BL

BL57-RE / BL57-NE
(with/without reference point)

Supports a wide range of applications and offers the highest performance in its class.
Ideal for precision stages, semiconductor inspection systems,
precision processing machines, and liquid crystal manufacturing equipment.

Actual size

BL57-RE

- Achieves a measuring length of up to 1,060mm upon request, and offers the highest-level response speed and accuracy in its class.
- Signal pitch : 400nm
- Built-in reference point.
  〈Applications〉 Precision measuring equipment, precision stages.

BL57-NE

- Compact size makes machine integration much easier
- Theoretically unaffected by changes in temperature, humidity, air pressure and air movement. Unparalled measuring stability achieved by use of low expansion glass
- Signal pitch : 400nm
  〈Applications〉 High-accuracy microscopes, measurement equipment.

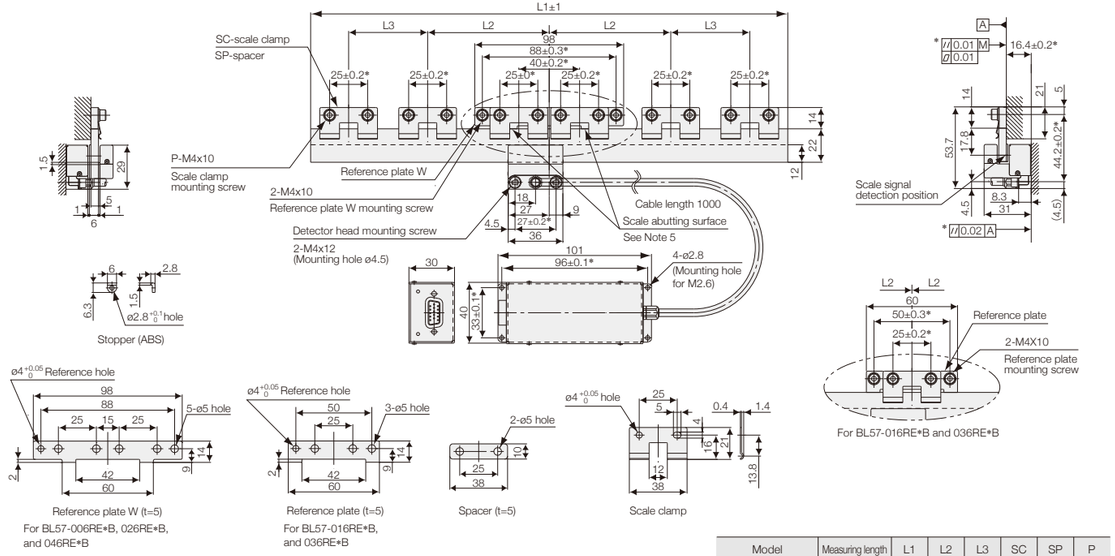
Type example : BL57-106REFB

- 106: Measuring length
- R: with reference point; N: without reference point
- E: Open type scale
- A: 4-split A/B quadrature output; F: 4-split 8-split A/B quadrature output; G: 20-split 40-split A/B quadrature output; H: Analog 1Vp-p output
- B: Soda-lime glass; C: Low expansion glass

*Contact us directly for connection with BD96

External Dimensions

● BL57-xxxRE*B (Measuring length : 60/160/260/360/460 mm)

