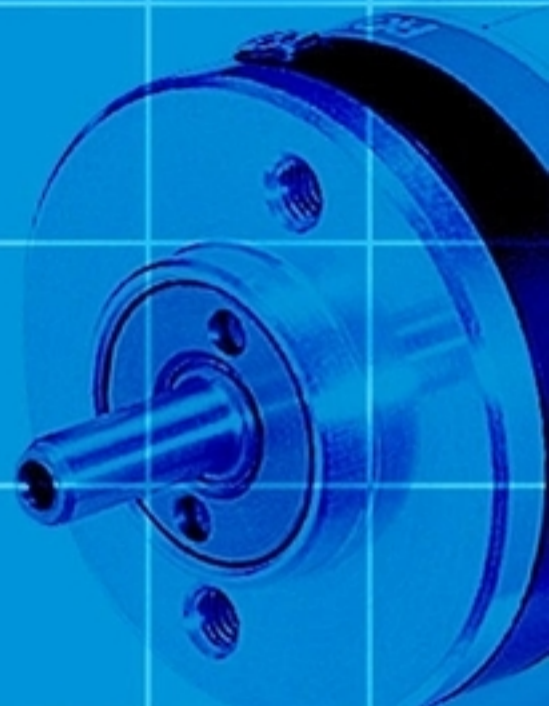


Moving towards tomorrow

MECAPION

New name of



Rotary Encoder

Products Collection

Vol. 5.2



of **metronix** in korea



www.mecapion.com





Moving Towards Tomorrow



Change Up History

**The leader in
"High Precision,
Digital Control"**

2010 System Engineering

2008 Industrial Robot System

2005 Motion System & ASIC

2001 AC Servo System

1995 Rotary Encoder

**Total Solution of
Digital Mechatronics**

Mechatronics + Champion Mechatronics + New Pioneer



SALES NETWORK

Domestic Network



Kyungin area
Kyungin Center / R&D Center
14 Agents

Chungchong area
2 Agents

Youngnam area
Head office/ Factory / R&D Center
10 Agents

Honam area
1 Agent



Overseas Network

China Factory

WUXI MECAPION MACHINERY & ELECTRICAL CO., LTD.

Agent

Asia	Singapore / Vietnam / Indonesia / China
Europe	Germany / Italy / Turkey / France Greece / Spain / Sweden
America	U.S.A.
Others	India / Iran / Israel / South Africa / Venezuela

Global FA Leading Company MECAPION

Rotary Encoder

- >>> Detecting the coordinates of automatic control machine
- >>> Detecting the angle and position of industrial robot
- >>> Speed control of motor
- >>> Detecting the processing position of machine tool table
- >>> Detecting the stop position of elevator speed
- >>> Detecting the cutting position of automatic cutting line
- >>> Detecting the number of engine rotation at operating speed of automobile
- >>> Detecting the transferred amount of hydraulic cylinder
- >>> Measuring textile length at textile factory
- >>> Detector for automatic control as per other designer's purpose



Certificates



Certificate of ISO 9001
Quality Management System



CE Certificate for Rotary
Encoder



CE Certificate for AC Servo
Motor



CE Certificate for AC Servo
Drive



UL



RoHS
Encoder H Type



RoHS
Encoder S Type



RoHS
Servo Motor



Patent 1



Patent 2



Certificate of Superior
Technology Company



Certificate as promising
export company

History

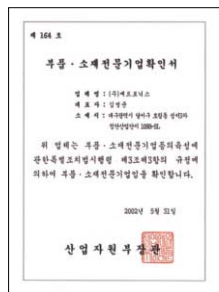
- Sep. 1995 MECAPION was established and started Sensor business
- Jun. 1996 FA and OA encoder series were developed
- Mar. 1997 Rotary encoder for Servo Motor was developed
- May. 1997 Rotary encoder for elevator was developed and provided
- Nov. 1999 Robot encoder was developed
- Achieved CE mark for Rotary encoder
- Be selected as Venture Enterprise
- Jan. 2000 Moved and expanded company (Seongseo Industrial Complex)
- May. 2000 Started Servo business
- Aug. 2000 Changed into corporation
- Dec. 2000 Authorized by Small and Medium Business Corporation Authority
- Feb. 2001 Servo Motor was developed
- Jun. 2001 Expanded and relocated the plant(Seongseo 3rd Industrial Complex)
- Aug. 2001 Servo Drive(VS, VP) was developed
- Sep. 2001 R&D Center was established
- Feb. 2002 Be awarded the prize of the 1st Venture Enterprise of Daegu City
- Apr. 2002 Established Kyungin Center
- May. 2002 Be qualified on participation of industry-university cooperation consortium
- Be selected as a special technical company for component and material (By ministry of Commerce, Industry and Energy)
- Jun. 2002 Be qualified by ISO 9001
- Spinner motor for semiconductor was developed
- Jul. 2002 Be selected as the best enterprise of grade valuation for Venture enterprises(By the Federation of Korean Industries)
- Nov. 2002 Be awarded the prize of the 2nd Venture Enterprise of Daegu City
- Dec. 2002 Be selected as INNO-BIZ Company
- May. 2003 Achieved CE mark for Servo Motor
- Jun. 2004 Be selected as prospective export company (By the Small and Medium Industry Promotion Corporation)
- Aug. 2004 Economy Servo Drive(VK) was developed
- Sep. 2004 Be awarded a Gold Prize of 5th Inno Tech Show(By The Prime Minister)
- Oct. 2004 Achieved CE mark for Servo Drive
- Be awarded the chairman prize of Special Committee on Small and Medium Enterprise in 2004 Venture Show
- Nov. 2004 Be awarded a memorial tablet for export of 1 million
- Jan. 2005 Be selected as Daegu 5 Star Enterprises (By Ministry of Commerce, Industry and Energy)
- Started Motion system business
- Feb. 2005 Established China factory in Wuxi, China
- Jun. 2005 Be attracted the 3rd investment and issued of new share by Korea Development Bank
- Nov. 2005 Registered 2 kind of patents
- Dec. 2005 Invested to ASIC design and development company(30%)
- Dec. 2006 Be awarded a memorial tablet for export of 3 millions
- Mar. 2007 Be selected as Star Enterprises
- Oct. 2007 Win Grand Enterprise prize by Daegu City
- Nov. 2007 Open Guangdong Center in China
- Jan. 2008 Start Robot business



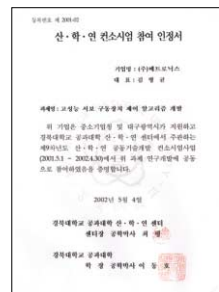
Certificate of INNO-BIZ



Certificate of Venture Enterprise



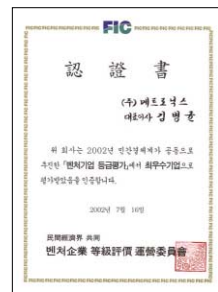
Certificate of Special Technical Company for Component and material



Certificate on Participation of Industry-University Cooperation Consortium



Certificate of Excellent Company in Technical Competitiveness



Certificate of Best Enterprise on Grade Valuation for Venture Enterprises

The definition of Rotary Encoder

Encoder is light sensor that detects and converts mechanical transfer or displacement into electric signal. It detects the position, speed, angle of FA System by means of converting analog signal generated from a revolution of the shaft into digital signal by the internal fixed circuit.

The characteristics of Rotary Encoder

High Resolution

- We can provide the high resolution encoder because we make high-precision board of signs through Photo Etching method

Easy to record the measuring value

- It is easy to record measuring value because of digital output and safe from the error caused by careless of operator.

High Stability

- Since it can make a digital servo, it is not to be influenced by noise even if there is some time-delay.

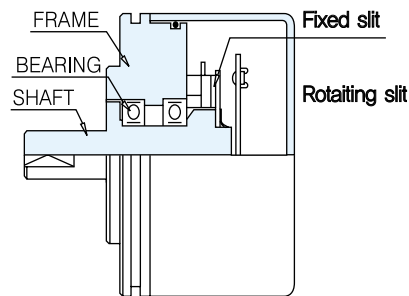
Various kinds of type

- There are various kinds of rotary encoder with wide resolution, appearance. So the price is very cheap and any kind of type can be obtained as per the customer's request

The Composition of Rotary Encoder

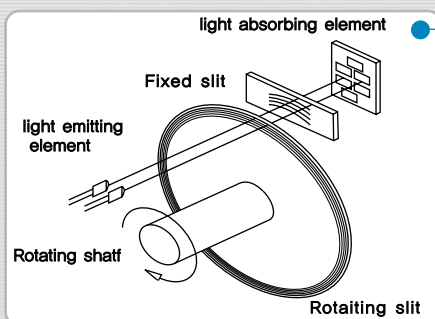
Rotary Encoder is basically composed of equipment part, light-absorbing / light emitting part, circuit part but it may be different depending on the model.

The equipment part is composed by shaft, frame, bearing. The light-absorbing / light emitting part are composed by light-absorbing element, light emitting element, disk/mask. The circuit part is composed by the circuit which formalizes the signal generated from light-absorbing element.



