

Absolute linear encoder
Exposed type SmartSCALE

SQ57

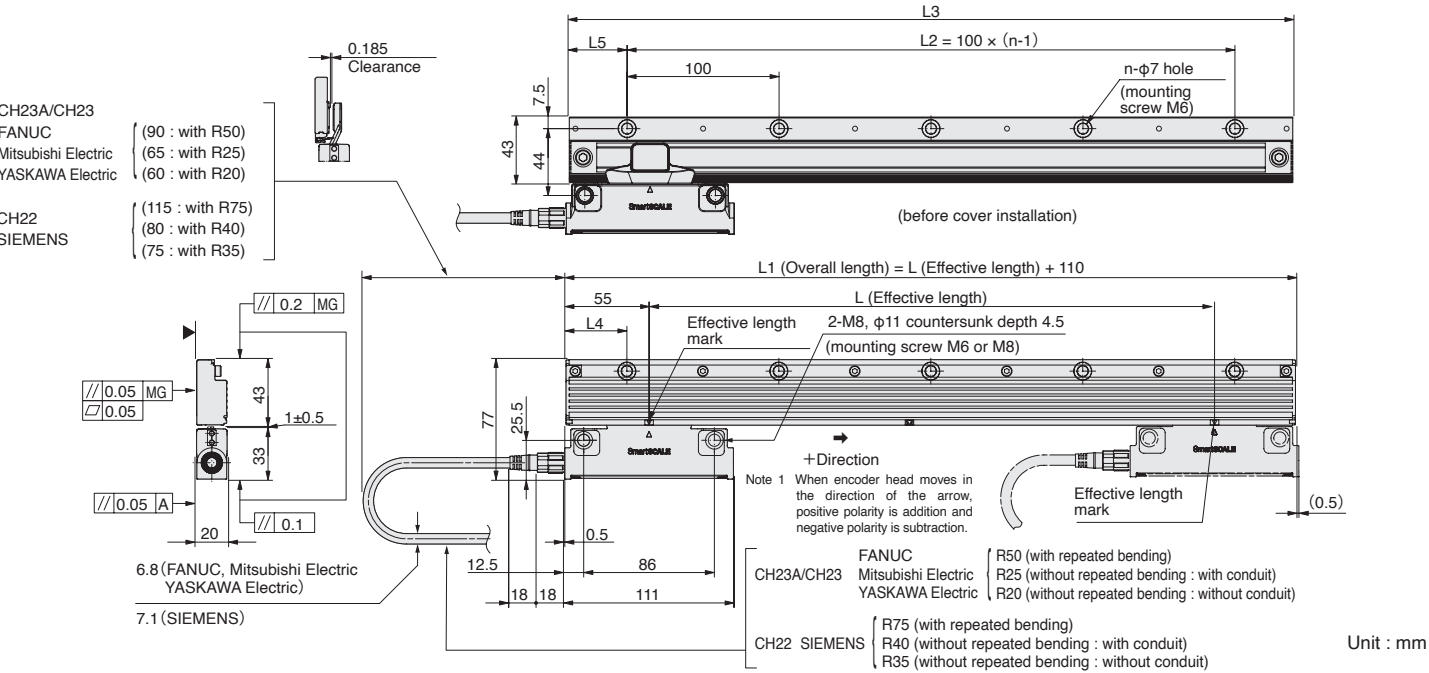
- No air purging is required even in harsh environments.
- Separate and bearingless construction for long service life
- Sealed structure with IP67 grade



- FANUC
- Mitsubishi Electric
- YASKAWA Electric
- SIEMENS
- BiSS-C*

* Please contact our sales department.

Dimensions



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

MG : Machine guide
For effective length exceeding 3,770 mm, please contact our sales department.