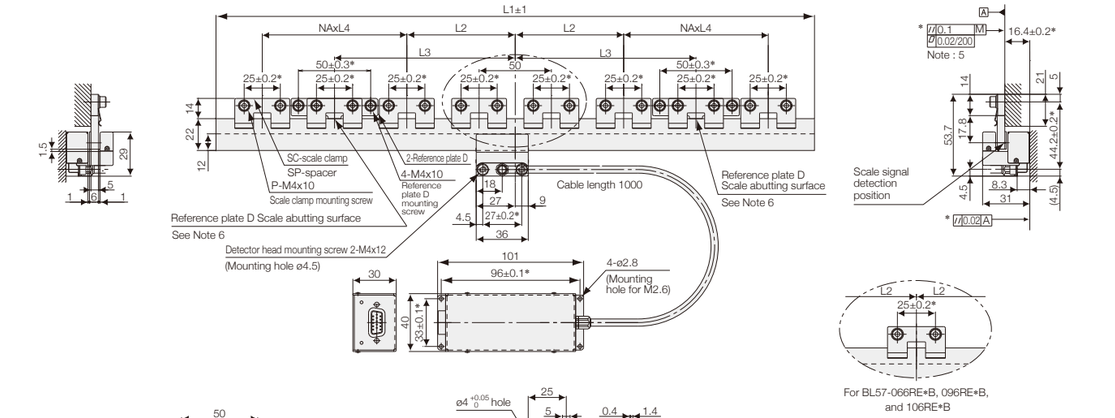


Model	Measuring length	L1	L2	L3	SC	SP	P
BL57-006RE*B	60	96	—	—	2	—	4
BL57-016RE*B	160	196	75	—	3	2	6
BL57-026RE*B	260	296	120	—	4	2	8
BL57-036RE*B	360	396	75	75	5	4	10
BL57-046RE*B	460	496	120	75	6	4	12

Unit: mm

Note 1: The items marked by an asterisk indicate the machining dimensions on the mounting surface.
Note 2: The surface roughness of the scale mounting surface is Rmax = 6.3S.
Note 3: The surface roughness of the detector head mounting surface is Rmax = 12.5S.
Note 4: "M" refers to the machine guide.
Note 5: When mounting the reference plate (reference plate W), adjust the plate so that the parallelism between the corresponding scale abutting surface and the machine guide is 0.01mm or less.

● BL57-xxxRE*B (Measuring length : 560/660/760/860/960/1060 mm)

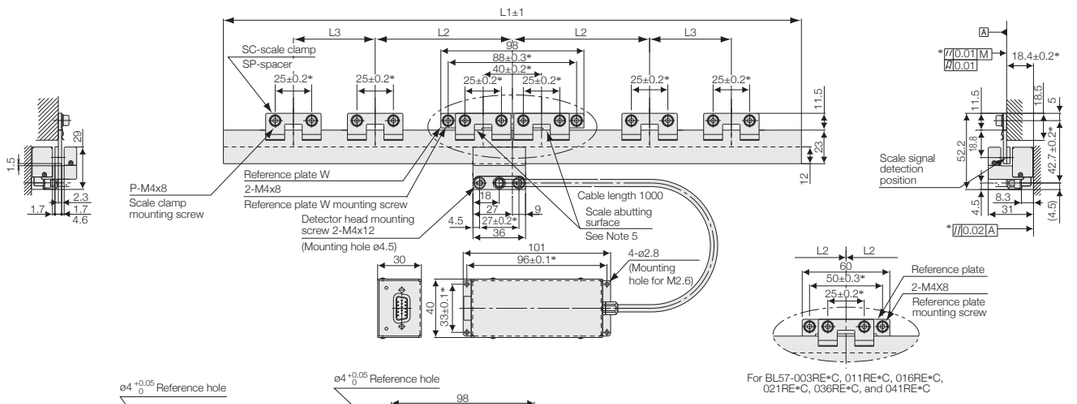


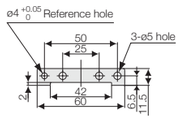
Model	Measuring length	L1	L2	L3	L4	NA	SC	SP	P
BL57-056RE*B	560	596	100	175	75	2	8	6	16
BL57-066RE*B	660	696	75	225	75	3	9	7	18
BL57-076RE*B	760	796	100	250	75	3	10	8	20
BL57-086RE*B	860	896	100	250	75	4	12	10	24
BL57-096RE*B	960	996	75	300	75	5	13	11	26
BL57-106RE*B	1060	1096	75	300	75	6	15	13	30

