Magnescale

SPEED X PRECISION


Magnescale Co., Ltd.

| | | | | |
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Magnescale

SPEED X PRECISION







# Feedback Scale

Magnescale Co., Ltd.

# Blessing of the Earth

Absolute **Magnescale**

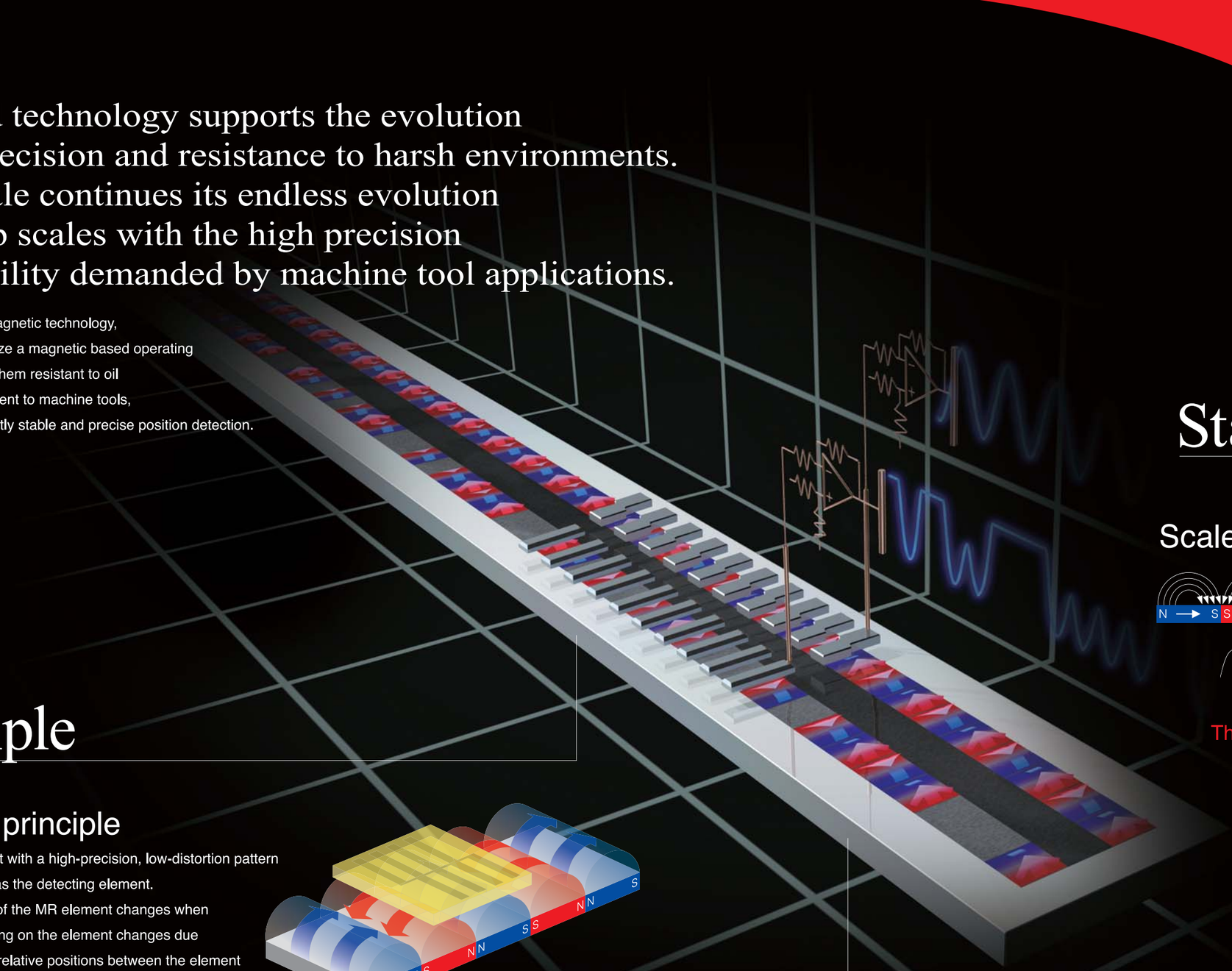


A compass using geomagnetism will guide you across the sea even during conditions of zero visibility in dense fog or in a storm with giant waves. Similarly, Magnescale uses magnetic technology to provide precise positioning even in severely harsh environments such as oil, coolant, and condensation in machine tools. Magnescale is jam-packed with state-of-the-art technologies, from precise magnetic recording and detection technology to advanced arithmetic processing technology and beyond. And, it's these cutting-edge technologies that are supporting the next generation of global manufacturing.

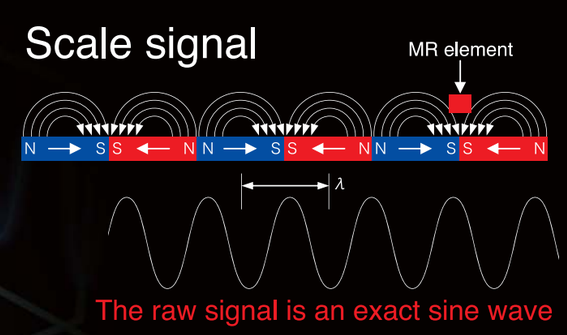
Beyond to Next Stage

# 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.

Born from advanced magnetic technology,
Magnescale scales utilize a magnetic based operating
principle which makes them resistant to oil
and condensation inherent to machine tools,
thus enabling consistently stable and precise position detection.



## Stability



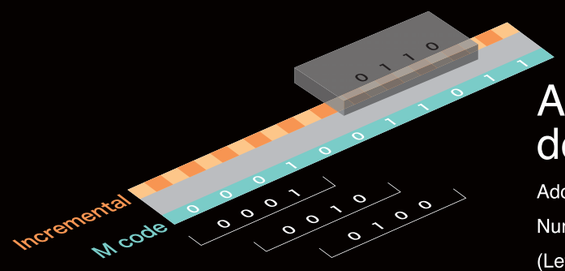

The raw signal is an exact sine wave

# 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.



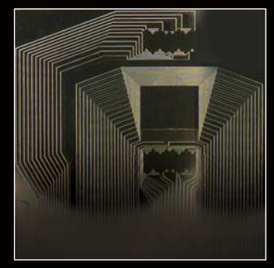




## Absolute position detection system

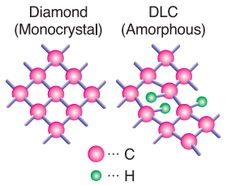
Adopts the 2-track M-code system.
Number of M-code bits: Up to 18 bits
(Left figure: Example of 4-bit codes)

## 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.



# Resistance to Harsh Environments



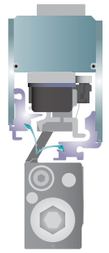



## Protective structure

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).

## Impact resistance of 450 m/s², vibration resistance of 250 m/s²

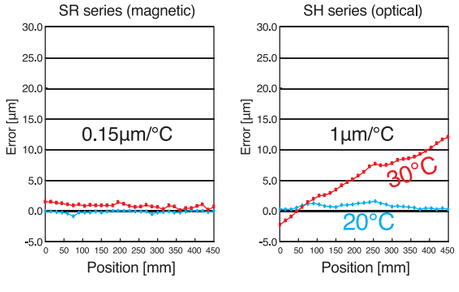
Magnescale primarily uses ferrous materials to protect the detector, thereby realizing high vibration and impact resistance characteristics. Furthermore, the SR67A series employs multi-point connection construction and a highly rigid case to achieve top class vibration and impact resistance.






## Thermal expansion

Magnescales' have the same linear expansion coefficient as that of cast iron used for the structure of general machine tools. Therefore, the scales exhibit the same thermal behavior as the equipment in which they are installed. This is evident in maintaining extremely stable positioning even in environments where the temperature is constantly changing. Due to the design structure of the SR series scales, they can be installed in close contact with the equipment while still achieving high positioning accuracy despite large temperature fluctuations.




## 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.

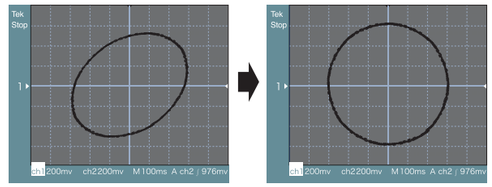


# High Precision

## Advanced arithmetic processing technology

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

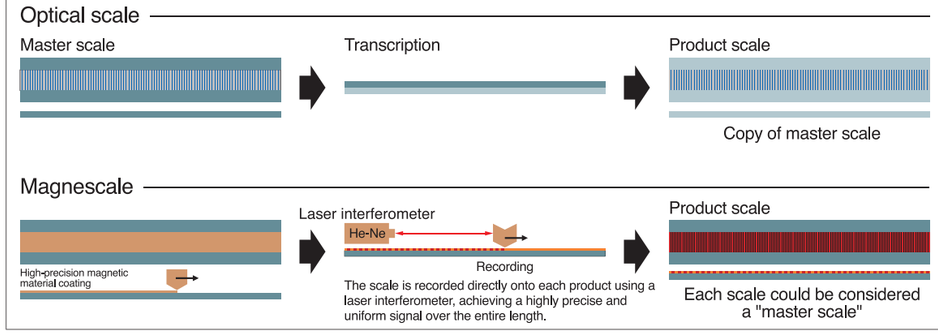
Example of multi-arithmetic processing circuit.




# High resolution

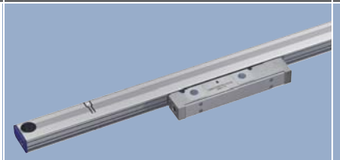
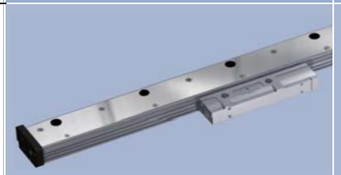
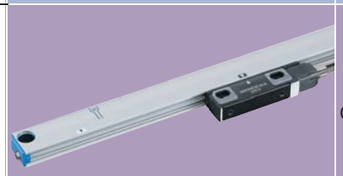
High performance processing allows for resolutions down to 5nm and 1nm.*

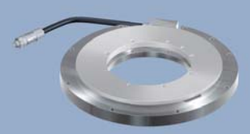
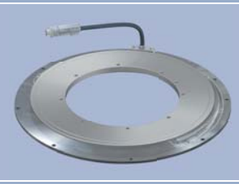
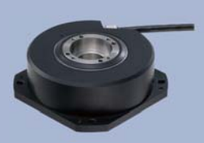
## Scale recording method




*For resolution of 1nm(0.001µm), please contact our sales department.

# 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) | Slim type **SR27A** |  | Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ | FANUC<br>Mitsubishi Electric<br>SIEMENS | 70 to 2,040 mm | 0.005µm (0.001µm is available*) | (3+3L/1,000) µmp-p or (5+5L/1,000) µmp-p L:Effective length(mm) | 200m/min | IP54 (Air purge not included) IP65 (Air purge included) | P10・11 |
| | | Robust type **SR67A** |  | Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ | FANUC<br>Mitsubishi Electric<br>SIEMENS | 140 to 3,640 mm | 0.005µm (0.001µm is available*) | (3+3L/1,000) µmp-p or (5+5L/1,000) µmp-p L:Effective length(mm) | 200m/min | IP54 (Air purge not included) IP65 (Air purge included) | P12・13 |
| | INC (Incremental) | Slim type **SR74** |  | 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 L:Effective length(mm) | 50m/min (Resolution: 0.1 µm, Minimum phase difference: at 50 ns) | IP54 (Air purge not included) IP65 (Air purge included) | P14・15 |
| | | 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 L:Effective length(mm) | 50m/min (Resolution: 0.1 µm, Minimum phase difference: at 50 ns) | IP54 (Air purge not included) IP65 (Air purge included) | P16・17 |

| | 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 type **RS97-1024E** |  | Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ | FANUC<br>Mitsubishi Electric<br>SIEMENS | φ96mm | 23 bit (8,388,608 pulse/ revolution) | ±2.5" | 5,000min$^{-1}$ | IP65 | P18・19 |
| | | Exposed type **RS97-1024N** |  | Absolute serial bidirectional signal Compliant with EIA-485 / DRIVE-CLiQ | FANUC<br>Mitsubishi Electric<br>SIEMENS | φ180mm | 23 bit (8,388,608 pulse/ revolution) | ±2.5" | 5,000min$^{-1}$ | IP65 | P20・21 |
| | | Enclosed type **RU97-2048** |  | Compliant with DRIVE-CLiQ | SIEMENS | A：φ20mm B：φ22mm | 25 bit (33,554,432 pulse/ revolution) | ±2.5" | 2,000min$^{-1}$ (Maximum mechanical revolutions: 3,000min$^{-1}$) | IP65 | P22・23 |
| | | Enclosed type **RU77-4096** |  | Absolute serial bidirectional signal Compliant with EIA-485 | FANUC<br>Mitsubishi Electric<br>Yaskawa Electric | φ20mm | 25 bit (33,554,432 pulse/ revolution) | ±2.5" | 2,000min$^{-1}$ (Maximum mechanical revolutions: 3,000min$^{-1}$) | IP65 | P24・25 |

*For resolution of 1nm(0.001µm), please contact our sales department. *Magnescale reserves the right to change product specifications without prior notice.

