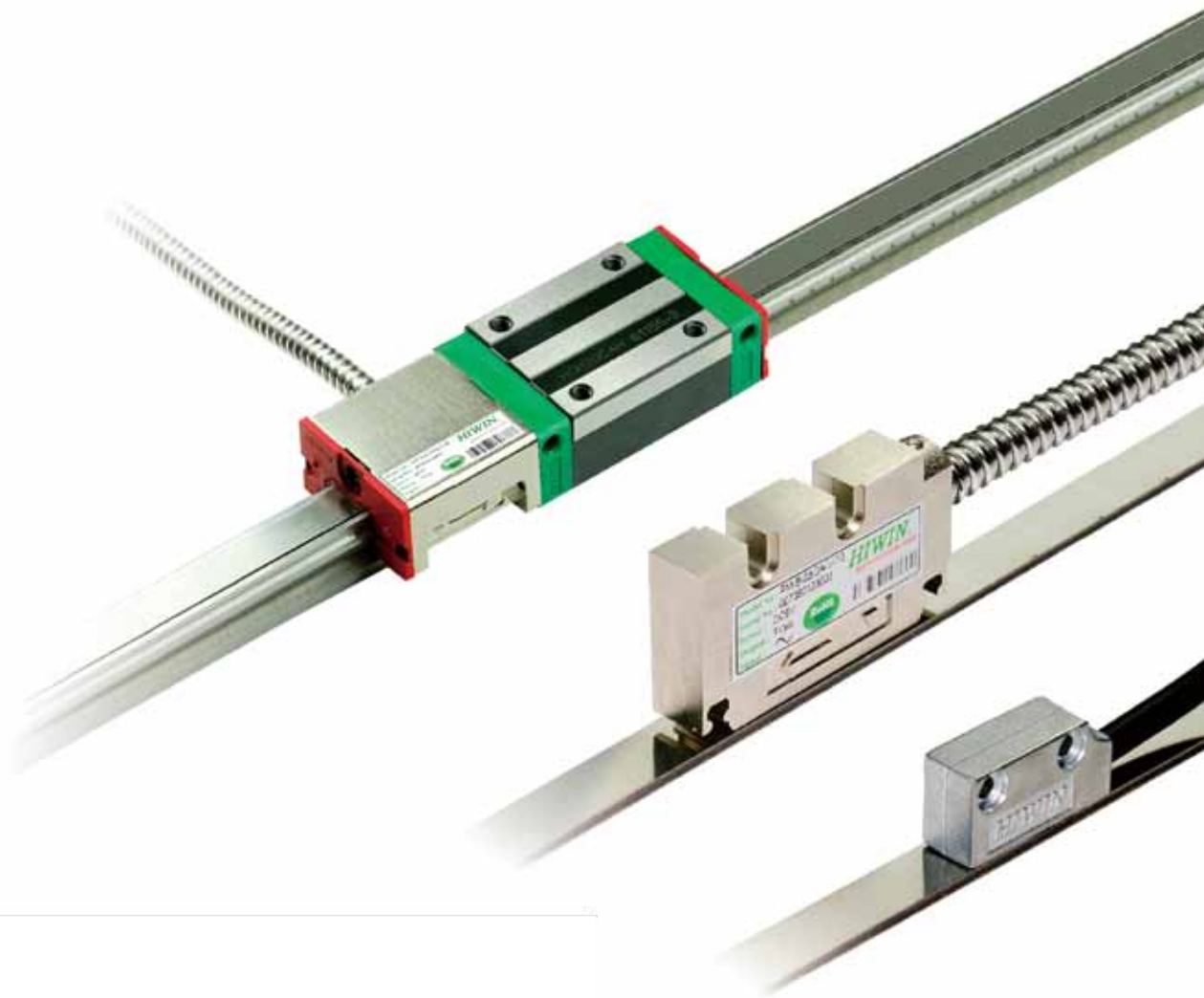


# Positioning Measurement System



Technical Information



**Multi Axis Robot**

- Pick-and-place / Assembly / Grinding and Polishing / Semiconductor / Light Industry / Automotive industry / Food industry
- Articulated Robot
  - Delta Robot
  - Movable Delta Robot
  - SCARA Robot
  - Wafer Robot
  - Electric Gripper



**Single Axis Robot**

- Precision / Semiconductor / Medical / FPD
- KK, SK
  - KS, KA
  - KU, KE



**Medical Equipment**

- Hospital / Rehabilitation centers / Nursing homes
- Robotic Gait Training System
  - Hygiene System
  - The Robotic Endoscope Holder
  - Robot for Upper Limb Exercise



**Ball screw**

- Precision Ground / Rolled
- Super S series
  - Super T series
  - Mini Roller
  - Ecological & Economical Lubrication Module E2
  - Rotating Nut (R1)
  - Energy-Saving & Thermal-Controlling (C1)
  - Heavy Load Series (RD)



**Linear Guideway**

- Automation / Semiconductor / Medical
- Ball Type--HG, EG, WE, MG, PM
  - Quiet Roller Type--QH, QE, QW, QR
  - Other--RG, E2, PG, SE, RC



**Direct Drive CNC Tilting Rotary**

- Aerospace / Medical / Auto industry
- RAB-800
  - RAB-500



**Bearing**

- Machine tools / Robot
- Crossed Roller Bearings
  - Ball Screw Bearings
  - Linear Bearing
  - Support Unit



**AC Servo Motor & Drive**

- Semiconductor / Packaging machine / SMT / Food industry / LCD
- Drives-D1, D1-N, D2
  - Motors-400W-2000W



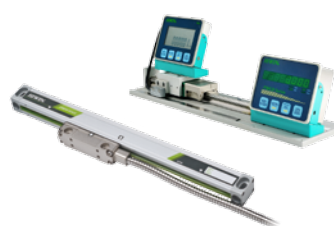
**Torque Motor (Direct Drive Motor)**

- Inspection / Testing equipment / Machine tools/ Robot
- Rotary Tables-TMS,TMY,TMN
  - TMR Series



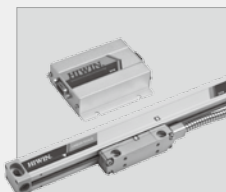
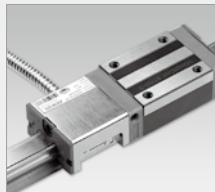
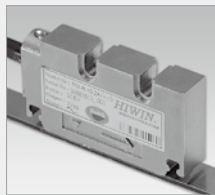
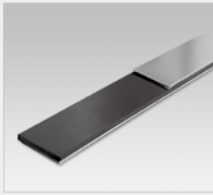
**Linear Motor**

- Automated transport / AOI application / Precision / Semiconductor
- With Iron-core
  - Coreless Type
  - Linear Turbo LMT
  - Planar Servo Motor
  - Air Bearing Platform
  - X-Y Stage
  - Gantry Systems



**Positioning Measurement System**

- Cutting machines / Traditional gantry milling machines / Programmable drilling machines
- High Resolution
  - Signal Translator
  - High-precision Enclosed
  - High Efficiency Counter



## I. High Resolution Positioning Measurement System

- 1. Positioning Scale ..... 1
- 2. Positioning Measurement - Tiny Type ..... 2
- 3. Positioning Measurement - Standard Type ..... 5
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## IV. High Efficiency Counter

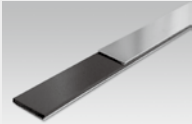




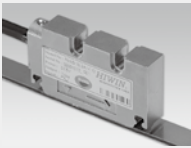






- 1. Micro LCD counter ..... 27
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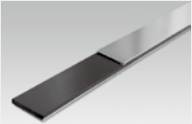




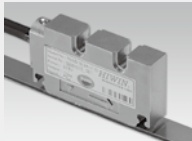






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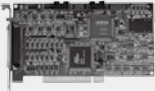


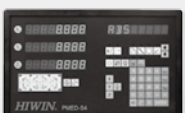


The Component Breakdown of the Positioning Measurement System - 1mm Placement Figure (Analog)

Pole Pitch	Refer Page	Resolution	Encoder Type	Refer Page	Signal	Type of Connector
1mm PS-B-□□□□□ 	Page 1	1μm	<b>T Type</b> PM-B-□□-□A-T-□□ 	Page 2	Analog	<b>Flying Lead</b> 
			<b>Standard Type</b> PM-B-□□-□A-S-□□ 			<b>D-sub VGA 15 Pin</b> 
			<b>Vertical Type</b> PM-B-□□-□A-V-□□ 	Page 5		<b>D-sub 15 Pin</b> 
			<b>PG Type</b> PM-B-□□-□A-G-□□-□□ 	Page 11		<b>17 Pin Circular Plug</b> 
				Page 8		<b>SCSI 14 Pin</b> 
						<b>SCSI 14 Pin(with screw)</b> 
						<b>SCSI 20 Pin</b> 






Translator	Refer Page	Trunk Connector	Refer Page	Counter/Display Application	Refer Page
				<p>High Efficiency Single Axis Counter                      PMED-H1-1-00-□</p> 	Page 29
		<p>Hiwin Drive</p> 		<p>Linear Motors                      (HIWIN LM)</p> 	

The Component Breakdown of the Positioning Measurement System - 1mm Placement Figure (Digital)








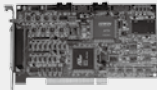
Pole Pitch	Refer Page	Resolution	Encoder Type	Refer Page	Signal	Type of Connector
1mm PS-B-□□□□□ 	Page 1	1μm	<b>T Type</b> PM-B-□□-□D-T-□□ 	Page 2	Digital	<b>Flying Lead</b> 
			<b>Standard Type</b> PM-B-□□-□D-S-□□ 	Page 5		<b>D-sub VGA 15 Pin</b> 
			<b>Vertical Type</b> PM-B-□□-□D-V-□□ 	Page 11		<b>D-sub 15 Pin</b> 
			<b>PG Type</b> PM-B-□□-□D-G-□□-□□ 	Page 8		<b>17 Pin Circular Plug</b> 
						<b>SCSI 14 Pin</b> 
						<b>SCSI 14 Pin(with screw)</b> 
						<b>SCSI 20 Pin</b> 

	Counter/Display Application	Refer Page
	<p>PLC \ Drive \ Controller</p> 	
 <p>Hiwin Drive</p>	<p>High Efficiency Single Axis Counter PMED-H1-1-00-□</p> 	Page 29
	<p>High Efficiency Multi-axis Counter PMED-S4-□-□</p> 	Page 34
	<p>Multi-axis Counter PMED-S3-□-□</p> 	Page 32
	<p>Linear Motors (HIWIN LM)</p> 	

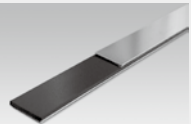
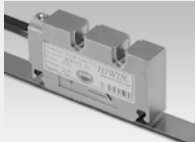




The Component Breakdown of the Positioning Measurement System - 5mm Placement Figure (Analog)

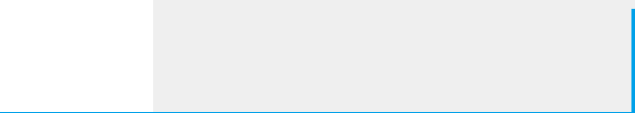
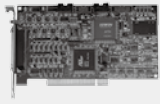
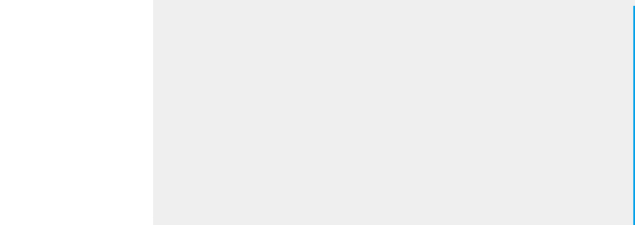

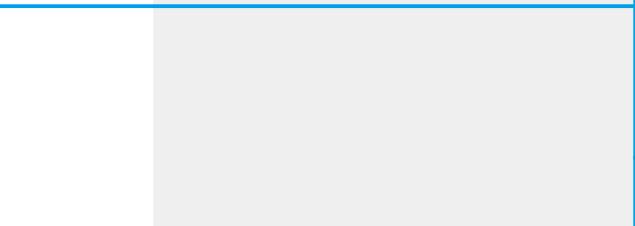


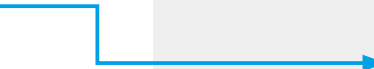

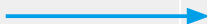

Pole Pitch	Refer Page	Resolution	Encoder Type	Refer Page	Signal	Type of Connector
5mm PS-A-□□□□□	Page 1	5μm	<b>E Type</b> PM-A-□□-□A-E-00 	Page 16	Analog	D-sub VGA 15 Pin 
			<b>H Type</b> PM-A-□□-□A-H-□□ 	Page 18		SCSI 14 Pin  SCSI 14 Pin (with screw) 



Translator	Refer Page	Trunk Connector	Refer Page	Counter/Display Application	Refer Page
				<b>Micro LCD Counter</b> UPLD-A-□□-□-□□ 	Page 27
				<b>LCD Counter System</b> PMLD-A-□□-□-□□ 	Page 29
				<b>High Efficiency Single Axis Counter</b> PMED-H1-1-A1-□ 	Page 31
			Page 21	<b>High Efficiency Multi-axis Counter</b> PMED-S4-□-□ 	Page 36
<b>Translator</b> ST-A-□□ 	Page 20	<b>D-sub 9 Pin to D-sub VGA 15 Pin</b> STC-□□-00-□ 		<b>Multi-axis Counter</b> PMED-S3-□-□ 	Page 34
				<b>PLC \ Drive \ Controller</b> 	

The Component Breakdown of the Positioning Measurement System - 5mm Placement Figure (Digital)

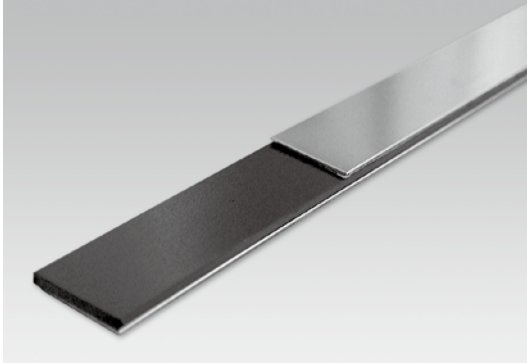
Pole Pitch	Refer Page	Resolution	Encoder Type	Refer Page	Signal	Type of Connector
<p>5mm PS-A-□□□□□</p> 	<p>Page 1</p>	<p>5µm</p>	<p>Vertical Type PM-A-□□-□D-V-□□</p> 	<p>Page 11</p>	<p>Digital</p>	<p>Flying Lead </p> <p>D-sub VGA 15 Pin </p> <p>D-sub 15 Pin </p> <p>SCSI 20 Pin </p>

	Counter/Display Application	Refer Page
	<p>PLC \ Drive \ Controller</p> 	
	<p>High Efficiency Multi-axis Counter PMED-S4-□-□</p> 	Page 34
	<p>Multi-axis Counter PMED-S3-□-□</p> 	Page 32
	<p>High Efficiency Single Axis Counter PMED-H1-1-00-□</p> 	Page 29
 <p>Hiwin Drive</p>  	<p>Linear Motors (HIWIN LM)</p> 	



# I. High Resolution Positioning Measurement System

## 1. Positioning Scale



### Features:

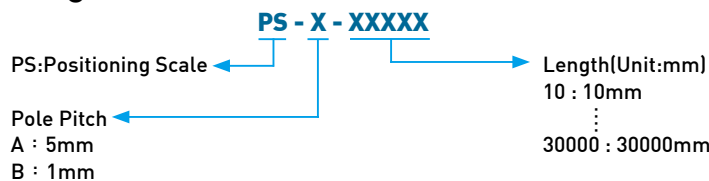
- Compatible with various measurement instruments to achieve different accuracy requirements.
- Magnetic scale can maintain performance under severe ambient conditions caused by oil, water or dust to gain required accuracy and signal feedback.