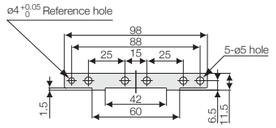
Unit: mm

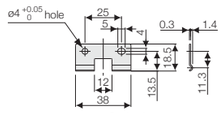
Note 1: The items marked by an asterisk indicate the machining dimensions on the mounting surface.
Note 2: The surface roughness of the scale mounting surface is Rmax = 6.3S.
Note 3: The surface roughness of the detector head mounting surface is Rmax = 12.5S.
Note 4: "M" refers to the machine guide.
Note 5: The flatness of the scale mounting surface must be within 0.02 over the range of 7 (width)×200 (length)mm.
Note 6: Mount and adjust the paired reference plates (D) so that their reference surfaces have a parallelism of 0.1 or less with respect to the machine guide.

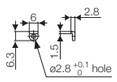
● BL57-xxxRE∗C (Measuring length : 30/60/110/160/210/260/310/360/410 mm)

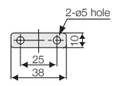












Model	Measuring length	L1	L2	L3	SC	SP	P
BL57-003RE∗C	30	66	—	—	1	—	2
BL57-006RE∗C	60	96	—	—	2	—	4
BL57-011RE∗C	110	146	50	—	3	2	6
BL57-016RE∗C	160	196	75	—	3	2	6
BL57-021RE∗C	210	246	100	—	3	2	6
BL57-026RE∗C	260	296	120	—	4	2	8
BL57-031RE∗C	310	346	120	—	4	2	8
BL57-036RE∗C	360	396	75	75	5	4	10
BL57-041RE∗C	410	446	100	100	5	4	10

Unit: mm

Note 1: The items marked by an asterisk indicate the machining dimensions on the mounting surface. Note 2: The surface roughness of the scale mounting surface is Rmax = 6.3S.
Note 3: The surface roughness of the detector head mounting surface is Rmax = 12.5S. Note 4: "M" refers to the machine guide.
Note 5: When mounting the reference plate (reference plate W), adjust the plate so that the parallelism between the corresponding scale abutting surface and the machine guide is 0.01mm or less.

Main Specifications [BL57-RE]

Model		F	G	H
Output signal form		A/B quadrature output		Analog output
Detection principle		Diffraction grating scanning system		
Scale length (Low expansion glass)	Measuring length	30, 60, 110, 160, 210, 260, 310, 360, 410 mm		
	Max. travel	Measuring length + 10mm (5mm on each side)		
	Overall length	Measuring length + 36mm		
Scale length (Soda-lime glass)	Measuring length	60, 160, 260, 360, 460, 560, 660, 760, 860, 960, 1060 mm		
	Max. travel	Measuring length +10mm (5mm on each side)		
	Overall length	Measuring length + 36mm		
Grating pitch		1.6μm		
Signal pitch		0.4μm (400nm)		
Output signal		Differential(compliant with EIA-422)		Differential (only reference point output are compliant with EIA-422)
Resolution		0.1/0.05μm (selectable)	0.02/0.01μm (selectable)	0.4μm (1Vp-p)
Scale accuracy (at 20℃)		±0.5μm(30 to 160mm) / 1.0μm(210 to 360mm) / ±1.5m(410mm or more)		
Thermal expansion coefficient		Low expansion glass:-0.7x10^{-6}/℃ • Soda-lime glass:8x10^{-6}/℃		
Max. response speed		1,500mm/s(0.1μm) 650mm/s(0.05μm)	300mm/s(0.02μm) 120mm/s(0.01μm)	3,000mm/s (Note1)
		Minimum phase difference:38ns	Minimum phase difference:38ns	Max 7.5MHz