Absolute linear encoder

# Slim type

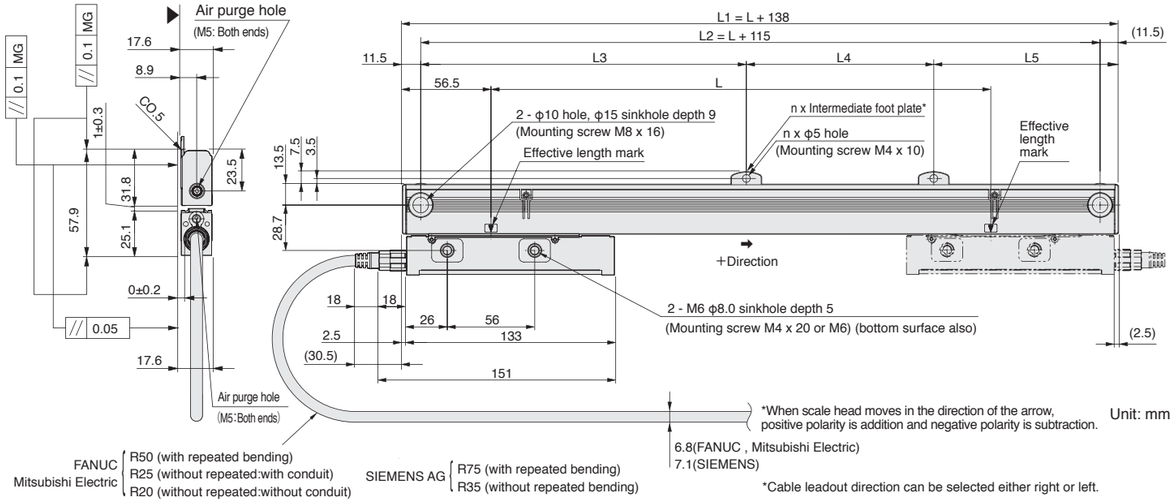
# SR27A

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



FANUC | Mitsubishi Electric | SIEMENS

## Dimensions




| Effective length | Total 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 | Total 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 |

Unit: mm

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.
- 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).



## Specifications

| Model name | SR27A - ×××○□AX | SR27A - ×××○□BX<br>SR27A - ×××○□DX | SR27A - ×××○AZY |
|---|---|---|---|
| Effective length (L: mm) | 70 - 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 (Set at factory shipping) | 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/αi interface compatible | Mitsubishi Electric | SIEMENS AG |
| Resolution | Selectable from 0.001*, 0.005, 0.01, 0.05, 0.1, 0.5 and 1 μm (Factory set) | Selectable from 0.001*, 0.005, 0.01, 0.05 and 0.1 μm (Factory set) | Selectable from 0.001*, 0.005 and 0.01μm (Factory set) |
| Maximum response speed | 200 m/min | | |
| Functional safety | Please consult with each controller manufacturer regarding support for functional safety. | | EN ISO13849-1:2008 Cat.3<br>EN 62061:2005 / IEC 61508:2010<br>EN61800-5-2:2007 |
| Legal compliance | FCC Part15 Subpart B Class A<br>ICES-003 Class A Digital Device<br>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/s² (50 Hz to 3,000 Hz) | | |
| 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 | | DC+17 to +30.8 V |
| Maximum power consumption | 1.3W or less (4.75V or 5.25V) | | 1.75W or less (17V)<br>1.9W or less (30.8V) |
| Consumption current | 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<br>13 m | CH23-***NVM<br>13 m | CH22-***NSMY<br>30 m |
| Compatible cables (types with relay connectors) Maximum cable length | CH23-***NVK + CH23-***NPFA<br>30 m | CH23-***NVK + CH23-***NPMA<br>30 m | CH22-***NSMF + CH22-*** NSFY<br>30 m |

*For resolution of 1nm(0.001μm), please contact our sales department. *Magnescale reserves the right to change product specifications without prior notice.

## Details of model designation

Scale

SR27A - ××× ○ □ △ #

[×××]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 |
|---|---|---|---|---|---|
| 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 |

SIEMENS AG: S, A
Mitsubishi Electric: S, A, B, C
FANUC: S, A, B, C, D, E, T, F, G, H, I, J, K

[△]Communication protocol

| Type | NC manufacturer | Remarks |
|---|---|---|
| A | FANUC | α/αi interface |
| B | Mitsubishi Electric | 2-wire |
| D | Mitsubishi Electric | 4-wire |
| Z | SIEMENS AG | DRIVE-CLiQ |

SIEMENS AG: Y only
Mitsubishi Electric, FANUC: X only
* Please consult our representative separately for arbitrary positions.

[#]Reference point position

| Type | Reference point position |
|---|---|
| X | Center |
| Y | Fixed to 10mm from left end of effective length |

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 | 1.5m |
| 070 | 7m |
| 260 | 26m |

[○]Conduit specification

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

[▽]Cable seath (covering)

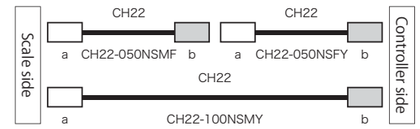
| Type | Cable specification |
|---|---|
| S | PU (Polyurethane, Siemens Motion connect 800+) |

[※]Scale side connector

| Type | Specification | Remarks |
|---|---|---|
| M | Scale head connector | Standard |
| F | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing |
| E | M12 connector (Female) with panel mount relay made by Phoenix Contact | Relay/ Waterproofing/ Attatched connector |

[#]Controller side connector

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




CH22-050NSMF
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
Original of Magnescale
Controller side connector
M12 (male) made by Phoenix Contact

CH22-100NSMY
example)
Cable length 10m
Without conduit
PU sheath
Scale side connector
Original of Magnescale
Controller side connector
RJ45 by YAMAICHI ELECTRONICS

CH22-050NSFY
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
M12 (Female)
Controller side connector
RJ45 made by YAMAICHI ELECTRONICS

CH23 - □□□○▽※#

[□□□]
Cable length
(Example)

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

[○]Conduit specification

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

[▽]Cable sheath

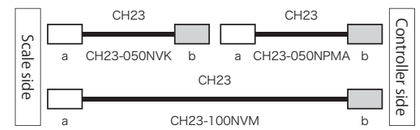
| Type | Cable specification |
|---|---|
| V | PVC(Φ6.8)[Scale side] |
| P | PVC(Φ8)[Controller side] |
| E | PU(Φ8)[Controller side] |

[※]Controller side connector

| Type | | Specification | Remarks | |
|---|---|---|---|---|
| Without | With | | | |
| | | Earth wire | | |
| Z | - | Open-end | Scale side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 2P made by TAJIMI ELECTRONICS | |
| None | - | | Standard | |
| M | - | 10P made by Sumitomo 3M | | Mitsubishi NC, J3 (INC serial, ABS) |
| F | Q | 20P straight case made by Honda Tsushin Kogyo | | FANUC (INC serial, ABS) |
| J | S | Horizontal drawing case made by HIROSE Electric | | FANUC (INC serial, ABS) |
| K | - | 10P JN1 (Male) made by Japan Aviation Electronics Industry | | Relay |
| N | - | 12P R04 (Male) made by TAJIMI ELECTRONICS | | Relay (fixed) |

[#]Scale side connector

| 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) |




CH23-050NVK
example)
Cable length 5m
Without conduit
PVC sheath
Scale side connector
Original of Magnescale
Controller side connector
10P JN1 (male) made by Japan Aviation Electronics Industry

CH23-100NVM
example)
Cable length 10m
Without conduit
PVC sheath
Scale side connector
Original of Magnescale
Controller side connector
10P made by Sumitomo 3M

CH23-050NPMA
example)
Cable length 5m
Without conduit
PVC sheath
Scale side connector
10P JN2 (Female) made by Japan Aviation Electronics Industry
Controller side connector
10P made by Sumitomo 3M

Absolute linear encoder

# Robust type

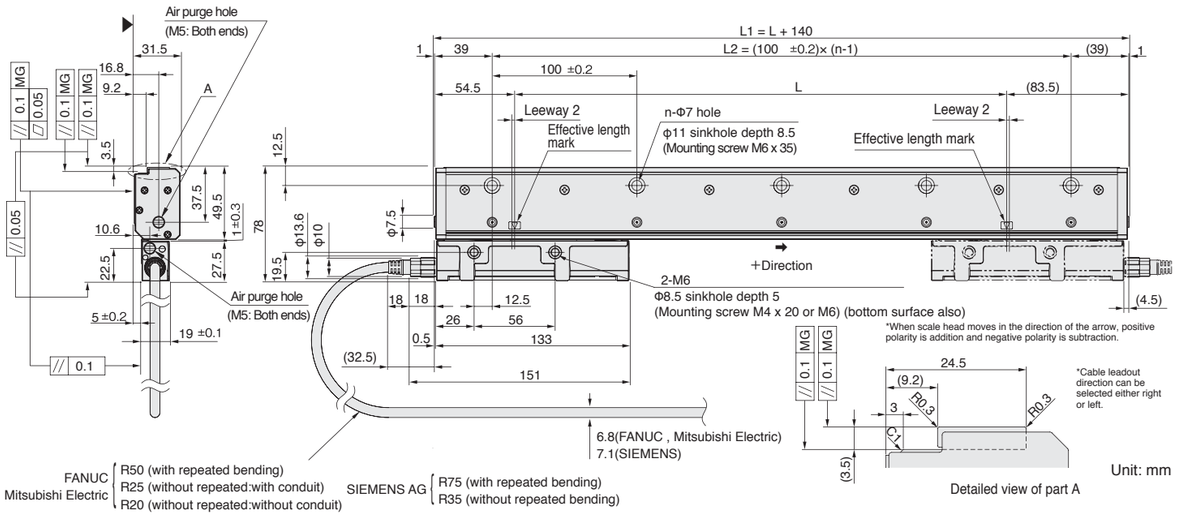
# SR67A



- High rigidity provides resistance to shock and vibration
- Magnetic system allows use even in environments with condensation, oil, and other adverse conditions
- Enables direct communication using the protocol of each supporting manufacturer without the requirement of an amplifier
- Same thermal expansion as iron

FANUC | Mitsubishi Electric | SIEMENS

## Dimensions




Unit: mm

FANUC / Mitsubishi Electric: R50 (with repeated bending), R25 (without repeated:with conduit), R20 (without repeated:without conduit)

SIEMENS AG: R75 (with repeated bending), R35 (without repeated bending)

| Effective length L | Total length 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 L | Total length 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

MG: Machine guide

Notes
- The surface indicated by the ▲ marks is the installation surface.
- 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).



## Specifications

| Model name | SR67A - ×××○□AX | SR67A - ×××○□BX<br>SR67A - ×××○□DX | SR67A - ×××○AZY |
|---|---|---|---|
| Effective length (L: mm) | 140 - 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 (Set at factory shipping) | 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/αi interface compatible | Mitsubishi Electric | SIEMENS AG |
| Resolution | Selectable from 0.001*, 0.005, 0.01, 0.05, 0.1, 0.5 and 1 μm (Factory set) | Selectable from 0.001*, 0.005, 0.01, 0.05 and 0.1 μm (Factory set) | Selectable from 0.001*, 0.005 and 0.01μm (Factory set) |
| Maximum response speed | 200 m/min | | |
| Functional safety | Please consult with each controller manufacturer regarding support for functional safety. | | EN ISO13849-1:2008 Cat.3<br>EN 62061:2005 / IEC 61508:2010<br>EN61800-5-2:2007 |
| Legal compliance | FCC Part15 Subpart B Class A<br>ICES-003 Class A Digital Device<br>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/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 | | DC+17 to +30.8 V |
| Maximum consumption current | 1.3W or less (4.75V or 5.25V) | | 1.75W or less (17V)<br>1.9W or less (30.8V) |
| Consumption current | 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<br>13 m | CH23-***NVM<br>13 m | CH22-***NSMY<br>30 m |
| Compatible cables (types with relay connectors) Maximum cable length | CH23-***NVK + CH23-***NPFA<br>30 m | CH23-***NVK + CH23-***NPMA<br>30 m | CH22-***NSMF + CH22-*** NSFY<br>30 m |

*For resolution of 1nm(0.001μm), please contact our sales department. *Magnescale reserves the right to change product specifications without prior notice.

## Details of model designation

### Scale

SR67A - ××× ○ □ △ #

[×××]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 |
|---|---|---|---|---|---|
| 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 |

SIEMENS AG: S, A
Mitsubishi Electric: S, A, B, C
FANUC: S, A, B, C, D, E, T, F, G, H, I, J, K

[△]Communication protocol

| Type | NC manufacture | Remarks |
|---|---|---|
| A | FANUC | α/αi interface |
| B | Mitsubishi Electric | 2-wire |
| D | Mitsubishi Electric | 4-wire |
| Z | SIEMENS AG | DRIVE-CLiQ |

SIEMENS AG: Y only
Mitsubishi Electric, FANUC: X only
* Please consult our representative separately for arbitrary positions.

