

### Magnescale Co., Ltd.

Shinagawa Intercity Tower A-18F, 2-15-1, Konan, Minato-ku, Tokyo 108-6018, JAPAN : 45 Suzukawa, Isehara-shi, Kanagawa 259-1146, JAPAN Headquarters

TEL.+81(0)463-92-1011 FAX.+81(0)463-92-1012 Tokyo Office : Shinagawa Intercity Tower A-18F, 2-15-1, Konan, Minato-ku, Tokyo 108-6018, JAPAN TEL.+81(0)3-5460-3574 FAX.+81(0)3-5460-9614 Nagoya Office : 2-35-16, Meieki, Nakamura-ku, Nagoya Aichi, 450-0002, JAPAN TEL.+81(0)52-587-1823 FAX.+81(0)52-587-1848 Osaka Office : 2-14-6, Nishi-Nakajima, Yodogawa-ku, Osaka 532-0011, JAPAN International Sales Department : 45 Suzukawa, Isehara-shi, Kanagawa 259-1146, JAPAN TEL.+81(0)6-6305-3101 FAX.+81(0)6-6304-6586 TEL.+81(0)463-92-7971 FAX.+81(0)463-92-7978 : 5740 Warland Drive, Cypress, CA 90630, USA TEL.+1(562)594-5060 FAX.+1(562)594-5061 Magnescale Europe GmbH : Antoniusstrasse 14, 73249 Wernau, Germany TEL.+49(0) 7153 934 291 FAX.+49(0) 7153 934 299

#### http://www.magnescale.com

The contents of this literature are as of Aug. 2013 This catalog is printed with soy ink. MGS-FB-1308-EN-C



Feedback Scales General Catalog

SPEED X PRECISION



### Blessing of the Earth



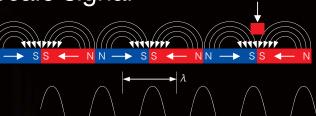


Advanced technology supports the evolution of high precision and resistance to harsh environments. Magnescale continues its endless evolution to develop scales with the high precision and durability demanded by machine tool applications.

Magnescales born from advanced magnetic technology apply magnetism as the measurement principle, which makes them resistant to the oil and condensation inherent to machine tools, and enables consistently stable and precise position detection.

## Stability

### Scale signal



The raw signal is an exact sine way

# Principle

### **Detection principle**

A thin-film MR element with a high-precision, low-distortion pattern arrangement is used as the detecting element.

The resistance value of the MR element changes when the magnetic field acting on the element changes due to an alteration in the relative positions between the element and the magnetic media. This change in resistance value is read electronically to detect the amount of positional change.

### MR element

The MR element uses a special pattern to enable stable signal detection with high precision.

The patented detecting head pattern incorporates various technologies that help to achieve a high-precision signal, such as the following:

- 1) Harmonic distortion components are removed from the detected signal.
- 2) Stable signal output can be obtained over the entire effective length.
- 3) Stable signal output can be obtained with respect to temperature variation.



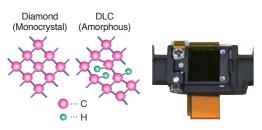
Absolute position detection system

Employs the 2-track M-code system.

Number of M-code bits: Up to 18 bits

(Left figure: Example of 4-bit codes)

### Environmental resistance



### Protective structure

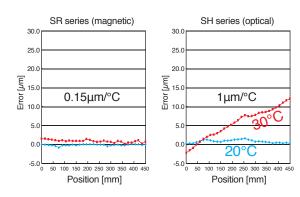
A diamond-like carbon (DLC) film is formed on the surface of the detecting head (the surface facing the magnetic scale) as a protective film. The detecting head is securely protected against both mechanical and environmental factors by multiple layers of protective film, which includes the DLC film (the world's first patent pending protective DLC film to be used on a MR element surface).

# High Precision

# Impact resistance of 450 m/s<sup>2</sup>, vibration resistance of 250 m/s<sup>2</sup>

Magnescale primarily uses ferrous members as the case material to protect the detector section, thereby realizing high vibration resistance and impact resistance characteristics. Furthermore, the SR67A series employs multi-point fixation construction in addition to the highly rigid case, achieving the industry's top-class vibration resistance and impact resistance

### Thermal expansion



Magnescales have the same linear expansion coefficient as that of iron used for the structure of general machine tools. Therefore, the scales exhibit the same behavior as the equipment in which they are installed, even in environments where the temperature changes, allowing extremely stable control. In particular, the SR67A series scales can be installed in close contact with the equipment, so heat is exchanged effectively with the equipment, making it possible to obtain stable accuracy even in environments where the temperature changes.

### Resistance to condensation and oil

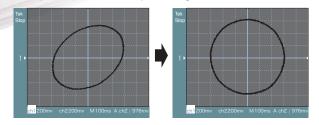
Magnescale employs a magnetic detection principle that is resistant to the effects of condensation and oil inherent to machine tools. This principle allows for the achievement of high positioning accuracy even in severe environments.



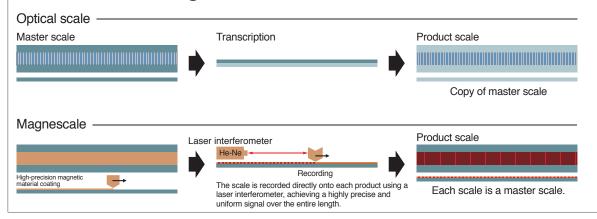
### Advanced arithmetic processing technology

Use of an arithmetic processing circuit, based on original technology, achieves a higher interpolation accuracy.

Example of multi-arithmetic processing circuit.



### Scale recording method



## Lineup

	Communication system	Type/model name		Output signal	Compatible controllers	Effective length	Maximum resolution	Accuracy	Maximum response speed	Protective design grade	Page
	ABS	Linear Slim type SR27A		Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC Mitsubishi Electric SIEMENS	70 to 2,040 mm	0.01μm	3+3L/1,000 μmp-p or 5+5L/1,000 μmp-p	200m/min	IP54 (Air purge not included) IP65 (Air purge included)	SR27A P10·11
Linear	(Absolute)	Linear Robust type SR67A		Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC Mitsubishi Electric SIEMENS	140 to 3,640 mm	0.01μm	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)	200m/min	IP54 (Air purge not included) IP65 (Air purge included)	SR67A P12·13
scale	INC	Linear Slim type SR74	e e	A/B Reference point Line driver signal Compliant with EIA-422	-	70 to 2,040 mm	0.05μm	3+3L/1,000 μmp-p or 5+5L/1,000 μmp-p	50m/min (Resolution: 0.1 μm, Minimum phase difference: at 50 ns)	IP54 (Air purge not included) IP65 (Air purge included)	SR74 P14·15
	(Incremental)	Linear Robust type SR84		A/B Reference point Line driver signal Compliant with EIA-422	-	140 to 3,040 mm	0.05μm	3+3L/1,000 μmp-p or 5+5L/1,000 μmp-p	50m/min (Resolution: 0.1 μm, Minimum phase difference: at 50 ns)	IP54 (Air purge not included) IP65 (Air purge included)	<b>SR84</b> P16·17