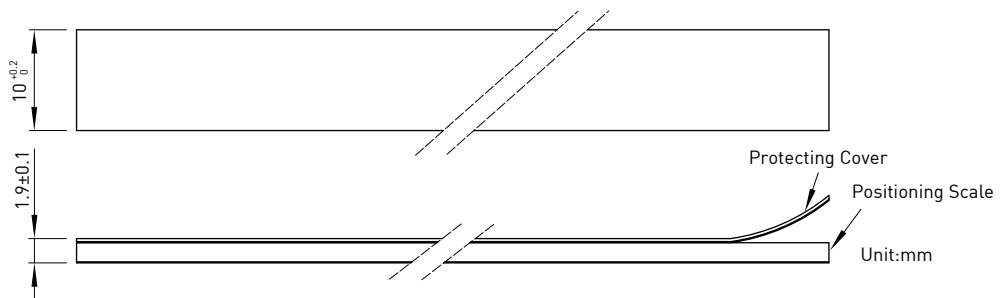
### 1.1 Specifications:

Pole pitch	1mm	5mm
Accuracy@20°C	$\pm 20 \mu\text{m/m}$	$\pm (80+15xL) \mu\text{m}$ (L : Length(Unit: m))
Width	10mm (0mm~+0.2mm)	
Thickness	1.9mm ( $\pm 0.1\text{mm}$ )	
Maximum scale length	24m	30m
Coefficient of linear thermal expansion	$(11 \pm 1) \times 10^{-6} \text{m/K}$	
Working temperature	0°C~50°C	
Storage temperature	-5°C~70°C	
Protection class	IP67	

### 1.2 Ordering Code:



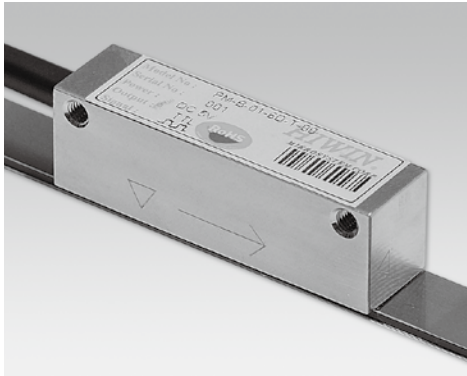
### 1.3 Dimensions:



#### Caution!

1. Magnetic scale consists of magnetic substance and should be kept away from strong magnetic field during installation to prevent a malfunction.
2. Please leave the magnetic field strength 5000 gauss at least 5cm, to prevent the position measurement system from disruption.

## 2. Positioning Measurement- Tiny Type



### Features:

- Tiny shape
- Digital or analog output available
- Simple design and easy-mounting
- Same installation holes as other optical encoders, easy to switch and replace
- Resolution up to 1  $\mu$ m.
- Repeatability up to  $\pm 2 \mu$ m.
- Available gap up to 0.4mm.



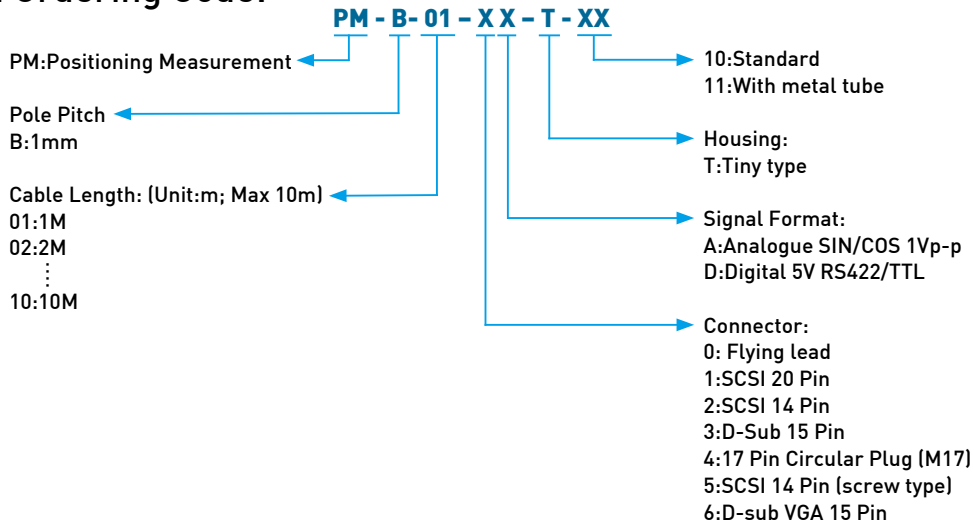
### 2.1 Specifications:

Pole Pitch	1mm	
Available gap <sup>(1)</sup>	0.4mm	
Signal format	Analogue	Digital
Output signal	SIN/COS 1Vp-p	5V TTL/RS422
Resolution	1mm	1 $\mu$ m
Repeatability <sup>(2)</sup>	$\pm 3\mu$ m	$\pm 2\mu$ m
Reference signal	1 mm/pulse	
Maximum travel speed	10m/sec	5m/sec
Input voltage	5VDC $\pm 5\%$	
Operating temperature	0 $^{\circ}$ C~50 $^{\circ}$ C	
Storage temperature	-5 $^{\circ}$ C~70 $^{\circ}$ C	
Protection class	IP67	

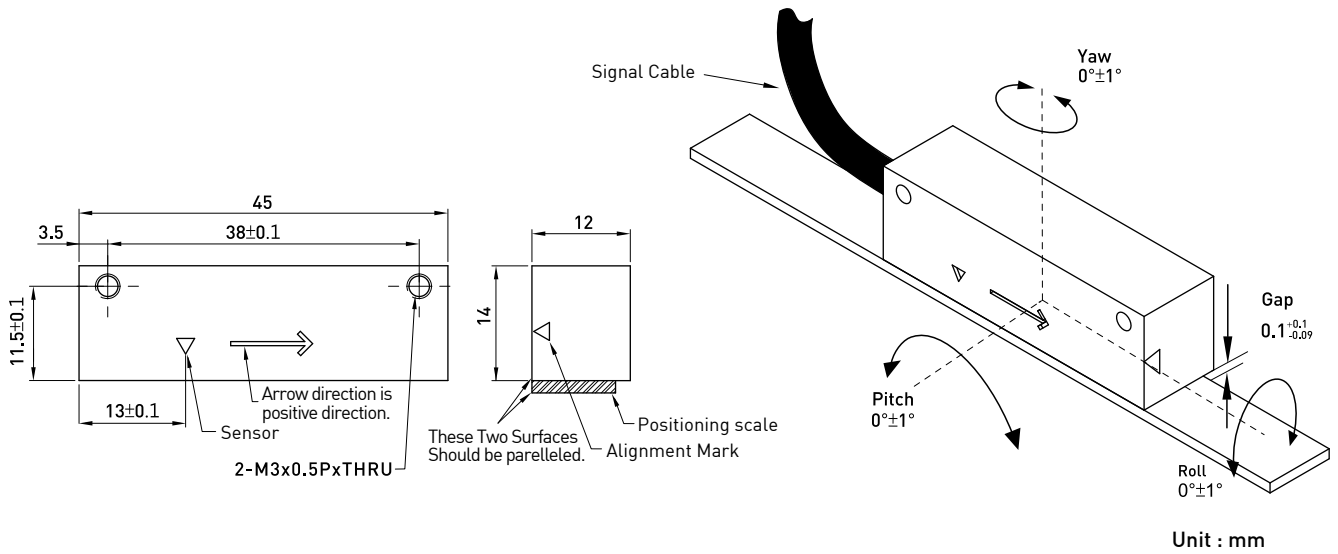
Note: (1) Please refer Chap 2.7 for Gap-Repeatability relationship.

(2) The data were measured while gap is 0.1mm.

### 2.2 Ordering Code:



### 2.3 Dimensions:

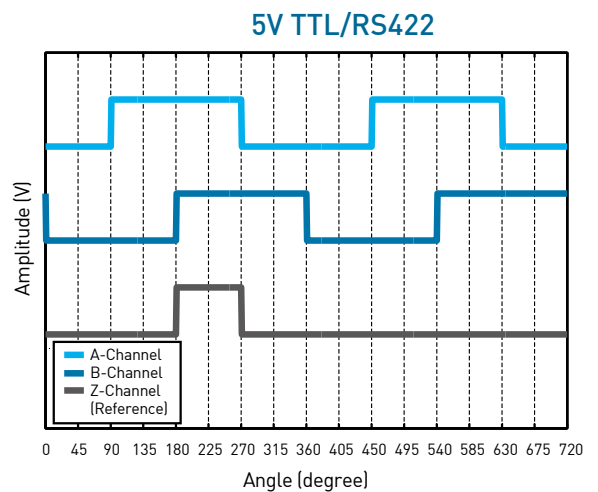
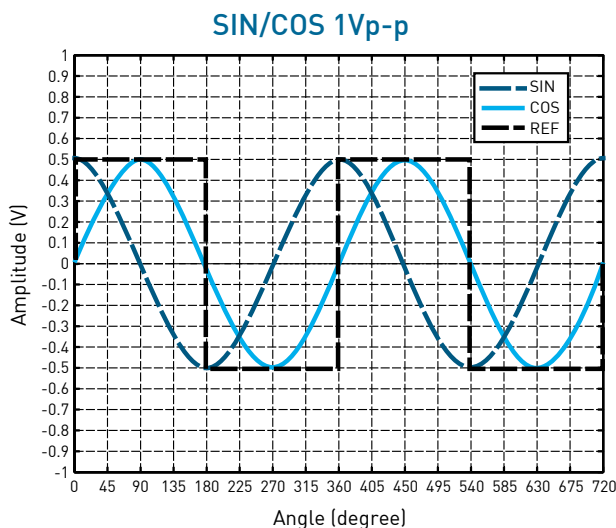


### 2.4 Pin Assignment:

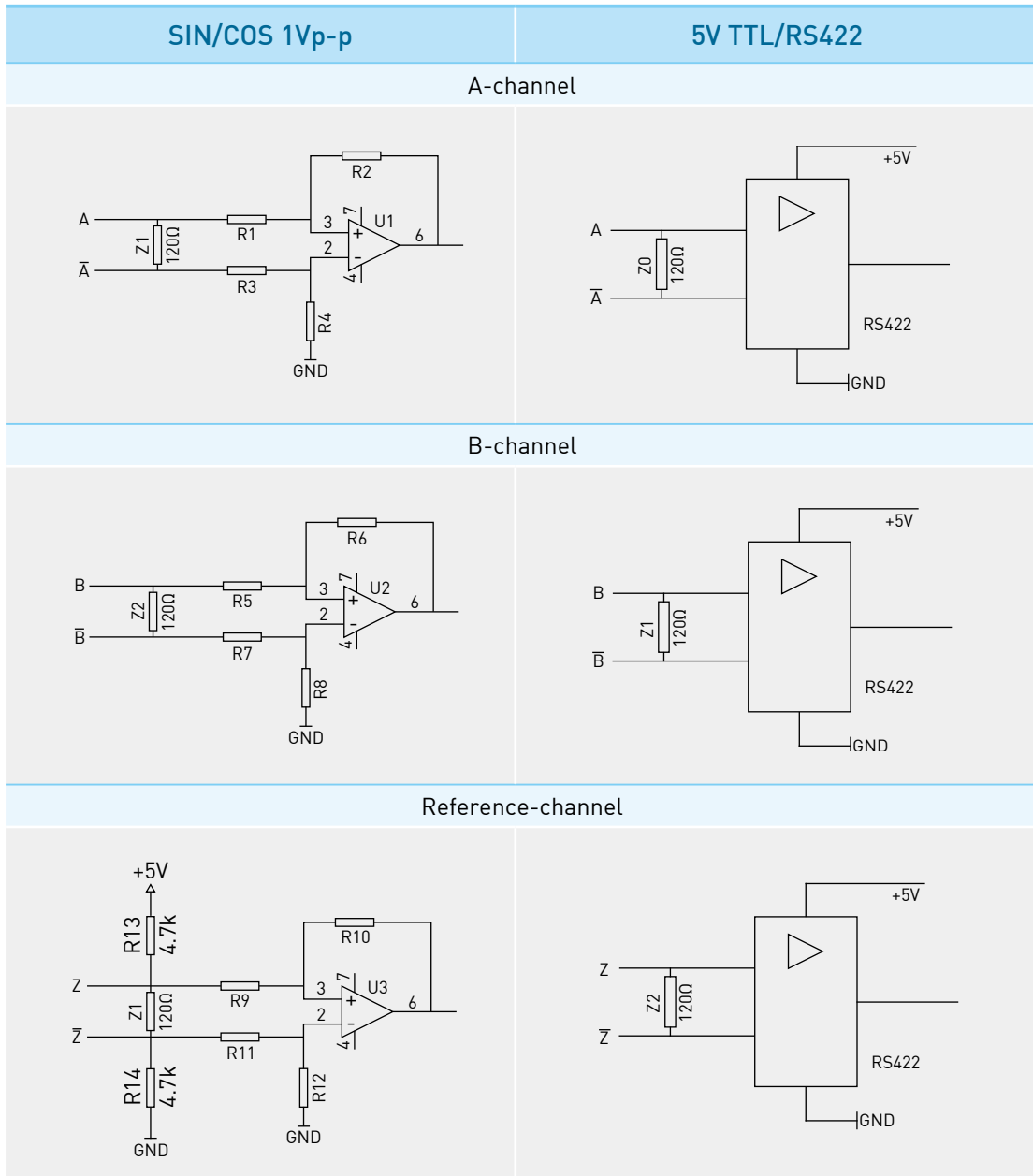
Function	Signal		Color	Connector (male) (SCSI 14 Pin) Analogue	Connector (male) (SCSI 20 Pin)		Connector (male) (D-Sub 15 Pin)		Connector (male) <sup>(1)</sup> (17 Pin Circular Plug)	Connector (male) (D-Sub VGA 15 Pin)		Flying Lead
	Analogue	Digital		Analogue	Digital	Analogue	Digital	Analogue	Digital	Analogue	Digital	
Power	5VDC		Brown	1	3	3	4	7	4/5	1	1	Brown
	GND		White	8	2	2	12	2	12/13	2	2	White
Output Signal	SIN+	A+	Green	10	16	4	9	14	9	11	3	Green
	SIN-	A-	Yellow	11	17	5	1	6	1	12	9	Yellow
	COS+	B+	Blue	3	18	6	10	13	10	13	4	Blue
	COS-	B-	Red	4	19	7	2	5	2	14	10	Red
Reference Signal	REF+	Z+	Purple	5	8	8	3	12	3	7	7	Purple
	REF-	Z-	Gray	6	9	9	11	4	11	8	8	Gray
Shield				Case	1/Case		Case		Case	Case		

Note: (1)17 Pin Circular Plug; Brnad: INTERCONTEC; P/N:AKU874MR1087004A000

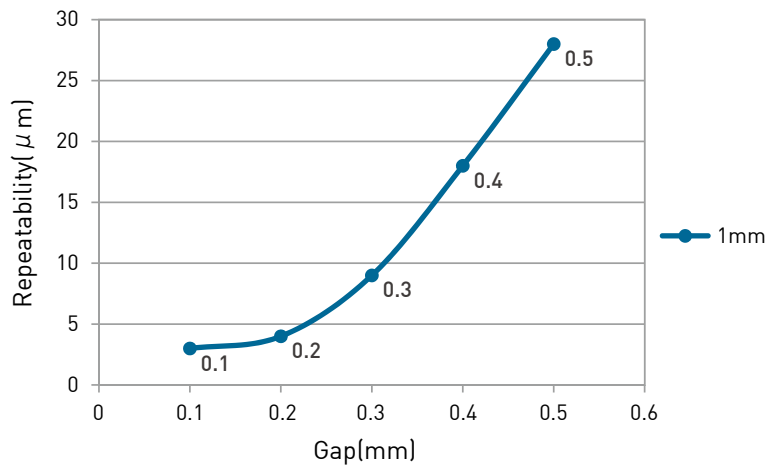
### 2.5 Signal Format:



## 2.6 Recommended Input Circuit:



## 2.7 Gap-Repeatability Relationship:





### 3. Positioning Measurement- Standard Type



#### Features:

- Digital or analog signal output available
- Simple design and easy-mounting
- Same installation holes as other optical encoders, easy to switch and replace
- Waterproof and dustproof
- Optional metal protection tube
- Resolution up to 1 μ m.
- Repeatability up to ± 2 μ m.
- Available gap up to 0.4mm.