[#]Reference point position

| Type | Reference point position |
|---|---|
| X | Center |
| Y | Fixed to 10mm from left end of effective length |

### 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 | 1.5m |
| 070 | 7m |
| 260 | 26m |

[○]Conduit specification

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

[▽]Cable seath (covering)

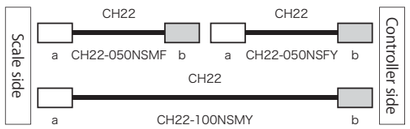
| Type | Cable specification |
|---|---|
| S | PU (Polyurethane, Siemens Motion connect 800+) |

[※]Scale side connector

| Type | Specification | Remarks |
|---|---|---|
| M | Scale head connector | Standard |
| F | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing |
| E | M12 connector (Female) with panel mount relay made by Phoenix Contact | Relay/ Waterproofing/ Attatched connector |

[#]Controller side connector

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




CH22-050NSMF
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
Original of Magnescale
Controller side connector
M12 (male) made by Phoenix Contact

CH22-100NSMY
example)
Cable length 10m
Without conduit
PU sheath
Scale side connector
Original of Magnescale
Controller side connector
RJ45 made by YAMAICHI ELECTRONICS

CH22-050NSFY
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
M12 (Female)
Controller side connector
RJ45 made by YAMAICHI ELECTRONICS

CH23 - □□□○▽※#

[□□□]
Cable length
(Example)

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

[○]Conduit specification

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

[▽]Cable sheath

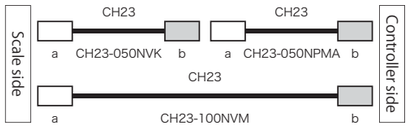
| Type | Cable specification |
|---|---|
| V | PVC(Φ6.8) [Scale side] |
| P | PVC(Φ8) [Controller side] |
| E | PU(Φ8) [Controller side] |

[※]Controller side connector

| Type | | Specification | Remarks | |
|---|---|---|---|---|
| Without | With | Earth wire | | |
| Z | - | Open-end | Scale side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 2P made by TAJIMI ELECTRONICS | |
| None | - | Open-end | Standard | |
| M | - | 10P made by Sumitomo 3M | | Mitsubishi NC, J3 (INC serial, ABS) |
| F | Q | 20P straight case made by Honda Tsushin Kogyo | | FANUC (INC serial, ABS) |
| J | S | Horizontal drawing case made by HIROSE Electric | | FANUC (INC serial, ABS) |
| K | - | 10P JN1 (Male) made by Japan Aviation Electronics Industry | | Relay |
| N | - | 12P R04 (Male) made by TAJIMI ELECTRONICS | | Relay (fixed) |

[#]Scale side connector

| 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) |




CH23-050NVK
example)
Cable length 5m
Without conduit
PVC sheath
Scale side connector
Original of Magnescale
Controller side connector 10P JN1 (male) made by Japan Aviation Electronics Industry

CH23-100NVM
example)
Cable length 10m
Without conduit
PVC sheath
Scale side connector
Original of Magnescale
Controller side connector 10P made by Sumitomo 3M

CH23-050NPMA
example)
Cable length 5m
Without conduit
PVC sheath
Scale side connector
10P JN2 (Female) made by Japan Aviation Electronics Industry
Controller side connector 10P made by Sumitomo 3M

Incremental linear encoder

# Slim type

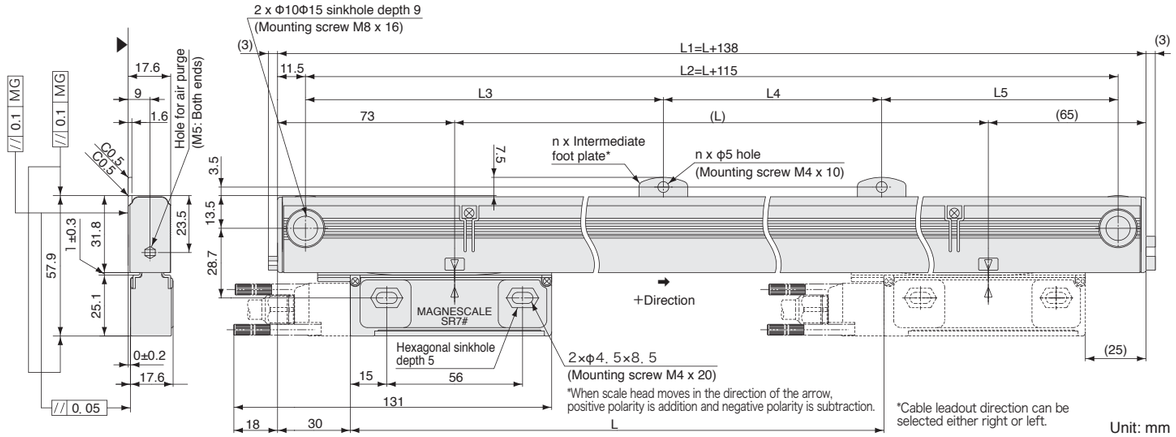
# SR74

- 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 point

## Dimensions (cable left-lead out direction)




Unit: mm

| Effective length | Total 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 |
| 720 | 858 | 835 | 417.5 | – | 417.5 | 1 |

| Effective length | Total 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 ≧ 720 mm, two locations when L ≧ 1440 mm

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).



## Specifications

| Model name | SR74 |
|---|---|
| Effective length (L: mm) | 70-2,040 |
| 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<br>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 µm (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<br>ICES-003 Class A Digital Device<br>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/$s^2$ (50 Hz to 3,000Hz) |
| Impact resistance | 350 m/$s^2$ (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 |
| Maximum consumption current | 1.0W or less (4.75V or 5.25V) |
| Consumption current | 200mA (5V) (when the controller is connected) |
| Mass | Approx. 0.27kg+ 1.36kg/m or less |
| Standard compatible cable | CH33-***CP/CE |
| Maximum cable length | 15 m |

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

## Details of model designation

Scale

SR74 - ××× ★ ○ □ ◆ ### 

[×××]Effective length (L): cm units

[★]Cable lead-out direction

| Type | Lead-out direction |
|---|---|
| R | Right |
| L | Left |

[○]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 | | 1.0 | K | | 1 |

[◆]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 | | |

[###]Reference point position
(Distance from left end of effective length:Unit mm)

| Reference point position | Indication method |
|---|---|
| Less than 1,000 | Number (850 mm → 850) |
| 1,000−1,099 mm | A + lower 2 digits(1,050 mm → A50) |
| 1,100−1,199 mm | B + lower 2 digits |
| 1,200−1,299 mm | C + lower 2 digits |
| 1,300−1,399 mm | D + lower 2 digits |
| 1,400−1,499 mm | E+ lower 2 digits |
| 1,500−1,599 mm | F + lower 2 digits |
| 1,600−1,699 mm | G+ lower 2 digits |
| 1,700−1,799 mm | H + lower 2 digits |
| 1,800−1,899 mm | J + lower 2 digits |
| 1,900−1,999 mm | K + lower 2 digits |
| 2,000−2,040 mm | L+ lower 2 digits |
| Center | X |
| Multi | Y |
| Signed-type | Z |

Cable

CH33 - □□ ○ ▽ ※ #

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

| Type | Cable length |
|---|---|
| 07 | 7m |
| 26 | 26m |

[○]Conduit

| Type | Conduit |
|---|---|
| C | With conduit (standard) |
| N | Without conduit |

[▽]Cable seath (covering)

| Type | |
|---|---|
| P | PVC (Polyvinyl chloride) |
| E | PU (Polyurethane) |

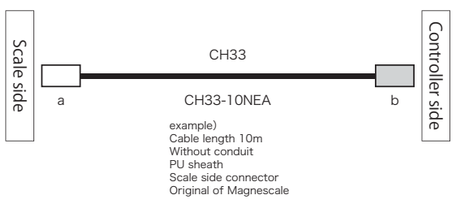
[※]Controller side connector

| Type | | Specification | Remarks |
|---|---|---|---|
| Without | With | Earth wire | |
| None | - | Open-end | Standard |
| A | - | D-sub 15P | |
| D | - | D-sub 9P | |
| L | - | 10P made by Sumitomo 3M | Mitsubishi NC, J3 (A/B/Reference) |
| E | P | 20P straight case made by Honda Tsushin Kogyo | FANUC (A/B/Reference) |
| G | - | 6P made by molex® | YASKAWA Electric, Panasonic (INC serial, ABS) |
| H | R | Horizontal drawing case made by HIROSE Electric | FANUC (A/B/Reference) |

[#]Scale side connector

| Type | Specification | Remarks |
|---|---|---|
| None | Original of Magnescale | Standard |

*Relay type cannot be used for A/B/Reference type of SR74 and SR84




example)
Cable length 10m
Without conduit
PU sheath
Scale side connector
Original of Magnescale

Incremental linear encoder

# Robust type

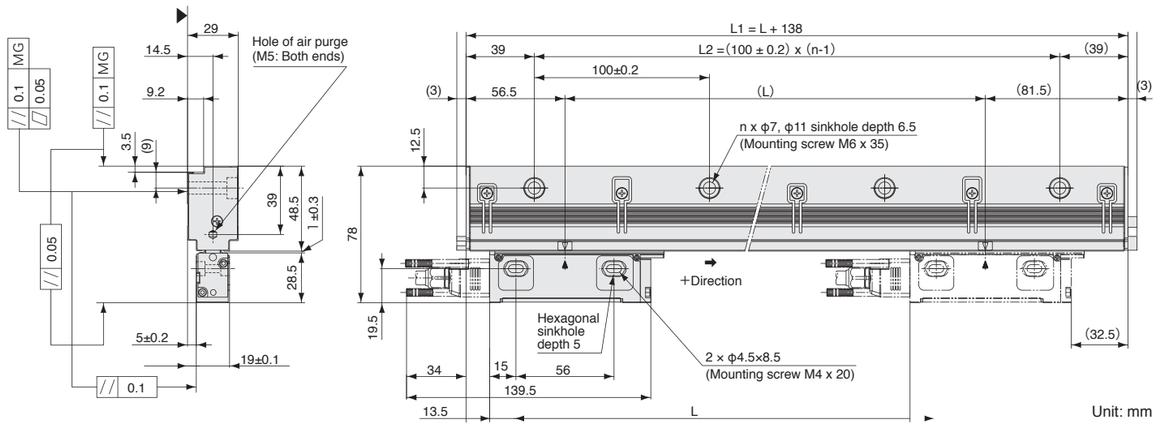
# SR84

- 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-lead out direction)




Unit: mm

*When scale head moves in the direction of the arrow, positive polarity is addition and negative polarity is subtraction. *Cable leadout direction can be selected either right or left.

| Effective length | Total length | L2 | n |
|---|---|---|---|
| L | L1 | | |
| 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 | L2 | n |
|---|---|---|---|
| L | L1 | | |
| 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 |

MG: Machine guide

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).