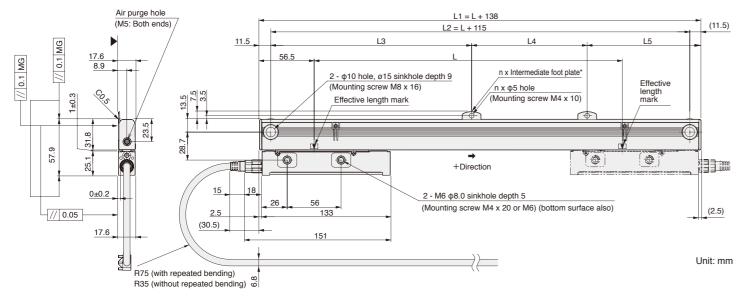
	Communication system	Type/model name	Output signal	Compatible controllers	Through hole diameter	Maximum resolution	Accuracy	Maximum response speed	Protective design grade	Page
		Rotary Exposed type RS97-1024E	Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC Mitsubishi Electric SIEMENS	ф96mm	23 bit (8,388,608 pulse/ revolution)	±2.5 sec.	5,000min <sup>-1</sup>	IP65	RS97-1024E P18•19
Rotary	ABS	Rotary Exposed type RS97-1024N	Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ	FANUC Mitsubishi Electric SIEMENS	ф180mm	23 bit (8,388,608 pulse/ revolution)	±2.5 sec.	5,000min-1	IP65	RS97-1024N P20•21
scale	(Absolute)	Rotary Enclosed type RU97-2048	Compliant with DRIVE-CLiQ	SIEMENS	A∶φ20mm B∶φ22mm	25 bit (33,554,432 pulse/ revolution)	±2.5 sec.	2,000min-1 (Maximum mechanical revolutions: 3,000min-1)	IP65	RU97-2048 P 22•23
		Rotary Enclosed type RU77-4096	Absolute serial bidirectional signal Compliant with EIA-485	FANUC Mitsubishi Electric Yaskawa Electric	ф20mm	25 bit (33,554,432 pulse/ revolution)	±2.5 sec.	2,000min-1 (Maximum mechanical revolutions: 3,000min-1)	IP65	RU77-4096 P 24•25

### Linear slim type

- · Slim type allows installation in narrow spaces
- Magnetic system enables use even in environments with condensation, oil, and other adverse conditions
- · Supports the communication protocol of each supporting manufacturer
- · Same thermal expansion as iron



Mitsubishi Electric



Effective length	Total length		Mountin	ng pitch		Number of intermediate foot plates	Effective length	Total length		Mountin	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 ML  $\geq$  670 mm, two locations when ML  $\geq$  1440 mm

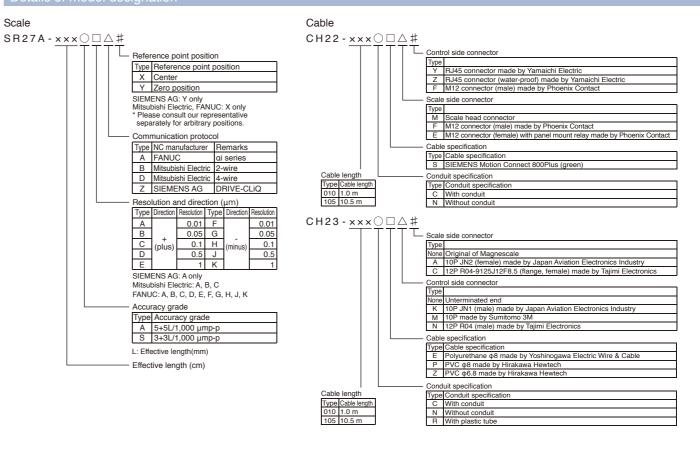
Notes • The surface indicated by the ▲ marks is the installation surface.

- Screws indicated in the diagram are supplied as standard accessories.
- · Movement outside the effective length (L) will damage the scale 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).

opecifications						
Model name	SR27A-□□□**A■	SR27A-□□□**BX SR27A-□□□**DX	SR27A-□□□*AZY			
Effective length (L: mm)		70 - 2,040				
Thermal expansion coefficient		12±1 × 10 <sup>-6</sup> /°C				
Accuracy(at 20°C)	3+3L/1,000	$0 \mu$ mp-p or 5+5L/1,000 $\mu$ mp-p, L: Effective le	ength (mm)			
Reference point	Center, or user-selected position (Set at factory shipping)	Fixed to center	Fixed to 10 mm from left end of effective length			
Output signal	Absolute serial bidirectional s	ignal, compliant with EIA-485	Compliant with DRIVE-CLiQ			
Compatible controllers	FANUC ai interface compatible	SIEMENS AG				
Resolution	Selectable from 0.01, 0.05, 0.1, 0.5 and 1 $\mu$ m (Set at factory shipping)	0.01 μm				
Maximum response speed		200 m/min				
Functional safety	Please consult with each con support for fur	EN ISO13849-1:2008 Cat.3 EN 62061:2005 / IEC 61508:2010 EN61800-5-2:2007				
Legal compliance	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN55011 Gp1 Class A, EN61000-6-2					
Operating temperature range		0 to +50°C				
Storage temperature range		-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 (A	Air purge not included), IP65 (Air purge inc	cluded)			
Power supply voltage range	DC+4.75	to +5.25 V	DC+17 to +30.8 V			
Maximum power consumption	1.3W or less (4	1.75V or 5.25V)	1.75W or less (17V) 1.9W or less (30.8V)			
Power consumption	250mA (5V) (when the	controller is connected)	75mA (24V) (when the controller is connected)			
Mass		Approx. 0.39kg+ 1.53kg/m or less				
Compatible cables (types without relay connectors) Maximum cable length	CH23-***NVF 13 m					
Compatible cables (types with relay connectors) Maximum cable length	CH23-***NVK + CH23-***NPFA 30 m	CH23-***NVK + CH23-***NPMA 30 m	CH22-***NSMF + CH22-*** NSFY 30 m			

#### Details of model designation

Scale

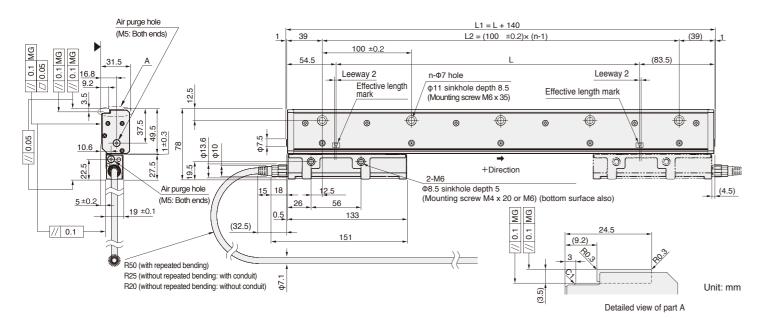


Linear robust type

- · High rigidity provides resistance to shock and vibration
- Magnetic system allows use even in environments with condensation, oil, and other adverse conditions
- · Supports the communication protocol of each supporting manufacturer
- · Same thermal expansion as iron



Mitsubishi Electric



Effective length	Total length	Mounting pitch	Number of intermediate foot plates
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	Total length	Mounting pitch	Number of intermediate foot plates
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

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

· Screws indicated in the diagram are supplied as standard accessories.