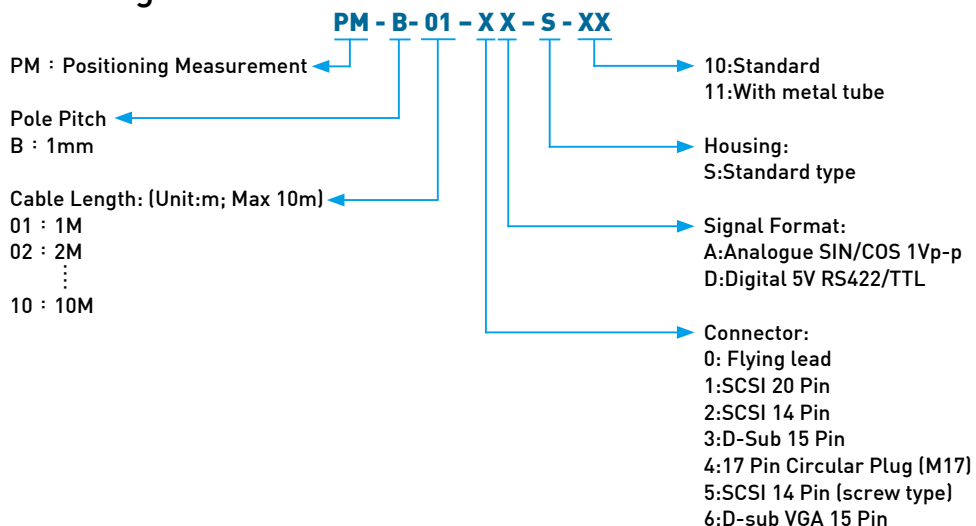
#### 3.1 Specifications:

Pole Pitch	1mm	
Available gap <sup>(1)</sup>	0.4mm	
Signal format	Analogue	Digital
Output signal	SIN/COS 1Vp-p	5V TTL/RS422
Resolution	1mm	1μm
Repeatability <sup>(2)</sup>	±3μm	±2μm
Reference signal	1 mm/pulse	
Maximum travel speed	10m/sec	5m/sec
Input voltage	5VDC ± 5%	
Operating temperature	0°C~50°C	
Storage temperature	-5°C~70°C	
Protection class	IP67	

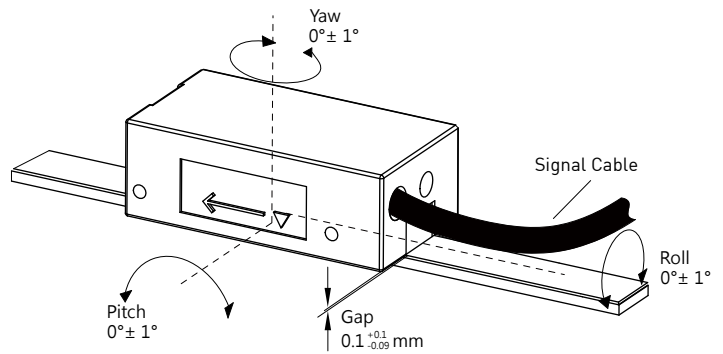
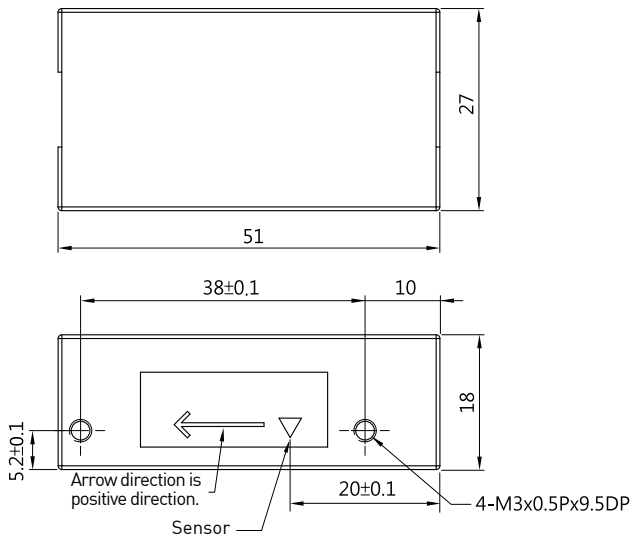
Note: (1) Please refer Chap 3.7 for Gap-Repeatability relationship.

(2) The data were measured while gap is 0.1mm.

#### 3.2 Ordering Code:



### 3.3 Dimensions:



Unit : mm

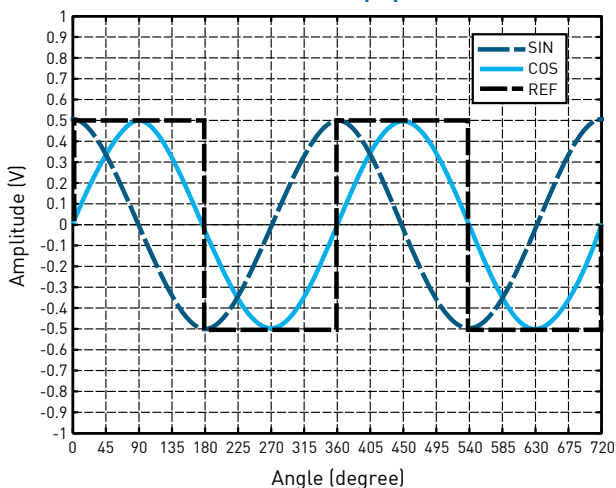
### 3.4 Pin Assignment:

Function	Signal		Color	Connector (male) (SCSI 14 Pin) Analogue	Connector (male) (SCSI 20 Pin)		Connector (male) (D-Sub 15 Pin)		Connector (male) <sup>(1)</sup> (17 Pin Circular Plug)	Connector (male) (D-Sub VGA 15 Pin)		Flying Lead
	Analogue	Digital		Analogue	Digital	Analogue	Digital	Analogue	Digital	Analogue	Digital	
Power	5VDC		Brown	1	3	3	4	7	4/5	1	1	Brown
	GND		White	8	2	2	12	2	12/13	2	2	White
Output Signal	SIN+	A+	Green	10	16	4	9	14	9	11	3	Green
	SIN-	A-	Yellow	11	17	5	1	6	1	12	9	Yellow
	COS+	B+	Blue	3	18	6	10	13	10	13	4	Blue
	COS-	B-	Red	4	19	7	2	5	2	14	10	Red
Reference Signal	REF+	Z+	Purple	5	8	8	3	12	3	7	7	Purple
	REF-	Z-	Gray	6	9	9	11	4	11	8	8	Gray
Shield				Case	1/Case		Case		Case	Case		

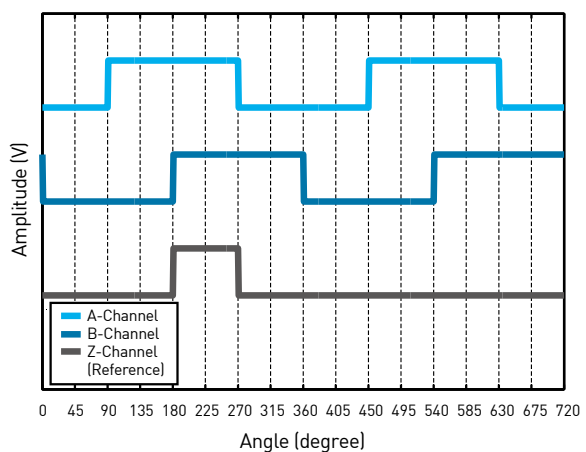
Note: (1)17 Pin Circular Plug; Brnad: INTERCONTEC; P/N:AKU874MR1087004A000

### 3.5 Signal Format:

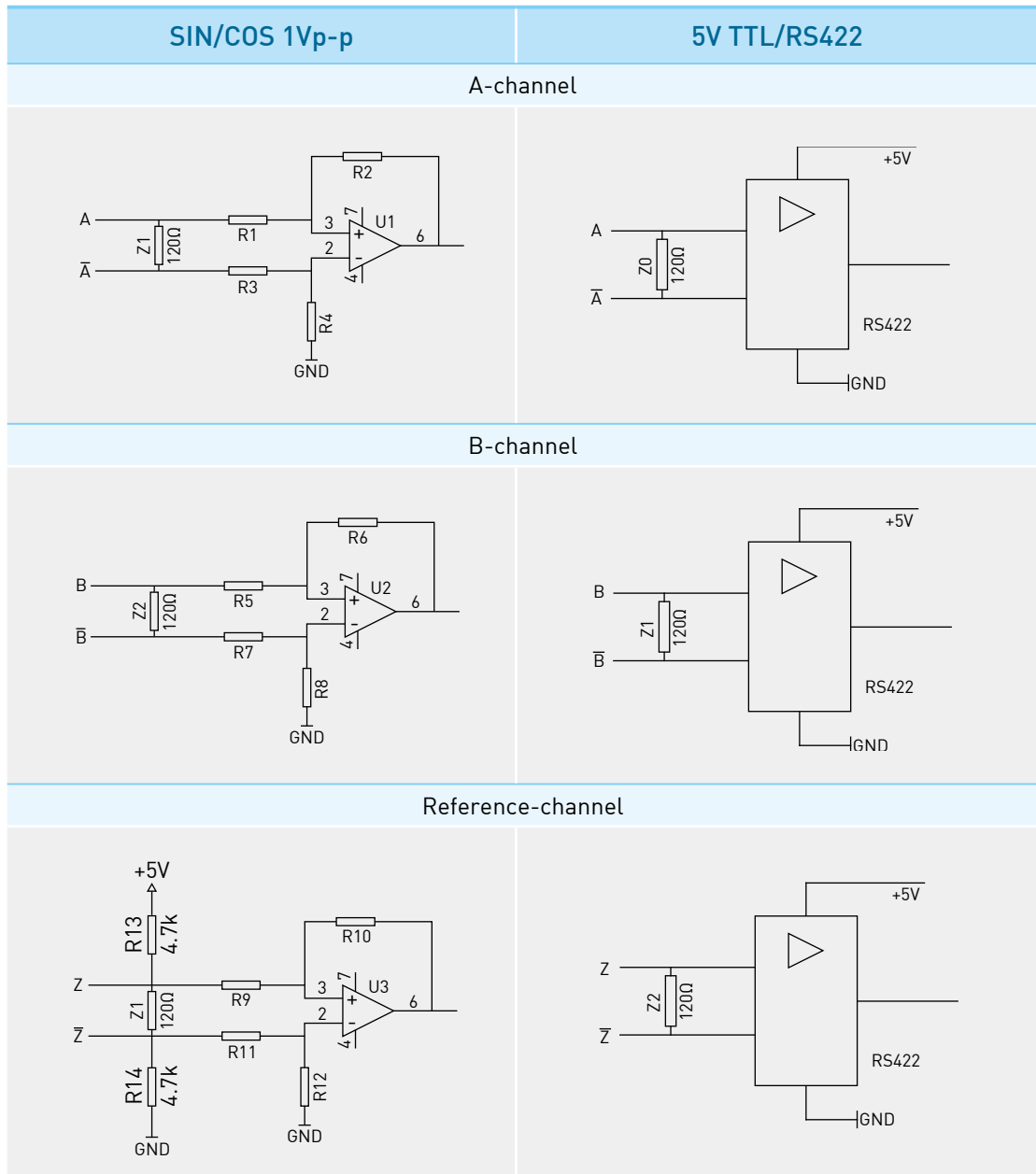
SIN/COS 1Vp-p



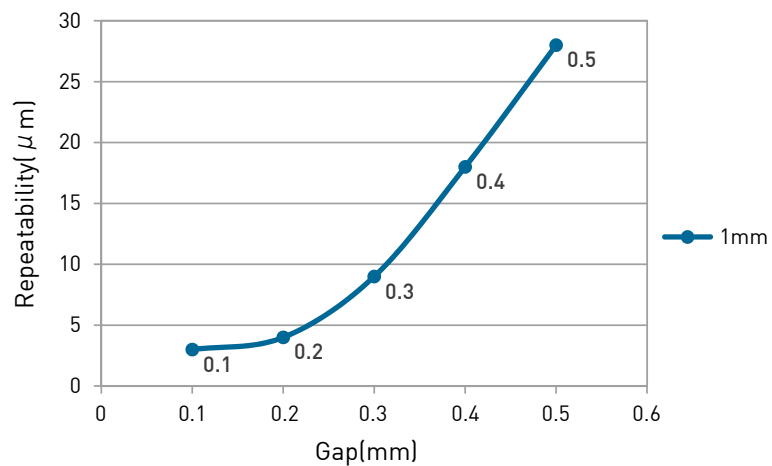
5V TTL/RS422



### 3.6 Recommended Input Circuit:



### 3.7 Gap-Repeatability Relationship:



## 4. Positioning Measurement- PG Type



### Features:

- Digital or analog signal output available
- Compact design and compatible with HIWIN linear guideways
- Cost-effective and reliable
- Optimal solution for automation equipment that requires precise position feedback
- Resolution up to 1  $\mu$  m.
- Repeatability up to  $\pm 2 \mu$  m.
- Available gap up to 0.4mm.



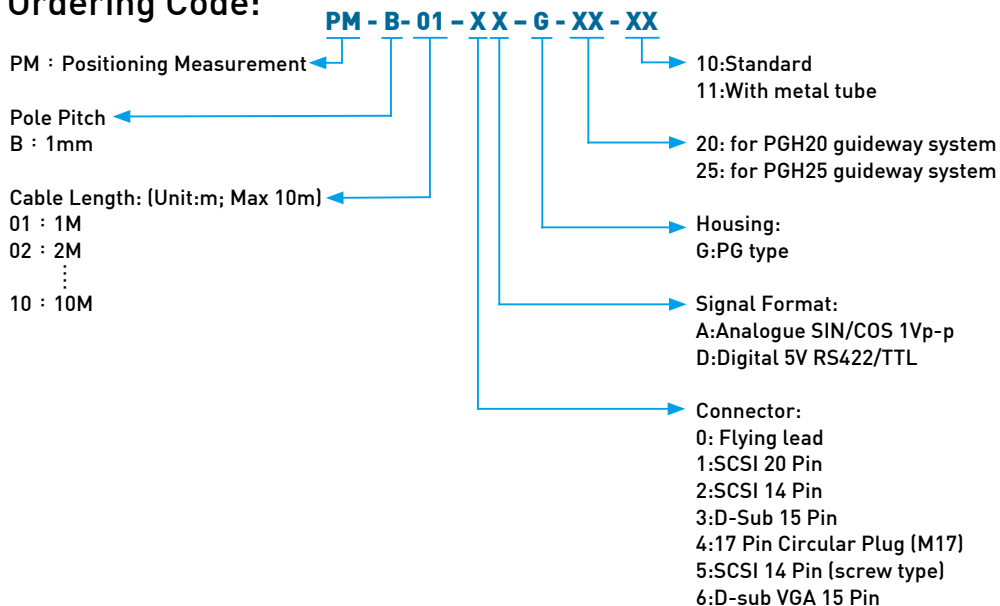
### 4.1 Specifications:

Pole Pitch	1mm	
Available gap <sup>(1)</sup>	0.4mm	
Signal format	Analogue	Digital
Output signal	SIN/COS 1Vp-p	5V TTL/RS422
Resolution	1mm	1 $\mu$ m
Repeatability <sup>(2)</sup>	$\pm 3\mu$ m	$\pm 2\mu$ m
Reference signal	1 mm/pulse	
Maximum travel speed	10m/sec	5m/sec
Input voltage	5VDC $\pm$ 5%	
Operating temperature	0 $^{\circ}$ C~50 $^{\circ}$ C	
Storage temperature	-5 $^{\circ}$ C~70 $^{\circ}$ C	
Protection class	IP67	

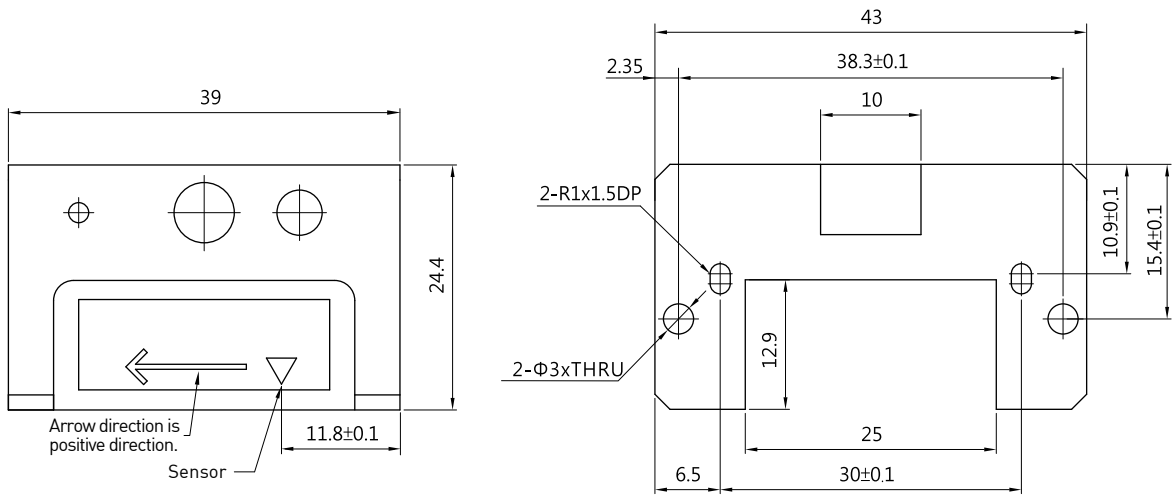
Note: (1) Please refer Chap 4.7 for Gap-Repeatability relationship.