## Specifications

| | |
|---|---|
| Model name | SR84 |
| Effective length (L: mm) | 140-3,040 |
| 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<br>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 µm (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<br>ICES-003 Class A Digital Device<br>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 $m/s^2$ (50 Hz to 2,000Hz) |
| Impact resistance | 450 $m/s^2$ (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 |
| Maximum consumption current | 1.0W or less (4.75V or 5.25V) |
| Consumption current | 200mA (5V) (when the controller is connected) |
| Mass | Approx. 1.24kg+ 4kg/m or less |
| Standard compatible cable | CH33-***CP/CE |
| Maximum cable length | 15 m |

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

## Details of model designation

Scale

SR84 - ×××★○□◆###

[×××]Effective length (L): cm units

[★]Cable lead-out direction

| Type | Lead-out direction |
|---|---|
| R | Right |
| L | Left |

[○]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 | | 1.0 | K | | 1 |

[◆]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 | | |

[###]Reference point position
(Distance from left end of effective length:Unit mm)

| Reference point position | Indication method |
|---|---|
| Less than 1,000 | Number (850 mm → 850) |
| 1,000−1,099 mm | A + lower 2 digits(1,050 mm→A50) |
| 1,100−1,199 mm | B + lower 2 digits |
| 1,200−1,299 mm | C + lower 2 digits |
| 1,300−1,399 mm | D + lower 2 digits |
| 1,400−1,499 mm | E + lower 2 digits |
| 1,500−1,599 mm | F + lower 2 digits |
| 1,600−1,699 mm | G + lower 2 digits |
| 1,700−1,799 mm | H + lower 2 digits |
| 1,800−1,899 mm | J + lower 2 digits |
| 1,900−1,999 mm | K + lower 2 digits |
| 2,000−2,099 mm | L + lower 2 digits |
| 2,100−2,199 mm | M + lower 2 digits |
| 2,200−2,299 mm | N + lower 2 digits |
| 2,300−2,399 mm | P + lower 2 digits |
| 2,400−2,499 mm | Q + lower 2 digits |
| 2,500−2,599 mm | R + lower 2 digits |
| 2,600−2,699 mm | S + lower 2 digits |
| 2,700−2,799 mm | T + lower 2 digits |
| 2,800−2,899 mm | U + lower 2 digits |
| 2,900−2,999 mm | V + lower 2 digits |
| 3,000−3,040 mm | W + lower 2 digits |
| Center | X |
| Multi | Y |
| Signed-type | Z |

Cable

CH33 - □□○▽※#

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

| Type | Cable length |
|---|---|
| 07 | 7m |
| 26 | 26m |

[○]Conduit

| Type | Conduit |
|---|---|
| C | With conduit (standard) |
| N | Without conduit |

[▽]Cable seath (covering)

| Type | |
|---|---|
| P | PVC (Polyvinyl chloride) |
| E | PU (Polyurethane) |

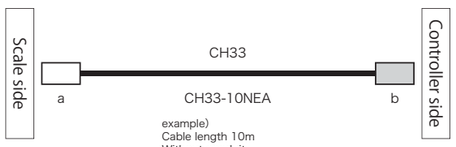
[※]Controller side connector

| Type | | Specification | Remarks |
|---|---|---|---|
| Without | With | Earth wire | |
| None | - | Open-end | Standard |
| A | - | D-sub 15P | |
| D | - | D-sub 9P | |
| L | - | 10P made by Sumitomo 3M | Mitsubishi NC, J3 (A/B/Reference) |
| E | P | 20P straight case made by Honda Tsushin Kogyo | FANUC (A/B/Reference) |
| G | - | 6P made by molex® | YASKAWA Electric, Panasonic (INC serial, ABS) |
| H | R | Horizontal drawing case made by HIROSE Electric | FANUC (A/B/Reference) |

[#]Scale side connector

| Type | Specification | Remarks |
|---|---|---|
| None | Original of Magnescale | Standard |

*Relay type cannot be used for A/B/Reference type of SR74 and SR84




example)
Cable length 10m
Without conduit
PU sheath
Scale side connector
Original of Magnescale

Absolute angle encoder

# Exposed type

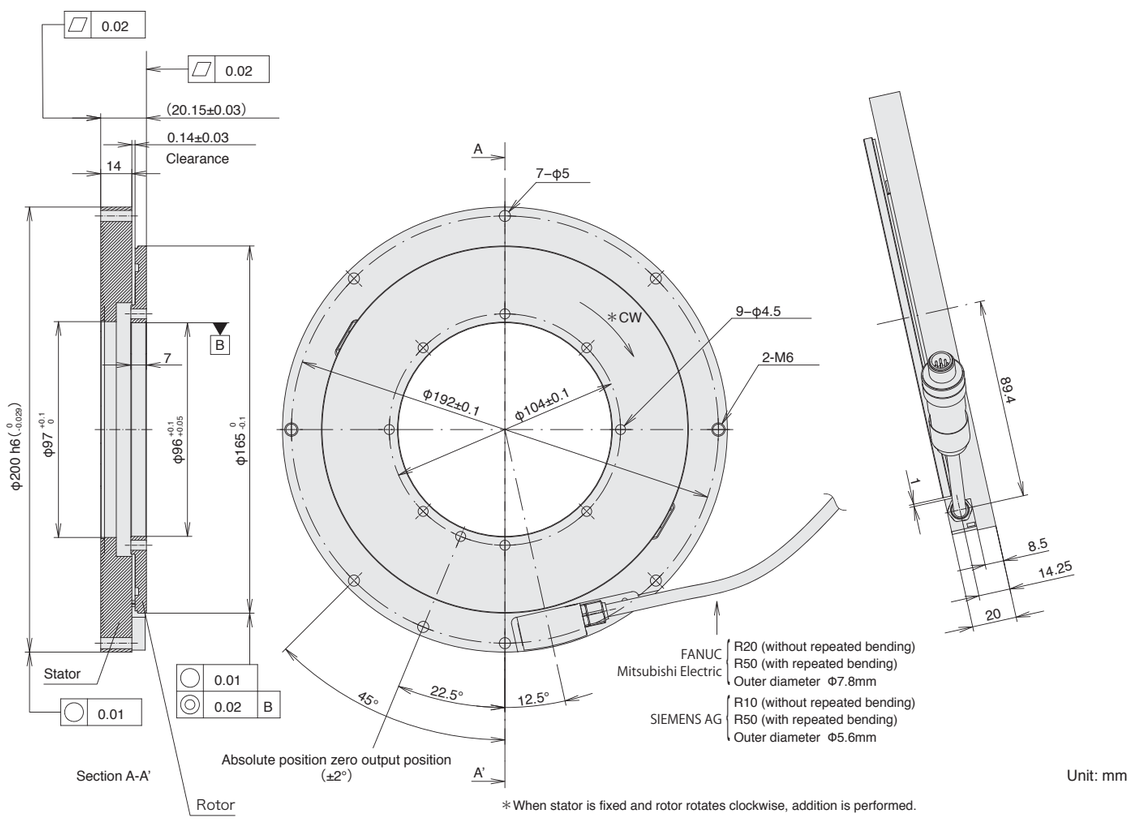
# RS97-1024E



- Enables direct communication using the protocol of each supporting manufacturer without the requirement of an amplifier
- Magnetic system allows use even in environments with condensation, oil, and other adverse conditions
- 96mm diameter through-hole allows for design and mounting flexibility
- Dual head configuration reduces the effect of axial runout

FANUC | Mitsubishi Electric | SIEMENS

## Dimensions




Unit: mm

∗When stator is fixed and rotor rotates clockwise, addition is performed.

## Specifications

| Model name | RS97-1024EGA | RS97-1024EGD | RS97-1024EGZ |
|---|---|---|---|
| Output wave number | 1,024 waves/revolution | | |
| Through hole diameter | φ96 mm | | |
| Accuracy(at 20°C) | ±2.5" | | |
| Output signal | Absolute serial bidirectional signal, 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 $min^{-1}$ | | |
| Functional safety | Please consult with each controller manufacturer regarding support for functional safety. | | EN ISO13849-1:2008 Cat.3<br>EN 62061:2005 / IEC 61508:2010<br>EN61800-5-2:2007 |
| Legal compliance | FCC Part15 Subpart B Class A<br>ICES-003 Class A Digital Device<br>EN55011 Gp1 Class A, EN61000-6-2 | | |
| Operating temperature range | 0 to +60°C | | |
| Storage temperature range | -10 to +60°C | | |
| Vibration resistance | 150 $m/s^2$ (50 Hz to 2,000 Hz) | | |
| Impact resistance | 1,000 $m/s^2$ (11 ms) | | |
| Protective design grade | IP65 | | |
| Power supply voltage range | DC+4.75 to +5.25 V | | DC+17 to +30.8 V |
| Maximum consumption current | 1.25W or less (4.75V)<br>1.2W or less (5.25V) | | 2.3W or less (17V)<br>3.1W or less (30.8V) |
| Consumption current | 240mA (5V) (when the controller is connected) | | 120mA (24V) (when the controller is connected) |
| Output connector | JN1HS10PL4S made by Japan Aviation Elecronics Industry | | SACC-M12MS-8QH made by Phoenix Contact |
| Moment of inertia | $9\times10^{-4}$ $kgm^2$ or less | | |
| Mass | Approx. 2kg (rotor: 0.2kg/ stator: 1.7kg) or less | | |
| Compatible cables (types without relay connectors) Maximum cable length | CH23-***NPFA<br>30 m | CH23-***NPMA<br>30 m | CH22-***NSFY<br>30 m |
| Compatible cables (types with relay connectors) Maximum cable length | CH23-***NPKA + CH23-***NPFA<br>30 m | CH23-***NPKA + CH23-***NPMA<br>30 m | CH22-***NSFF + CH22-***NSFY<br>30 m |

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

## Details of model designation

### Scale

RS97-1024E G △ ■■

[E]Rotor inner diameter
96 mm

[G]Resolution
23 bit

[△]Communication protocol

| Type | NC manufacturer | Remarks |
|---|---|---|
| A | FANUC | α interface |
| D | Mitsubishi Electric | 4-wire |
| Z | SIEMENS AG | DRIVE-CLiQ |

[■■]Head cable length

| Type | Head cable length |
|---|---|
| 01 | 1 m |
| 02 | 2 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 | 1.5m |
| 070 | 7m |
| 260 | 26m |

[○]Conduit specification

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

【▽】Cable seath (covering)

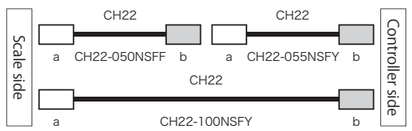
| Type | Cable specification |
|---|---|
| S | PU (Polyurethane, Siemens Motion connect 800+) |

【※】Scale side connector

| Type | Specification | Remarks |
|---|---|---|
| M | Scale head connector | Standard |
| F | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing |
| E | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing/ Attatched connector |

【#】Controller side connector

| Type | Specification | Remarks |
|---|---|---|
| None | Open-end | |
| Y | RJ45 connector made by YAMAICHI ELECTRONICS | Adopts NC machine tool |
| Z | RJ46 connector (water proof) made by YAMAICHI ELECTRONICS | Relay |
| F | M12 connector (Male) made by Phoenix Contact | Relay/ Waterproofing |




CH22-050NSFF
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
M12 (Female) made by Phoenix Contact
Controller side connector
M12 (Male) made by Phoenix Contact

CH22-100NSFY
example)
Cable length 10m
Without conduit
PU sheath
Scale side connector
M12 (Female) made by Phoenix Contact
Controller side connector
RJ45 made by YAMAICHI ELECTRONICS

CH22-055NSFY
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
M12 (Female) made by Phoenix Contact
Controller side connector
RJ45 made by YAMAICHI ELECTRONICS

CH23-□□□○▽※#

[□□□]
Cable length
(Example)

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

[○]Conduit specification

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

【▽】Cable sheath

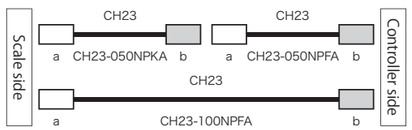
| Type | Cable specification |
|---|---|
| V | PVC(Φ6.8)[Scale side] |
| P | PVC(Φ8)[Controller side] |
| E | PU(Φ8)[Controller side] |

【※】Controller side connector

| Type | | Specification | Remarks |
|---|---|---|---|
| Without | With | Earth wire | |
| Z | - | Open-end | Scale side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 2P made by TAJIMI ELECTRONICS |
| None | - | Standard | |
| M | - | 10P made by Sumitomo 3M | Mitsubishi NC, J3 (INC serial, ABS) |
| F | Q | 20P straight case made by Honda Tsushin Kogyo | FANUC (INC serial, ABS) |
| J | S | Horizontal drawing case made by HIROSE Electric | FANUC (INC serial, ABS) |
| K | - | 10P JN1 (Male) made by Japan Aviation Electronics Industry | Relay |
| N | - | 12P R04 (Male) made by TAJIMI ELECTRONICS | Relay (fixed) |

【#】Scale side connector

| 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) |




CH23-050NPKA
example)
Cable length 5m
Without conduit
PVC sheath(Φ8)
Scale side connector
Original of Magnescale
10P JN1 (Female) made by Japan Aviation Electronics Industry
Controller side connector
10P JN2 (Male) made by Japan Aviation Electronics Industry

CH23-100NPFA
example)
Cable length 10m
Without conduit
PVC sheath(Φ8)
Scale side connector
Original of Magnescale
10P JN1 (Female) made by Japan Aviation Electronics Industry
Controller side connector
20P made by Honda Tsushin Kogyo

CH23-050NPFA
example)
Cable length 5m
Without conduit
PVC sheath(Φ8)
Scale side connector
10P JN2 (Female) made by Japan Aviation Electronics Industry
Controller side connector
20P made by Honda Tsushin Kogyo