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

Effective length	Overall length	Mounting pitch					Number of bolts
L	L1	L2	L3	L4	L5	n	
1,370	1,480	1,400	1,476	40	38	15	
1,470	1,580	1,500	1,576	40	38	16	
1,570	1,680	1,600	1,676	40	38	17	
1,670	1,780	1,700	1,776	40	38	18	
1,770	1,880	1,800	1,876	40	38	19	
1,870	1,980	1,900	1,976	40	38	20	
1,970	2,080	2,000	2,076	40	38	21	
2,070	2,180	2,100	2,176	40	38	22	
2,270	2,380	2,300	2,376	40	38	24	
2,470	2,580	2,500	2,576	40	38	26	
2,670	2,780	2,700	2,776	40	38	28	
2,870	2,980	2,900	2,976	40	38	30	
3,070	3,180	3,100	3,176	40	38	32	
3,270	3,380	3,300	3,376	40	38	34	
3,470	3,580	3,500	3,576	40	38	36	
3,670	3,780	3,700	3,776	40	38	38	
3,770	3,880	3,800	3,876	40	38	39	

Unit : mm

Specifications

Model name	SQ57-xxS□A###	SQ57 -xxxS□BX -xxxS□DX	SQ57-xxS□F###	SQ57-xxS □Z▼
Effective length (L: mm)	70 to 3,770 **			
Thermal expansion coefficient	12 ± 1 × 10 ⁻⁶ /°C (encoder alone)			
Accuracy (at 20°C)	± (1.5 + 1.5L/1000) μm L : Effective length mm			
Reference point	Center, or user-selected position (Factory set)	Fixed to center	Center, or user-selected position (Factory set)	10 mm from left end of the effective length to the left outside
Output signal	Absolute serial bidirectional signal, compliant with EIA-485			Compliant with DRIVE-CLiQ
Compatible controllers	FANUC α/ai interface compatible	Mitsubishi Electric	YASKAWA Electric	SIEMENS AG
Resolution	Selectable from 0.005, 0.01, 0.05, 0.1, 0.5 and 1 μm (Factory set)		Selectable from 0.005 and 0.01 μm (Factory set)	
Maximum response speed	200 m/min			
Functional safety	—			IEC 61508, EN/BS 62061 SIL 2 EN/BS/ISO 13849-1 Cat. 3 / PL d EN/BS 61800-5-2
Product Safety	FCC Part15 Subpart B Class A	ICES-003 Class A Digital Device	EN/BS 61000-6-2, EN/BS 61000-6-4	
Product Environment	EN/BS 63000			
Operating temperature	0 to +50 °C			
Storage temperature	-20 to +60 °C			
Vibration resistance	250 m/s ² (50 Hz to 2,000 Hz)			
Impact resistance	980 m/s ² (11 ms)			
Protective design grade	IP67			
Power supply voltage	DC +4.75 to +5.25 V			DC +17 to +30.8 V
Maximum power consumption	1.35 W (TYP)			2.1 W (TYP) (24 V)
Consumption current	270 mA (TYP)			85 mA (TYP) (24 V)
Mass	Sensor head 120 g, Encoder 430 + (2.9×Effective length (mm)) g			
Compatible cables (types without relay connectors) Maximum cable length	CH23A-***NVF 11 m	CH23-***NVM 11 m	CH23-***NVG 11 m	CH22-***NSMY 30 m
Compatible cables (types with relay connectors) Maximum cable length	CH23A-***NVK + CH23A-***NPFA 30 m	CH23-***NVK + CH23-***NPMA 30 m	CH23-***NVK + CH23-***NVGA + CH23-***NVGA 30 m *2	CH22-***NSMF + CH22-*** NSFY 30 m

*1 For effective length exceeding 3,770 mm, please contact our sales department.
*2 Three-piece configuration; cannot be used in two-piece configuration.
Magnescale reserves the right to change product specifications without prior notice.

Details of model designation

Encoder

SQ57-xxxS□△###

SQ57-xxxS□Z▼

[xxx] Effective length (cm)

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

L : Effective length (mm)

[□] Resolution and direction (μm)

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

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

[△] Communication protocol

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

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

Type	Reference point position
X	Effective length center
(Absolute position)	Distance from left end of effective length

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

[▼] Reference point position (SIEMENS AG)

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

Cables

CH22-□□□○▽※#

[□□□] Cable length

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

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

[○] Conduit specification

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

CH23-□□□○▽※#

CH23A-□□□○▽※#

(CH23A : FANUC model only)