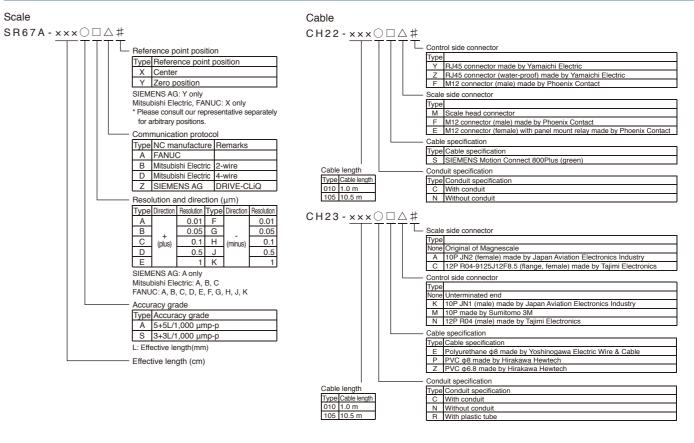
• Movement outside the effective length (L) will damage the scale head. It is recommended that the mechanical movable length (stroke) be set to 10 mm or more to the inside of both ends of the effective length (L).

$\overline{}$										
S	n	Δ	$\sim$ 1	ш	$\sim$	9	ŤI	$\cap$	n	
U	v	$\overline{}$	U.		U	a		U	ш	<b>(</b>

Opecifications						
Model name	SR67A-□□□**A■	SR67A-□□□**BX SR67A-□□□**DX	SR67A-□□□*AZY			
Effective length (L: mm)		140 - 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	3,040 mm) or 5+5L/1,000 $\mu$ mp-p (effective length	n 140 to 3,640 mm), L: Effective length (mm)			
Reference point	Center, or user-selected position (Set at factory shipping)	Fixed to center	Fixed to 10 mm from left end of effective length			
Output signal	Absolute serial bidirectional s	Compliant with DRIVE-CLiQ				
Compatible controllers	FANUC ai interface compatible	FANUC ai interface compatible Mitsubishi Electric				
Resolution	Selectable from 0.01, 0.05, 0.1, 0.5 and 1 $\mu$ m (Set at factory shipping)	0.01 μm				
Maximum response speed		200 m/min				
Functional safety	Please consult with each con support for fur	EN ISO13849-1:2008 Cat.3 EN 62061:2005 / IEC 61508:2010 EN61800-5-2:2007				
Legal compliance	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN55011 Gp1 Class A, EN61000-6-2					
Operating temperature range		0 to +50°C				
Storage temperature range		-20 to +55°C				
Vibration resistance		250 m/s² (50 Hz to 3,000 Hz)				
Impact resistance		450 m/s <sup>2</sup> (11 ms)				
Protective design grade	IP54 (A	Air purge not included), IP65 (Air purge in	cluded)			
Power supply voltage range	DC+4.75	to +5.25 V	DC+17 to +30.8 V			
Maximum power consumption	1.3W or less (4	1.75V or 5.25V)	1.75W or less (17V) 1.9W or less (30.8V)			
Power consumption	250mA (5V) (when the	controller is connected)	75mA (24V) (when the controller is connected)			
Mass		Approx. 0.9kg+ 5.2kg/m or less				
Compatible cables (types without relay connectors) Maximum cable length	CH23-***NVF 13 m	CH23-***NVF CH23-***NVM				
Compatible cables (types with relay connectors) Maximum cable length	CH23-***NVK + CH23-***NPFA 30 m	CH23-***NVK + CH23-***NPMA 30 m	CH22-***NSMF + CH22-*** NSFY 30 m			

#### Details of model designation

Scale



### Linear slim type

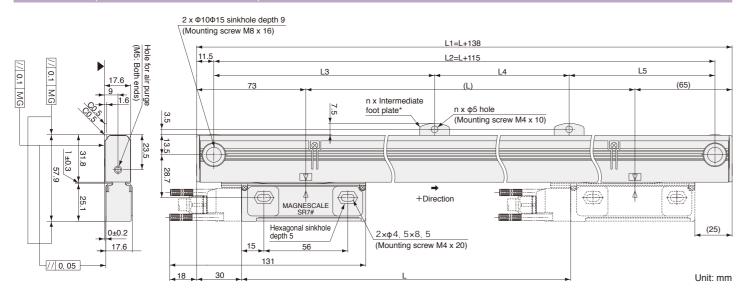
SR74

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



A/B/Reference poin

#### Dimensions (cable left-lead out direction)



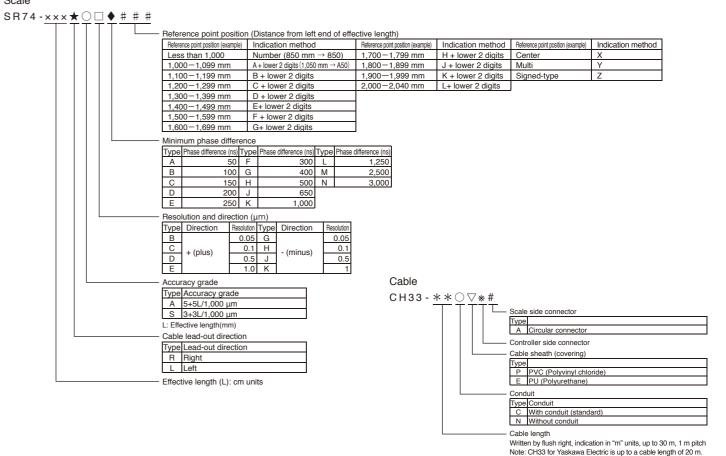
Effective length	Total length		Mountir	ng pitch		Number of intermediate foot plates	Effective length	Total length		Mountii	ng pitch		Number of intermediate foot plates
L	L1	L2	L3	L4	L5	n	L	L1	L2	L3	L4	L5	n
70	208	185	_	_	_	0	770	908	885	442.5	-	442.5	1
120	258	235	-	-	_	0	820	958	935	467.5	-	467.5	1
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
720	858	835	417.5	_	417.5	1	2,040	2,178	2,155	720	720	715	2