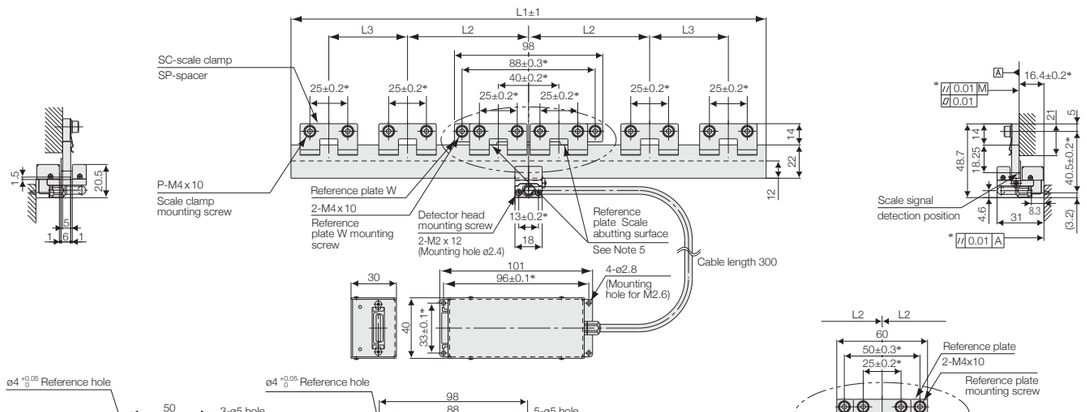
Model		F	G	H
Alarm		High impedance, output when max. response speed is exceeded or signal level error detected		None
Reference point position		User definable (within the range of measuring length)		
Reference point accuracy (at 20℃)		±0.4μm (depending on machine movement accuracy)		
Reference point detection direction		Single direction synchronous reference point		
Head cable	Cable length	1m (Note 4)		
	Bending radius	Static : 10mm		
Output cable length		15m Max (Note 2)(to the electronic control section)		15m Max(Note1) (Note 2)
Power supply (Note 3)		+5V (±5%)		
Power consumption		450mA (no load), 600mA (with 120Ω termination)		
Vibration resistance		100m/s^2 (50 to 2000Hz)		
Impact resistance		200m/s^2		
Operating temperature		0 to +40℃(No condensation)		
Storage temperature		-10 to + 50℃		
Light source		Semiconductor laser : Wavelength 790nm, Output 6mW		
Radiation power		JIS Class 1 equivalent, DHHS Class 1 equnivalent		

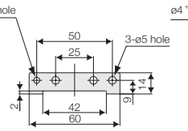
(Note1)

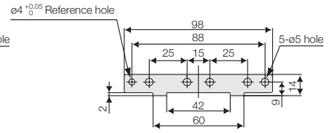
Cable length (m)	Max. response speed (mm/s)
3	3,000
9	2,330
15	1,660

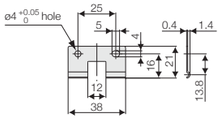
Note 1: Max. response speed become limited by output cable length (the part beyond the interface box).
Note 2: A power supply line longer than 10m is incompatible with EN61000-6-2. Take surge protection measures upon use.
Note 3: Satisfy the required specifications at the connector input section.
Note 4: Special models can support up to 3m. However, the max. response speed is limited depending on the cable length.(In a 3m cable, the max. response speed is two-thirds that of a 1m cable.)
Note 5: Special models can support a measuring length of 420mm to 560mm by low expansion glass and 1,070mm to 1,260mm by soda-lime glass.

