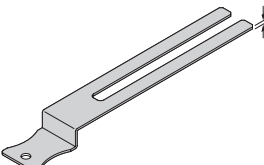
SZ27	t
For center value verification	1.0 mm
For lower limit verification	0.8 mm
For upper limit verification	1.2 mm



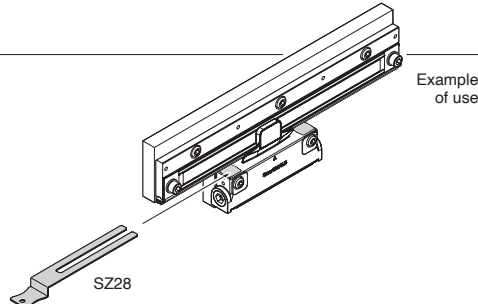
SZ28

Track positioning spacer

- Applicable models
SQ57



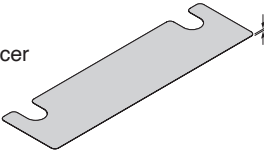
SZ28	t
For center value verification	1.0 mm
For lower limit verification	0.8 mm
For upper limit verification	1.2 mm



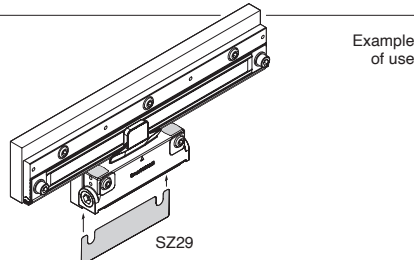
SZ29

Clearance adjustment spacer

- Applicable models
SQ57



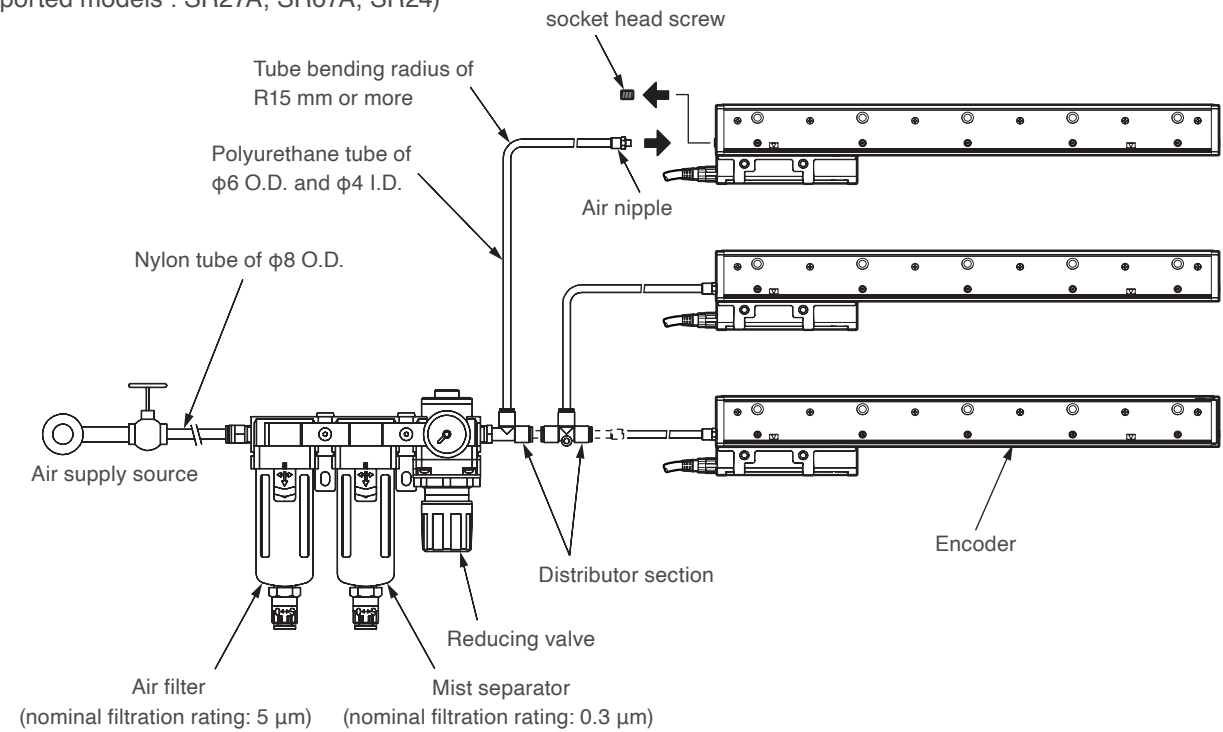
SZ29	t
—	0.05 mm
—	0.1 mm
—	0.2 mm



Technology

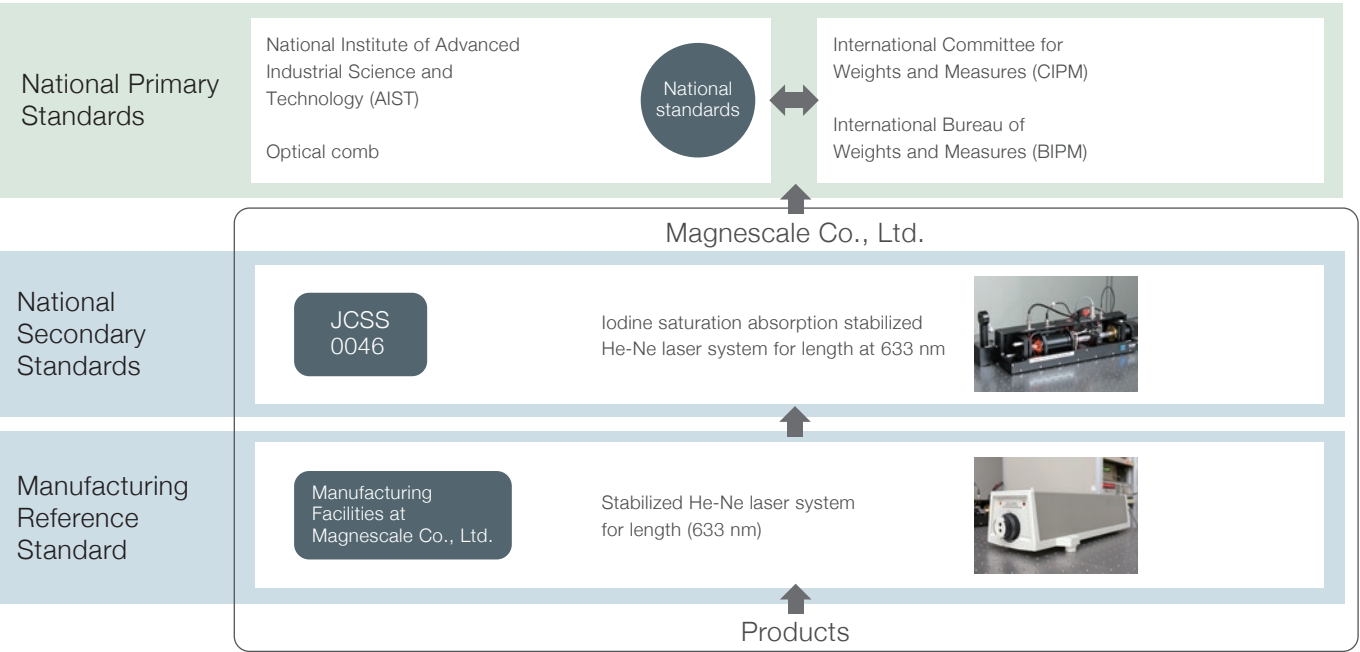