MG: Machine guide \* Intermediate foot plate: One location when  $L \ge 720$  mm, two locations when  $L \ge 1440$  mm

Specifications			
Model name	SR74		
Effective length (L: mm)	70-2,040		
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), Signed-type (standard pitch 20 mm), 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 $\mu$ m (Set at factory shipping)		
Maximum response speed	50m/ min (Resolution: 0.1 μm, Minimum phase difference: at 50 ns)		
Functional safety	_		
Legal compliance	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN55011 Gp1 Class A, EN61000-6-2(60 V DC or less)		
Operating temperature range	0 to +50°C		
Storage temperature range	-20 to +55°C		
Vibration resistance	150 m/s² (50 Hz to 3 kHz)		
Impact resistance	350 m/s² (11 ms)		
Protective design grade	IP54 (Air purge not included), IP65 (Air purge included)		
Power supply voltage range	DC+4.75 to +5.25 V		
Power consumption	200 mA (at 120 Ω termination) or less		
Mass	Approx. 0.27kg+ 1.36kg/m or less		
Standard compatible cable	CH33-***CP/CE		
Maximum cable length	15 m		

#### Details of model designation

### Scale



4

Unit: mm

### Linear robust type

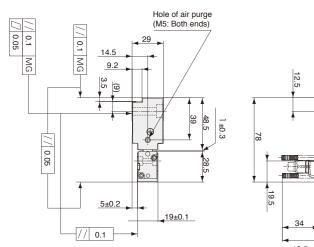
**SR84** 

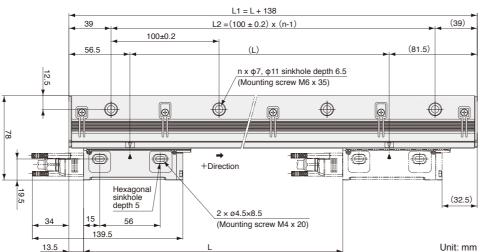
- High rigidity provides resistance to shock and vibration
- Magnetic system allows use even in environments with condensation, oil, and other adverse conditions
- Same thermal expansion as iron



A/B/Reference point

#### Dimensions (cable left-lend out direction)





Effective length	Total length	Mounting pitch	Number of intermediate foot plates		
L	L1	L2	n		
140	278	200	3		
240	378	300	4		
340	478	400	5		
440	578	500	6		
540	678	600	7		
640	778	700	8		
740	878	800	9		
840	978	900	10		
940	1,078	1,000	11		
1,040	1,178	1,100	12		
1,140	1,278	1,200	13		
1,240	1,378	1,300	14		

Effective length	Total length	Mounting pitch	Number of intermediate foot plates
L	L1	L2	n
1,340	1,478	1,400	15
1,440	1,578	1,500	16
1,540	1,678	1,600	17
1,640	1,778	1,700	18
1,740	1,878	1,800	19
1,840	1,978	1,900	20
2,040	2,178	2,100	22
2,240	2,378	2,300	24
2,440	2,578	2,500	26
2,640	2,778	2,700	28
2,840	2,978	2,900	30
3,040	3,178	3,100	32

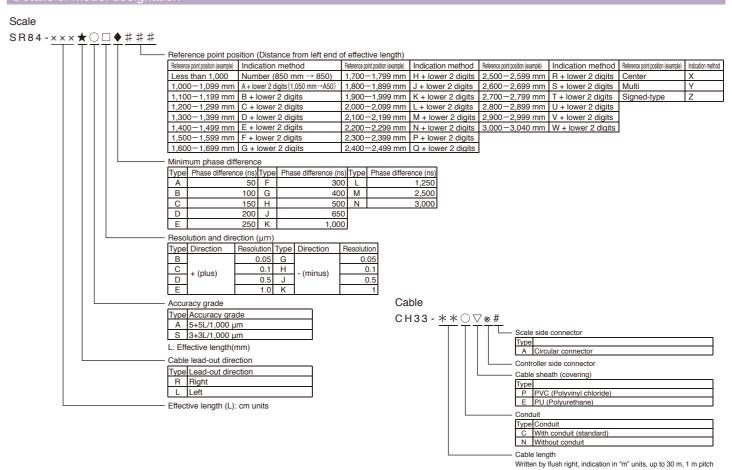
Manuations

No contract Contract of Contract

MG: Machine guide Unit: mm

Specifications	
Model name	SR84
Effective length (L: mm)	140-3,040
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	None, Center point, Multi point, Signed-type, 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 $\mu$ m (Set at factory shipping)
Maximum response speed	50m/ min (Resolution: 0.1 $\mu$ m, Minimum phase difference: at 50 ns)
Functional safety	-
Legal compliance	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN55011 Gp1 Class A, EN61000-6-2 Safety standards not applicable (60 V DC or less)
Operating temperature range	0 to +50°C
Storage temperature range	-20 to +55°C
Vibration resistance	250 m/s² (50 Hz to 2 kHz)
Impact resistance	450 m/s² (11 ms)
Protective design grade	IP54 (Air purge not included), IP65 (Air purge included)
Power supply voltage range	DC+4.75 to +5.25 V
Power consumption	200 mA (at 120 Ω termination) or less
Mass	Approx. 1.24kg+ 4kg/m or less
Standard compatible cable	CH33-***CP/CE
Maximum cable length	15 m

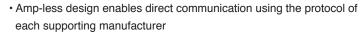
#### Details of model designation



Note: CH33 for Yaskawa Electric is up to a cable length of 20 m.

### Rotary exposed type

RS97-1024



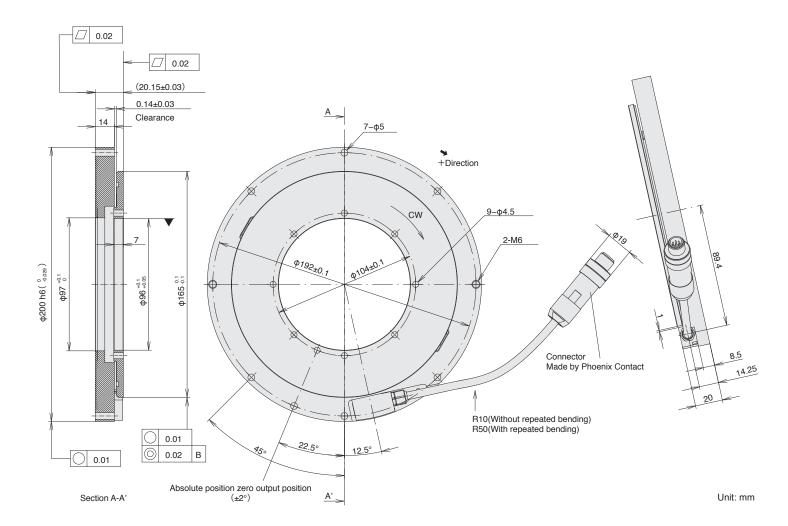
- Magnetic system enables use even in environments with condensation and oil and other adverse conditions
- 96mm diameter through-hole allows for design and mounting flexibility
- Use of two heads provides resistance to axial runout