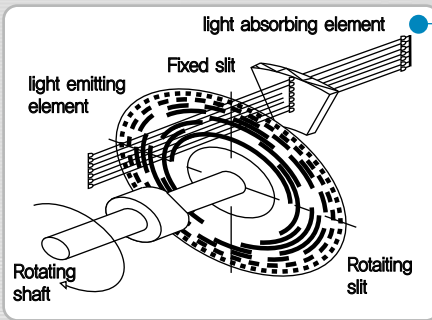
The composition of Encoder

The principle of Rotary Encoder



INCREMENTAL ENCODER

- The light generated from light emitting element passes through rotating and fixed slit. The light energy is converted into current through light-absorbing element and passes through fixed-waved circuit & output circuit and output as two spherical pulses which have different phase of 1/4 cycle.
 - It is output as spherical wave depending on the amount of rotating displacement of the shaft.
 - The external counter figures out the number of pulses and the amount of rotating displacement is detected.
 - You have to set the origin to find a certain rotating displacement and add the number of pulse from the origin accumulatively.
 - You can add the extra circuit to the output circuit of encoder and improve the electric resolution by increasing the output pulse 2times, 4times
 - You have to find the origin newly when the power is re-provided after power failure.



Absolute Encoder

- The basic principle of absolute encoder is same as incremental encoder. In case of Incremental encoder, two spherical pulses which have different phase are Output, while in case of absolute encoder, it is output as digital code (Binary, BCD, Gray code)
 - The amount of rotating displacement is output as parallel 2^n More the number of output code's bit is, higher the resolution is.
 - It detects the rotating position by reading the output code directly.
 - Once the origin of input rotating shaft is fixed, the rotating angle whose coordinates origin is always in the origin is output as digital code.
 - It always maintains the absolute position when the power is re-provided after power failure.

Open Collector

- The emitter terminal of transistor is connected to 0[V] by using NPN transistor in output side of encoder and open the collector terminal with + Vcc and use it for output terminal. It is recommended when encoder and collector does not coincide on the power voltage.

⟨Application⟩ FA for general use, Textile machine, Lubricator, Automation Machine, Injection machine, Cutting machine, Printing machine, Packaging machine

Voltage Output

- The emitter terminal of transistor is connected to 0[V] by using NPN transistor in output side of encoder and the collector terminal is connected with + Vcc and load resistor and use it for output terminal. It is recommended when the voltage of the applicable equipment is same as the voltage of encoder and no-load is applied to the input side of used machine.

⟨Application⟩ FA for general use, Textile machine, Lubricator, Automation Machine Injection machine, Cutting machine, Printing machine, Packaging machine

Totem Pole

- Totem pole is composed of two NPN transistor between +Vcc of encoder output circuit and 0[V], which is complement output type. If one transistor is ON, another should be OFF. The current inflows at both directions through two transistors of output side and output current flows all the time. So it has low impedance and is not much influenced by noise and deformed wave. It can be also used for voltage output and open collector type.

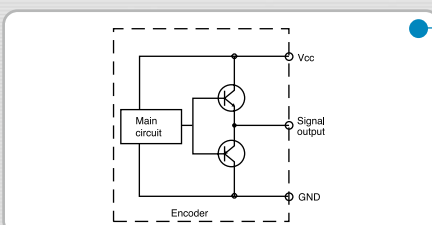
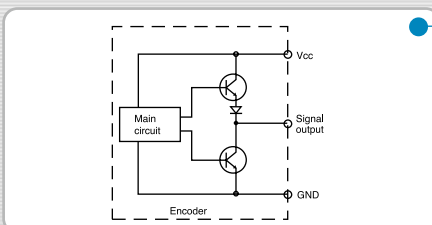
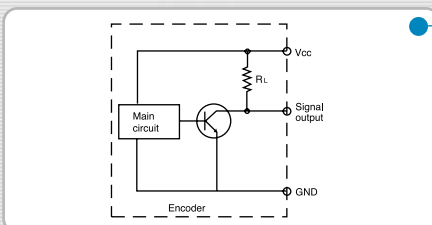
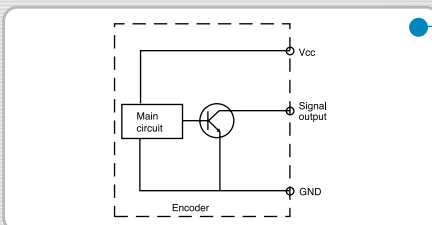
⟨Application⟩ FA for general use, Textile machine, Lubricator, Automation Machine Injection machine, Cutting machine, Printing machine, Packaging machine

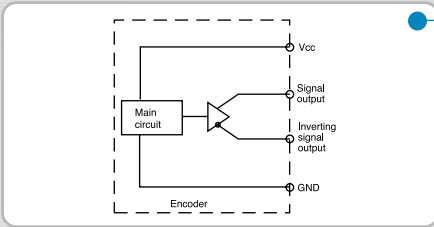
Complemental or Push-Pull Output

- It is composed of the upper PNP type transistor and the lower NPN type transistor. It is also complement output type just like Totem pole ; If one transistor is ON, another should be OFF. It has high input impedance and low output impedance so it is possible to provide large-scale power even under low impedance and is suitable for long-distance transmission because it has same phase of input/output signal and wide frequency area.

⟨Application⟩ Elevator (special customized)

The output circuit type of Rotary Encoder

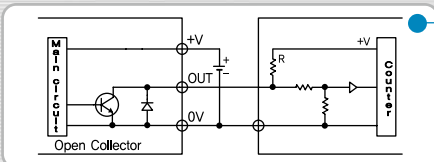




Line Driver

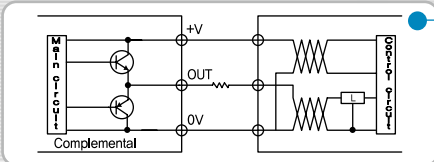
- It applies the exclusive IC(26LS31) for Line driver to the encoder output circuit. The exclusive IC for Line driver is suitable for long-distance transmission because it has high-speed response and good noise-proof. For the receiver of controller which receives the line driver output of encoder, IC(26LS32) which is corresponding to RS-422A should be used.
(Application) AC Servo system, DC Servo System, Robot, A.G.V., NC Construction machine

The example of output connection for Rotary Encoder



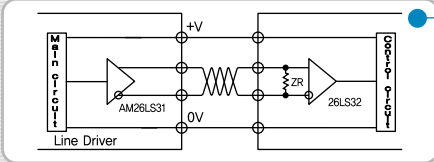
The output connection with counter

- In case that open collector type of encoder is connected to the counter, you have to connect Pull up resistor to the receiving circuit and the resistor[R] should be set less than 5/1 of input impedance.



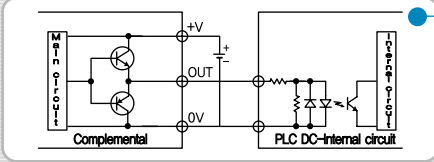
The output connection of Complementary type

- In case of complementary output type, the current inflows all the time since two transistors complements each other. It is suitable for middle-distance transmission since it has good noise-proof and low distorted wave, which is mainly applied for elevator.



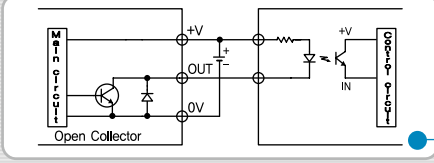
The output connection of Line Driver type

- In case of Line driver output type, For the receiving circuit which receives the output of encoder, you have to use IC(26LS32) which is corresponding to RS422A. You have to also apply use Twist pair cable .



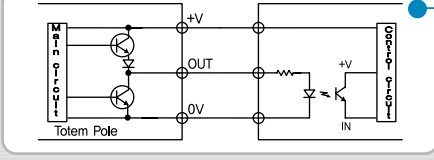
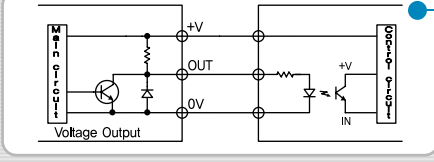
The output connection of Encoder and PLC

- In case that you connect the encoder to the PLC, you can use them by connecting directly DC input unit of encoder and PLC. In this case, the input scanning frequency of DC input unit of PLC which receive the output of encoder should be higher than max. response frequency of encoder.(Approximately, more than 10 times)
In case that the power is not stable when you apply the DC power of PLC to the encoder, the encoder may have malfunction so you have to use separately the stable DC power for encoder.

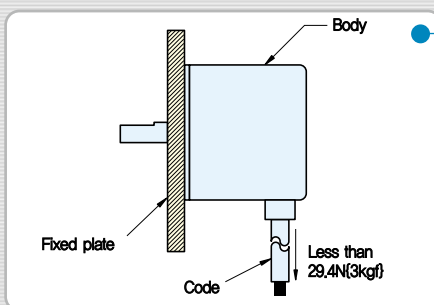
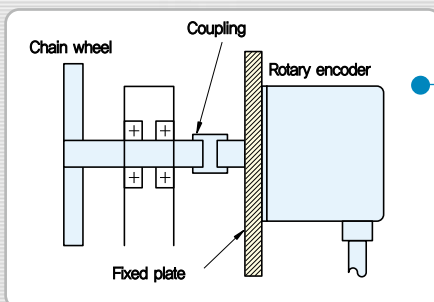
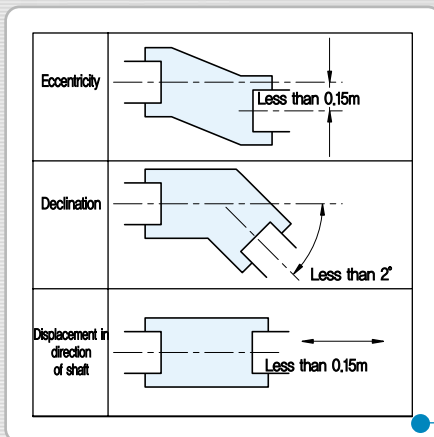


The output connection with Photo coupler

- In case of connecting rotary encoder and photo coupler, the resistor[R] should not exceed the operating current of photo coupler and encoder's max. load current. The response of photo coupler should be more faster than max. response frequency of encoder to secure the allowance of response.