(2) The data were measured while gap is 0.1mm.

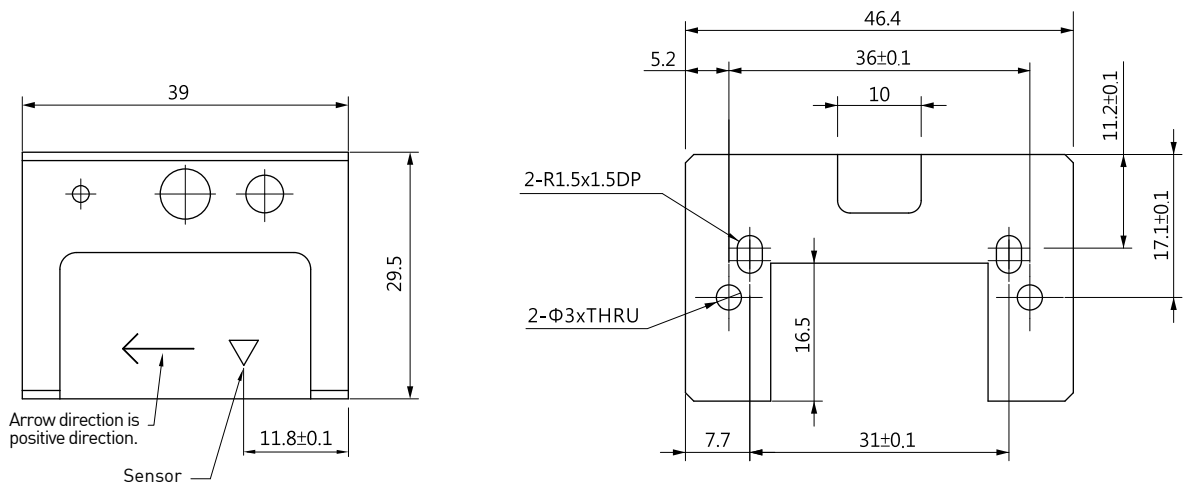
### 4.2 Ordering Code:



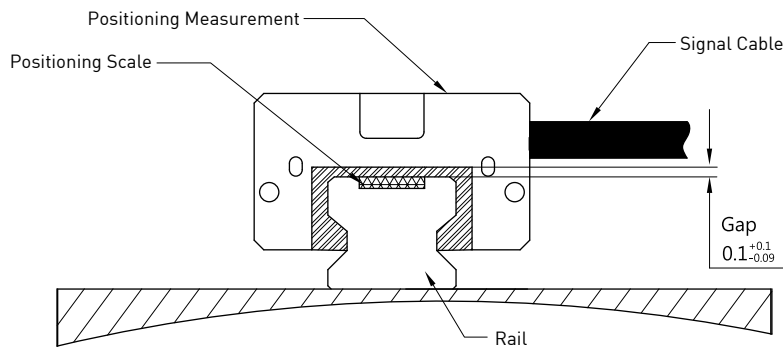
### 4.3 Dimensions:



※ Note: These dimensions are suitable for HIWIN PGH20 linear guideway.



※ Note: These dimensions are suitable for HIWIN PGH25 linear guideway.



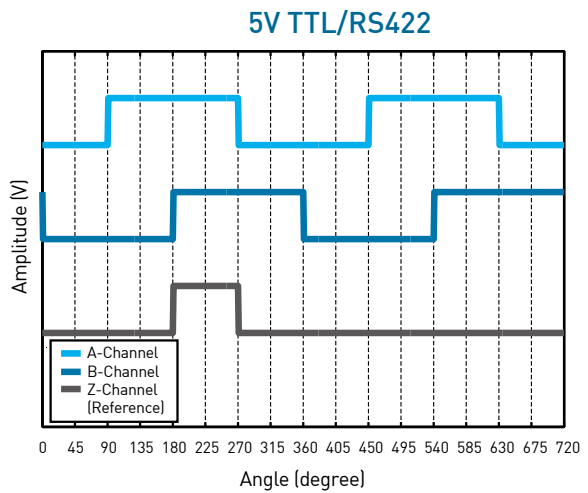
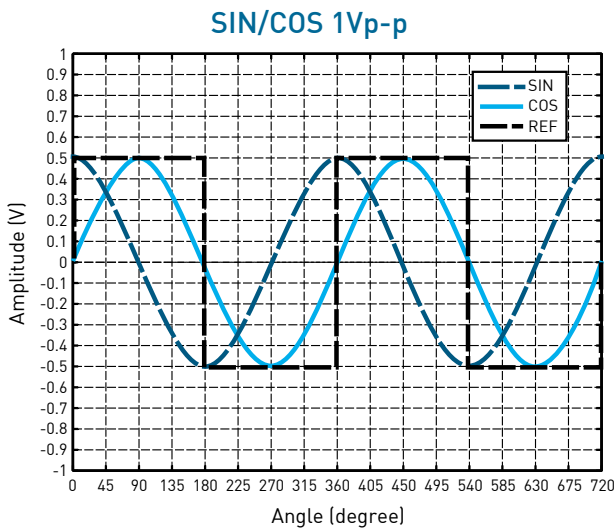
Unit : mm

### 4.4 Pin Assignment:

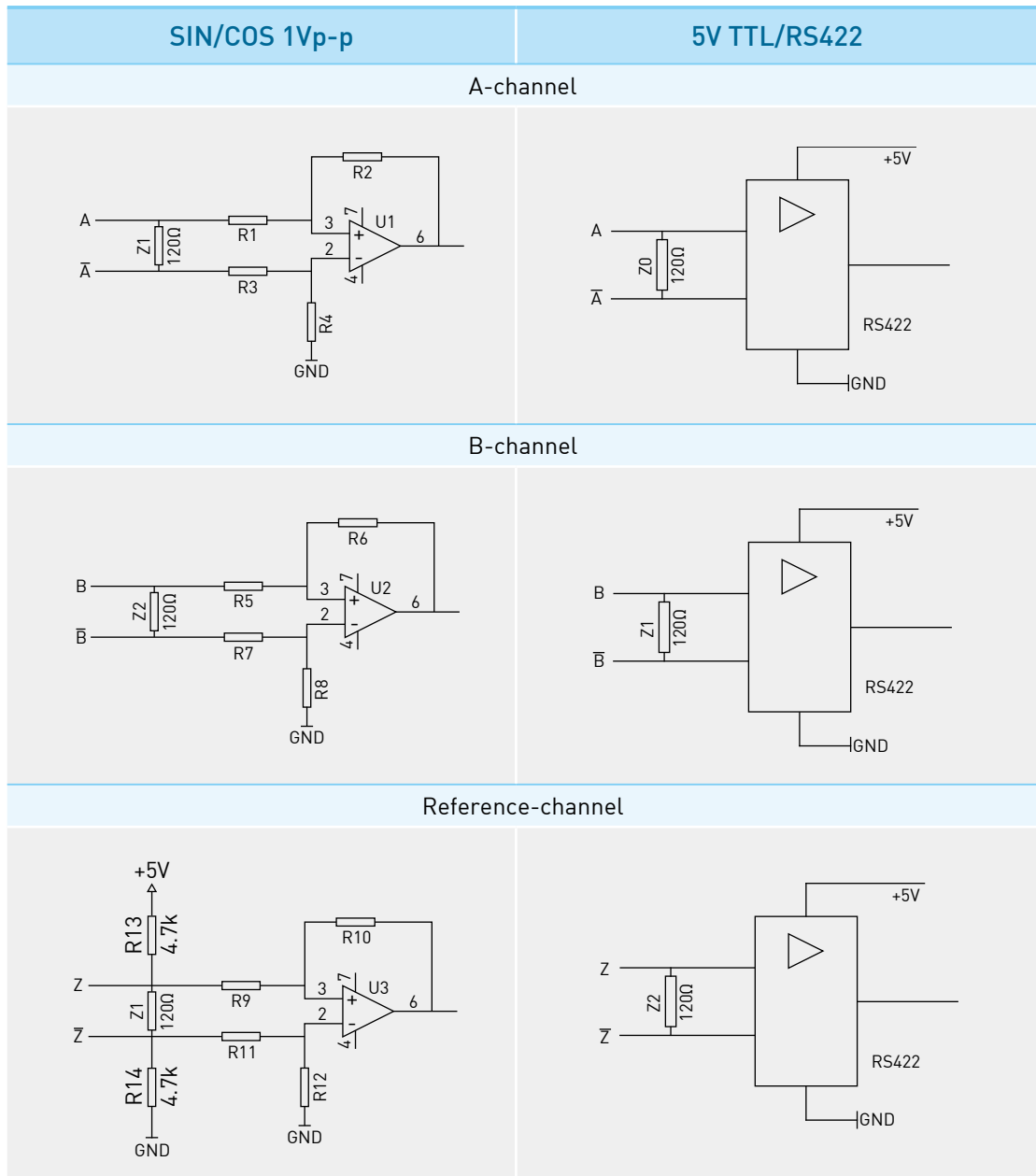
Function	Signal		Color	Connector (male) (SCSI 14 Pin) Analogue	Connector (male) (SCSI 20 Pin)		Connector (male) (D-Sub 15 Pin)		Connector (male) <sup>(1)</sup> (17 Pin Circular Plug)	Connector (male) (D-Sub VGA 15 Pin)		Flying Lead
	Analogue	Digital		Analogue	Digital	Analogue	Digital	Analogue	Digital	Analogue	Digital	
Power	5VDC		Brown	1	3	3	4	7	4/5	1	1	Brown
	GND		White	8	2	2	12	2	12/13	2	2	White
Output Signal	SIN+	A+	Green	10	16	4	9	14	9	11	3	Green
	SIN-	A-	Yellow	11	17	5	1	6	1	12	9	Yellow
	COS+	B+	Blue	3	18	6	10	13	10	13	4	Blue
	COS-	B-	Red	4	19	7	2	5	2	14	10	Red
Reference Signal	REF+	Z+	Purple	5	8	8	3	12	3	7	7	Purple
	REF-	Z-	Gray	6	9	9	11	4	11	8	8	Gray
Shield				Case	1/Case		Case		Case	Case		

Note: (1)17 Pin Circular Plug; Brnad: INTERCONTEC; P/N:AKU874MR1087004A000

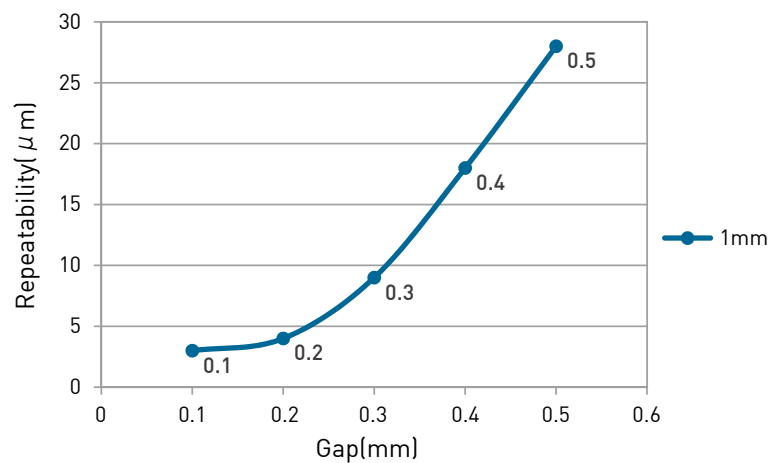
### 4.5 Signal Format:



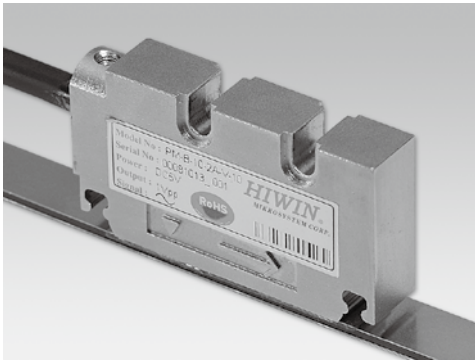
### 4.6 Recommended Input Circuit:



### 4.7 Gap-Repeatability Relationship:



## 5. Positioning Measurement- Vertical Type



### Features:

- Digital or Analog signal output available
- Vertical shape, optimal for space-saving applications
- Optional metal protection tube
- Resolution up to 1  $\mu$  m.
- Repeatability up to  $\pm 2 \mu$  m.
- Available gap up to 4mm.



### 5.1 Specifications:

Pole Pitch	1mm		5mm	
Available gap <sup>(1)</sup>	0.4mm		4mm	
Signal format	Analogue	Digital	Digital	
Output signal	SIN/COS 1Vp-p	5V TTL/RS422	5V TTL/RS422	24V/PP
Resolution <sup>(3)</sup>	1mm	1 $\mu$ m	5 $\mu$ m	5 $\mu$ m
Repeatability <sup>(2)</sup>	$\pm 3\mu$ m	$\pm 2\mu$ m	$\pm 10\mu$ m	$\pm 10\mu$ m
Reference signal	2 mm/pulse	1 mm/pulse	5 mm/pulse	
Maximum travel speed	10m/sec	5m/sec	5m/sec	8m/sec
Input voltage	5VDC $\pm$ 5%			24VDC $\pm$ 10%
Operating temperature	0 $^{\circ}$ C~50 $^{\circ}$ C			
Storage temperature	-5 $^{\circ}$ C~70 $^{\circ}$ C			
Protection class	IP67			

Note: (1) Please refer Chap 5.7 for Gap-Repeatability relationship.

(2) The data of 1mm encoder were measured while gap is 0.1mm; And the data of 5mm encoder were measured while gap is 1mm

(3) If you have other request on resolution, please do not hesitate to contact us.