FANUC

Mitsubishi Electric

SIEMENS

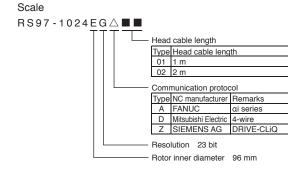
### Dimensions

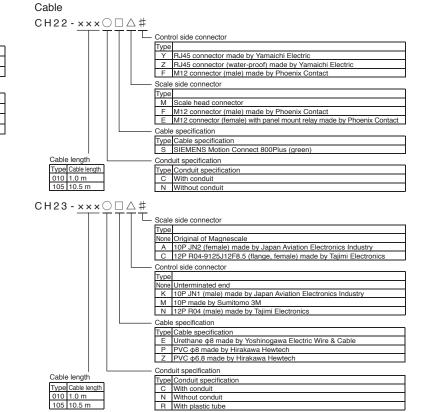


٩n	20	ifi <i>c</i>	ati	or	10
JΡ	-	IIIC	,au	OI.	lO

Model name	RS97-1024EGA	RS97-1024EGD	RS97-1024EGZ						
Output wave number	1,024 waves/revolution								
Through hole diameter		96 mm							
Accuracy(at 20°C)		±2.5 sec.							
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)							
Maximum response revolutions		5,000 min <sup>-1</sup>							
Functional safety	Please consult with each	ch controller manufacturer regarding supp	oort for functional safety.						
Legal compliance		FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN55011 Gp1 Class A, EN61000-6-2							
Operating temperature range		0 to +60°C							
Storage temperature range		-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 range	DC+4.75 t	to +5.25 V	DC+17 to +30.8 V						
Maximum power consumption	1.25W or le 1.2W or le	,	2.3W or less (17V) 3.1W or less (30.8V)						
Power consumption	240mA (5V) (when the	controller is connected)	120mA (24V) (when the controller is connected)						
Moment of inertia		9×10 <sup>-4</sup> kgm² or less							
Starting torque (at 20°C)									
Mass	Ар	prox. 2kg (rotor: 0.2kg/ stator: 1.7kg) or l	ess						
Compatible cables (types without relay connectors) Maximum cable length	CH23-***NPFA 30 m	CH23-***NPMA 30 m	CH22-***NSFY 30 m						
Compatible cables (types with relay connectors) Maximum cable length	CH23-***NPKA + CH23-***NPFA 30 m	CH23-***NPKA + CH23-***NPMA 30 m	CH22-***NSFF + CH22-***NSFY 30 m						

### Details of model designation





18

### Rotary exposed type

# RS97<sub>-1024</sub>N

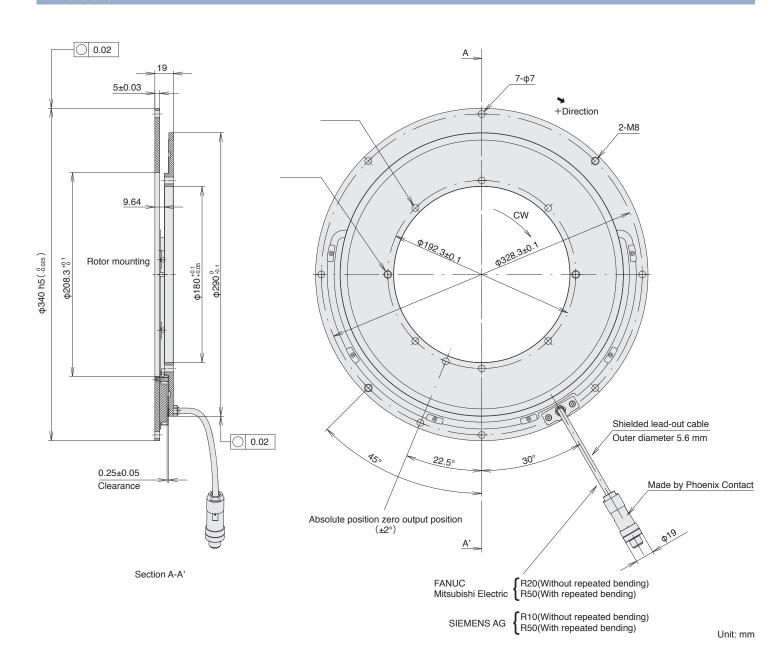
- Amp-less design enables direct communication using the protocol of each supporting manufacturer
- Magnetic system enables use even in environments with condensation and oil and other adverse conditions
- 180mm diameter through-hole allows for design and mounting flexibility
- Use of two heads provides resistance to axial runout

EANILIC

Mitsubishi Electric

SIEMENS

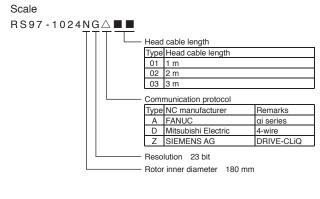
### Dimensions

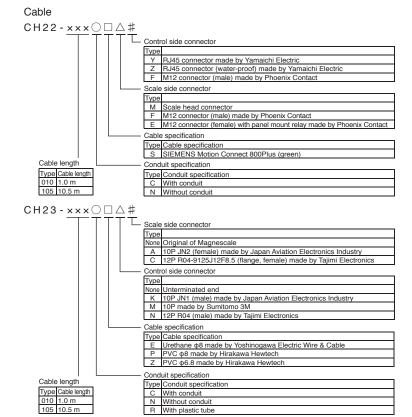


### Specifications

Model name	RS97-1024NGA	RS97-1024NGD	RS97-1024NGZ		
Output wave number		1,024 waves/revolution			
Through hole diameter		180 mm			
Accuracy(at 20°C)		±2.5 sec.			
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)			
Maximum response revolutions		5,000 min <sup>-1</sup>			
Functional Safety	Please consult with each	ch controller manufacturer regarding supp	ort for functional safety.		
Legal compliance	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN55011 Gp1 Class A, EN61000-6-2				
Operating temperature range		0 to +60°C			
Storage temperature range		-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 range	DC+4.75 t	to +5.25 V	DC+17 to +30.8 V		
Maximum power consumption	1.35W or le 1.3W or le	,	2.5W or less (17V) 3.2W or less (30.8V)		
Power consumption	260mA (5V) (when the	controller is connected)	120mA (24V) (when the controller is connected)		
Moment of inertia		8.8× 10 <sup>-3</sup> kg² or less			
Mass	Арр	orox. 3.4kg (rotor: 0.6kg/ stator: 2.8kg) or I	ess		
Compatible cables (types without relay connectors) Maximum cable length	CH23-***NPFA 30 m	CH23-***NPMA 30 m	CH22-***NSFY 30 m		
Compatible cables (types with relay connectors) Maximum cable length	CH23-***NPKA + CH23-***NPFA 30 m	CH23-***NPKA + CH23-***NPMA 30 m	CH22-***NSFF + CH22-***NSFY 30 m		