Absolute angle encoder

# Exposed type

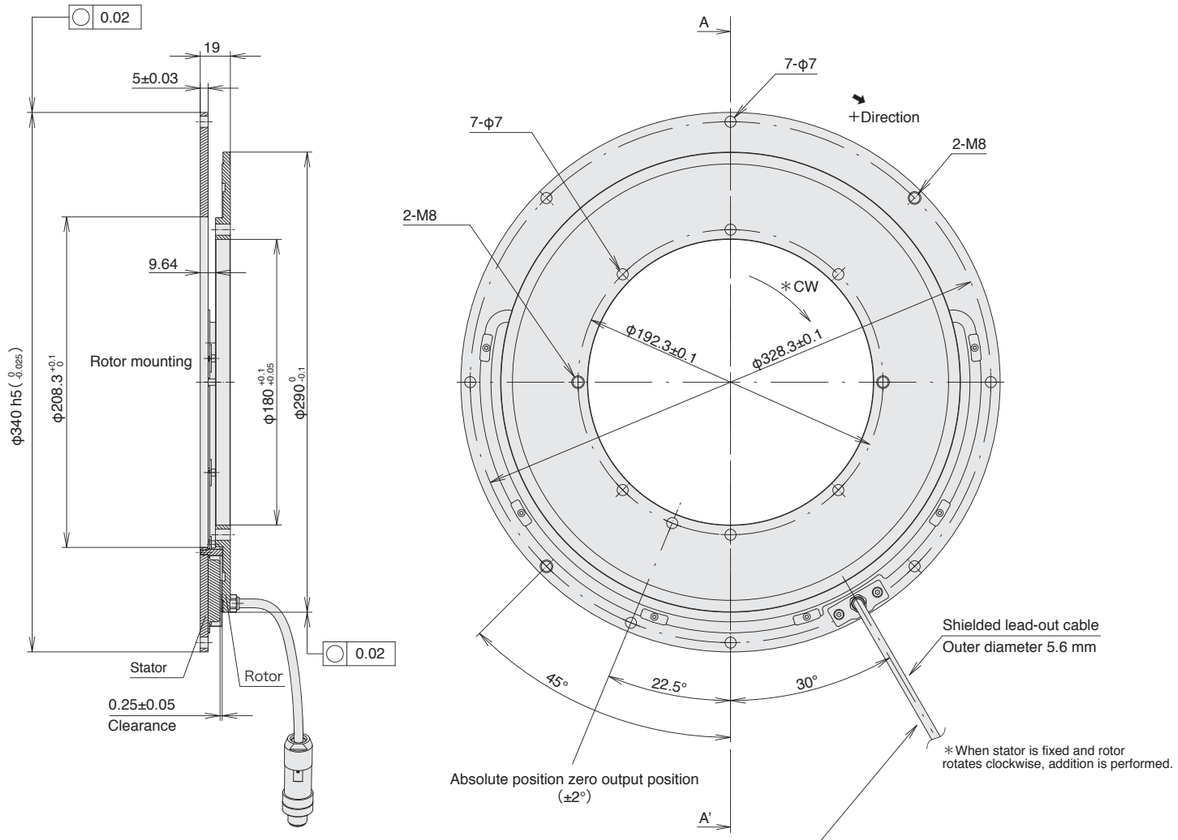
# RS97-1024N



- Enables direct communication using the protocol of each supporting manufacturer without the requirement of an amplifier
- Magnetic system enables use even in environments with condensation, oil, and other adverse conditions
- 180mm diameter through-hole allows for design and mounting flexibility
- Dual head configuration reduces the effect of axial runout

FANUC | Mitsubishi Electric | SIENEMS

## Dimensions




Section A-A'

Please contact us for inquiries about RS97-1024N model.

FANUC / Mitsubishi Electric: R20 (without repeated bending), R50 (with repeated bending), Outer diameter Φ7.8mm

SIEMENS AG: R10 (without repeated bending), R50 (with repeated bending), Outer diameter Φ5.6mm

Unit: mm

## Specifications

| Model name | RS97-1024NGA | RS97-1024NGD | 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 | | Compliant with DRIVE-CLiQ |
| Compatible controllers | FANUC | Mitsubishi Electric | SIEMENS AG |
| Resolution | 23 bits (8,388,608 pulses/revolution) | | |
| Maximum response revolutions | 5,000 $min^{-1}$ | | |
| Functional Safety | Please consult with each controller manufacturer regarding support for functional safety. | | EN ISO13849-1:2008 Cat.3<br>EN 62061:2005 / IEC 61508:2010<br>EN61800-5-2:2007 |
| Legal compliance | FCC Part15 Subpart B Class A<br>ICES-003 Class A Digital Device<br>EN55011 Gp1 Class A, EN61000-6-2 | | |
| Operating temperature range | 0 to +60°C | | |
| Storage temperature range | -10 to +60°C | | |
| Vibration resistance | 150 $m/s^2$ (50 Hz to 2,000 Hz) | | |
| Impact resistance | 1,000 $m/s^2$ (11 ms) | | |
| Protective design grade | IP65 | | |
| Power supply voltage range | DC+4.75 to +5.25 V | | DC+17 to +30.8 V |
| Maximum consumption current | 1.35W or less (4.75V)<br>1.3W or less (5.25V) | | 2.5W or less (17V)<br>3.2W or less (30.8V) |
| Consumption current | 260mA (5V) (when the controller is connected) | | 120mA (24V) (when the controller is connected) |
| Output connector | JN1HS10PL2 made by Japan Aviation Elecronics Industry | | SACC-M12MS-8Q H made by Phoenix Contact |
| Moment of inertia | 8.8× $10^{-3}$ $kgm^2$ or less | | |
| Mass | Approx. 3.4kg (rotor: 0.6kg/ stator: 2.8kg) or less | | |
| Compatible cables (types without relay connectors) Maximum cable length | CH23-***NPFA<br>30 m | CH23-***NPMA<br>30 m | CH22-***NSFY<br>30 m |
| Compatible cables (types with relay connectors) Maximum cable length | CH23-***NPKA + CH23-***NPFA<br>30 m | CH23-***NPKA + CH23-***NPMA<br>30 m | CH22-***NSFF + CH22-***NSFY<br>30 m |

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

## Details of model designation

Scale

RS97-1024NG△■■

[N]Rotor inner diameter
180 mm

[G]Resolution
23 bit

[△]Communication protocol

| Type | NC manufacturer | Remarks |
|---|---|---|
| A | FANUC | α interface |
| D | Mitsubishi Electric | 4-wire |
| 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 |
|---|---|
| 010 | 1.5m |
| 070 | 7m |
| 260 | 26m |

[○]Conduit specification

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

【▽】Cable seath (covering)

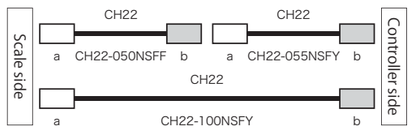
| Type | Cable specification |
|---|---|
| S | PU (Polyurethane, Siemens Motion connect 800+) |

【※】Scale side connector

| Type | Specification | Remarks |
|---|---|---|
| M | Scale head connector | Standard |
| F | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing |
| E | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing/ Attatched connector |

【#】Controller side connector

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




CH22-050NSFF
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
M12 (Female) made by Phoenix Contact
Controller side connector
M12 (Male) made by Phoenix Contact

CH22-100NSFY
example)
Cable length 10m
Without conduit
PU sheath
Scale side connector
M12 (Female) made by Phoenix Contact
Controller side connector
RJ45 made by YAMAICHI ELECTRONICS

CH22-055NSFY
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
M12 (Female) made by Phoenix Contact
Controller side connector
RJ45 made by YAMAICHI ELECTRONICS

CH23-□□□○▽※#

[□□□]
Cable length
(Example)

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

[○]Conduit specification

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

[▽]Cable sheath

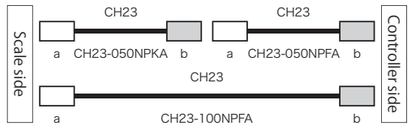
| Type | Cable specification |
|---|---|
| V | PVC(Φ6.8) [Scale side] |
| P | PVC(Φ8) [Controller side] |
| E | PU(Φ8) [Controller side] |

【※】Controller side connector

| Type | | Specification | Remarks | |
|---|---|---|---|---|
| Without | With | Earth wire | | |
| Z | - | Open-end | Scale side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 2P made by TAJIMI ELECTRONICS | |
| None | - | Standard | | |
| M | - | 10P made by Sumitomo 3M | | Mitsubishi NC, J3 (INC serial, ABS) |
| F | Q | 20P straight case made by Honda Tsushin Kogyo | | FANUC (INC serial, ABS) |
| J | S | Horizontal drawing case made by HIROSE Electric | | FANUC (INC serial, ABS) |
| K | - | 10P JN1 (Male) made by Japan Aviation Electronics Industry | | Relay |
| N | - | 12P R04 (Male) made by TAJIMI ELECTRONICS | | Relay (fixed) |

【#】Scale side connector

| 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) |




CH23-050NPKA
example)
Cable length 5m
Without conduit
PVC sheath(Φ8)
Scale side connector
10P JN1 (Female) made by Japan Aviation Electronics Industry
(Female) Controller side connector
10P JN2 (Male) made by Japan Aviation Electronics Industry

CH23-100NPFA
example)
Cable length 10m
Without conduit
PVC sheath(Φ8)
Scale side connector
10P JN1 (Female) made by Japan Aviation Electronics Industry
Controller side connector
20P made by Honda Tsushin Kogyo

CH23-050NPFA
example)
Cable length 5m
Without conduit
PVC sheath(Φ8)
Scale side connector
10P JN2 (Female) made by Japan Aviation Electronics Industry
Controller side connector
20P made by Honda Tsushin Kogyo

Absolute angle encoder

# Enclosed type

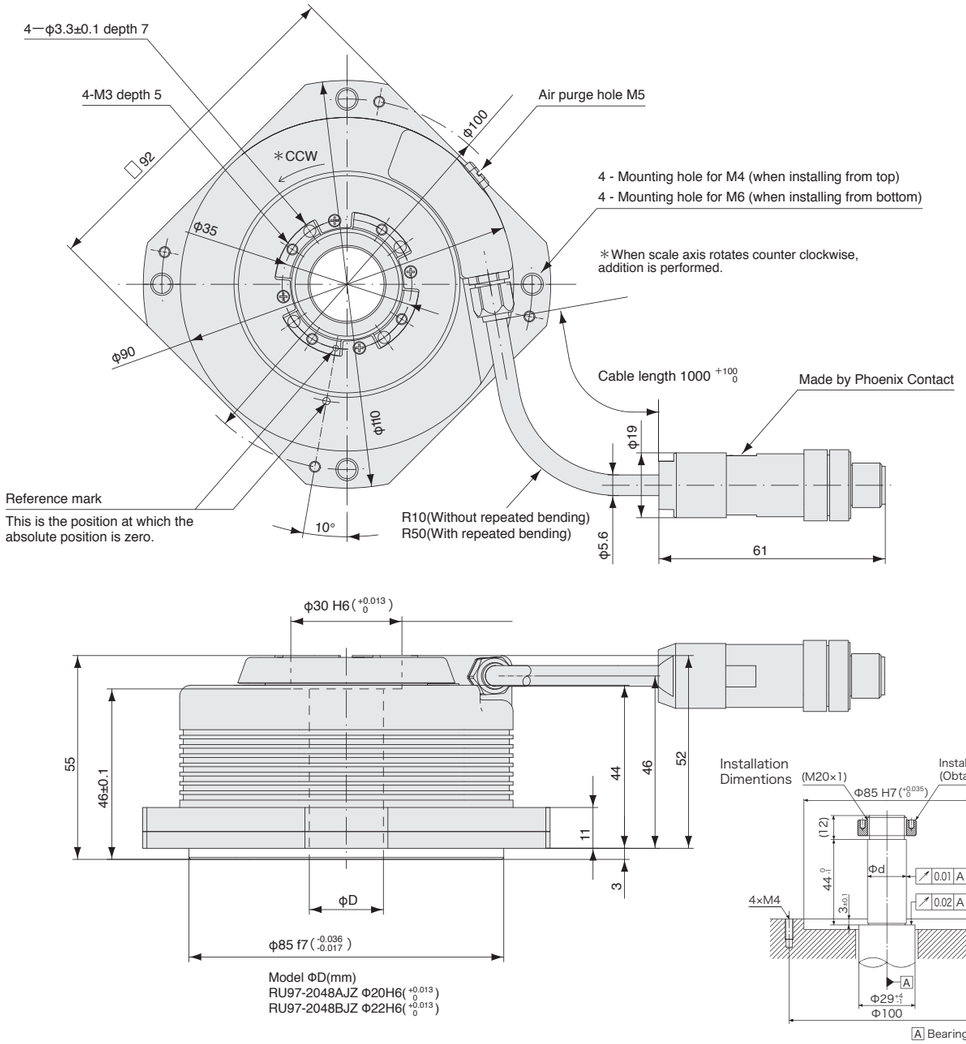
# RU97-2048

- Enables direct communication using the SIEMENS DRIVE-CLiQ protocol without the requirement of an amplifier
- Magnetic system enables use even in environments with condensation, oil, and other adverse conditions
- Internal coupling allows for design and mounting flexibility