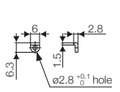
● BL57-xxxNE∗B (Measuring length : 60/160/260/360/460 mm)

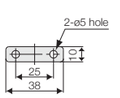










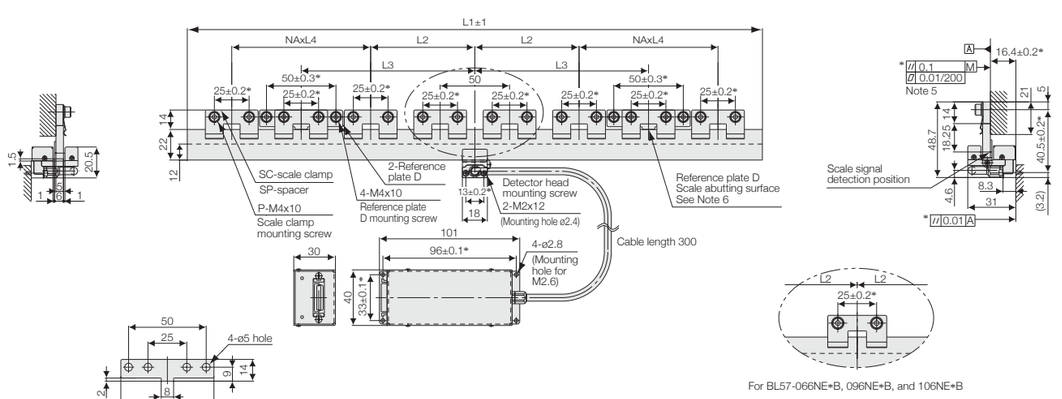


Model	Measuring length	L1	L2	L3	SC	SP	P
BL57-006NE∗B	60	96	—	—	2	—	4
BL57-016NE∗B	160	196	75	—	3	2	6
BL57-026NE∗B	260	296	120	—	4	2	8
BL57-036NE∗B	360	396	75	75	5	4	10
BL57-046NE∗B	460	496	120	75	6	4	12

Unit: mm

Note 1: The items marked by an asterisk indicate the machining dimensions on the mounting surface. Note 2: The surface roughness of the scale mounting surface is Rmax = 6.3S.
Note 3: The surface roughness of the detector head mounting surface is Rmax = 12.5S. Note 4: "M" refers to the machine guide.
Note 5: When mounting the reference plate (reference plate W), adjust the plate so that the parallelism between the corresponding scale abutting surface and the machine guide is 0.01mm or less.

● BL57-xxxNE∗B (Measuring length : 560/660/760/860/960/1060 mm)



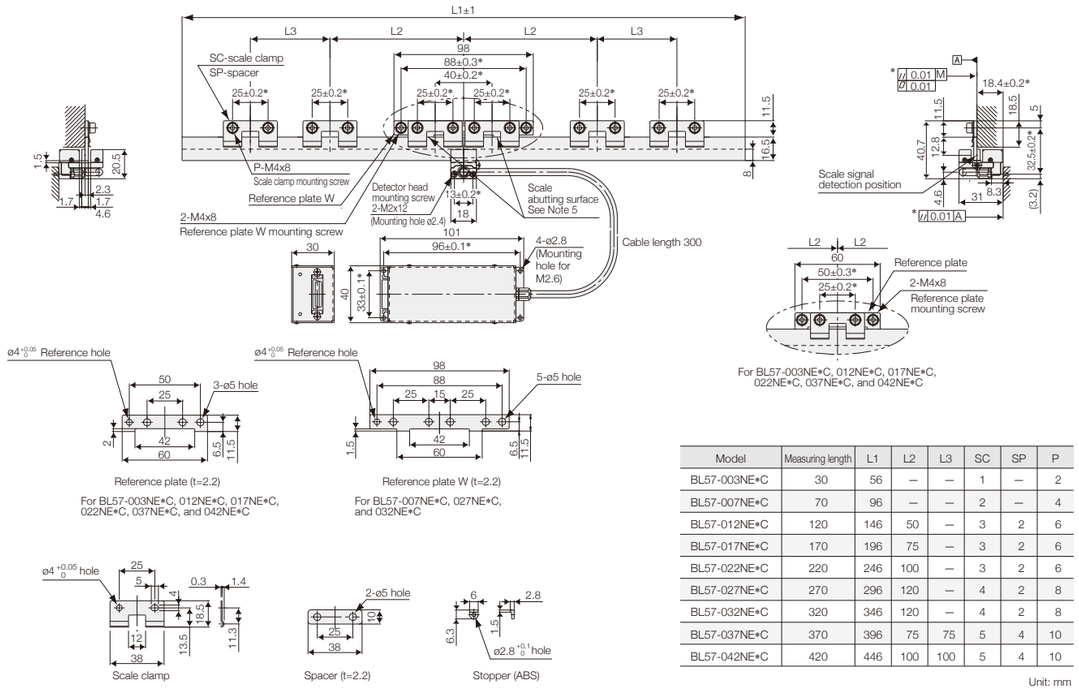
Model	Measuring length	L1	L2	L3	L4	NA	SC	SP	P
BL57-056NE∗B	560	596	100	175	75	2	8	6	16
BL57-066NE∗B	660	696	75	225	75	3	9	7	18
BL57-076NE∗B	760	796	100	250	75	3	10	8	20
BL57-086NE∗B	860	896	100	250	75	4	12	10	24
BL57-096NE∗B	960	996	75	300	75	5	13	11	26
BL57-106NE∗B	1060	1096	75	300	75	6	15	13	30