### Details of model designation





### Rotary enclosed type

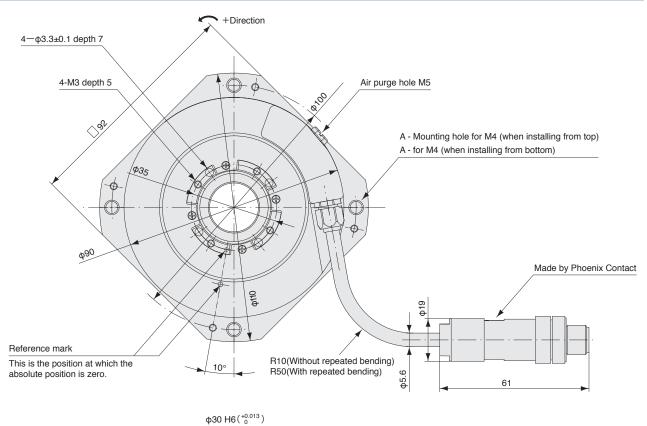
# RU97<sub>-2048</sub>

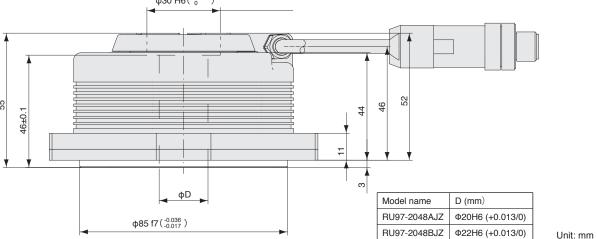
- Amp-less design enables direct communication using the SIEMENS AG DRIVE-CLIQ protocol
- Magnetic system enables use even in environments with condensation and oil and other adverse conditions
- Use of two heads provides resistance to axial runout
- Internal coupling increases degree of mounting freedom



SIEMENS

#### Dimensions

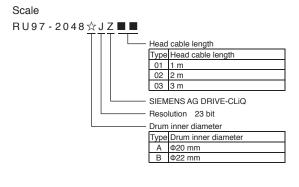


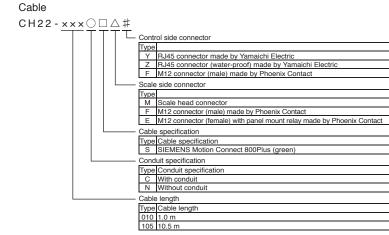


#### Specifications

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 sec.
Output signal	Compliant with DRIVE-CLiQ, single turn absolute type
Compatible controllers	SIEMENS AG
Resolution	25 bits (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	EN ISO13849-1:2008 Cat.3 EN 62061:2005 / IEC 61508:2010 / EN61800-5-2:2007
Legal compliance	FCC Part15 Subpart B Class A ICES-003 Class A Digital Device EN55011 Gp1 Class A, EN61000-6-2
Operating temperature range	0 to +60°C
Storage temperature range	-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 range	DC+17 to +30.8 V
Maximum power consumption	1.6 W or less (17 V or 30.8 V)
Power consumption	65 mA (24 V) (when the controller is connected)
Moment of inertia	9.4×10 <sup>-5</sup> kgm² or less
Starting torque (at 20°C)	0.08 Nm or less
Mass	Approx. 1.2kg 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





### Rotary enclosed type

# RU77<sub>-4096</sub>

- Magnetic system enables use even in environments with condensation and oil and other adverse conditions
- · Use of two heads provides resistance to axial runout
- Amp-less design enables direct communication using the protocol of each supporting manufacturer
- Internal coupling increases degree of mounting freedom

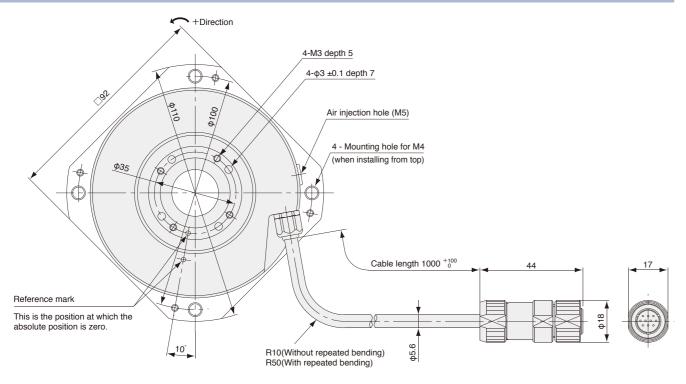
EVNITIO

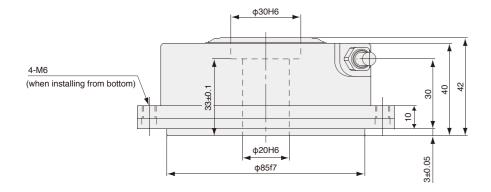
Mitsuhishi Electric

Yaskawa Electric



#### Dimensions





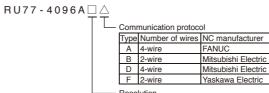
Unit: mm

$\overline{}$										
8	n	Δ	$\sim$	ы	$\sim$	а	ŤΙ	റ	n	
$\overline{}$	Ю.	ullet	<u> </u>		v	u		U	ш	$\sim$

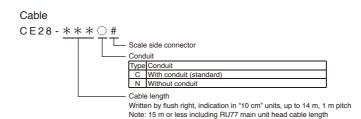
Model name	RU77-4096AXX
Output wave number	4,096 waves/revolution
Through hole diameter	ф20 mm
Accuracy(at 20°C)	±2.5 sec.
Output signal	Absolute serial bidirectional signal, compliant with EIA-485
Compatible controllers	FANUC Mitsubishi Electric Yaskawa Electric
Resolution	1/8, 192 (Max. 25 bits output)
Maximum response revolutions	2,000 min <sup>-1</sup>
Maximum mechanical revolutions	3,000 min <sup>-1</sup>
Functional safety	_
Legal compliance	FCC Part15 Subpart B Class A and ICES-003 Class A Digital Device and EN55011 Gp 1 Class A, EN 61000-6-2 Safety standards not applicable (60 V DC or less)
Operating temperature range	0 to +60°C
Storage temperature range	-10 to +60°C
Vibration resistance	150 m/s² (50 Hz to 2000 Hz)
Impact resistance	1,000 m/s <sup>2</sup> (11 ms)
Protective design grade	IP65
Power supply voltage range	DC4.75-5.25 V (with connecting terminal)
Power consumption	200mA (at 120Ω termination)
Moment of inertia	9.4×10 <sup>-5</sup> kgm² or less
Starting torque (at 20°C)	0.1 Nm or less
Mass	Approx. 1.2kg or less
Standard compatible cable	CE28-***J
Maximum cable length	15 m