[□□□] Cable length

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

[○] Conduit specification

Type	Conduit specification
C	With conduit
N	Without conduit

[▽] Cable sheath

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

[▽] Cable seath (covering)

Type	Cable specification
S	PU

[※] Encoder side connector : a

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

[#] Controller side connector : b

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

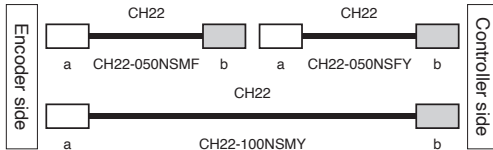
* CH23 only

[※] Controller side connector : b

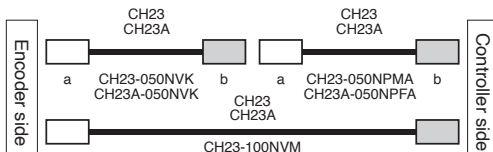
Type	Specification	Remarks
None	Original of Magnescale	Standard
A	10P JN2 (Female) made by Japan Aviation Electronics Industry	Relay
C	12P R04-9125JF8.5 made by TAJIMI ELECTRONICS	Relay (fixed)

[#] Encoder side connector : a

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



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



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

Absolute linear encoder

Exposed type SmartSCALE

SQ47

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



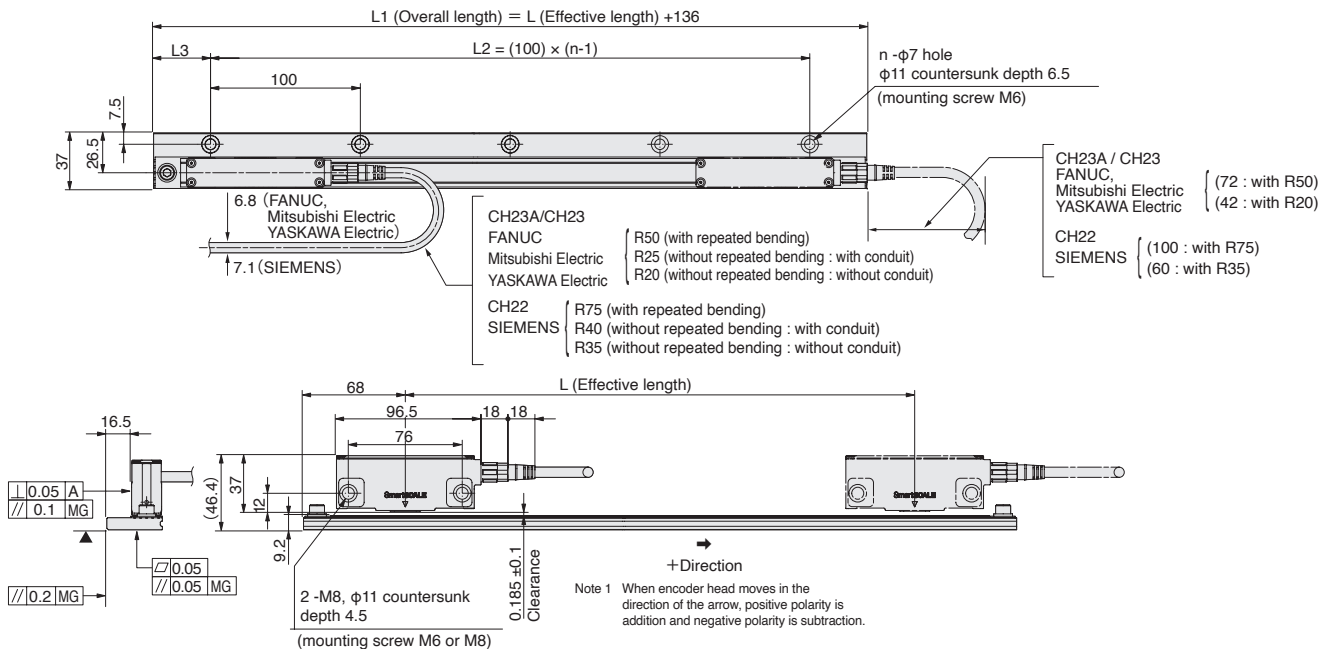
FANUC

Mitsubishi Electric

YASKAWA Electric

SIEMENS

Dimensions



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

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

Unit : mm

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

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

Specifications

Model name	SQ47-xxx★S□A###	SQ47 -xxx★S□BX -xxx★S□DX	SQ47-xxx★S□F###	SQ47-xxx★S□Z▼
Effective length (L : mm)	90 to 3,740*1			
Thermal expansion coefficient	12 ± 1 × 10 ⁻⁶ /°C (encoder alone)			
Accuracy (at 20 °C)	± (1.5 + 1.5L/1000) μm L : Effective length mm			
Reference point	Center, or user-selected position (Factory set)	Fixed to center	Center, or user-selected position (Factory set)	10 mm from left end of the effective length to the left outside
Output signal	Absolute serial bidirectional signal, compliant with EIA-485			Compliant with DRIVE-CLiQ
Compatible controllers	FANUC α/ai interface compatible	Mitsubishi Electric	YASKAWA Electric	SIEMENS AG
Resolution	Selectable from 0.005, 0.01, 0.05, 0.1, 0.5 and 1 μm (Factory set)		Selectable from 0.005 and 0.01 μm (Factory set)	
Maximum response speed	200 m/min			
Functional safety	—			IEC 61508, EN/BS 62061 SIL 2 EN/BS/ISO 13849-1 Cat. 3 / PL d EN/BS 61800-5-2
Product Safety	FCC Part15 Subpart B Class A	ICES-003 Class A Digital Device	EN/BS 61000-6-2, EN/BS 61000-6-4	
Product Environment	EN/BS 63000			
Operating temperature	0 to +50 °C			
Storage temperature	-20 to +60 °C			
Vibration resistance	250 m/s ² (50 Hz to 2,000 Hz)			
Impact resistance	980 m/s ² (11 ms)			
Protective design grade	IP67			