SIEMENS

## Dimensions




## Specifications

| | |
|---|---|
| Model name | RU97-2048AJZ<br>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 | EN ISO13849-1:2008 Cat.3<br>EN 62061:2005 / IEC 61508:2010 / EN61800-5-2:2007 |
| Legal compliance | FCC Part15 Subpart B Class A<br>ICES-003 Class A Digital Device<br>EN55011 Gp1 Class A, EN61000-6-2 |
| Operating temperature range | 0 to +60°C |
| Storage temperature range | -10 to +60°C |
| Vibration resistance | 150 $m/s^2$ (50 Hz to 2,000 Hz) |
| Impact resistance | 1,000 $m/s^2$ (11 ms) |
| Protective design grade | IP65 |
| Power supply voltage range | DC+17 to +30.8 V |
| Maximum consumption current | 1.6 W or less (17 V or 30.8 V) |
| Consumption current | 65 mA (24 V) (when the controller is connected) |
| Moment of inertia | $9.4\times10^{-5}$ $kgm^2$ 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<br>30 m |
| Compatible cables (types with relay connectors) Maximum cable length | CH22-***NSFF + CH22-***NSFY<br>30 m |

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

## Details of model designation

Scale

R U 9 7 - 2 0 4 8 ☆ J Z ■ ■

[☆]Drum inner diameter

| Type | Drum inner diameter |
|---|---|
| A | Φ20 mm |
| B | Φ22 mm |

[J]Resolution 25 bit

[Z]SIEMENS AG DRIVE-CLiQ

[■■]Head cable length

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

Cables

C H 2 2 - □ □ □ ○ ▽ ※ #

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

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

[○]Conduit specification

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

【▽】Cable seath (covering)

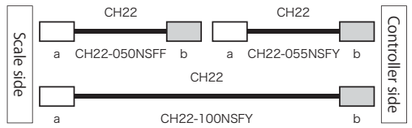
| Type | Cable specification |
|---|---|
| S | PU (Polyurethane, Siemens Motion connect 800+) |

【※】Scale side connector

| Type | Specification | Remarks |
|---|---|---|
| M | Scale head connector | Standard |
| F | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing |
| E | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing/ Attatched connector |

【#】Controller side connector

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




CH22-050NSFF
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
M12 (Female) made by Phoenix Contact
Controller side connector
M12 (Male) made by Phoenix Contact

CH22-100NSFY
example)
Cable length 10m
Without conduit
PU sheath
Scale side connector
M12 (Female) made by Phoenix Contact
Controller side connector
RJ45 made by YAMAICHI ELECTRONICS

CH22-055NSFY
example)
Cable length 5m
Without conduit
PU sheath
Scale side connector
M12 (Female) made by Phoenix Contact
Controller side connector
RJ45 made by YAMAICHI ELECTRONICS

Absolute angle encoder

# Enclosed type

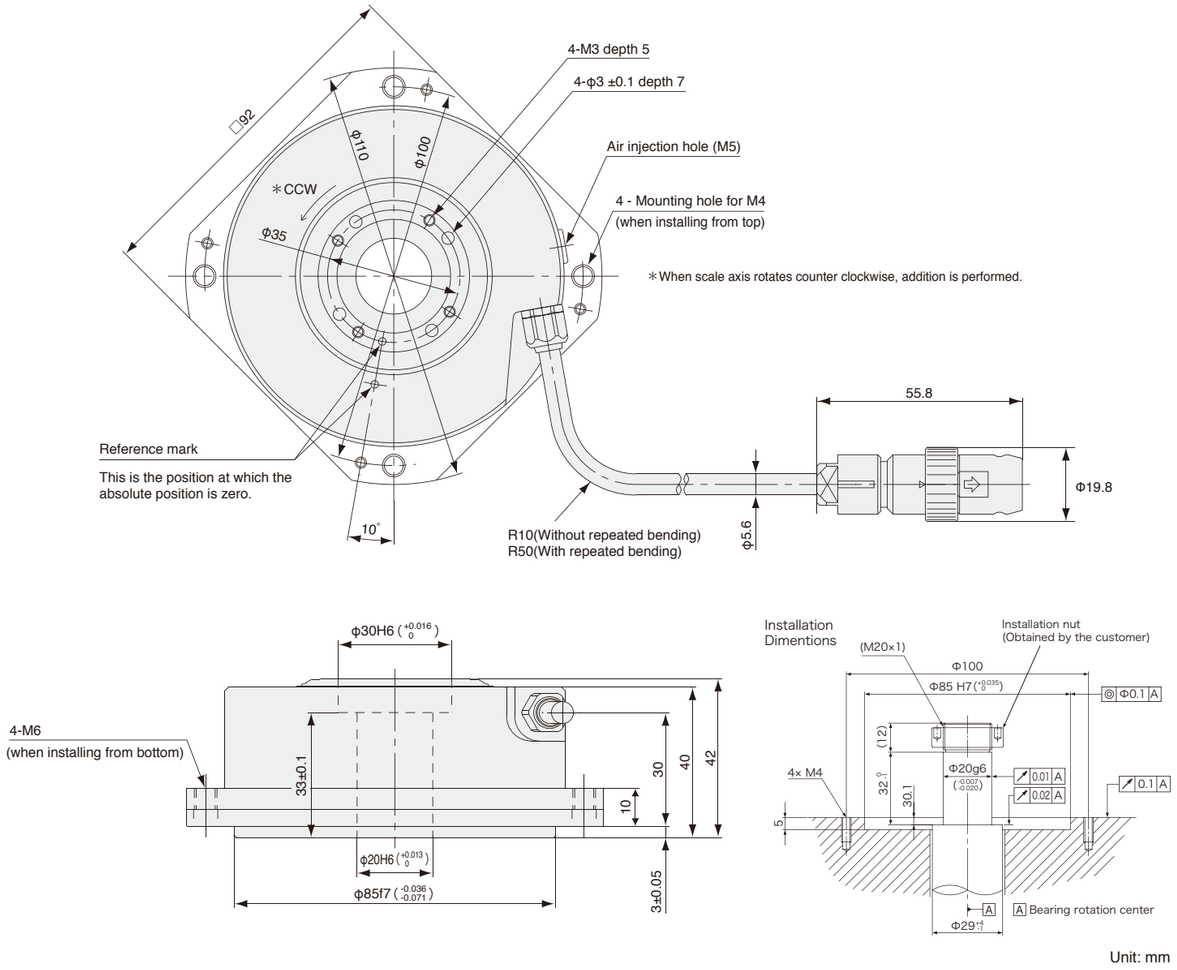
# RU77-4096

- Magnetic system enables use even in environments with condensation, oil, and other adverse conditions
- Enables direct communication using the protocol of each supporting manufacturer without the requirement of an amplifier
- Internal coupling allows for design and mounting flexibility



FANUC | Mitsubishi Electric | Yaskawa Electric

## Dimensions




Unit: mm

## Specifications

| Model name | RU77-4096A□A | RU77-4096A□B<br>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 | 25bit (33,554,432 pulse/revolution) | | 21bit (2,097,152 pulse/revolution) |
| Maximum response revolutions | 2,000 $min^{-1}$ | | |
| Maximum mechanical revolutions | 3,000 $min^{-1}$ | | |
| 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 $m/s^2$ (50 Hz to 2000 Hz) | | |
| Impact resistance | 1,000 $m/s^2$ (11 ms) | | |
| Protective design grade | IP65 | | |
| Power supply voltage range | DC4.75-5.25 V (with connecting terminal) | | |
| Consumption current | 200mA (at 120Ω termination) | | |
| Moment of inertia | $9.4\times10^{-5}$ $kgm^2$ or less | | |
| Starting torque (at 20°C) | 0.1 Nm or less | | |
| Mass | Approx. 1.2kg or less | | |
| Standard compatible cable | CH33-***, CE28-*** | | |
| Maximum cable length | CH33-*** : 30 m, CE28-*** : 15 m | | |

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

## Details of model designation

### Scale

RU77-4096A□△★○○

[□]Resolution

| Type | Resolution | Number of pulses/revolution | Number of partitions |
|---|---|---|---|
| A | Approx. 2.5"/1,000 | 131,072 | 1/32 |
| B | Approx. 1"/1,000 | 262,144 | 1/64 |
| C | Approx. 7"/10,000 | 524,288 | 1/128 |
| D | Approx. 3.5"/10,000 | 1,048,576 | 1/256 |
| E | Approx. 2"/10,000 | 2,097,152 | 1/512 |
| F | Approx. 1"/10,000 | 4,194,304 | 1/1,024 |
| G | Approx. 4.5"/100,000 | 8,388,608 | 1/2,048 |
| H | Approx. 2"/100,000 | 16,777,216 | 1/4,096 |
| J | Approx. 1"/100,000 | 33,554,432 | 1/8,192 |

*Yaskawa Electric: D,F

[△]Communication protocol

| Type | Number of wires | NC manufacturer |
|---|---|---|
| A | 4-wire | FANUC α interface |
| B | 2-wire | Mitsubishi Electric |
| D | 4-wire | Mitsubishi Electric |
| F | 2-wire | Yaskawa Electric |

[○○]Cable length

| Type | Cable length |
|---|---|
| 10 | 1m |

[★]Connector

| Connector | Description | Remarks |
|---|---|---|
| Plastic water proofing(Male) | J | main cable length Max.1m、extension cable : CH33 ※Max cable length(main+extension) : 30m |
| Metal water proofing(Male) | G | main cable length Max.9m、extension cable : CE28 ※Max cable length(main+extension) : 15m |

### CH33-□□○▽※#

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

(Example)

| Type | Cable length |
|---|---|
| 07 | 7m |
| 26 | 26m |

[○]Conduit

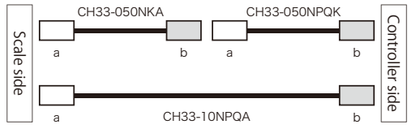
| Type | Conduit |
|---|---|
| C | With conduit (standard) |
| N | Without conduit |

[▽]Cable seath (covering)

| Type | |
|---|---|
| P | PVC (Polyvinyl chloride) |
| E | PU (Polyurethane) |

【※】Controller side connector

| Type | | Specification | Remarks |
|---|---|---|---|
| Without | With | Earth wire | |
| None | - | Open-end | Standard |
| M | - | 10P made by Sumitomo 3M | Mitsubishi NC, J3,J4 (ABS) |
| - | Q | 20P straight case made by Honda Tsushin Kogyo | FANUC (ABS) |
| G | - | 6P made by molex® | YASKAWA Electric(ABS) |
| - | S | Horizontal drawing case made by HIROSE Electric | FANUC (ABS) |
| K | - | 10P JN1 (Male) made by Japan Aviation Electronics Industry | Relay |




CH33-050NKA example)
Cable length 5m
Without conduit
Controller side connector
10P (JB1) made by Japan Aviation Electronic Industry
Scale side connector
JB1D10PL2 made by Japan Aviation Electronics Industry

CH33-10NPQA example)
Cable length 10m
Without conduit
Controller side connector made by Honda Tsushin Kogyo
Scale side connector
JB1D10PL2 made by Japan Aviation Electronics Industry

CH33-050NPQK example)
Cable length 5m
Without conduit
Controller side connector
20P made by Honda Tsushin Kogyo
Scale side connector
JB1D10PL2 made by Japan Aviation Electronics Industry

【#】Scale side connector

| 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) |

### Cable

CE28-□□□○※

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

(Example)

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

[○]Conduit

| Type | Conduit |
|---|---|
| C | With conduit (standard) |
| N | Without conduit |

【※】Controller side connector

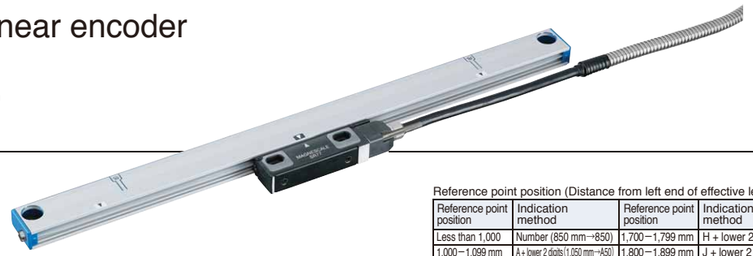
| Type | | Specification | Remarks |
|---|---|---|---|
| Without | With | Earth wire | |
| Without | - | Open-end | Standard |
| M | - | 10P made by Sumitomo 3M | Mitsubishi NC, J3,J4 (ABS) |
| F | Q | 20P made by Honda Tsushin Kogyo | FANUC (ABS) |
| G | - | 6P made by molex® | YASKAWA Electric (ABS) |
| J | - | 10P (JB1) made by Japan Aviation Electronics Industry | RU77 cable extention (standard) |
| K | - | 10P (JN1) made by Japan Aviation Electronics Industry | RU77 cable extention (standard) |

# Other Models

## Absolute linear encoder slim type

# SR77

FANUC
Mitsubishi Electric
Panasonic
Yaskawa Electric



- Effective length:
  70,120,170,220,270,320,370,420,470,520,
  570,620,720,770,820,920,1020,1140,1240,
  1340,1440,1540,1640,1740,1840,2040 mm
- Maximum resolution: 0.01µm
- Accuracy: (3+3L/1,000) µmp-p L:mm
  (5+5L/1,000) µmp-p L:mm
- Maximum response speed: 200m/min
- Protective design grade: IP65

Cable: C H 3 3

※ Please refer to page 29 for cable specifications.