Unit: mm

Note 1: The items marked by an asterisk indicate the machining dimensions on the mounting surface. Note 2: The surface roughness of the scale mounting surface is Rmax = 6.3S.
Note 3: The surface roughness of the detector head mounting surface is Rmax = 12.5S. Note 4: "M" refers to the machine guide.
Note 5: The flatness of the scale mounting surface must be within 0.02 over the range of 7 (width)×200 (length)mm.
Note 6: Mount and adjust the paired reference plates (D) so that their reference surfaces have a parallelism of 0.1 or less with respect to the machine guide.

External Dimensions

● **BL57-xxxNE∗C (Measuring length : 30/70/120/170/220/270/320/370/420 mm)**



Model	Measuring length	L1	L2	L3	SC	SP	P
BL57-003NE∗C	30	56	—	—	1	—	2
BL57-007NE∗C	70	96	—	—	2	—	4
BL57-012NE∗C	120	146	50	—	3	2	6
BL57-017NE∗C	170	196	75	—	3	2	6
BL57-022NE∗C	220	246	100	—	3	2	6
BL57-027NE∗C	270	296	120	—	4	2	8
BL57-032NE∗C	320	346	120	—	4	2	8
BL57-037NE∗C	370	396	75	75	5	4	10
BL57-042NE∗C	420	446	100	100	5	4	10

Unit: mm

Note 1: The items marked by an asterisk indicate the machining dimensions on the mounting surface. Note 2: The surface roughness of the scale mounting surface is Rmax = 6.3S.
Note 3: The surface roughness of the detector head mounting surface is Rmax = 12.5S. Note 4: "M" refers to the machine guide.
Note 5: When mounting the reference plate (reference plate W), adjust the plate so that the parallelism between the corresponding scale abutting surface and the machine guide is 0.01mm or less.

Main Specifications[BL57-NE]

Model		A	F	G	H
Output signal form		A/B quadrature output			Analog output
Detection principle		Diffraction grating scanning system			
Scale length (Low expansion glass)	Measuring length	30, 70, 120, 170, 220, 270, 320, 370, 420 mm			
	Max. travel	Measuring length +10mm (5mm on each side)			
	Overall length	Measuring length + 26mm			
Scale length (Soda-lime glass)	Measuring length	60, 160, 260, 360, 460, 560, 660, 760, 860, 960, 1060 mm			
	Max. travel	Measuring length +10mm (5mm on each side)			
	Overall length	Measuring length + 36mm			
Grating pitch		1.6µm			
Signal pitch		0.4µm (400nm)			
Output signal		Differential (compliant with EIA-422)			Differential
Resolution		0.1µm	0.1/0.05µm (selectable)	0.02/0.01µm (selectable)	0.4µm (1Vp-p)
Scale accuracy (at 20℃)		±0.5µm (30 to 170mm)/ 1.0µm (220 to 370mm)/ ±1.5µm (420mm or more)			
Thermal expansion coefficient		Low expansion glass: -0.7 x 10^{-6}/℃・Soda-lime glass:8 x 10^{-6}/℃			
Max. response speed		1,000mm/s	1,500mm/s (0.1µm) 650mm/s(0.05µm)	300mm/s(0.02µm) 120mm/s(0.01µm)	3,000mm/s (Note 1)
		Minimum phase difference:80ns	Minimum phase difference:38ns	Minimum phase difference:38ns	Max 7.5MHz