Power supply voltage	DC +4.75 to +5.25 V			DC +17 to +30.8 V
Maximum power consumption	1.35 W (TYP)			2.1 W (TYP) (24 V)
Consumption current	270 mA (TYP)			85 mA (TYP) (24 V)
Mass	Sensor head 110 g, Encoder 350 + (2.5 × Effective length (mm)) g			
Compatible cables (types without relay connectors) Maximum cable length	CH23A-***NVF 11 m	CH23-***NVM 11 m	CH23-***NVG 11 m	CH22-***NSMY 30 m
Compatible cables (types with relay connectors) Maximum cable length	CH23A-***NVK + CH23A-***NPFA 30 m	CH23-***NVK + CH23-***NPMA 30 m	CH23-***NVK + CH23-***NVGA + CH23-***NVGA 30 m *2	CH22-***NSMF + CH22-*** NSFY 30 m

*1 For effective length exceeding 3,740 mm, please contact our sales department.
*2 Three-piece configuration; cannot be used in two-piece configuration.
Magnescale reserves the right to change product specifications without prior notice.

Details of model designation

Encoder

SQ47-xxx★S□△###

SQ47-xxx★S□Z▼

[xxx] Effective length (cm)

★ Cable lead-out direction

Type	Lead-out direction
R	Right
L	Left

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

□ Resolution and direction (μm)

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

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

△ Communication protocol

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

[#] Reference point position

Type	Reference point position
X	Effective length center
(Absolute position)	Distance from left end of effective length
Mitsubishi Electric : X only If the reference point from the left end of effective length is greater than 1000, the left two digits are letters of the alphabet	
[▼] Reference point position (SIEMENS AG)	
Type	Reference point position : Left from the edge of the effective length
Y	Online diagnostic function not supported
Z	Online diagnostic function support

Cables

CH22-□□□○▽※#

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

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

○ Conduit specification

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

CH23-□□□○▽※#

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

□□□ Cable length
(Example)

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

○ Conduit specification

Type	Conduit specification
C	With conduit
N	Without conduit

▽ Cable sheath

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

▽ Cable seath (covering)

Type	Cable specification
S	PU

※ Encoder side connector : a

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

[#] Controller side connector : b

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

* CH23 only

※ Controller side connector : b

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

[#] Encoder side connector : a

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