Air purging

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 ℓ/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

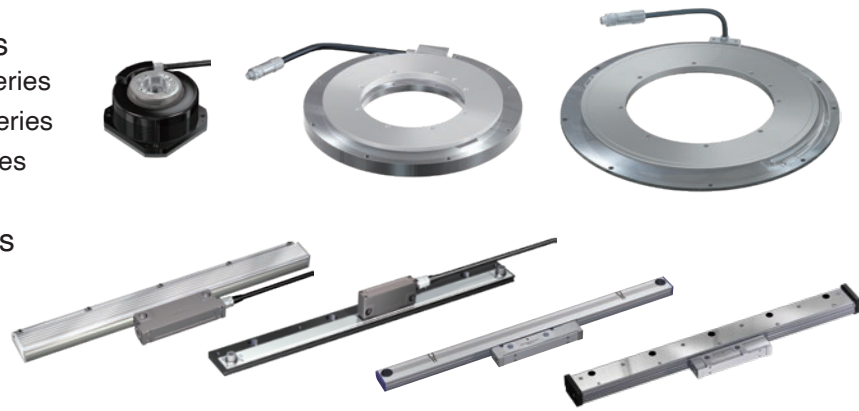
* Safety of Machinery - If the product is used in equipment subject to conformity to the electrical equipment of machinery (EN60204-1), please take measures to ensure conformity to that standard before use.
* Please note that some products may have different standards or may not have been certified in 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
 - Linear encoders
SQ57-Z series
SQ47-Z series
SR27A-AZ series
SR67A-AZ series



* Consult our sales representative for details.