### Details of model designation

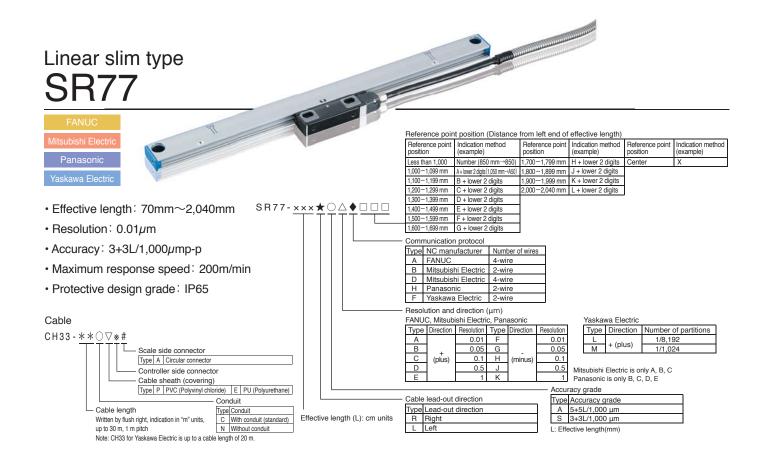
#### Scale

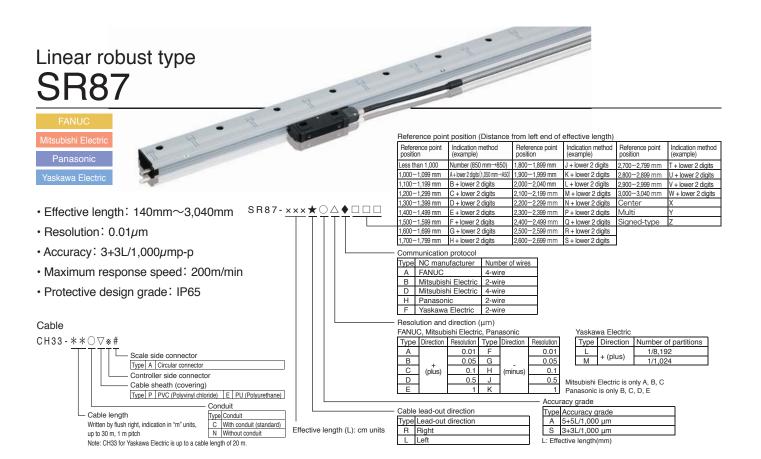


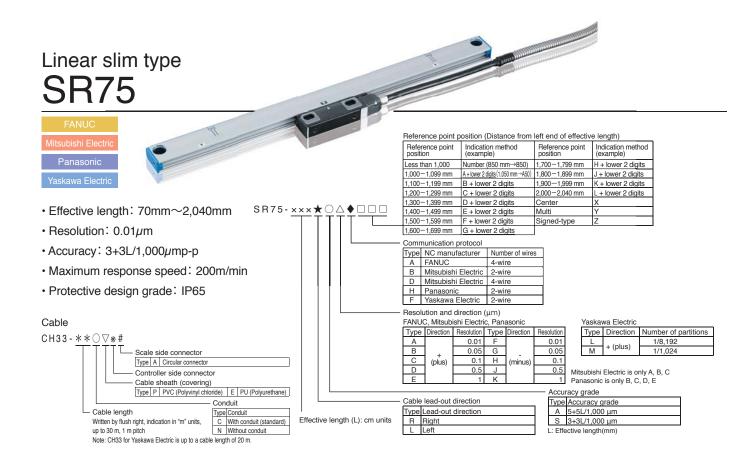
Тур	e Resolution	Number of pulses/revolution	Number of partitions	Туре	Resolution	Number of pulses/revolution	Number of partitions
Α	Approx. 2.5°/1,000	131,072	1/32	F	Approx. 1°/10,000	4,194,304	1/1,024
В	Approx. 1°/1,000	262,144	1/64	G	Approx. 4.5°/100,000	8,388,608	1/2,048
С	Approx. 7°/10,000	524,288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



### Other Models







RU74-4096A□■

# Rotary enclosed type RU74

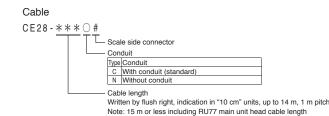
A/B/Reference point

Hollow diameter: φ110
Resolution: Approx.1/1,000°

• Accuracy: ±2.5 sec.

• Maximum response revolution: 300min-1

• Protective design grade: IP65



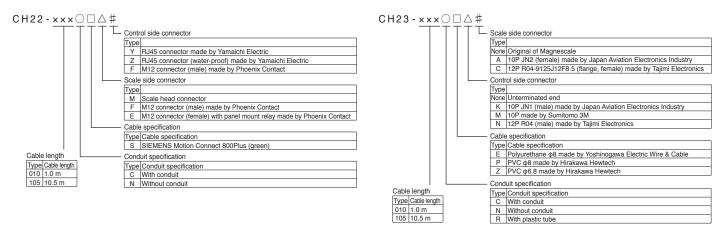
Minimum phase difference							
Tuno	Minimum phase	Response re	volutions (min.)	Tumo	Minimum phase	Response re	volutions (min.)
Type	difference	Approx.1°/1,000	Approx.1°/10,000	Type	difference	Approx.1°/1,000	Approx.1°/10,000
Α	50	2,000	267	Η	500	266	27
В	100	1,332	133	J	650	205	21
С	150	888	89	K	1,000	133	13
D	200	666	67	L	1,250	107	11
Ε	250	533	53	М	2,500	53	5
F	300	444	44	Ν	3,000	44	4
G	400	333	33				