### 5.2 Ordering Code:

**PM - B - 01 - XX - V - XX**

PM: ← Positioning Measurement

Pole Pitch  
A : 5mm  
B : 1mm

Cable Length: (Unit:m; Max 10m)  
01 : 1M  
02 : 2M  
⋮  
10 : 10M

	PM-B	PM-A
0	Standard	Standard
1	With metal tube	With metal tube
2		With scraper
3		With metal tube and scraper

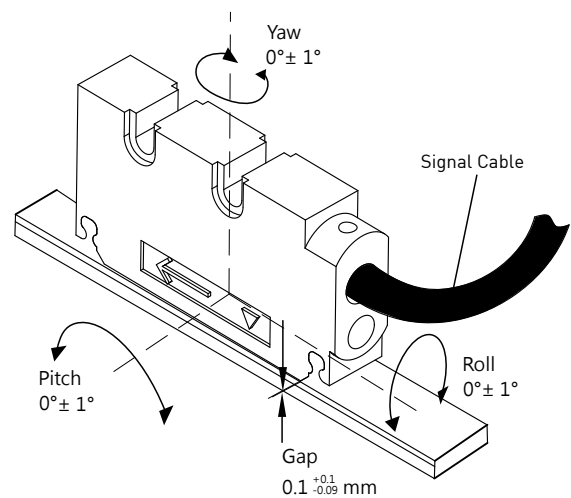
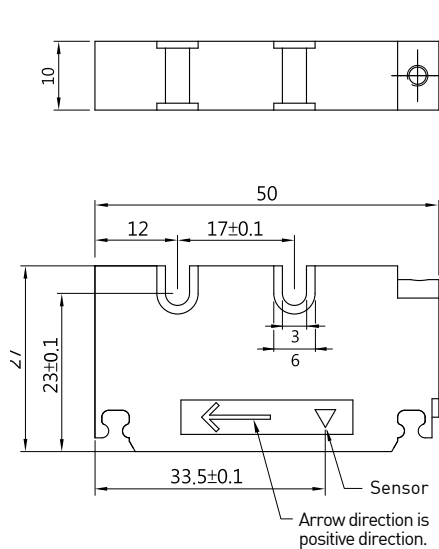
	PM-B	PM-A
1	Analogue: 1Vp-p 1mm	
	Digital: 5V RS422/TTL 1μm	Digital: 5V RS422/TTL 5μm
3	Digital: 24V/PP 1μm	Digital: 24V/PP 5μm
4		Digital: 5V RS422/TTL 10μm
5		Digital: 24V/PP 10μm
7		Digital: 24V/PP 25μm
8		Digital: 24V/PP 100μm

Housing:  
V:Vertical type

Signal Format:  
A:Analogue SIN/COS 1Vp-p  
D:Digital

Connector:  
0: Flying lead  
1:SCSI 20 Pin  
2:SCSI 14 Pin  
3:D-Sub 15 Pin  
4:17 Pin Circular Plug (M17)  
5:SCSI 14 Pin (screw type)  
6:D-sub VGA 15 Pin  
7:D-sub 9 Pin

### 5.3 Dimensions:



Unit : mm

## 5.4 Pin Assignment:

### 5V TTL/RS422

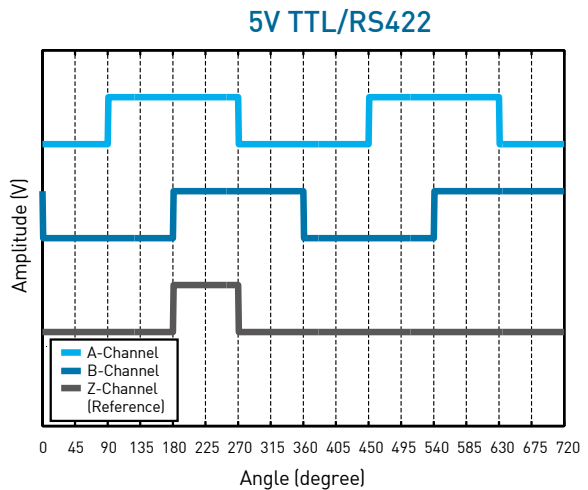
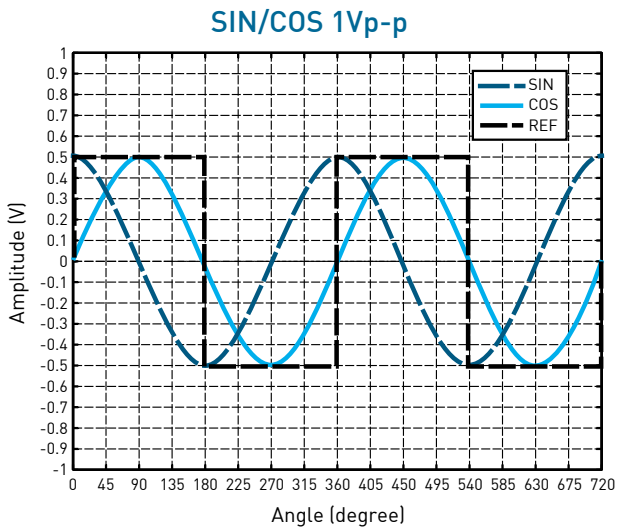
Function	Signal		Color	Connector (male) (SCSI 14 Pin) Analogue	Connector (male) (SCSI 20 Pin)		Connector (male) (D-Sub 15 Pin)		Connector (male) <sup>(1)</sup> (17 Pin Circular Plug)	Connector (male) (D-Sub VGA 15 Pin)		Flying Lead
	Analogue	Digital		Analogue	Digital	Analogue	Digital	Analogue	Digital	Analogue	Digital	
Power	5VDC		Brown	1	3	3	4	7	4/5	1	1	Brown
	GND		White	8	2	2	12	2	12/13	2	2	White
Output Signal	SIN+	A+	Green	10	16	4	9	14	9	11	3	Green
	SIN-	A-	Yellow	11	17	5	1	6	1	12	9	Yellow
	COS+	B+	Blue	3	18	6	10	13	10	13	4	Blue
	COS-	B-	Red	4	19	7	2	5	2	14	10	Red
Reference Signal	REF+	Z+	Purple	5	8	8	3	12	3	7	7	Purple
	REF-	Z-	Gray	6	9	9	11	4	11	8	8	Gray
Shield				Case	1/Case		Case		Case	Case		

Note: (1)17 Pin Circular Plug; Brnad: INTERCONTEC; P/N:AKU874MR1087004A000

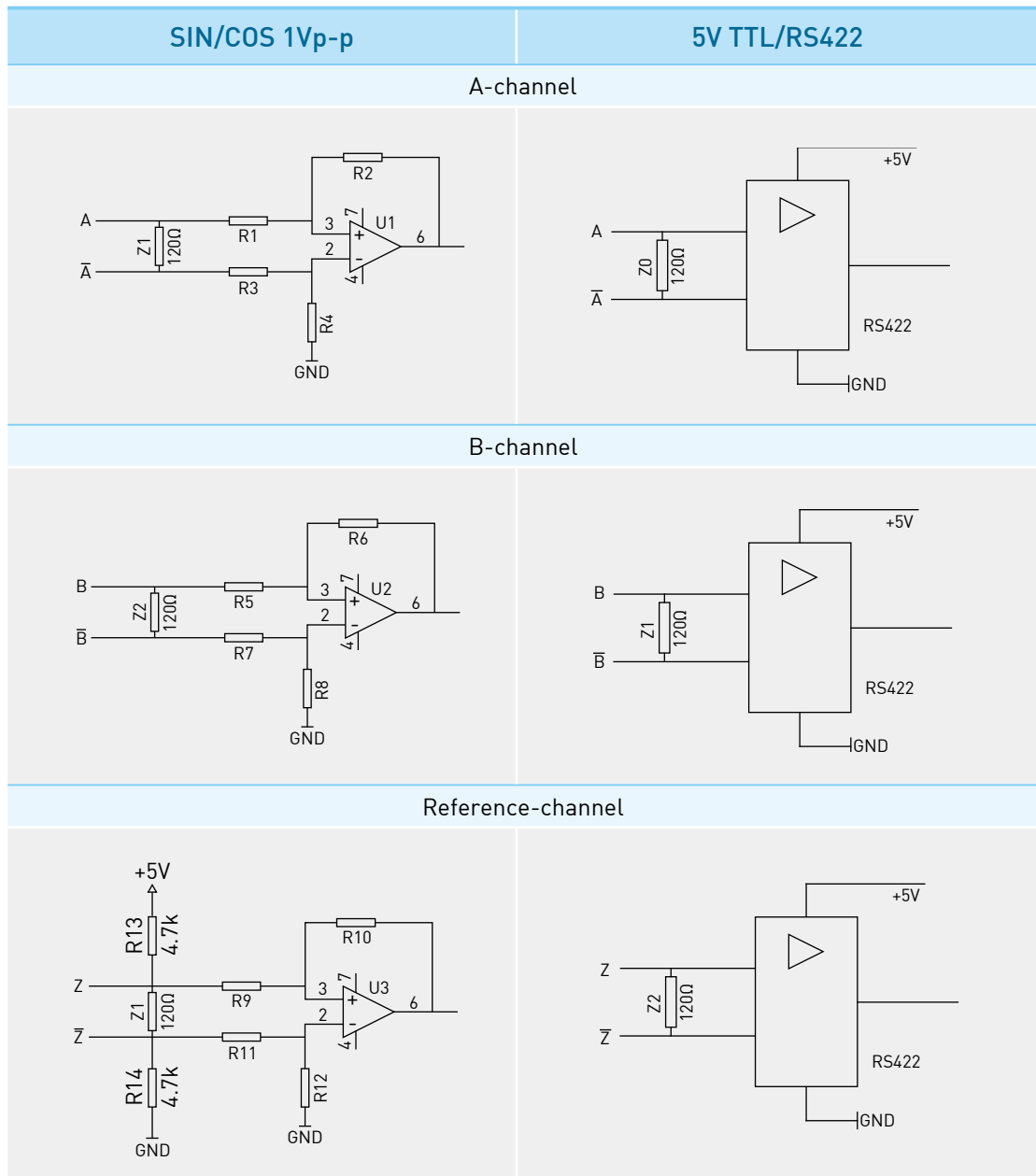
### 24V/PP

Function	Signal	Color	Connector (male) (D-Sub 9 Pin)	Flying Lead
	Digital		Digital	
Power	24V	Brown	2	Brown
	0V	White	1	White
Output Signal	A(PP)	Green	3	Green
	/A(PP)	Yellow	8	Yellow
	B(PP)	Blue	4	Blue
	/B(PP)	Red	7	Red
Reference Signal	Z+	Purple	5	Purple
	Z-	Gray	9	Gray
Shield			Case	

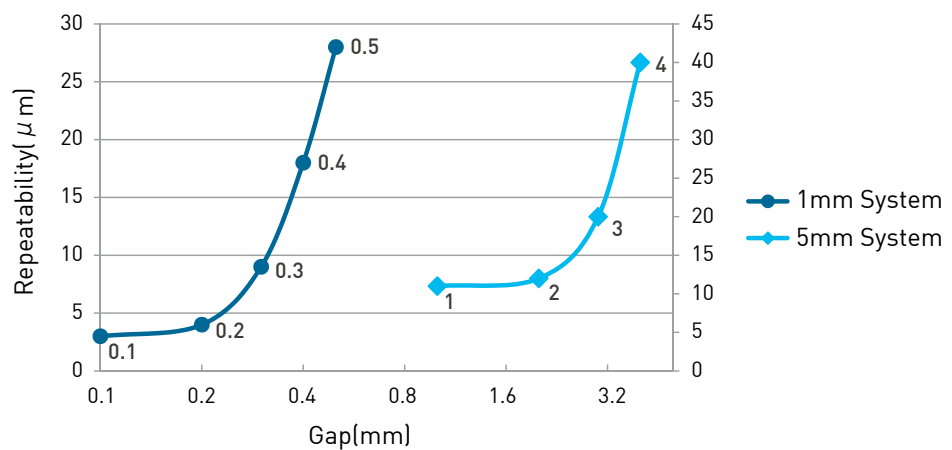
## 5.5 Signal Format:



### 5.6 Recommended Input Circuit:

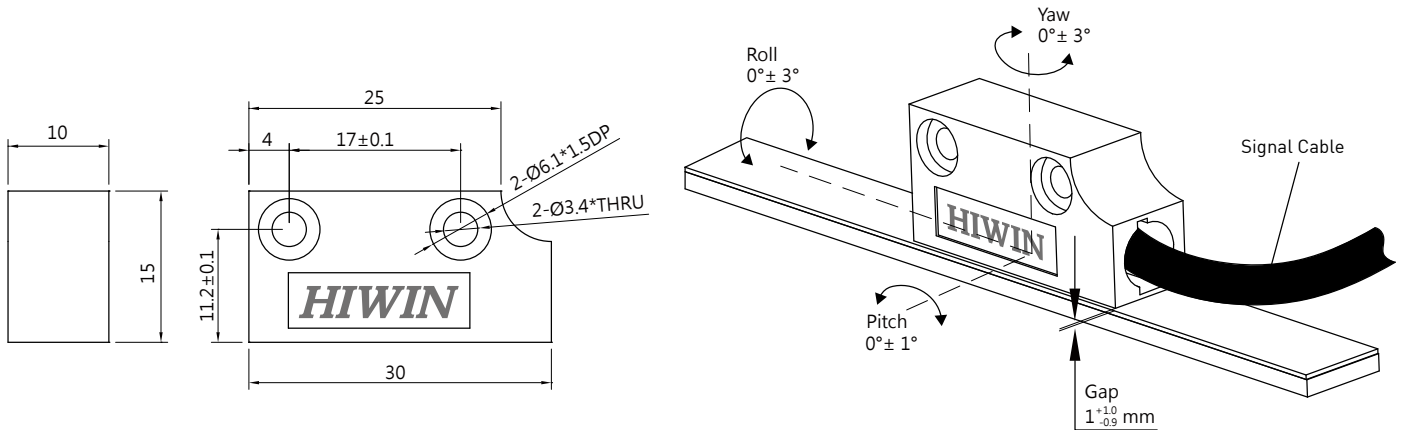


### 5.7 Gap-Repeatability Relationship:





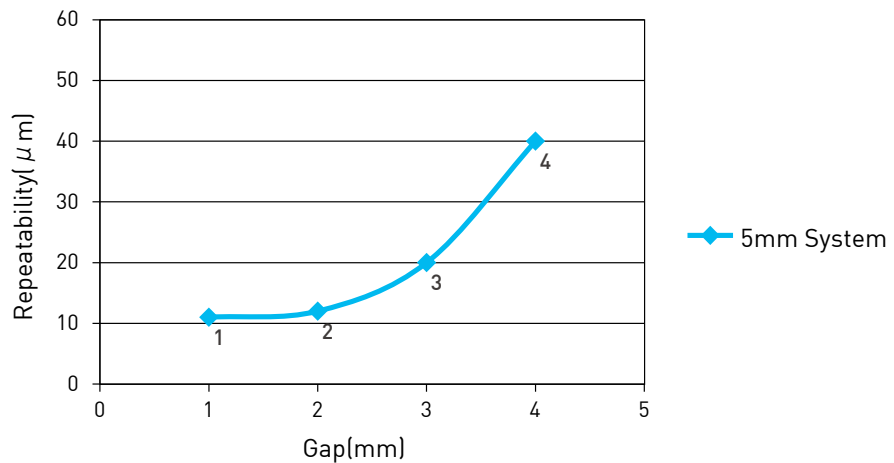
### 6.3 Dimensions:



### 6.4 Pin Assignment:

Function	Signal	Color	Connector (male) (SCSI 14 Pin)	Connector (male) (D-Sub VGA 15 Pin)
	Analogue		Analogue	Analogue
Power	5V	Brown	1	1
	0V	White	8	2
Output Signal	SIN+	Green	10	11
	SIN-	Yellow	11	12
	COS+	Blue	3	13
	COS-	Red	4	14
Shield			Case	Case

### 6.5 Gap-Repeatability Relationship:



## 7. Positioning Measurement- H Type



### Features:

- Analog signal output
- Compact design used with Hiwin linear guideways
- Optimal for space-saving applications
- Easy installation
- Resolution is up to 5 μm when integrating with ST-A.
- Repeatability up to ±10 μm.
- Available gap up to 4mm.



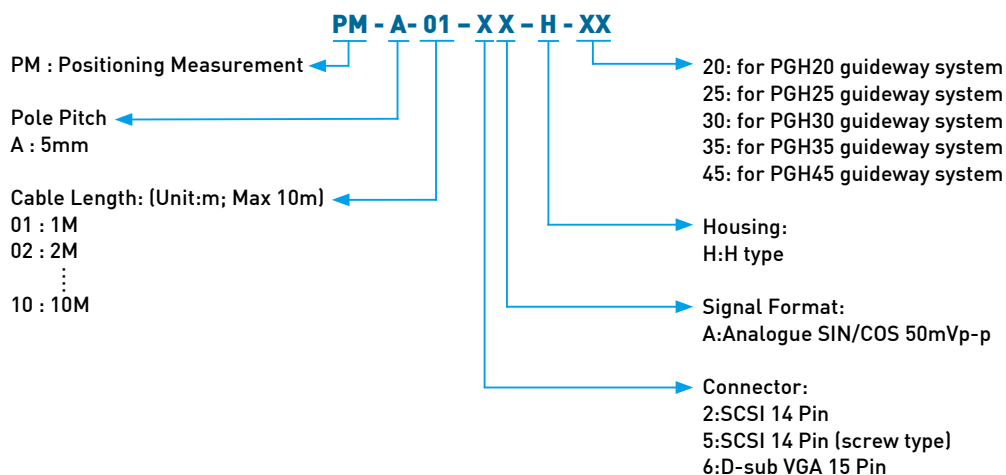
### 7.1 規格 :

Pole Pitch	5mm
Available gap <sup>(1)</sup>	4mm
Signal format	Analogue
Output signal	SIN/COS 50mVp-p
Resolution	5mm
Repeatability <sup>(2)</sup>	±10μm
Maximum travel speed	10m/sec
Input voltage	5VDC±5%
Operating temperature	0°C~50°C
Storage temperature	-5°C~70°C
Protection class	IP67

Note: (1) Please refer Chap 7.5 for Gap-Repeatability relationship.