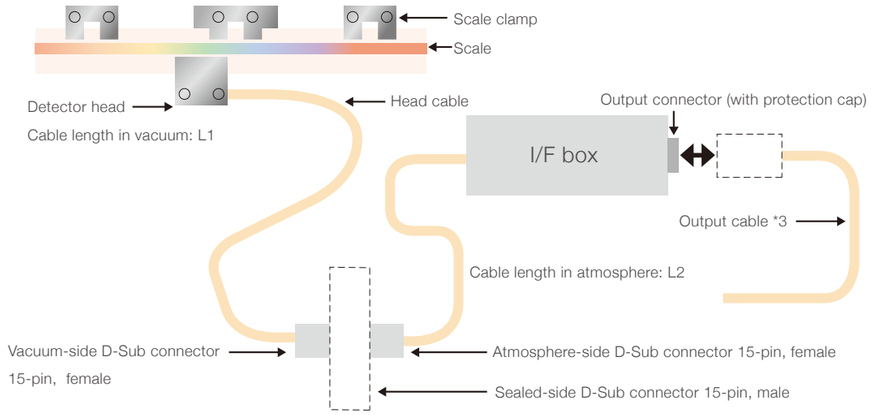
Model		A	F	G	H
Alarm		High-impedance A/B quadrature output signals when signal level error detected.	High-impedance output when max. response speed exceeded or signal level error detected.		None
Head cable	Cable length	300mm			
	Bending radius	Static: 10mm			
Output cable length		15m Max (Note 2) (to the electronic control section)			15m Max (Note 1) (Note 2)
Power supply (Note 3)		+5V (+10%-5%)	+5V (±5%)		
Power consumption		200 mA (no load) 250 mA (with 120Ω termination)	290mA (no load) 350mA (with 120Ω termination)		250 mA (no load,with 120Ω termination)
Vibration resistance		100m/s²(50 to 2000Hz)			
Impact resistance		200m/s²			
Operating temperature		0 to +40℃(no condensation)			
Storage temperature		-10 to + 50℃			
Light source		Semiconductor laser : Wavelength 790nm, Output 6mW			
Radiation power		JIS Class 1 equivalent, DHHS Class 1 equivalent			

(Note 1)

Cable length (m)	Max. response speed (mm/s)
3	3,000
9	2,330
15	1,660

Note 1: Max. response speed become limited by output cable length (the part beyond the interface box).
Note 2: A power supply line longer than 10m is incompatible with EN61000-6-2.Take surge protection measures upon use.
Note 3: Satisfy the required specifications at the connector input section.

BL57-RE supporting vacuum environment (Special models)



Vacuum-compatible, open type with reference point. Allowing ultra-precise positioning in a vacuum environment.

- Ultimate vacuum of 10^{-5} Pa class.
- Emitted gas flow rate of 10^{-6} Pa・m^3 class.
- Signal pitch 0.4µm
- Built-in reference point.

Applications: Semiconductor inspection systems, length measuring SEM.

*1: For dimensions of head, scale, and I/F box, see the page on BL57-RE. *2: Cable length in vacuum and in atmosphere (L1 + L2) is up to 3m.
*3: Output cable is not included in the product.

Outgas analysis chart