Notice for applying Rotary Encoder



■ Circumstances

- Do not use rotary encoder in the below circumstances.
 - The place where the equipment may be defected due to the excessive vibration, shock
 - Nearby the equipment which emits strong magnetism, electric noise
 - The place which has inflammable, corrosive gas / the splashing water, oil / dirt
 - The place where the temperature, humidity exceeds the propriety
 - Nearby the strong alkali / acid materials
 - The place is exposed to a direct ray of light

■ Instructions to install encode

- Please don't splash water or oil to the body
- As rotary encoder is composed by precision components, you must handle it with care.
- In case of forward, reverse rotation, you have to check the installation direction and adjusting direction
- In case that you set the origin of the applicable equipment at Z phase of encoder, please make sure to check the position of Z phase.
- In case of gear connection, mind that you do not inflict the excessive load to the rotating shaft.
- In case of fixing with screw, please tighten with less than 0.49N.m[5kg .f]
- In case of using coupling, make sure to install it within permitted limit.
- Please be noted that if installation error(partial disposition, declination) encoder may be broken or the life span may be shortened
- In case of connecting with chain timing belt or wheel, the extra bearing and coupling will be needed to connect encoder.

■ Instructions for wiring

- For Rotary encoder, please provide the power independently within the rated voltage.
- In case that you wire the coder after fixing the product, the power to pull the code should not exceed 29.4N[3kgf]
- Please check the connection to avoid the mis-wiring. In case of short, the product may be broken or damaged.
- Wiring work should be done after cutting off the power. In case that the power is on, the output circuit may be damaged.
- In case of wiring high-tension wire and power line at the same time, the malfunction caused by induction noise or damage may occur. So please use the separate wiring.
- In case that serge occurs at the used power, please suck serge by connecting serge observer between power.
- In case of no used output line, FG line, they should be insulated

■ Instructions in case of extending wiring

- Please make sure that you have to use Twist Pair Shield cable when you extend the rotary encoder cable.
 - Line Driver → Vcc-0V, A- \bar{A} , B- \bar{B} , Z- \bar{Z}
 - Open Collector, Voltage Output, Totem Pole, Complementary
 - ➔ Vcc-0V, A-0V, B-0V, Z-0V

- In case of extending the wiring, remaining voltage of output signal may be increased or the wave may be distorted due to phase to phase resistance or phase to phase capacity.
- The wiring work should be shortest to avoid induction noise.
- In case of extending the wiring, opening time of output wave will be extended and it may influence the phase difference of A, B phase.
- In case of extending the wiring, Line Driver output type is recommended. Please provide DC 5[V] of the power supply for Line Drive and be noted that the voltage drops by approximately 1[V] when you make it 100m longer.

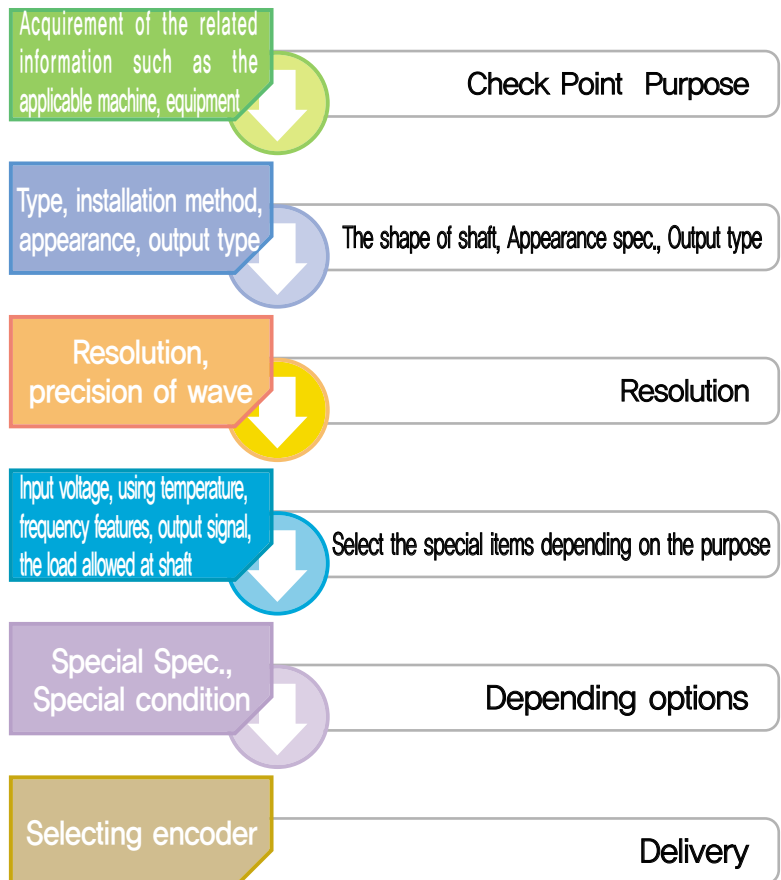
■ Instructions under vibration

- When you apply vibration to the rotary encoder, wrong pulse will occur and it leads to malfunction so you must handle it with care
- Please make sure that you do not transmit the vibration generated from rotation or stop to the encoder since higher encoder's resolution is, more wrong pulse is due to vibration.

■ Noise-control Measures

- You are requested to provide the power independently.
- In case that the transmitting distance is long, please insert a number of μF Condenser which is for noise filter between case ground circuit and ground
- Keep away from the source of noise and the wiring work for encoder should be shortest.

The procedures to select the rotary encoder



Terms

■ Resolution[P/R]

- It means the number of pulse which is output from 1 revolution of the rotating shaft of rotary encoder. In case of Incremental encoder, it can be indicated in the number of rotating slits, in case of Absolute encoder, it can be indicated in number of division or bit.

■ Power voltage (Symbol : [Vcc], Unit : [V])

- It means the voltage which is applied to the rotary encoder. Please make sure to check the power voltage of the related product and input the voltage within the limits of rated voltage

■ Consuming current(Symbol ; [Icc], Unit : [m A])

- It means the current which encoder consumes when the power is applied to the encoder. Please make sure to use it within rated consuming current.

■ Moving Torque (Symbol : [Tr], Unit : [g-cm])

- It means the minimum power to rotate the rotation shaft when rotary encoder stops. Generally, the torque is less than the moving torque.

■ The max. response frequency (Symbol : [fr], Unit : [kHz])

- It means the max output pulse which rotary encoder can response per 1 second.
- Max. response frequency = Max. rpm/60 x resolution
- Please make sure to use it within max. allowable rpm and determine the resolution within rated max. rpm.

■ Max. allowable rpm. (Symbol ; [Nr], Unit : [rpm])

- It means the max. rpm which rotary encoder allows mechanically and it may affect the lifespan of encoder. Please make sure to use it within rated limits.

■ Allowable shaft load (Unit : [kgf])

- It indicates the allowed radial and axial load when the shaft is rotated.

■ Position deflection of allowable shaft (Unit : [mm])

- It indicates the position deflection when coupling or shaft is connected to the shaft of rotary encoder.

■ Bearing lifespan (Symbol : [hs], Unit : [hrs])

- The bearing lifespan of rotary encoder is in inverse proportion to the load of rpm. In case that input rpm and shaft load are lower, it depends on the lifespan of grease.

■ Forward rotation (Symbol : [CW])

- It means CW rotation in direction of rotating shaft. In case of Incremental encoder, A phase is output before B phase and absolute encoder indicates the direction to increase code.

■ A, B Phase

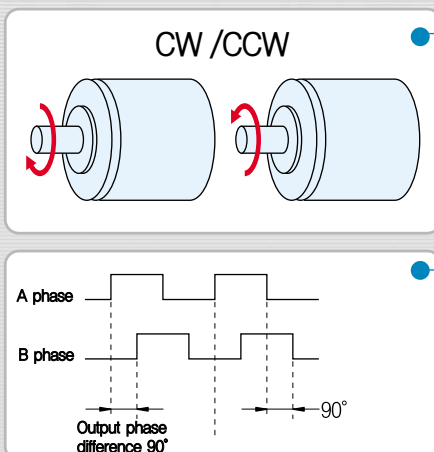
- The output signal of A, B phase are output with 90° of phase difference. It is the signal to discriminate the rotation direction.