(2) The data were measured while gap is 1mm.

### 7.2 Ordering Code:



### 7.3 Dimensions:

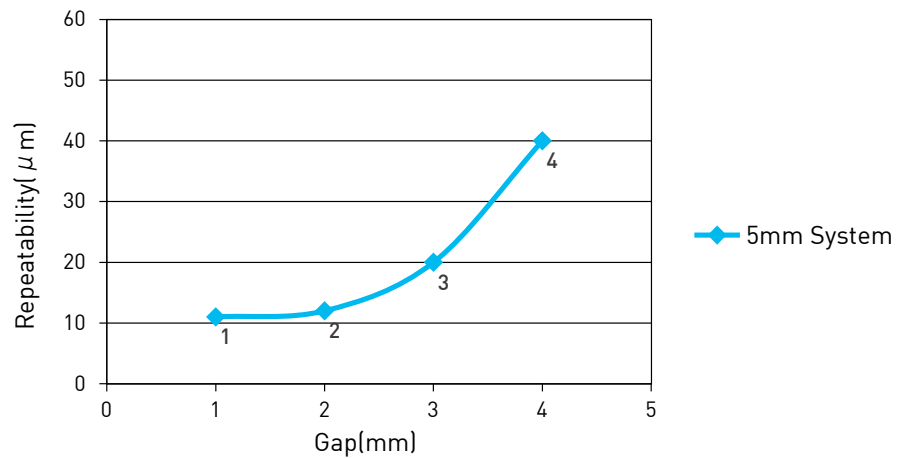
This type is used with HIWIN's guideway, please refer Page 181 to 185 of HIWIN Technology's catalogue for further details :

[http://www.hiwin.tw/download/tech\\_doc/gw/Linear%20Guideway-\(E\).pdf](http://www.hiwin.tw/download/tech_doc/gw/Linear%20Guideway-(E).pdf)

### 7.4 Pin Assignment:

Function	Signal	Color	Connector (male) (SCSI 14 Pin)	Connector (male) (D-Sub VGA 15 Pin)
	Analogue		Analogue	Analogue
Power	5V	Brown	1	1
	0V	White	8	2
Output Signal	SIN+	Green	10	11
	SIN-	Yellow	11	12
	COS+	Blue	3	13
	COS-	Red	4	14
Shield			Case	Case

### 7.5 Gap-Repeatability Relationship:



## II. Signal Translator



ST-A

### Features:

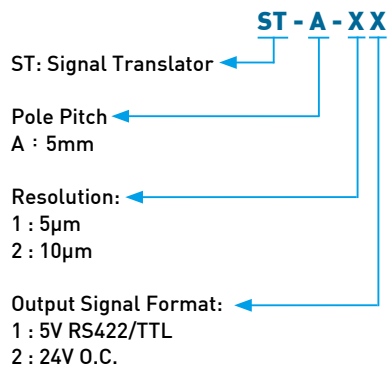
- Converting an analog signal input into a digital signal output
- Output signal 5V RS422/TTL or open collector
- Suitable for precise position feedback to a PC or PLC connection



### 1. Specifications:

Type	ST-A			
Pole Pitch	5mm			
Input signal	SIN/COS 50mVp-p			
Output signal	5V RS422/TTL		24V O.C.	
Resolution	5µm	10µm	5µm	10µm
Repeatability	±10µm	±20µm	±10µm	±20µm
Maximum output frequency	64KHz	32KHz	64KHz	32KHz
Maximum travel speed	1.5m/sec			
Input voltage	5VDC ± 5% / 0.5A			
Operating temperature	0°C~50°C			
Storage temperature	-5°C~70°C			
Protection class	IP43			

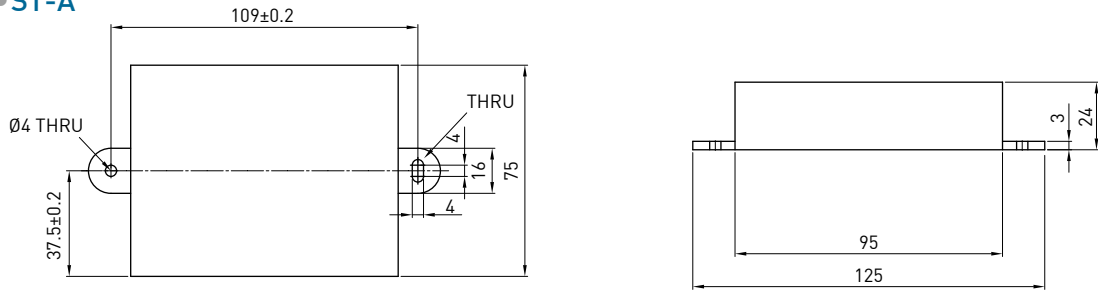
### 2. Ordering Code:





### 3. Dimensions:

• **ST-A**

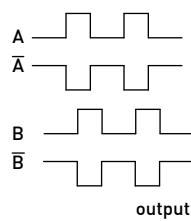


### 4. Pin Assignment:

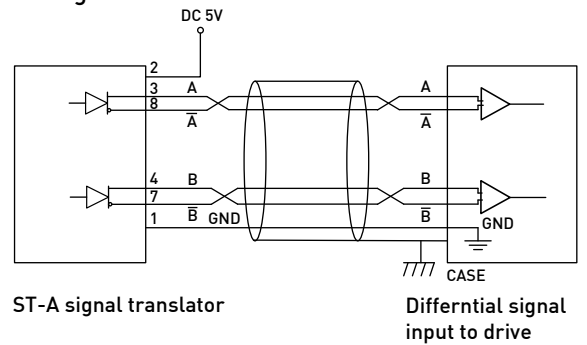
• **ST-A-□1(5V RS422/TTL)**

D-sub 9 pin definition for signal output connector

Function	Signal	Connector(male) (D-sub 9 pin)	I/O
Power	GND	1	I
	DC5V	2	
	SGND	6	
Output Signal	A+	3	O
	A-	8	
	B+	4	
	B-	7	



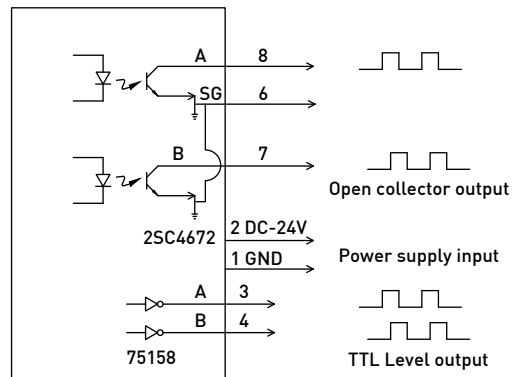
Wiring



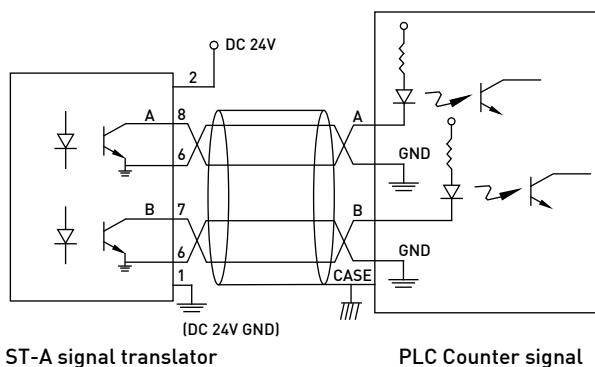
• **ST-A-□2(24V O.C.)**

D-sub 9 pin definition for signal output connector

Function	Signal	Connector(male) (D-sub 9 pin)	I/O
Power	GND	1	I
	DC24V	2	
	SGND	6	
Output Signal	A(open collector)	8	O
	B(open collector)	7	
	A(TTL level)	3	
	B(TTL level)	4	

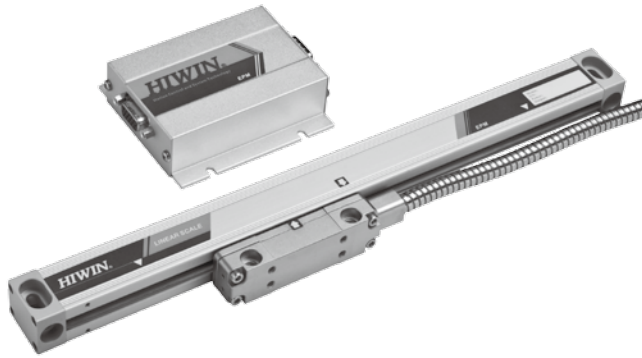


Wiring





# III. High-precision Enclosed Positioning Measurement System



## Features:

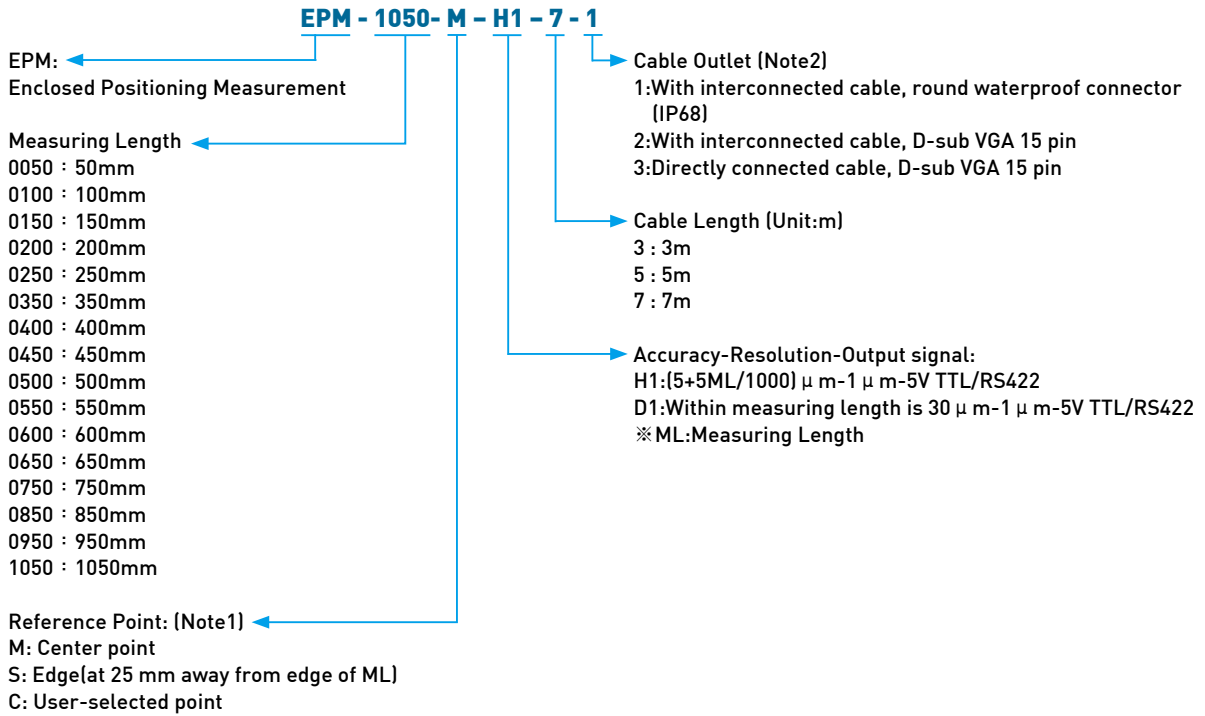
- Magnetic sensing mechanism
- Accuracy:  $(5+5ML/1000) \mu m$
- Resolution up to  $1 \mu m$
- With single index signal
- Simple design and easily mounted
- Superior environmental susceptibility against oil, water and dust.
- IP65 protection class.



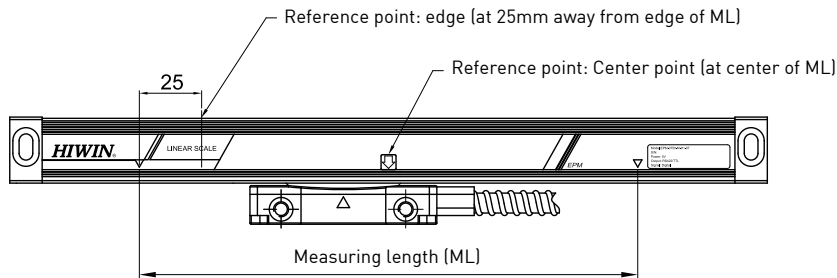
## 1. Specifications:

Measuring length (ML,unit:mm)	50、100、150、200	250、300、350、400、450、500、550、600、650、750、850、950、1050
Maximum travel(Unit: mm)	ML+104	ML+120
Overall length(Unit: mm)	ML+12	ML+28
Accuracy@20°C	$(5+5ML/1000) \mu m$	
	Within Measuring Length is $30 \mu m$	
Resolution	$1 \mu m$	
Signal format	Digital	
Output signal	5V TTL/RS422	
Reference point	Standard: Center point/Edge(at 25 mm away from edge of ML)	
	User-selected point	
Maximum travel speed	1.2m/sec	
Mounting parallelism	$\pm 0.1mm$	
Input voltage	5VDC $\pm 5\%$ / 0.23A	
Coefficient of linear thermal expansion	$(11.8 \pm 0.6) \times 10^{(-6)}m/K$	
Operating temperature	0°C~50°C	
Storage temperature	-20°C~60°C	
Protection class	Readhead	IP67
	Translator	IP30
Vibration resistance (50Hz~2000Hz)	150m/S <sup>2</sup> (EN60068-2-6)	
Impact resistance(11ms)	1000m/S <sup>2</sup> (EN60068-2-27)	

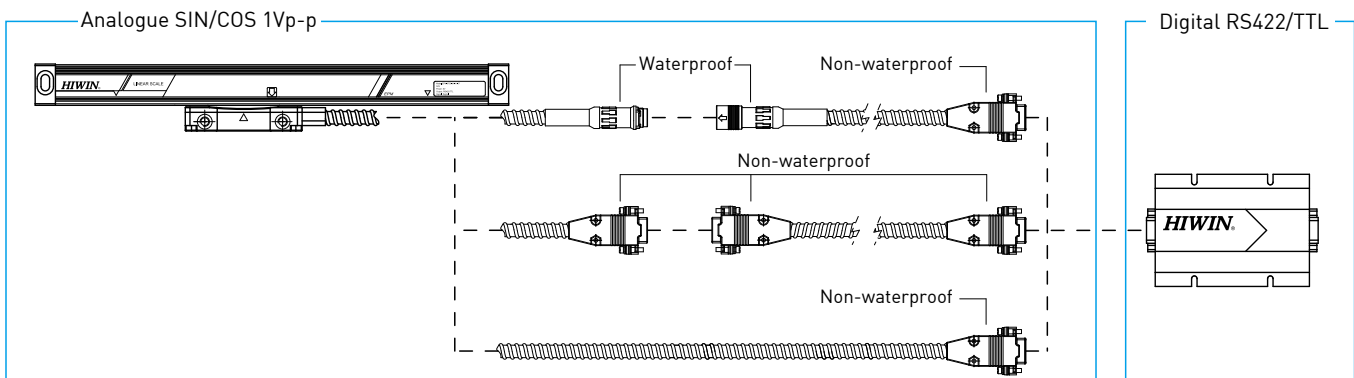
## 2. Ordering Code:



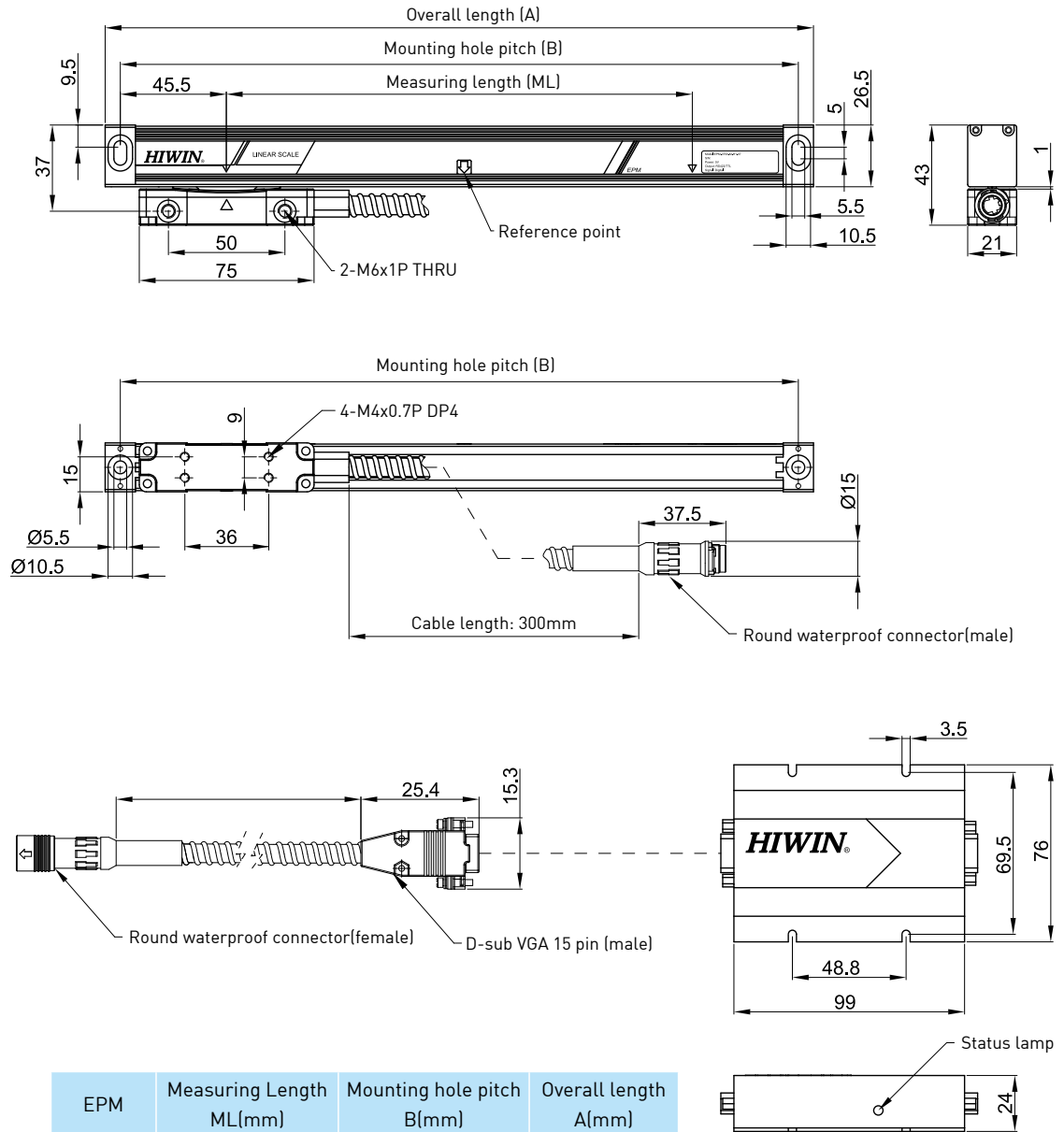
※ Note1: Reference point



※ Note2: Cable outlet



### 3. Dimensions:



EPM	Measuring Length ML(mm)	Mounting hole pitch B(mm)	Overall length A(mm)
EPM-0050	50	141	154
EPM-0100	100	191	204
EPM-0150	150	241	254
EPM-0200	200	291	304
EPM-0250	250	357	370
EPM-0300	300	407	420
EPM-0350	350	457	470
EPM-0400	400	507	520
EPM-0450	450	557	570
EPM-0500	500	607	620
EPM-0550	550	657	670
EPM-0600	600	707	720
EPM-0650	650	757	770
EPM-0750	750	857	870
EPM-0850	850	957	970
EPM-0950	950	1057	1070
EPM-1050	1050	1157	1170

#### 4. Pin Assignment:

Function	Signal		Color	Connector (male) (D –sub VGA 15 pin)	Connector (male) (D –sub 9 pin)
	Analogue	Digital		Analogue	Digital
Power	5V		Brown	1	2
	0V		White	2	1
Output Signal	SIN+	A+	Green	11	3
	SIN-	A-	Yellow	12	8
	COS+	B+	Blue	13	4
	COS-	B-	Red	14	7
Reference Signal	REF+	Z+	Purple	7	5
	REF-	Z-	Gray	8	9
Fault Detection Signal	FLT	-	-	-	6
Shield	-	-	-	Case	Case

# IV. High Efficiency Counter

## 1. Micro LCD Counter



### Features:

- LCD display, using 2 AA batteries
- Embedded head, suitable for cutting and wood-processing machines
- Parameter save function
- Extremely compact, easily mounted, and cost-effective.



### 1.1 Specifications:

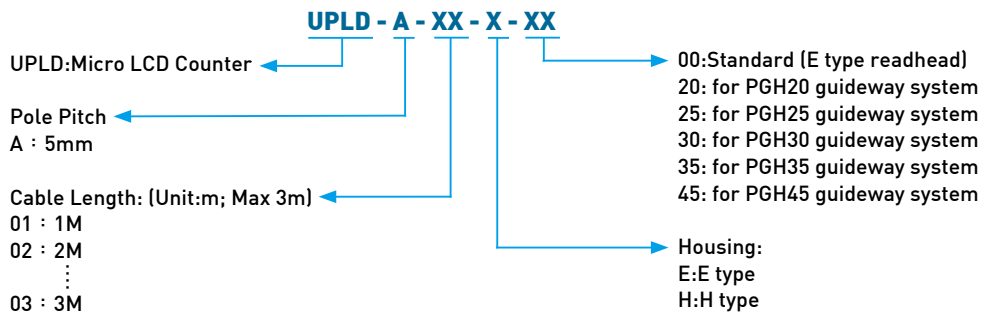
Display		8 digits LCD display with +/- sign
Accuracy@20°C		± (80+15xL) μm (L: Length (unit: m))
Resolution		5μm
Repeatability <sup>(1)</sup>		± 10μm
Operating speed		3m/sec (maximum 2G acceleration)
Input voltage		commercial AA No.3 batteries × 2
Battery life <sup>(2)</sup>		1 year by setting speed at 1.5m/s
Operating Temperature		0°C~50°C
Storage Temperature		-5°C~55°C
Protection class	Scale/Readhead	IP67
	Counter	IP43
Function	General	Set reading direction
		Unit conversion (mm/inch/°)
		Absolute/Incremental position(INC/ABS) selection
		Set display digits
		Set reference points
	Programmable	5 sets of maximum velocity settings (default: 1.5m/s)
		Angular measurement radius setting (minimum: 50mm)
		5 sets of programmable compensation reference points
	Display	set programmable coefficient ratio
		Indicate installed condition
	Other	Power monitor and display
		Keypad lock
		Parameter save function
		5 sets of independant incremental counters for relative measurement.

Note: (1) The data were measured while gap is 1mm.

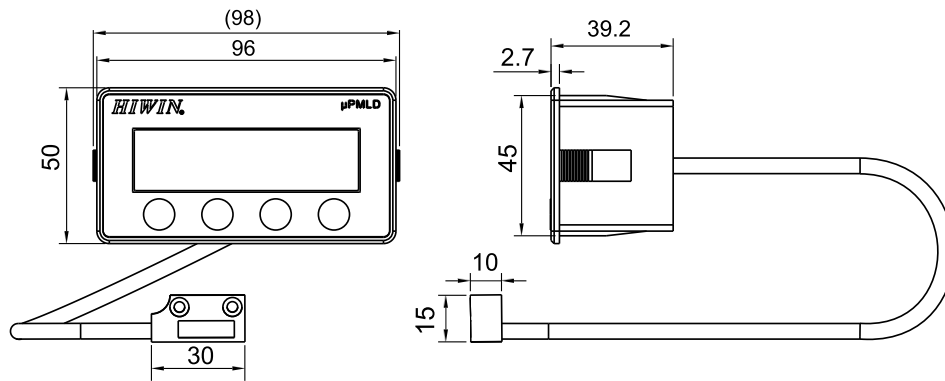
(2) Battery capacity is 2200mAh(ambient temperature: 20+/-5°C).

Capacity performance will vary under different environmental temperatures.

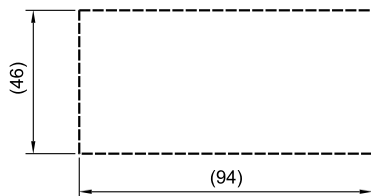
### 1.2 Ordering Code:



### 1.3 Dimensions:



Reference design dimensions for fram panel cut-out



Unit: mm



## 2. LCD Counter System



### Features:

- LCD display, using 2 AA batteries
- Embedded head, suitable for cutting and wood-processing machines
- Parameter save function
- Extremely compact, easily mounted, and cost-effective.



### 2.1 Specifications:

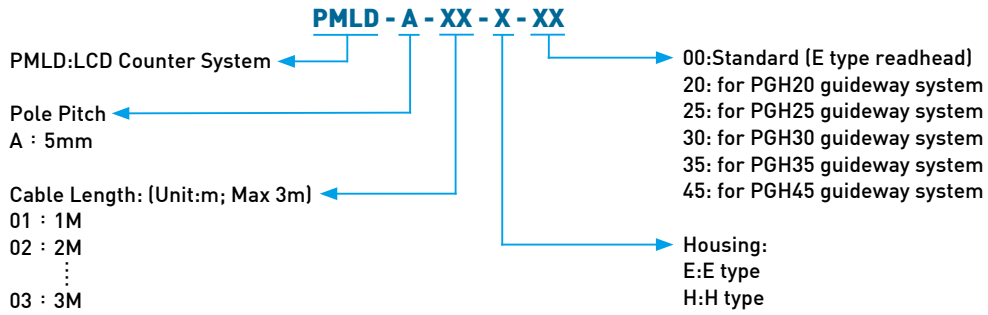
Display		8 digits LCD display with +/- sign
Accuracy@20°C		±(80+15xL) μm (L: Length [unit: m])
Resolution		5μm
Repeatability <sup>(1)</sup>		±10μm
Operating speed		3m/sec (maximum 2G acceleration)
Input voltage		commercial AA No.3 batteries × 2
Battery life <sup>(2)</sup>		1 year by setting speed at 1.5m/s
Operating Temperature		0°C~50°C
Storage Temperature		-5°C~70°C
Protection class	Scale/Readhead	IP67
	Counter	IP43
Function	General	Set reading direction
		Unit conversion (mm/inch/°)
		Absolute/Incremental position(INC/ABS) selection
		Set display digits
		Set reference points
		5 sets of maximum velocity settings (default: 1.5m/s)
	Programmable	Angular measurement radius setting (minimum: 50mm)
		5 sets of programmable compensation reference points
		set programmable coefficient ratio
	Display	Indicate installed condition
		Power monitor and display
	Other	Keypad lock
		Parameter save function
5 sets of independant incremental counters for relative measurement.		

Note: (1) The data were measured while gap is 1mm.

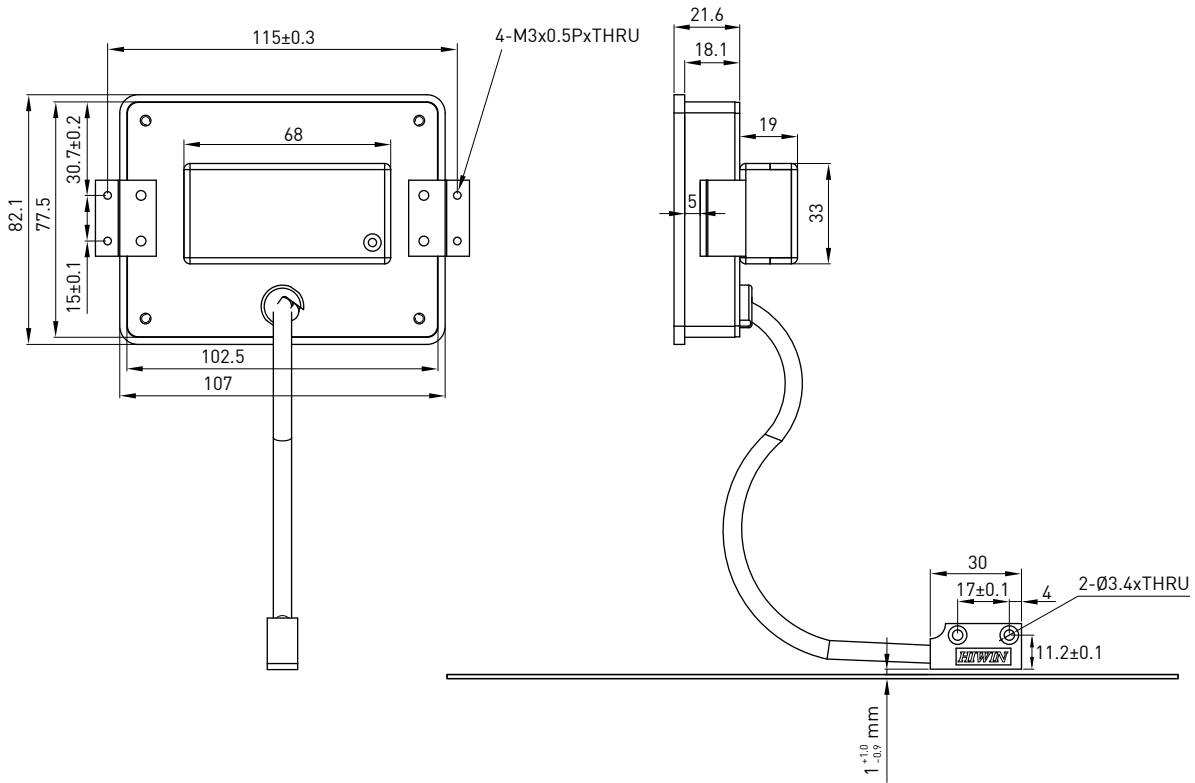
(2) Battery capacity is 2200mAh(ambient temperature: 20+/-5°C).

Capacity performance will vary under different environmental temperatures.

## 2.2 Ordering Code:



## 2.3 Dimensions:



Unit: mm

### 3. High Efficiency Single Axis Counter



#### Features:

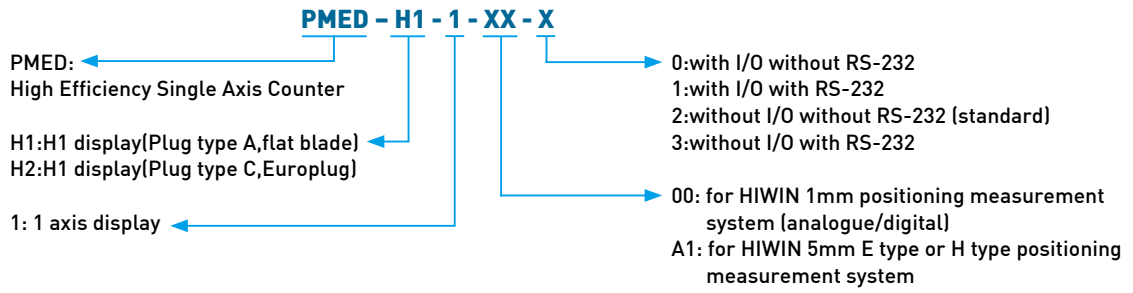
- LED display
- Can be used with other digital optical encoders
- Consists of multiple output interfaces
- Suitable for cutting and wood-processing machines
- Compact design and easy installation



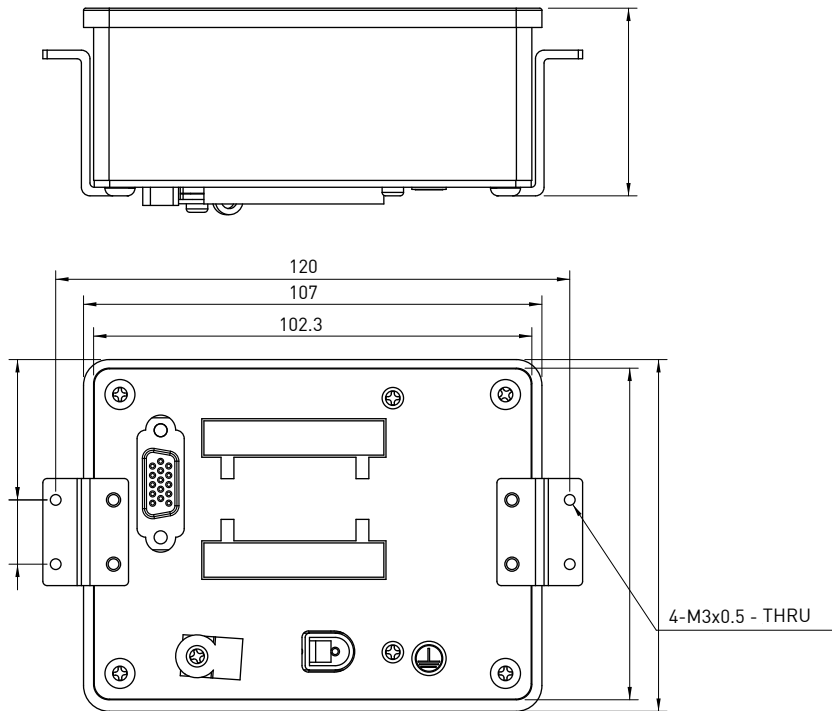
#### 3.1 Specifications:

Display		8 digit LED display
Resolution		1μm、2μm、5μm、10μm
Input signal		analogue: SIN/COS 1Vp-p; speed 2m/s, 2kHz digital: 5V TTL/RS422; speed 2m/s, 0.5MHz
Input voltage		5VDC ± 5% 1A (AC100~240V/ 5VDC)
Relay contact rating		24VDC/2A
Operating Temperature		0°C~50°C
Storage Temperature		-5°C~70°C
Protection class	Display	IP43
Function	General	Set reading direction
		Unit conversion (mm/inch)
		Absolute/Incremental position(INC/ABS) selection
		Set display digits (mm : 0.001, 0.01, 0.1, inch : 0.000001, 0.00001, 0.0001, 0.001)
		Input signal conversion (Digital/Analogue)
		Coordinate zero setting and auto-center (1/2) function
	Other	8 sets of preset function
		4 sets of relay output function
		Instant power failure memory
		RS-232 output (optional)

### 3.2 Ordering Code:

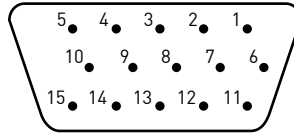


### 3.3 Dimensions:



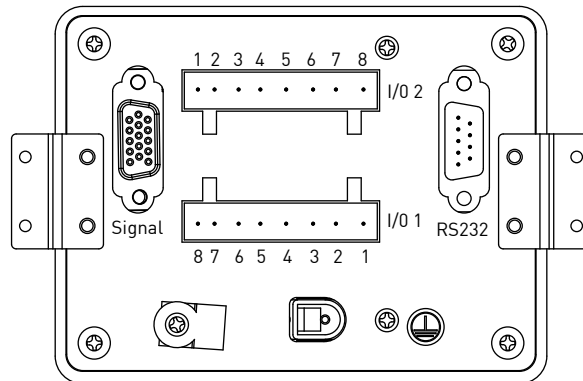
Unit: mm

### 3.4 Input signal descriptions:



PIN	Definition	PIN	Definition	PIN	Definition
1	+5V	6	NC	11	SIN+(Analogue)
2	GND	7	Z+	12	SIN-(Analogue)
3	A+(Digital)	8	Z-	13	COS+(Analogue)
4	B+(Digital)	9	A-(Digital)	14	COS-(Analogue)
5	NC	10	B-(Digital)	15	NC

### 3.5 Relay output signal descriptions:



PIN	I/O 1	I/O 2
1	N.C.	N.C.
2		
3	N.C.	N.C.
4		
5	Relay 0(CH-0)	Relay 2(CH-2)
6		
7	Relay 1(CH-1)	Relay 3(CH-3)
8		

## 4. Multi-Axis Counter



### Features:

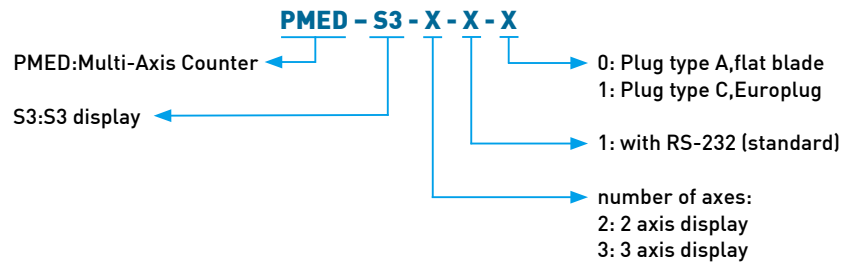
- LED display, high brightness
- Easy operation, suitable for cutting machines, traditional gantry milling machines, and programmable drilling machines
- Compact design and easy installation



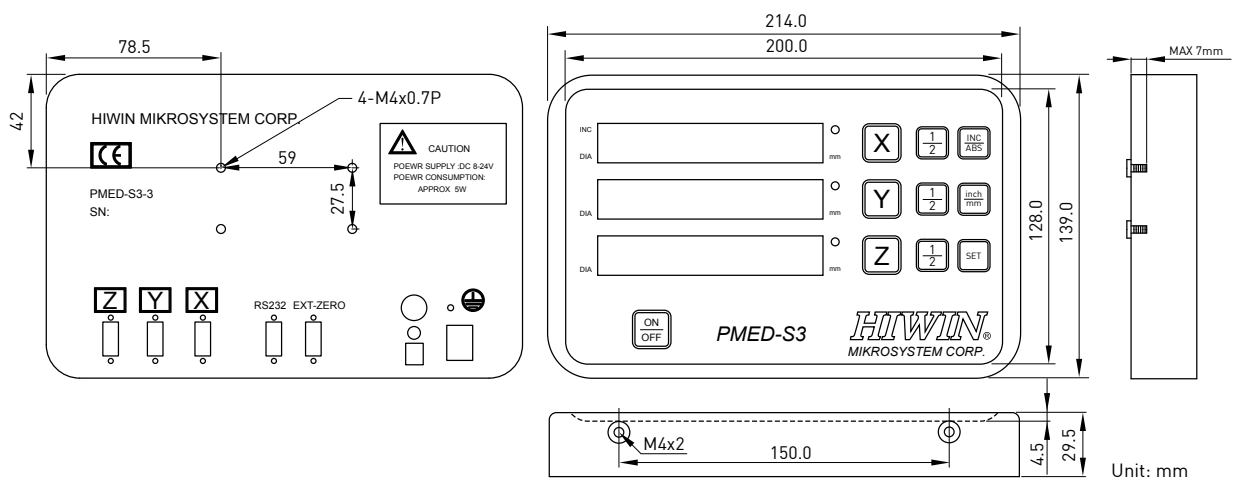
### 4.1 Specifications:

Display		8 digit LED display
Resolution		0.1μm ∨ 0.2μm ∨ 0.5μm ∨ 1μm ∨ 2μm ∨ 5μm ∨ 10μm ∨ 20μm ∨ 50μm
Input signal		Digital : 5V RS422/TTL
Input voltage		8~30VDC ± 5% / 0.08A
Operating Frequency		< 1.5MHz
Operating Temperature		0°C~50°C
Storage Temperature		-5°C~70°C
Protection class	Display	IP43
Function	General	ON/OFF function
		Coordinate Zero setting
		Unit conversion (mm/inch)
		Absolute/Incremental position(INC/ABS) selection
		Set display digits (0.0001, 0.0002, 0.0005, 0.001, 0.002, 0.005, 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 5, 10)
		Radius/diameter selection (RAD/DIA)
	Other	auto-center (1/2) function
		Linear error compensation
		Instant power failure memory
		RS-232 output

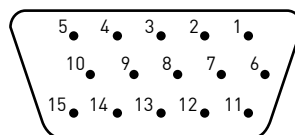
### 4.2 Ordering Code:



### 4.3 Dimensions:



### 4.4 Input signal descriptions:



PIN	Definition	PIN	Definition	PIN	Definition
1	+5V	6	FG	11	NC
2	GND	7	NC	12	NC
3	A+	8	NC	13	NC
4	B+	9	NC	14	NC
5	ABS-	10	NC	15	NC

Note: NC: No Connection  
FG: Frame Ground

## 5. High Efficiency Multi-Axis Counter



### Features:

- LED display
- Suitable for CNC machine centers, gantry machine centers, milling machines and drilling machines
- Easy operation and installation

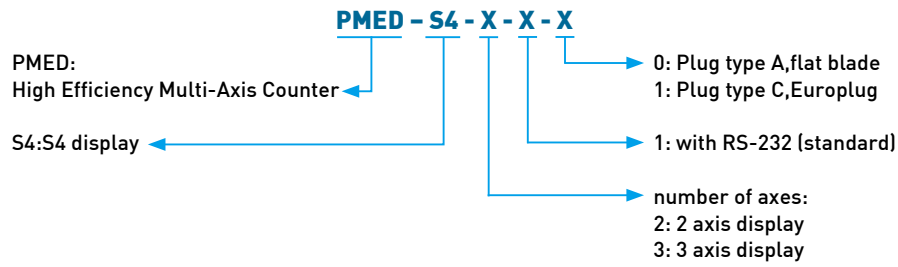


### 5.1 Specifications:

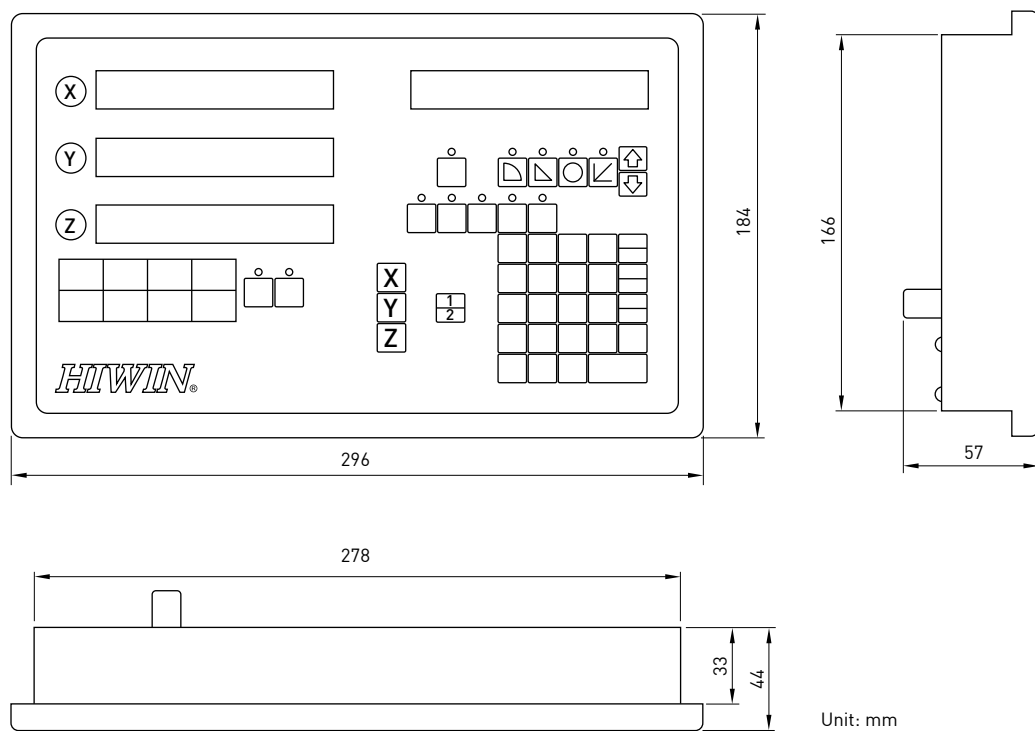
Display		8 digit LED display
Resolution		0.1 $\mu$ m 、 0.2 $\mu$ m 、 0.5 $\mu$ m 、 1 $\mu$ m 、 2 $\mu$ m 、 5 $\mu$ m 、 10 $\mu$ m 、 20 $\mu$ m 、 50 $\mu$ m
Input signal		digital: 5V TTL/RS422
Input voltage		90~240VAC
Operating Frequency		< 2MHz
Operating Temperature		0 $^{\circ}$ C~50 $^{\circ}$ C
Storage Temperature		-5 $^{\circ}$ C~70 $^{\circ}$ C
Protection class	Display	IP43
Function	General	Coordinate Zero setting
		Unit conversion (mm/inch)
		Absolute/Incremental position(INC/ABS) selection
		Set display digits (0.0001, 0.0002, 0.0005, 0.001, 0.002, 0.005, 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 5, 10)
		Radius/diameter selection (RAD/DIA)
		auto-center (1/2) function
	Other	Linear error compensation
		Instant power failure memory
		Shrink function, Calculator, RI detection, Bolt Circle machining, R-angle, Divide holes on an oblique line, Machining on an oblique line
		arc surface machining, inclined plane machining



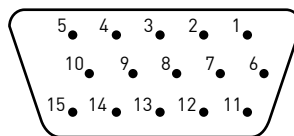
### 5.2 Ordering Code:



### 5.3 Dimensions:



### 5.4 Input signal descriptions:



PIN	Definition	PIN	Definition	PIN	Definition
1	+5V	6	FG	11	NC
2	GND	7	NC	12	NC
3	A+	8	NC	13	NC
4	B+	9	NC	14	NC
5	ABS-	10	NC	15	NC

Note: NC: No Connection  
FG: Frame Ground

## V. Accessories

### 1. Signal Transfer Cable

- Signal transfer cable for alternative display devices



#### Ordering Code:

**STC - XX - XX - X**    STC: Signal Transfer Cable

- 0: standard type
- 1: with metal tube
- 00: D-sub VGA 15 pin (for HIWIN display)
- 02: flying lead
- 01: cable length 1m
- 02: cable length 2m

### 2. Positioning Scale Installation Fixture

- For easy scale installation and parallelism of scale with respect to axis is guaranteed.



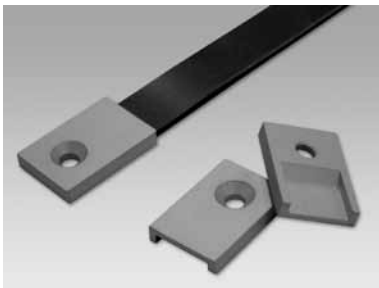
#### Ordering Code:

**PST - 02**    PST: Positioning Scale Installation Fixture

- 02: for tiny type positioning measurement
- 03: for Vertical type positioning measurement
- 04: for Standard type positioning measurement

### 3. Positioning Scale Fixture

- Preventing the warpage of scale under harsh environment.



#### Ordering Code:

**PSF - 01**    PSF: Positioning Scale Fixture

- 01: standard

# VI. Customer's Requirements(PM)

Date:

Company name			Contact person	
Tel		Fax		Title
Specifications Requirements for positioning measurement encoders	Accuracy (μm)		Notes	
	Resolution (μm)			
	Repeatability (μm)			
	Max. speed (m/min)			
	Input voltage (V)			
	Output signal			
	Operating Temperature (°C)			
	Protection level			
Specifications Requirements for signal transistors	Input voltage (V)			
	Output format			
Specifications Requirements for displays	Display axes			
	Display digits			
	Input voltage (V)			
	Operating speed (m/min)			
Budget				
Quantity				
Recommended specification :       Proponent :				

Manager :

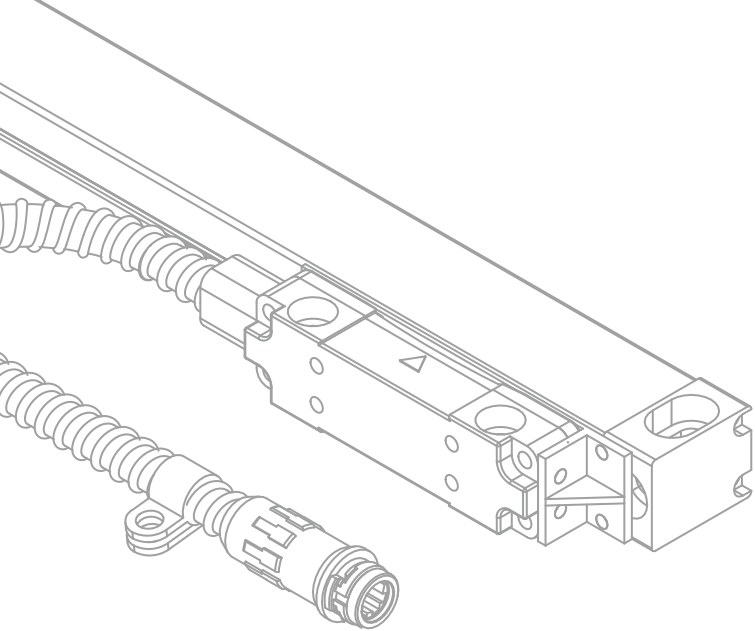
Head :

Applicant :









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Motion Control and System Technology

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