SR77- ××× ★ ○ △ ◆ □ □ □

Effective length (L): cm units

Reference point position (Distance from left end of effective length)

| Reference point position | Indication method | Reference point position | Indication method | Reference point position | Indication method |
|---|---|---|---|---|---|
| Less than 1,000 | Number (850 mm→850) | 1,700–1,799 mm | H + lower 2 digits | Center | X |
| 1,000–1,099 mm | A + lower 2 digits (1,050 mm→A50) | 1,800–1,899 mm | J + lower 2 digits | | |
| 1,100–1,199 mm | B + lower 2 digits | 1,900–1,999 mm | K + lower 2 digits | | |
| 1,200–1,299 mm | C + lower 2 digits | 2,000–2,040 mm | L + lower 2 digits | | |
| 1,300–1,399 mm | D + lower 2 digits | | | | |
| 1,400–1,499 mm | E + lower 2 digits | | | | |
| 1,500–1,599 mm | F + lower 2 digits | | | | |
| 1,600–1,699 mm | G + lower 2 digits | | | | |

Communication protocol

| Type | NC manufacturer | Number of wires |
|---|---|---|
| A | FANUC α interface | 4-wire |
| B | Mitsubishi Electric | 2-wire |
| D | Mitsubishi Electric | 4-wire |
| H | Panasonic | 2-wire |
| F | Yaskawa Electric | 2-wire |

Resolution and direction

FANUC, Mitsubishi Electric, Panasonic

| Type | Direction | Resolution | Type | Direction | Resolution |
|---|---|---|---|---|---|
| A | (plus) | 0.01 | F | (minus) | 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

| Type | Direction | Number of partitions |
|---|---|---|
| L | (plus) | 1/8,192 |
| M | | 1/1,024 |

Mitsubishi Electric is only A, B, C
Panasonic can be used with A~E*
*Contact our sales directly for detail model name

Accuracy grade

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

Cable lead-out direction

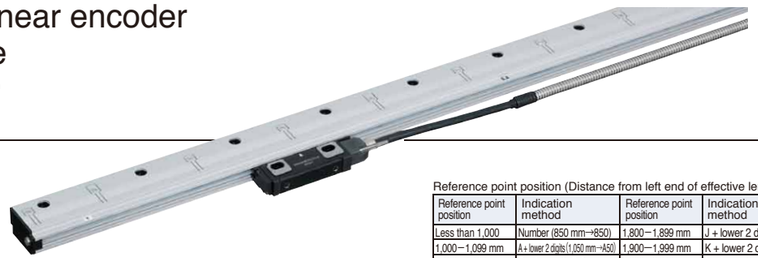
| Type | Lead-out direction |
|---|---|
| R | Right |
| L | Left |

L: Effective length(mm)

## Absolute linear encoder robust type

# SR87

FANUC
Mitsubishi Electric
Panasonic
Yaskawa Electric



- Effective length:
  140,240,340,440,540,640,740,840,940,1040,
  1140,1240,1340,1440,1540,1640,1740,1840,
  2040,2240,2440,2640,2840,3040 mm
- Maximum resolution: 0.01µm
- Accuracy: (3+3L/1,000) µmp-p L:mm
  (5+5L/1,000) µmp-p L:mm
- Maximum response speed: 200m/min
- Protective design grade: IP65

Cable: C H 3 3

※ Please refer to page 29 for cable specifications.

SR87- ××× ★ ○ △ ◆ □ □ □

Effective length (L): cm units

Reference point position (Distance from left end of effective length)

| Reference point position | Indication method | Reference point position | Indication method | Reference point position | Indication method |
|---|---|---|---|---|---|
| Less than 1,000 | Number (850 mm→850) | 1,800–1,899 mm | J + lower 2 digits | 2,700–2,799 mm | T + lower 2 digits |
| 1,000–1,099 mm | A + lower 2 digits (1,050 mm→A50) | 1,900–1,999 mm | K + lower 2 digits | 2,800–2,899 mm | U + lower 2 digits |
| 1,100–1,199 mm | B + lower 2 digits | 2,000–2,040 mm | L + lower 2 digits | 2,900–2,999 mm | V + lower 2 digits |
| 1,200–1,299 mm | C + lower 2 digits | 2,100–2,199 mm | M + lower 2 digits | 3,000–3,040 mm | W + lower 2 digits |
| 1,300–1,399 mm | D + lower 2 digits | 2,200–2,299 mm | N + lower 2 digits | Center | X |
| 1,400–1,499 mm | E + lower 2 digits | 2,300–2,399 mm | P + lower 2 digits | | |
| 1,500–1,599 mm | F + lower 2 digits | 2,400–2,499 mm | Q + lower 2 digits | | |
| 1,600–1,699 mm | G + lower 2 digits | 2,500–2,599 mm | R + lower 2 digits | | |
| 1,700–1,799 mm | H + lower 2 digits | 2,600–2,699 mm | S + lower 2 digits | | |

Communication protocol

| Type | NC manufacturer | Number of wires |
|---|---|---|
| A | FANUC α interface | 4-wire |
| B | Mitsubishi Electric | 2-wire |
| D | Mitsubishi Electric | 4-wire |
| H | Panasonic | 2-wire |
| F | Yaskawa Electric | 2-wire |

Resolution and direction

FANUC, Mitsubishi Electric, Panasonic

| Type | Direction | Resolution | Type | Direction | Resolution |
|---|---|---|---|---|---|
| A | (plus) | 0.01 | F | (minus) | 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

| Type | Direction | Number of partitions |
|---|---|---|
| L | (plus) | 1/8,192 |
| M | | 1/1,024 |

Mitsubishi Electric is only A, B, C
Panasonic can be used with A~E*
*Contact our sales directly for detail model name

Accuracy grade

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

Cable lead-out direction

| Type | Lead-out direction |
|---|---|
| R | Right |
| L | Left |

L: Effective length(mm)

## Incremental linear encoder slim type

# SR75

Mitsubishi Electric
Panasonic
Yaskawa Electric



- Effective length:
  70,120,170,220,270,320,370,420,470,520,
  570,620,720,770,820,920,1020,1140,1240,
  1340,1440,1540,1640,1740,1840,2040 mm
- Maximum resolution: 0.01µm
- Accuracy: (3+3L/1,000) µmp-p L:mm
  (5+5L/1,000) µmp-p L:mm
- Maximum response speed: 200m/min
- Protective design grade: IP65

Cable: C H 3 3

※ Please refer to page 29 for cable specifications.

SR75- ××× ★ ○ △ ◆ □ □ □

Effective length (L): cm units

Reference point position (Distance from left end of effective length)

| Reference point position | Indication method | Reference point position | Indication method |
|---|---|---|---|
| Less than 1,000 | Number (850 mm→850) | 1,700–1,799 mm | H + lower 2 digits |
| 1,000–1,099 mm | A + lower 2 digits (1,050 mm→A50) | 1,800–1,899 mm | J + lower 2 digits |
| 1,100–1,199 mm | B + lower 2 digits | 1,900–1,999 mm | K + lower 2 digits |
| 1,200–1,299 mm | C + lower 2 digits | 2,000–2,040 mm | L + lower 2 digits |
| 1,300–1,399 mm | D + lower 2 digits | Center | X |
| 1,400–1,499 mm | E + lower 2 digits | Multi | Y |
| 1,500–1,599 mm | F + lower 2 digits | Signed-type | Z |
| 1,600–1,699 mm | G + lower 2 digits | | |

Communication protocol

| Type | NC manufacturer | Number of wires |
|---|---|---|
| B | Mitsubishi Electric | 2-wire |
| D | Mitsubishi Electric | 4-wire |
| H | Panasonic | 2-wire |
| F | Yaskawa Electric | 2-wire |

Resolution and direction

Mitsubishi Electric, Panasonic

| Type | Direction | Resolution |
|---|---|---|
| A | (plus) | 0.01 |
| B | | 0.05 |
| C | | 0.1 |
| D | | 0.5 |
| E | | 1 |

Yaskawa Electric

| Type | Direction | Number of partitions |
|---|---|---|
| L | (plus) | 1/8,192 |
| M | | 1/1,024 |

Mitsubishi Electric is only A, B, C
Panasonic can be used with A~E*
*Contact our sales directly for detail model name

Accuracy grade

| Type | Accuracy grade |
|---|---|
| A | 5+5L/1,000 µm |
| S | 3+3L/1,000 µm |

Cable lead-out direction

| Type | Lead-out direction |
|---|---|
| R | Right |
| L | Left |

L: Effective length(mm)

## Incremental angle encoder enclosed type

# RU74

A/B/Reference point



- Hollow diameter: φ20
- Resolution: Approx.1/1,000° , Approx.1/10,000°
- Accuracy: ±2.5"
- Maximum response revolution: As the table on the right
- Protective design grade: IP65

RU74 - 4096A □ ■

Minimum phase difference

| Type | Minimum phase difference | Response revolutions (min.) Approx.1°/1,000 | Response revolutions (min.) Approx.1°/10,000 | Type | Minimum phase difference | Response revolutions (min.) Approx.1°/1,000 |
|---|---|---|---|---|---|---|
| A | 50 | 2,000 | 267 | E | 250 | 533 |
| B | 100 | 1,332 | 133 | F | 300 | 444 |
| C | 150 | 888 | 89 | G | 400 | 333 |
| D | 200 | 666 | 67 | H | 500 | 266 |
| | | | | J | 650 | 205 |
| | | | | K | 1,000 | 133 |

Resolution, rotation direction and polarity

| Type | Resolution | Rotation direction and polarity | Number of pulses/revolution |
|---|---|---|---|
| A | Approx. 1°/1,000 | CW/ + | 360,448 |
| B | Approx.1°/1,000 | CCW/ + | 360,448 |
| C | Approx.1°/10,000 | CW/ + | 3,600,384 |
| D | Approx.1°/10,000 | CCW/ + | 3,600,384 |

Cable

CE28 - ∗∗∗ ○ #

Scale side connector
Conduit

| Type | Conduit |
|---|---|
| C | With conduit (standard) |
| N | Without conduit |

Cable length
Written by flush right, indication in “10 cm” units, up to 14 m, 1 m pitch
Note: 15 m or less including RU74 main unit head cable length

# List of Adapter Cables

| Scale | Connected equipment | Controller side Connector | List of Adapter Cables | Scale side Connector | Maximum cable length | Cable bending radius |
|---|---|---|---|---|---|---|
| SR27A<br>SR67A | General-purpose cable | Open end | CH23-***○□ | Scale side<br>Original of<br>Magnescale | 13 m | 20 mm(Fixed, without conduit)<br>25 mm(Fixed, with conduit)<br>50 mm(Elbow-shaped bend) |
| | FANUC | Controller side<br>Honda Tsushin<br>Kogyo<br>PCR-S20FS+ | CH23-***○□F | Scale side<br>Original of<br>Magnescale | 13 m | 20 mm(Fixed, without conduit)<br>25 mm(Fixed, with conduit)<br>50 mm(Elbow-shaped bend) |
| | | | CH23-***○□FA/QA　CH23-***○□K | | Combined total 30 m | |
| | | Relay connector<br>JAE<br>JN1HS10PL2 | CH23-***○□KA | Relay connector<br>JAE<br>JN2DS10SL-R | Combined total 30 m | |
| | Mitsubishi Electric | Controller side<br>Sumitomo 3M<br>36210-0100PL | CH23-***○□M | Scale side<br>Original of<br>Magnescale | 13 m | |
| | | | CH23-***○□MA　CH23-***○□K | | Combined total 30 m | |
| | | Relay connector<br>JAE<br>JN1HS10PL2 | CH23-***○□KA | Relay connector<br>JAE<br>JN2DS10SL-R | Combined total 30 m | |
| | SIEMENS | Controller side<br>YAMAICHI<br>ELECTRONICS<br>CN078P-061-0001 | CH22-***○SMY | Scale side<br>Original of<br>Magnescale | 30 m | 35 mm(Fixed)<br>75 mm(Elbow-shaped bend) |
| | | | CH22-***○SFY　CH22-***○SMF | | Combined total 30 m | |
| | | Relay connector<br>Phoenix<br>Contact<br>SACC-M12MS-8Q SH | CH22-***○SFF | Relay connector<br>Phoenix Contact<br>SACC-M12MS-8Q SH | Combined total 30 m | |
| SR74<br>SR84 | General-purpose cable | Open end | CH33-**○▽ | Scale side<br>Original of<br>Magnescale | 30 m | 20 mm(Fixed, without conduit)<br>25 mm(Fixed, with conduit)<br>50 mm(Elbow-shaped bend) |
| | FANUC | Controller side<br>Honda Tsushin<br>Kogyo<br>PCR-S20FS+ | CH33-**○▽E/P | Scale side<br>Original of<br>Magnescale | 30 m | 20 mm(Fixed, without conduit)<br>25 mm(Fixed, with conduit)<br>50 mm(Elbow-shaped bend)<br>Relay type cannot be used<br>for A/B/Reference of SR74/84. |
| | Mitsubishi Electric | Controller side<br>Sumitomo 3M<br>36210-0100PL | CH33-**○▽L | Scale side<br>Original of<br>Magnescale | 30 m | |