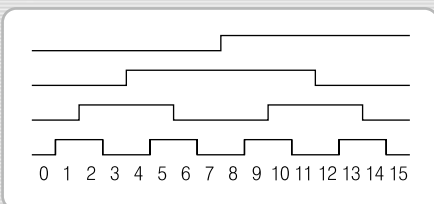
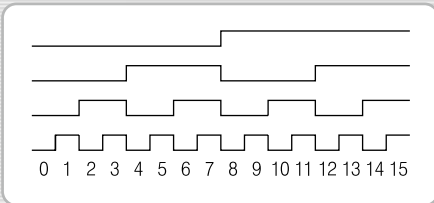
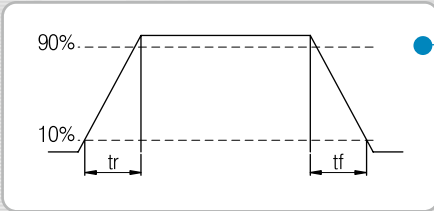
■ Z phase

- One Z phase is output per one rotation, which is called origin signal.

■ Isolation Resistor (Unit : [MΩ]

- It means the resistance between whole terminal of electric circuit and Case Ground





■ Vibration-proof (Unit : [G])

- It means the ability that rotary encoder is proof against the vibration, which is based on the vibration test

■ Impact-Proof (Unit : [G])

- It indicates the ability that rotary encoder is proof against the impact when it falls from height of 1m twice in direction of X, Y, Z axis

■ Rising(tr) / Decline(tf) Time

- Rising time : The time to reach the initial 10%~90% (When signal level is 100%)
- Decline time : The time to reach 90%~100% (When signal level is 100%)

■ Using temperature (Unit : [°C])

- It means the range of surrounding temperature to meet the performance of rotary encoder.

■ Maintaining Temperature (Unit : [°C])

- It means the range of temperature not to flame the performance of rotary encoder (suspension of power supply)

■ Bias Condenser

- It means the condenser which is connected between 0[V] of electric circuit of rotary encoder and encoder frame.

■ Binary Encoder

- It is one of output coder of Absolute encoder, which is the basic code to process digital signal. However, both 0 and 1 may be changed at the same time and the data may be mis-read due to time error.

Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2 ³	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
2 ²	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
2 ¹	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
2 ⁰	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

■ Gray Code

- It can avoid the same error as the binary coder to complement the weak point of it.
In case of changing the number, either 0 or 1 may be changed.

Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2 ³	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
2 ²	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0
2 ¹	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0
2 ⁰	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0









■ BCD Code

- It is one of output coder of Absolute encoder, which indicates the number (up to 10) as the binary system. It can be usually used for controller of system and counter.


















Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2 ³ ×10 ⁰	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0
2 ² ×10 ⁰	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	1
2 ¹ ×10 ⁰	0	0	1	1	0	0	1	1	0	0	0	0	1	1	0	0
2 ⁰ ×10 ⁰	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Rotary Encoder MECAPION Series

INCREMENTAL SHAFT TYPE

S30 Series (200 ~ 1024 P/R)		14
S40 Series (10 ~ 3600 P/R)		16
S48 Series (10 ~ 6000 P/R)		18
S58 Series (10 ~ 6000 P/R)		20
S66 Series (10 ~ 6000 P/R)		22
S68A Series (100 ~ 2048 P/R)		24
S68B Series (100 ~ 2048 P/R)		26
S78 Series (512 P/R)		28



INCREMENTAL HOLLOW TYPE

H30 Series (2000 ~ 3000 P/R)		30
H35 Series (512 ~ 3000 P/R)		32
H40 Series (10 ~ 3600 P/R)		34
H42 Series (2000 ~ 3000 P/R)		36
H45A Series (2000 ~ 3000 P/R)		38
H48 Series (5000 ~ 6000 P/R)		40
H60 Series (2000 ~ 6000 P/R)		42
H62 Series (1000 ~ 2048 P/R)		44
H70 Series (45 P/R)		46
H88-18 Series (512, 1024 P/R)		48
H88A-18 Series (512, 1024 P/R)		50
H88-30B Series (512, 1024 P/R)		52
H88-30C Series (512, 1024 P/R)		54
H88-38 Series (512, 1024 P/R)		56
H100 Series (512, 1024 P/R)		58
H108 Series (4096 P/R)		60
H128 Series (1024, 8192 P/R)		62

ABSOLUTE SHAFT TYPE

SA58 Series (1024 P/R, 10Bit)		64
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MANUAL PULSE GENERATOR

SM80 Series (100 P/R)		66
SPM Series (100 P/R)		68

INCREMENTAL
SHAFT TYPE

S30 Series

- Features : Small size and various resolution
200~1024P/R(4 Class), Wide ranging power voltage,
Customized design, Prompt delivery



Model

INCREMENTAL
SHAFT TYPE
Outer Diameter Ø30

Shaft Size

4 : Ø4

S30 - 4 -

Resolution(P/R)

200 500 1000
1024

Output Signal

- B : A, B
- Z : A, B, Z
- U : A, \bar{A} , B, \bar{B}
- V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Output Form

- O : Open Collector
- V : Voltage Output
- L : Line Driver

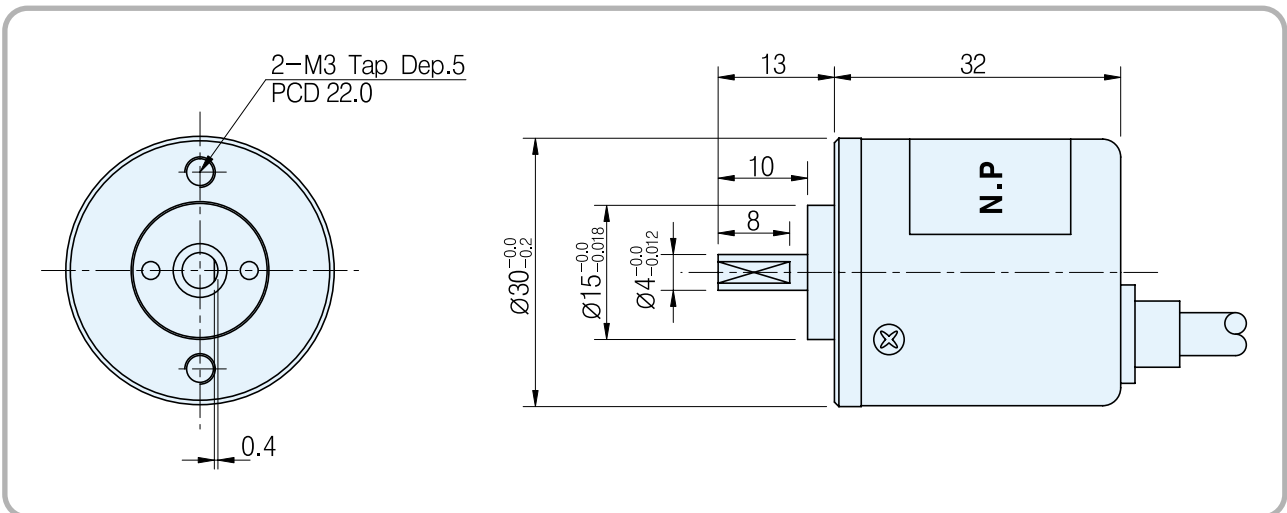
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

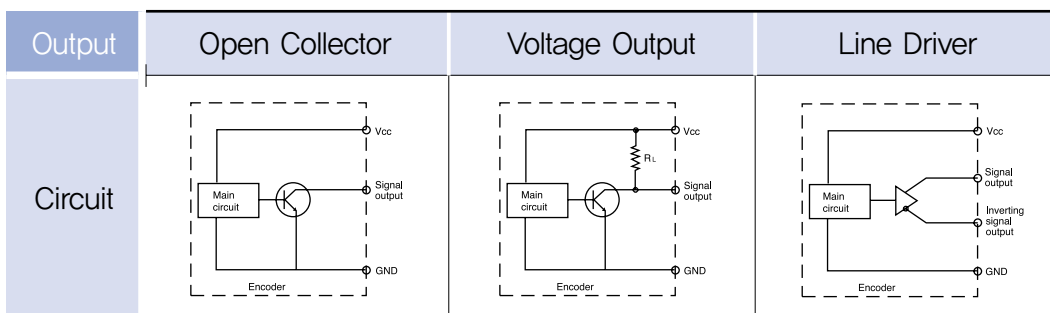


The sepc) of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Line Driver
Power Supply	DC +12[V] ~ +15[V] Ripple p-p : less than 5%	DC +12[V] ~ +15[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p: less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max
Maximum Response Frequency	150 KHz (200 ~ 1024 P/R)		
Output voltage	Less than V_L 0.5[V] / More than V_H 2.5[V] (In case of inputting +5V), /More than V_H 10[V](In case of inputting +15V)		
Output current	Less than 20mA	Less than 20mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]		

Mechanical Spec.

Starting Torque	50g – cm Max
Maximum number of revolution	3000 rpm
Bearing lifetime	20,000[hr](In case of rotating by 3000rpm)
Allowable Shaft Load	Radial : 1.8kg Max Axial : 0.9kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	4P(AWG26) Shield CABLE
weight	120g

Rigid Spec.