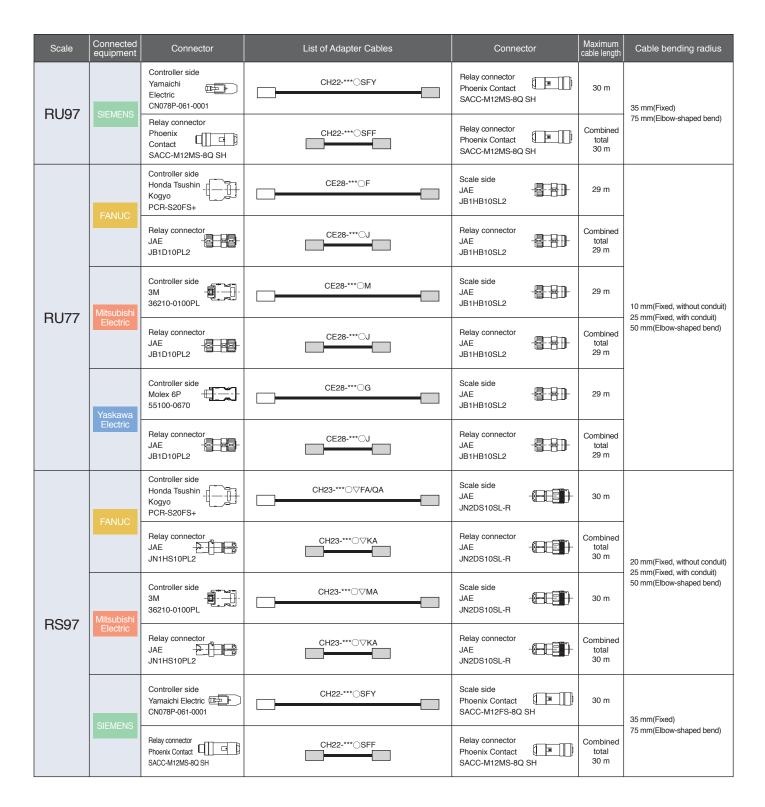
-	Resolution, rotation direction and polarity									
Type Resolution Rotation direction and polarity Number of pulses/revolution										
	Α	Approx. 1 °/1,000	CW/ +	360,448						
	В	Approx.1°/1,000	CCW/+	360,448						
	С	Approx.7°/10,000	CW/ +	3,600,384						
	D	Approx.3.5°/10,000	CCW/+	3,600,384						

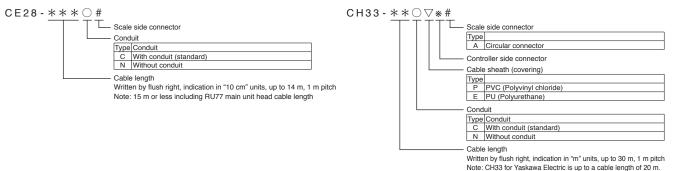
### List of Adapter Cables

Scale	Connected equipment	Connector	List of Adapter Cables	Connector	Maximum cable length	Cable bending radius
	General- purpose cable	Unterminated end	CH23-***○▽	Scale side Original of Magnescale	13 m	20 mm(Fixed, without conduit) 25 mm(Fixed, with conduit) 50 mm(Elbow-shaped bend)
		Controller side Honda Tsushin	CH23-***○▽F	Scale side Original of	13 m	
	FANUC	PCR-S20FS+	CH23-***○▽FA/QA CH23-***○▽K	Magnescale	Combined total 30 m	
		Relay connector JAE JN1HS10PL2	JAE JAE	Combined total 30 m	20 mm(Fixed, without conduit) 25 mm(Fixed, with conduit)	
SR27A		Controller side	CH23-***○▽M	Scale side Original of	13 m	50 mm(Elbow-shaped bend)
SR67A	Mitsubishi Electric	36210-0100PL	CH23-***○▽MA CH23-***○▽K	Magnescale	Combined total 30 m	
		Relay connector JAE JN1HS10PL2	CH23-***○▽KA	Relay connector JAE JN2DS10SL-R	Combined total 30 m	
		Controller side Yamaichi	CH22-***OSMY	Scale side Original of	30 m	
	SIEMENS	Electric CN078P-061-0001	CH22-***   CH22-***   SMF	Magnescale	Combined total 30 m	35 mm(Fixed) 75 mm(Elbow-shaped bend)
		Relay connector Phoenix Contact SACC-M12MS-8Q SH	CH22-***○SFF	Relay connector Phoenix Contact SACC-M12MS-8Q SH	Combined total 30 m	
	General- purpose cable	Unterminated end	CH33-**○▽	Scale side Original of Magnescale	30 m	20 mm(Fixed, without conduit) 25 mm(Fixed, with conduit) 50 mm(Elbow-shaped bend)
SR74 SR84	FANUC	Controller side Honda Tsushin Kogyo PCR-S20FS+	CH33-**○▽E/P	Scale side Original of Magnescale	30 m	20 mm(Fixed, without conduit) 25 mm(Fixed, with conduit)
	Mitsubishi Electric	Controller side 3M 36210-0100PL	CH33-**○▽M	Scale side Original of Magnescale	30 m	50 mm(Elbow-shaped bend)

#### Cables





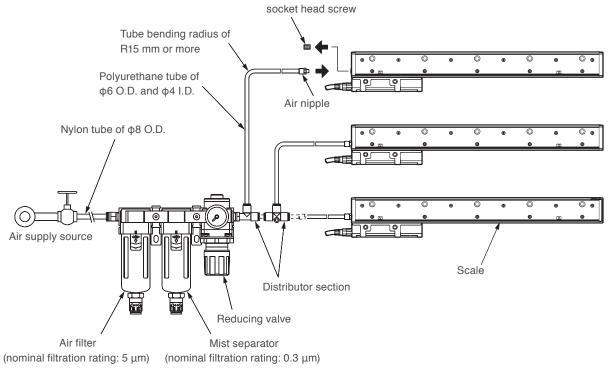


29

### Technology

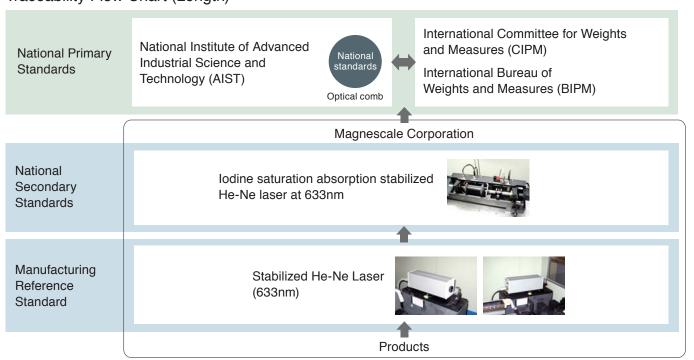
### Air purging

If Magnescale is used in a dusty or misty environment, it is recommended that air is introduced into the scale to alleviate any unwanted effects. Attach air nipples to M5 holes for air introduction that are provided at both ends of the scale to supply air into the scale. When introducing air into the scale, 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 scale is 10-20N ℓ/min.



### Traceability

Traceability Flow Chart (Length)



### Safety

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.





Our products comply with CE Marking requirements, have acquired UL certifications and meet other regulations, ensuring safe use the world over.

- EMC Directives(CE) EMI: EN 55011 Group 1 Class A / 91 EMS: EN 61000-6-2
- FCC regulation FCC Part 15 Subpart B Class A

for Products with built-in AC power supply:

• UL61010-1 • EN61010-1

for Products with Laser:

• DHHS (21CFR1040.10) • IEC60825-1

\* When using our devices with machines to which the European Machinery Drirective applies

### **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 scales that have acquired third-party functional safety certification in order to meet global demands for safety.



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

please make sure that the devices when installed on the machines fulfil the applicable requirements of the Directive \* Standards or regulations to be complied with may vary by product.