| Scale | Connected equipment | Controller side Connector | List of Adapter Cables | Scale side Connector | Maximum cable length | Cable bending radius |
|---|---|---|---|---|---|---|
| RU97 | SIEMENS | Controller side<br>YAMAICHI<br>ELECTRONICS<br>CN078P-061-0001 | CH22-***○SFY | Relay connector<br>Phoenix Contact<br>SACC-M12MS-8Q SH | 30 m | 35 mm(Fixed)<br>75 mm(Elbow-shaped bend) |
| | | Relay connector<br>Phoenix<br>Contact<br>SACC-M12MS-8Q SH | CH22-***○SFF | Relay connector<br>Phoenix Contact<br>SACC-M12MS-8Q SH | Combined total 30 m | |
| RU77 | FANUC | Controller side<br>Honda Tsushin<br>Kogyo<br>PCR-S20FS+ | CE28-***○F | Scale side<br>JAE<br>JB1HB10SL2 | 14 m | 10 mm(Fixed, without conduit)<br>25 mm(Fixed, with conduit)<br>50 mm(Elbow-shaped bend) |
| | | Relay connector<br>JAE<br>JB1D10PL2 | CE28-***○J | Relay connector<br>JAE<br>JB1HB10SL2 | | |
| | Mitsubishi Electric | Controller side<br>Sumitomo 3M<br>36210-0100PL | CE28-***○M | Scale side<br>JAE<br>JB1HB10SL2 | | |
| | | Relay connector<br>JAE<br>JB1D10PL2 | CE28-***○J | Relay connector<br>JAE<br>JB1HB10SL2 | | |
| | Yaskawa Electric | Controller side<br>Molex 6P<br>55100-0670 | CE28-***○G | Scale side<br>JAE<br>JB1HB10SL2 | | |
| | | Relay connector<br>JAE<br>JB1D10PL2 | CE28-***○J | Relay connector<br>JAE<br>JB1HB10SL2 | | |
| RS97 | FANUC | Controller side<br>Honda Tsushin<br>Kogyo<br>PCR-S20FS+ | CH23-***○□FA/QA | Scale side<br>JAE<br>JN2DS10SL-R | 30 m | 20 mm(Fixed, without conduit)<br>25 mm(Fixed, with conduit)<br>50 mm(Elbow-shaped bend) |
| | | Relay connector<br>JAE<br>JN1HS10PL2 | CH23-***○□KA | Relay connector<br>JAE<br>JN2DS10SL-R | Combined total 30 m | |
| | Mitsubishi Electric | Controller side<br>Sumitomo 3M<br>36210-0100PL | CH23-***○□MA | Scale side<br>JAE<br>JN2DS10SL-R | 30 m | |
| | | Relay connector<br>JAE<br>JN1HS10PL2 | CH23-***○□KA | Relay connector<br>JAE<br>JN2DS10SL-R | Combined total 30 m | |
| | SIEMENS | Controller side<br>YAMAICHI<br>ELECTRONICS<br>CN078P-061-0001 | CH22-***○SFY | Scale side<br>Phoenix Contact<br>SACC-M12FS-8Q SH | 30 m | 35 mm(Fixed)<br>75 mm(Elbow-shaped bend) |
| | | Relay connector<br>Phoenix Contact<br>SACC-M12MS-8Q SH | CH22-***○SFF | Relay connector<br>Phoenix Contact<br>SACC-M12MS-8Q SH | Combined total 30 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 | 1.5m |
| 070 | 7m |
| 260 | 26m |

[○]Conduit specification

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

【▽】Cable seath (covering)

| Type | Cable specification |
|---|---|
| S | PU (Polyurethane, Siemens Motion connect 800+) |

【※】Scale side connector

| Type | Specification | Remarks |
|---|---|---|
| M | Scale head connector | Standard |
| F | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing |
| E | M12 connector (Female) made by Phoenix Contact | Relay/ Waterproofing/ Attatched connector |

【#】Controller side connector

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

### CH23-□□□○▽※#

[□□□]Cable length

(Example)

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

[○]Conduit specification

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

【▽】Cable sheath(covering)

| Type | Cable specification |
|---|---|
| V | PVC(Φ6.8)[Scale side] |
| P | PVC(Φ8)[Controller side] |
| E | PU(Φ8)[Controller side] |

【※】Controller side connector

| Type | | Specification | Remarks |
|---|---|---|---|
| Without | With | Earth wire | |
| Z | - | Open-end | Scale side connector should be 10P JN2 (Female) made by Japan Aviation Electronics Industry or 2P made by TAJIMI ELECTRONICS |
| None | - | Standard | |
| M | - | 10P made by Sumitomo 3M | Mitsubishi NC, J3 (INC serial, ABS) |
| F | Q | 20P straight case made by Honda Tsushin Kogyo | FANUC (INC serial, ABS) |
| J | S | Horizontal drawing case made by HIROSE Electric | FANUC (INC serial, ABS) |
| K | - | 10P JN1 (Male) made by Japan Aviation Electronics Industry | Relay |
| N | - | 12P R04 (Male) made by TAJIMI ELECTRONICS | Relay (fixed) |

【#】Scale side connector

| 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) |

### CE28-□□□○※

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

(Example)

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

[○]Conduit

| Type | Conduit |
|---|---|
| C | With conduit (standard) |
| N | Without conduit |

【※】Controller side connector

| Type | | Specification | Remarks |
|---|---|---|---|
| Without | With | Earth wire | |
| Without | - | Open-end | Standard |
| L | - | 10P made by Sumitomo 3M | Mitsubishi NC, J3 (A/B/Reference) |
| M | - | | Mitsubishi NC, J3 (INC serial, ABS) |
| E | P | 20P made by Honda Tsushin Kogyo | FANUC (A/B/Reference) |
| F | Q | | FANUC (INC serial, ABS) |
| G | - | 6P made by molex® | YASKAWA Electric (INC serial, ABS) |
| J | - | 10P (J51) made by Japan Aviation Electronics Industry | RU77 cable extention (standard) |
| K | - | 10P (JN1) made by Japan Aviation Electronics Industry | RU77 cable extention (standard) |

### CH33-□□○▽※#

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

(Example)

| Type | Cable length |
|---|---|
| 07 | 7m |
| 26 | 26m |

[○]Conduit

| Type | Conduit |
|---|---|
| C | With conduit (standard) |
| N | Without conduit |

【▽】Cable seath (covering)

| Type | |
|---|---|
| P | PVC (Polyvinyl chloride) |
| E | PU (Polyurethane) |

【※】Controller side connector

| Type | | Specification | Remarks |
|---|---|---|---|
| Without | With | Earth wire | |
| None | - | Open-end | Standard |
| A | - | D-sub 15P | |
| D | - | D-sub 9P | |
| L | - | 10P made by Sumitomo 3M | Mitsubishi NC, J3,J4 (A/B Phase) |
| M | - | | Mitsubishi NC, J3,J4 (INC serial, ABS) |
| - | P | 20P straight case made by Honda Tsushin Kogyo | FANUC (A/B Phase) |
| - | Q | | FANUC (INC serial, ABS) |
| G | - | 6P made by molex® | YASKAWA Electric, Panasonic (INC serial, ABS) |
| - | R | Horizontal drawing case made by HIROSE Electric | FANUC (A/B Phase) |
| - | S | | FANUC (INC serial, ABS) |
| K | - | 10P JN1(Male)made by Japan Aviation Electronics Industry | Relay |
| N | - | 12P R04 (Male) made by TAJIMI ELECTRONICS | Relay(fixed) |

【#】Scale side connector

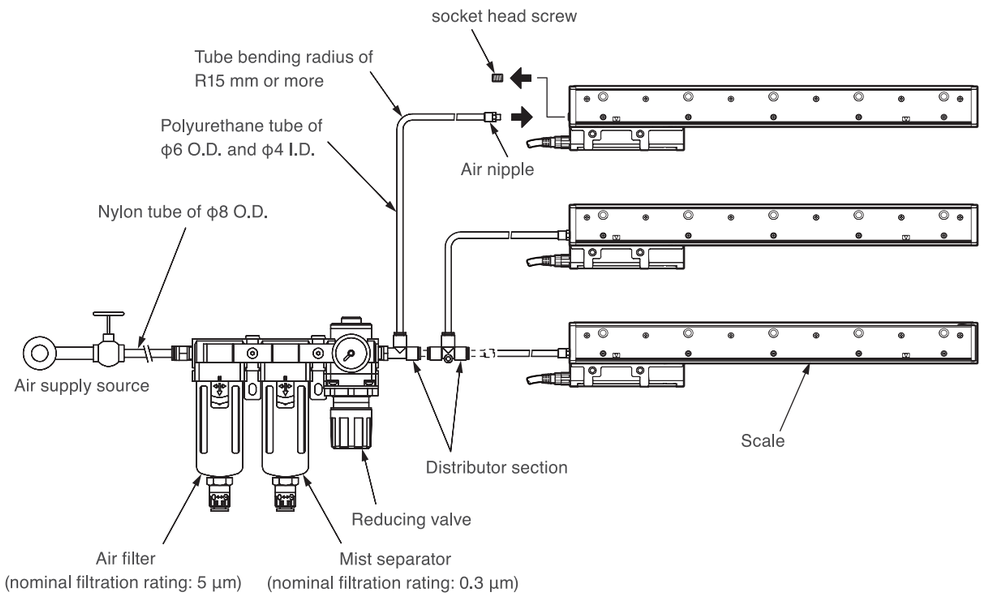
| Type | Specification | Remarks |
|---|---|---|
| None | Original of Magnescale | Standard |
| A | 10P JN2(Female)made by Japan Aviation Electronics Industry | Relay |
| C | 12P R04-9125JF8.5 made by TAJIMI ELECTRONICS | Relay(fixed) |

*Relay type cannot be used for A/B/Reference type of SR74 and SR84

# Technology

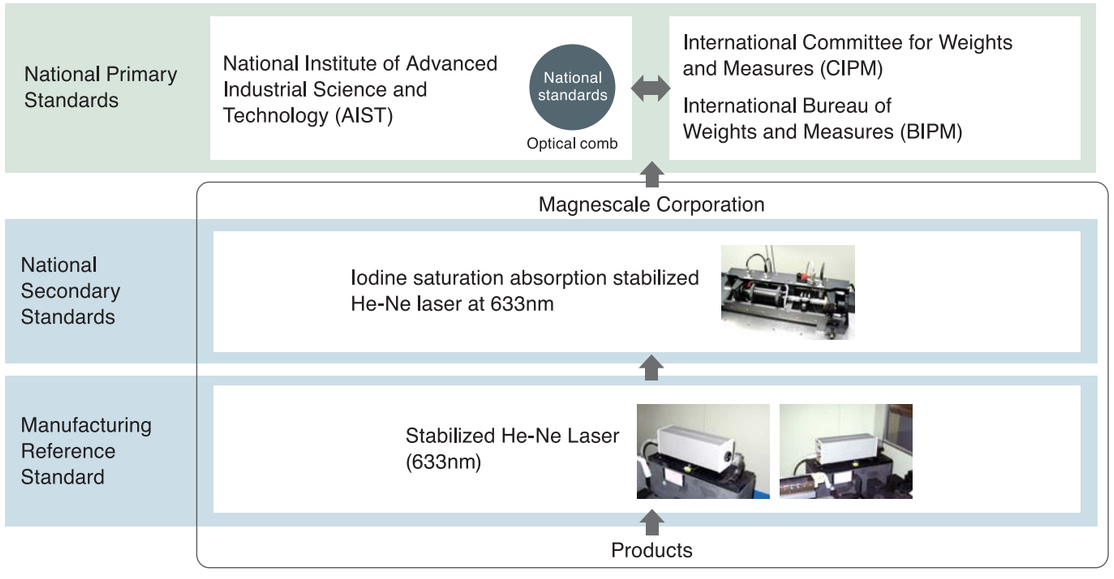
## Air purging

If scale 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 10-20ℓ/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.

ISO 9001 JACO QC10J0039

Magnescale Co., Ltd.
is registered to ISO 9001 (Quality)

ISO 14001 BUREAU VERITAS Certification

UKAS MANAGEMENT SYSTEMS 008

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

We have met:

- 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, 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.

# 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 | IEC61508:2010 / EN62061:2005 SIL 2<br>EN ISO13849-1 Cat. 3 / PL d<br>EN61800-5-2 |
| Models that have acquired certification | • Angle encoders<br>RS97-1024EGZ series<br>RS97-1024NGZ series<br>RU97-2048 Z series<br>• Linear encoders<br>SR27A-AZ series<br>SR67A-AZ series |

Functional Safety Type Approved TÜVRheinland FS



* Consult our sales representative for details.