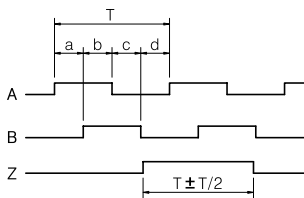
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ +85% RH
Preserving Humidity	30% ~ +90% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 50

Output Phase Shift

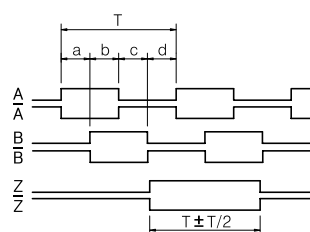
CW \rightarrow Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/8$
 $a, b, c, d = T/4 \pm T/8$



Open Collector, Voltage Output



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector Voltage Output	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Blue	-	\bar{A} Sig
White	B Sig	B Sig
Pink	-	\bar{B} Sig
Yellow	Z Sig	Z Sig
Orange	-	\bar{Z} Sig
Shield	CASE Shield	CASE Shield

S40 Series

- Features : Various resolution, 10~3600 P/R(29 Class)
- Wide ranging power voltage, Customized design,
- Prompt delivery



Model

INCREMENTAL
SHAFT TYPE
Outer Diameter Ø40

Shaft Size

6 : Ø6 ※Option : 5 : Ø5

S40 - 6 - [] [] [] [] - [] [] []

Resolution(P/R)

- 0010 0030 0048 0050 0060
- 0072 0075 0100 0120 0125
- 0192 0200 0250 0256 0300
- 0360 0400 0500 0512 0600
- 0720 1000 1024 1200 2000
- 2048 2500 3000 3600

Output Signal

- B : A, B
- Z : A, B, Z
- U : A, \bar{A} , B, \bar{B}
- V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Output Form

- O : Open Collector
- V : Voltage Output
- C : Complemental
- T : Totem Pole
- L : Line Driver

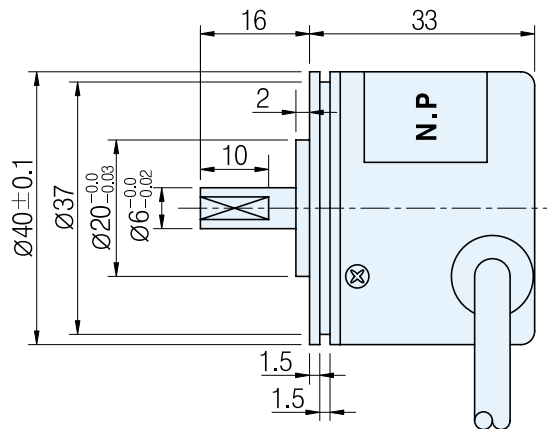
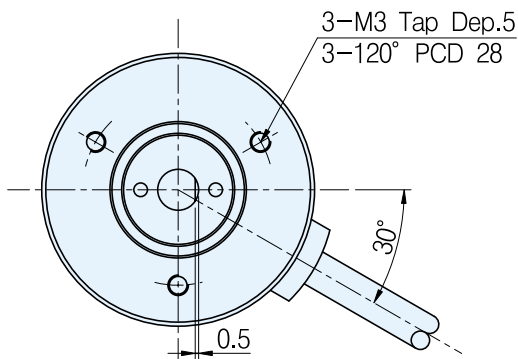
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

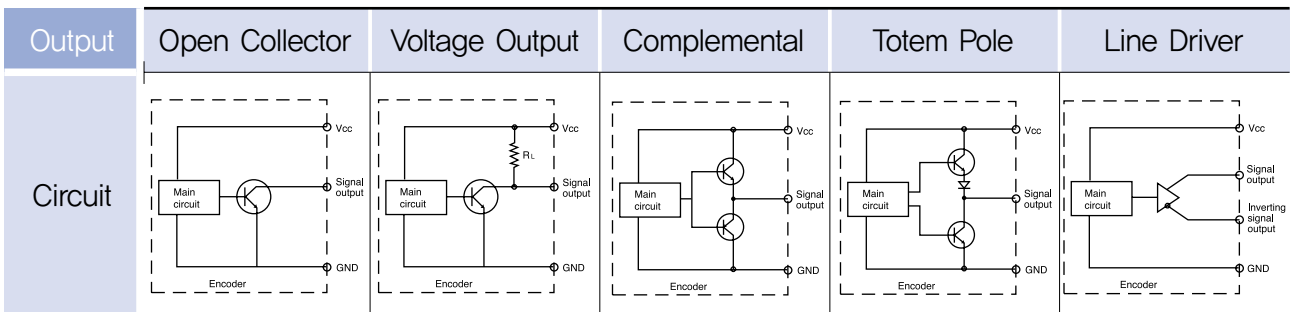


The sepc) of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Complemental	Totem Pole	Line Driver
Power Supply	DC +5[V] ~ +24[V] Ripple p-p : less than 5%	DC +5[V] ~ +24[V] Ripple p-p : less than 5%	DC +15[V], +24[V] Ripple p-p : less than 5%	DC +5[V] ~ 24[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz (10 ~ 2048 P/R) / 300 KHz (2500 ~ 3600 P/R)				
Output voltage	Less than $V_i \cdot 0.5[V]$ / More than $V_i \cdot 2.5[V]$ (In case of inputting +5V), / More than $V_i \cdot 10[V]$ (In case of inputting +15V) / More than $V_i \cdot 18[V]$ (In case of inputting +24V)				
Output current	Less than 20mA	Less than 20mA	Less than 10mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s	Less than 1 μ s	Less than 0,1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]				

Mechanical Spec.

Starting Torque	50g – cm Max
Maximum number of revolution	7000 rpm
Bearing lifetime	20,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2,2kg Max Axial : 1,1kg Max
Position deflection of allowable shaft	Radial : Less than 0,05 mm Axial : Less than 0,2mm
Connection Table	4P(AWG26) Shield CABLE
weight	150g

Rigid Spec.

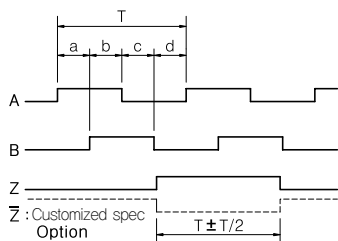
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 85% RH
Preserving Humidity	30% ~ 90% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 50

Output Phase Shift

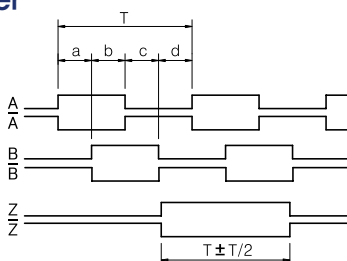
CW → Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Voltage Output
 Complemental, Totem Pole



Line Driver



Connection Table

Cable's Color	Connection Table	
Output Form	Open Collector Voltage Output Complemental Totem Pole	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Blue	-	\bar{A} Sig
White	B Sig	B Sig
Pink	-	\bar{B} Sig
Yellow	Z Sig	Z Sig
Orange	-	\bar{Z} Sig
Shield	CASE Shield	CASE Shield

S48 Series

- Features : Various resolution, 10~6000 P/R(31 class)
- Wide ranging power voltage, Customized design,
- Prompt delivery



Model

INCREMENTAL
SHAFT TYPE

Shaft Size

Outer Diameter $\varnothing 48$

8 : $\varnothing 8$ ※Option : 6 : $\varnothing 6$

S48 - 8 - **-** **-**

Resolution(P/R)

- 0010 0030 0048 0050 0060
- 0072 0075 0100 0120 0125
- 0192 0200 0250 0256 0300
- 0360 0400 0500 0512 0600
- 0720 1000 1024 1200 2000
- 2048 2500 3000 3600 5000
- 6000

Output Signal

- B : A, B
- Z : A, B, Z
- U : A, \bar{A} , B, \bar{B}
- V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Output Form

- O : Open Collector
- V : Voltage Output
- C : Complemental
- T : Totem Pole
- L : Line Driver

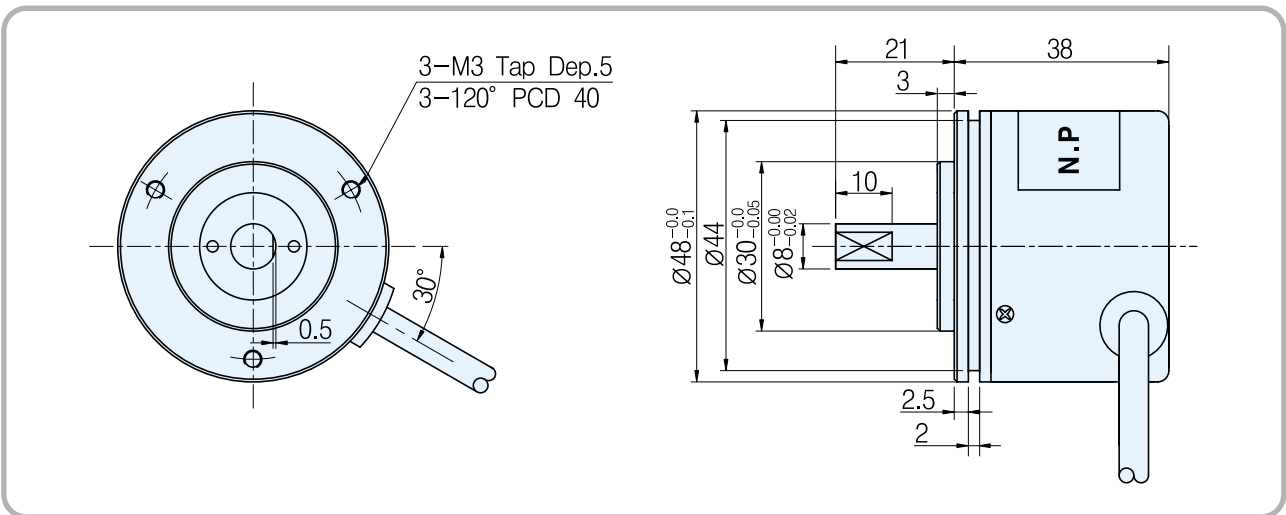
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

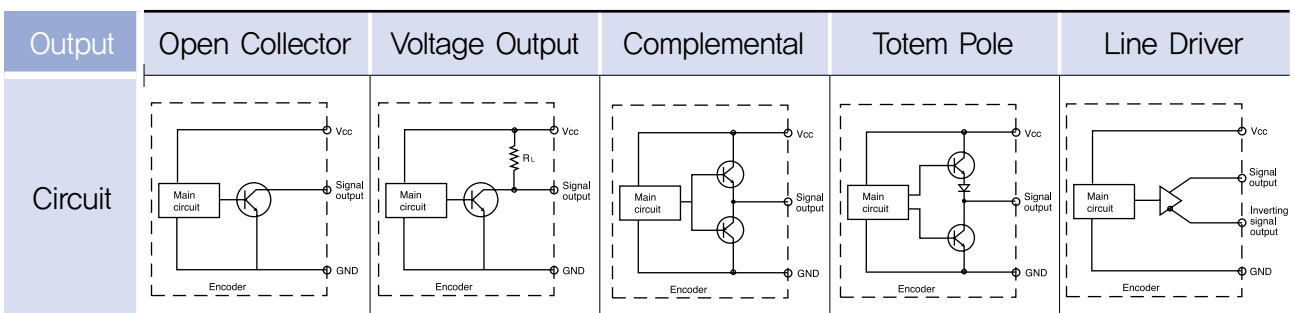


The sepcl of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Complemental	Totem Pole	Line Driver
Power Supply	DC +5[V] ~ +24[V] Ripple p-p : less than 5%	DC +5[V] ~ +24[V] Ripple p-p : less than 5%	DC +15[V], +24[V] Ripple p-p : less than 5%	DC +5[V] ~ 24[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz (10 ~ 2048 P/R) / 300 KHz (2500 ~ 6000 P/R)				
Output voltage	Less than $V_i - 0.5[V]$ / More than $V_i - 2.5[V]$ (In case of inputting +5V) / More than $V_i - 10[V]$ (In case of inputting +15V) / More than $V_i - 18[V]$ (In case of inputting +24V)				
Output current	Less than 20mA	Less than 20mA	Less than 10mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s	Less than 1 μ s	Less than 0,1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]				

※ The pulse is available up to 3,600P/R for Complemental type

※ In case of more than 5,000P/R, the input power should be +5[V]~+15[V](Except Line driver)

Mechanical Spec.

Starting Torque	80g – cm Max
Maximum number of revolution	6000 rpm
Bearing lifetime	27,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2.5kg Max Axial : 1.3kg Max
Position deflection of allowable shaft	Radial : Less than 0,05 mm Axial : Less than 0,2mm
Connection Table	4P(AWG26) Shield CABLE
weight	206g

Rigid Spec.

Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 85% RH
Preserving Humidity	30% ~ 90% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 50

Output Phase Shift

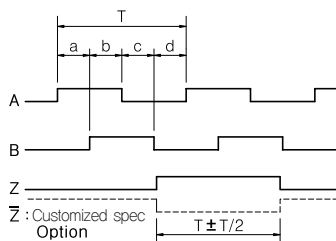
CW → Clockwise viewed from shaft end

$$a + b, c + d = T/2 \pm T/10$$

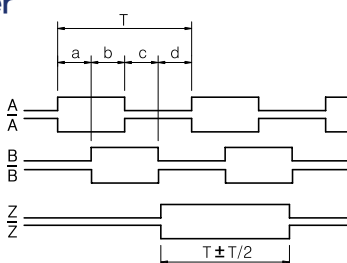
$$a, b, c, d = T/4 \pm T/10$$



Open Collector, Voltage Output
Complemental, Totem Pole



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector Voltage Output Complemental Totem Pole	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Blue	-	\bar{A} Sig
White	B Sig	B Sig
Pink	-	\bar{B} Sig
Yellow	Z Sig	Z Sig
Orange	-	\bar{Z} Sig
Shield	CASE Shield	CASE Shield

INCREMENTAL SHAFT TYPE S58 Series

- Feature : Various resolution, 10~6000P/R
- Wide range of Power supply, Customized Design
- Prompt delivery



Model

INCREMENTAL
SHAFT TYPE

Shaft Size

Ø6, Ø10

Resolution

S58 - 10 - [] [] [] [] - [] - [] - [] - [] - [] - []



- 1) Round Connector 8-Pin socket
- 2) Cable Output
- 3) Only for C & D of Connecting type this code will be issued.

Resolution(P/R)

- 0010 0030 0048 0050 0060
- 0072 0075 0100 0120 0125
- 0192 0200 0250 0256 0300
- 0360 0400 0500 0512 0600
- 0720 1000 1024 1200 2000
- 2048 2500 3000 3600 5000
- 6000

Output Signal

- B : A, B
- Z : A, B, Z
- U : A, \bar{A} , B, \bar{B}
- V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Flange Type

- C : Clamping Flange
- S : Synchro Flange

Output Form

- O : Open Collector
- V : Voltage Output
- C : Complemental
- T : Totem pole
- L : Line Driver

Cable Connecting Type

- A : Circular Connector, radial¹⁾
- B : Circular Connector, axial¹⁾
- C : Cable, radial²⁾
- D : Cable, axial²⁾

Power supply

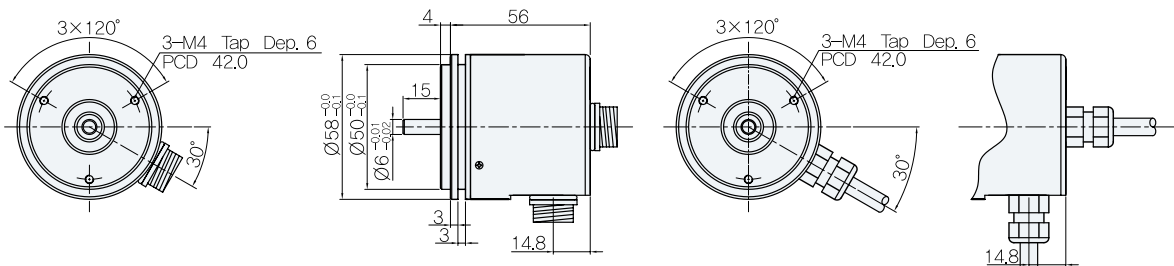
- 1 : 5~24V
- 2 : 15V
- 3 : 24V
- 4 : 5V

Cable Length

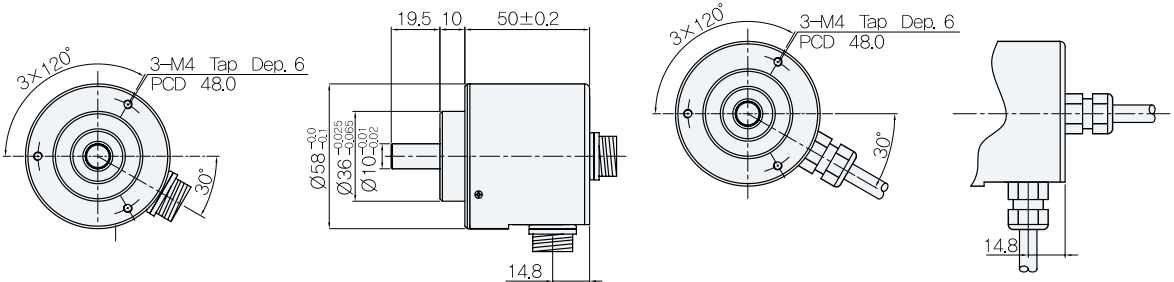
- 1 : 1.0m
- A : 10.0m

External Dimension

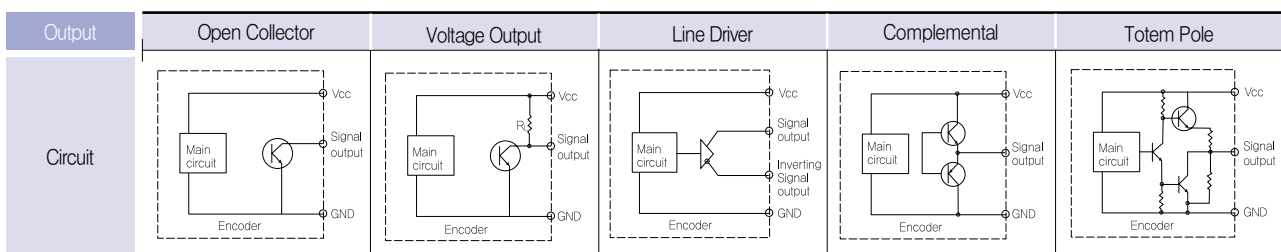
Synchro Flange Connector 8pole axial / radial & Cable



Clamping Flange Connector 8pole axial / radial & Cable



Output Circuit



Electrical Spec.

• Electrical Spec.

Resolution		10~6000P/R	
Output Type	Output Form	Power Supply	Current Consumption
	Voltage Output, Open Collector, Complementary, Totem Pole	5~24V	70mA
	Line Driver	5V	1500mA
	Line Driver ⁽¹⁾	5~24V	300mA
Maximum Response Frequency		10~2048p/r	150kHz
		2500~6000p/r	300kHz

※ The pulse is available up to 3,600P/R for Complementary type

※ In case of more than 5,000P/R, the input power should be +5[V]~+15[V](Except Line driver)



• Rigid Spec.

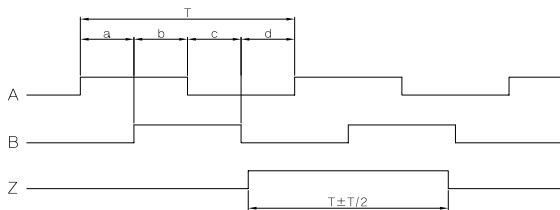
Operating Temp. Range	-10°C ~+70°C (No Freezing)
Preserving Temp	-20°C ~+85°C
Using Temp	35%~85%RH
Preserving Humidity	35%~90%RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 65

• Mechanical Spec.

Starting Torque	100 gf-cm
Max. No. of Rotation	6000rpm
Bearing Lifetime	30,000Hr(W/5000rpm)
Allowable Shaft Load	Radial : 2.2kg Max.
	Axial : 1.1kg Max.
Cable Type	4P(AWG26) Shield Cable

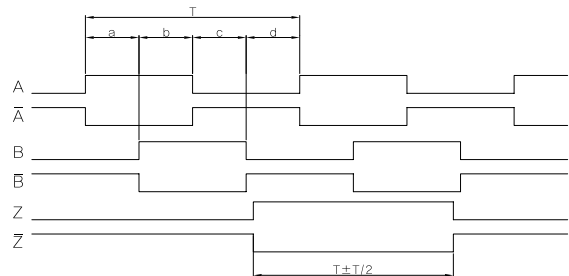
Signal Spec.

Voltage output, Open collector, Complementary, Totem pole



- $T=360^\circ/N$ (N : Resolution)
- $a+b, c+d = T/2 \pm T/10$
- A, B Phase has 90° of Difference
- Z Phase is Origin signal

Line Driver



→ CW from shaft end

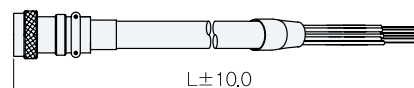
Cable Spec.

Cable color	Voltage output, Open collector, Complementary, Totem pole	Line driver
□ Red	DC+5~+24V	DC+5V/+5~+24V
□ Black	GROUND	GROUND
□ Green	A	A
□ Blue	-	\bar{A}
□ White	B	B
□ Pink	-	\bar{B}
□ Yellow	Z	Z
□ Orange	-	\bar{Z}
Shield	CASE SHIELD	

Extended Cable

Length(L)	Ordering Code		
	VL	ZO/ZV/ZC/ZT	BO/BV/BC/BT
1.0m	OS05BAK01xA	OS05BAK02xA	OS05BAK04xA
3.0m	OS05BAK01xB	OS05BAK02xB	OS05BAK04xB
5.0m	OS05BAK01xC	OS05BAK02xC	OS05BAK04xC
7.0m	OS05BAK01xD	OS05BAK02xD	OS05BAK04xD
10.0m	OS05BAK01xE	OS05BAK02xE	OS05BAK04xE

Body : SCN16-8RN
Extended Cable : SCN16-8P



S66 Series

- Features : Various resolution, 10~6000 P/R(31 class)
- Wide ranging power voltage, Customized design,
- Prompt delivery



Model

INCREMENTAL
SHAFT TYPE
Outer Diameter Ø66

Shaft Size

5 : Ø5

S66 - 5 - **-** **-** **-**

Resolution(P/R)
0010 0030 0048 0050 0060
0072 0075 0100 0120 0125
0192 0200 0250 0256 0300
0360 0400 0500 0512 0600
0720 1000 1024 1200 2000
2048 2500 3000 3600 5000
6000

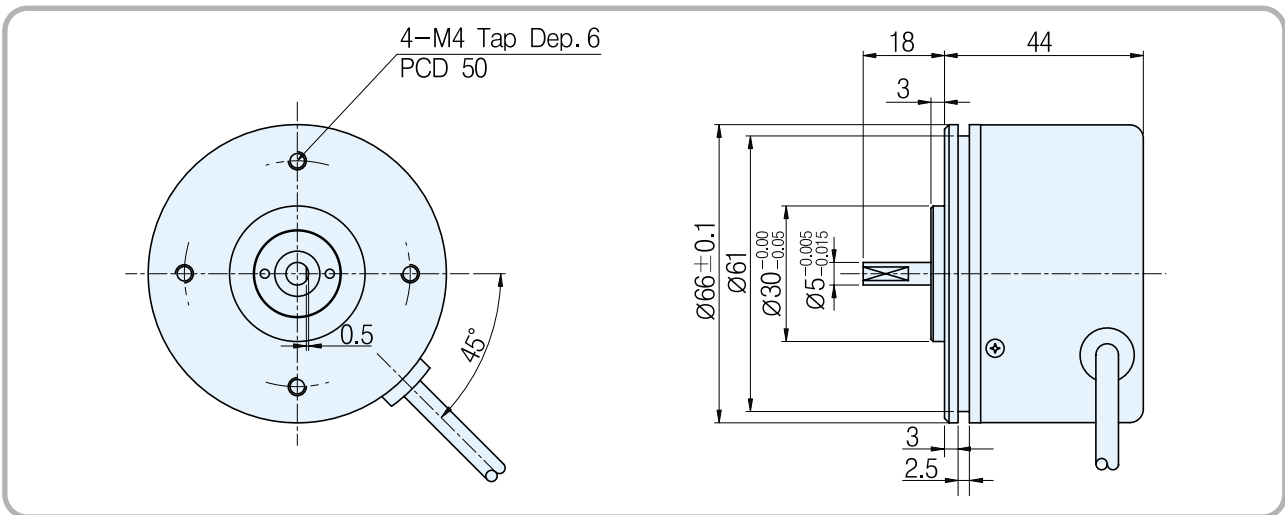
Output Signal
B : A, B
Z : A, B, Z
U : A, \bar{A} , B, \bar{B}
V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Output Form
O : Open Collector
V : Voltage Output
C : Complemental
T : Totem Pole
L : Line Driver

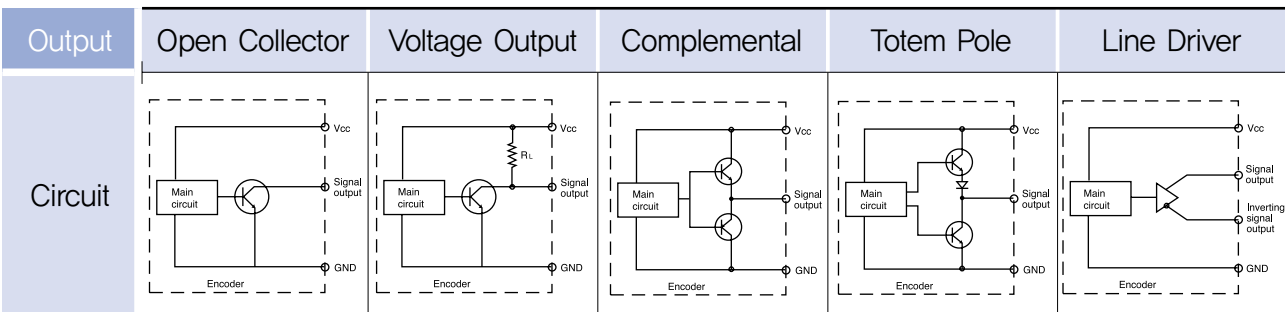
Cable Length
1 : 1[M]
2 : 2[M]
3 : 3[M]
4 : 5[M]
5 : 10[M]

The sepcl of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Complemental	Totem Pole	Line Driver
Power Supply	DC +5[V] ~ +24[V] Ripple p-p : less than 5%	DC +5[V] ~ +24[V] Ripple p-p : less than 5%	DC +15[V], +24[V] Ripple p-p : less than 5%	DC +5[V] ~ 24[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz (10 ~ 2048 P/R) / 300 KHz (2500 ~ 6000 P/R)				
Output voltage	Less than $V_i \cdot 0.5[V]$ / More than $V_i \cdot 2.5[V]$ (In case of inputting +5V) / More than $V_i \cdot 10[V]$ (In case of inputting +15V) / More than $V_i \cdot 18[V]$ (In case of inputting +24V)				
Output current	Less than 20mA	Less than 20mA	Less than 10mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s	Less than 1 μ s	Less than 0,1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]				

※ The pulse is available up to 3,600P/R for Complemental type

※ In case of more than 5,000P/R, the input power should be +5[V]~+15[V](Except Line driver)

Mechanical Spec.

Starting Torque	80g – cm Max
Maximum number of revolution	6000 rpm
Bearing lifetime	27,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2.5kg Max Axial : 1.3kg Max
Position deflection of allowable shaft	Radial : Less than 0,05 mm Axial : Less than 0,2mm
Connection Table	4P(AWG26) Shield CABLE
weight	250g

Rigid Spec.

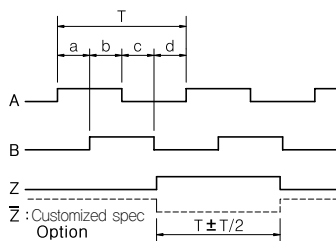
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 85% RH
Preserving Humidity	30% ~ 90% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 50

Output Phase Shift

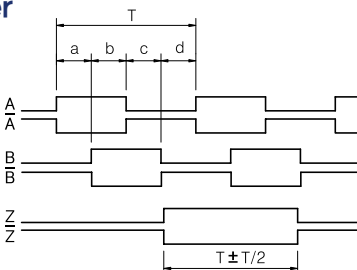
CW → Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Voltage Output
Complemental, Totem Pole



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector Voltage Output Complemental Totem Pole	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Blue	-	\bar{A} Sig
White	B Sig	B Sig
Pink	-	\bar{B} Sig
Yellow	Z Sig	Z Sig
Orange	-	\bar{Z} Sig
Shield	CASE Shield	CASE Shield

S68A Series

- Features : Machine tools, Industrial robot,
Rigid shaft type (Industrial robot),
Various resolution



Model

INCREMENTAL
SHAFT TYPE
Outer Diameter Ø68

Shaft Size

15 : Ø15 *Option : 10 : Ø10

S68A - 15 -

Resolution(P/R)

0100 0500 1000
1024 2000 2048

Output Signal

Z : A, B, Z
U : A, \bar{A} , B, \bar{B}
V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

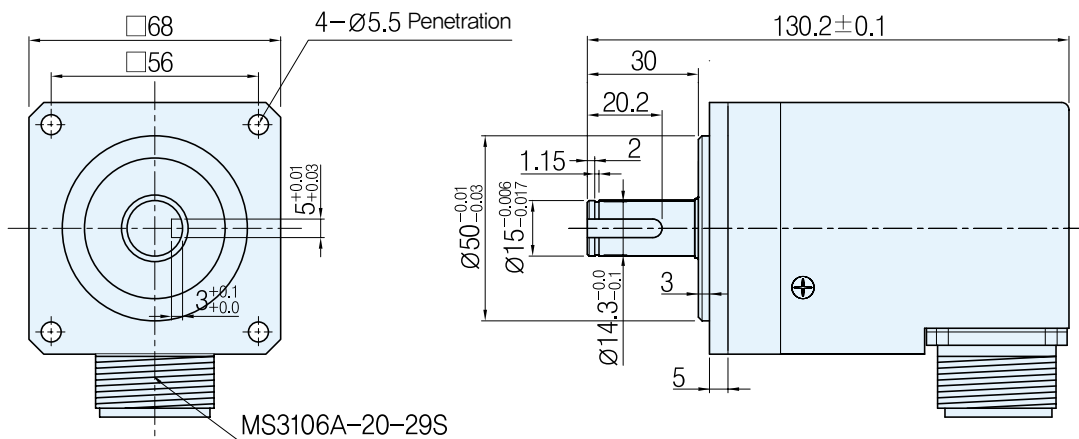
Output Form

O : Open Collector
V : Voltage Output
T : Totem Pole
L : Line Driver

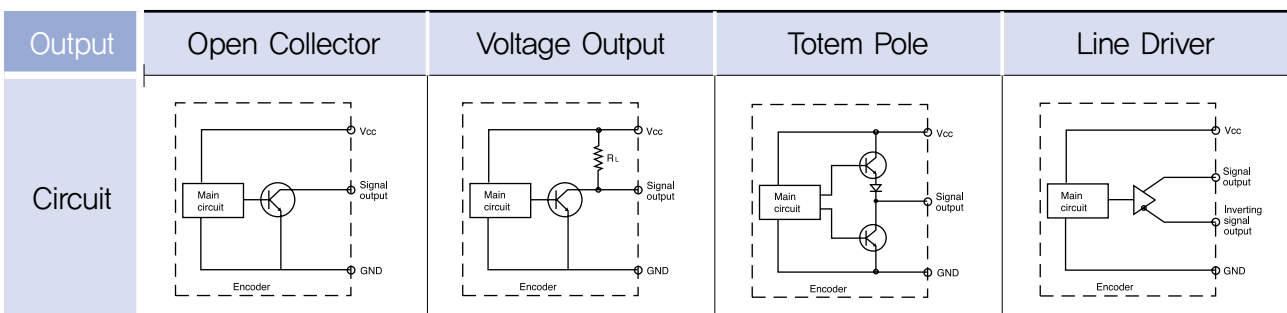


The sepcl of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Totem Pole	Line Driver
Power Supply	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +5[V] ~ 24[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz (100 ~ 2048 P/R)			
Output voltage	Less than $V_i \cdot 0.5[V]$ / More than $V_i \cdot 2.5[V]$ (In case of inputting +5V), / More than $V_i \cdot 10[V]$ (In case of inputting +15V) / More than $V_i \cdot 18[V]$ (In case of inputting +24V)			
Output current	Less than 20mA	Less than 20mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s	Less than 0.1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]			

Mechanical Spec.

Starting Torque	800g – cm Max
Maximum number of revolution	8000 rpm
Bearing lifetime	100,000[hr](In case of rotating by 6000rpm)
Allowable Shaft Load	Radial : 5kg Max Axial : 5kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	MS3102A20–29P
weight	720g

Rigid Spec.

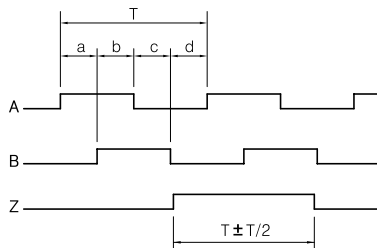
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ +85% RH
Preserving Humidity	35% ~ +95% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 54

Output Phase Shift

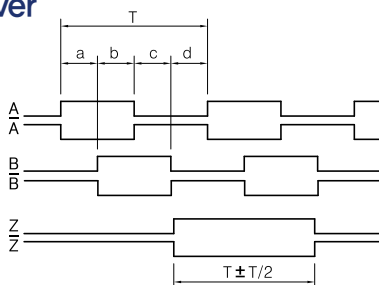
CW → Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Voltage Output Totem Pole



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector Voltage Output Totem Pole	Line Driver
H	Vcc	Vcc
K,M	GND	GND
A	A Sig	A Sig
N	-	\bar{A} Sig
C	B Sig	B Sig
R	-	\bar{B} Sig
B	Z Sig	Z Sig
P	-	\bar{Z} Sig
T	CASE Shield	CASE Shield

S68B Series

- Features : Various resolution, 10~3600 P/R(32 class)
- Wide ranging power voltage, Customized design,
- Prompt delivery →



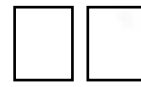
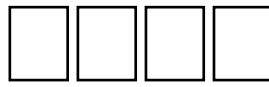
Model

INCREMENTAL
SHAFT TYPE
Outer Diameter Ø68

Shaft Size

10 : Ø10 ※Option : 15 : Ø15

S68B-10-



Resolution(P/R)

0100 0500 1000
1024 2000 2048

Output Signal

Z : A, B, Z
U : A, \bar{A} , B, \bar{B}
V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Output Form

O : Open Collector
V : Voltage Output
T : Totem Pole
L : Line Driver

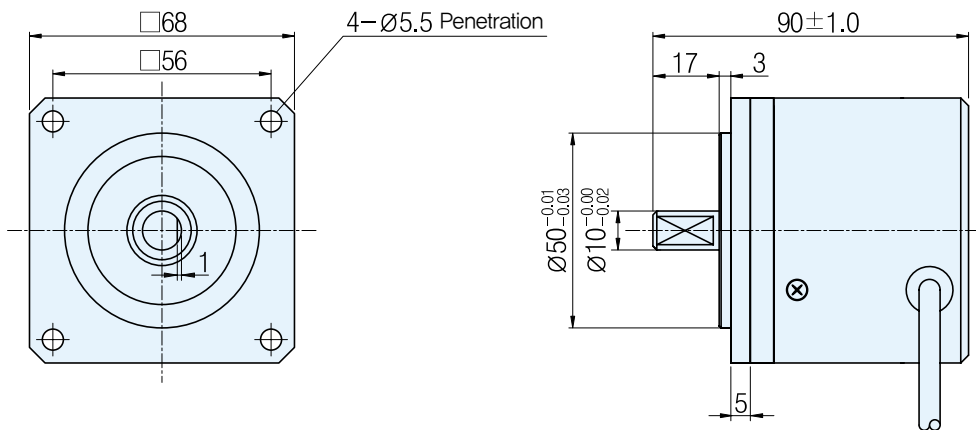
Cable Length

1 : 1[M]
2 : 2[M]
3 : 3[M]
4 : 5[M]
5 : 10[M]

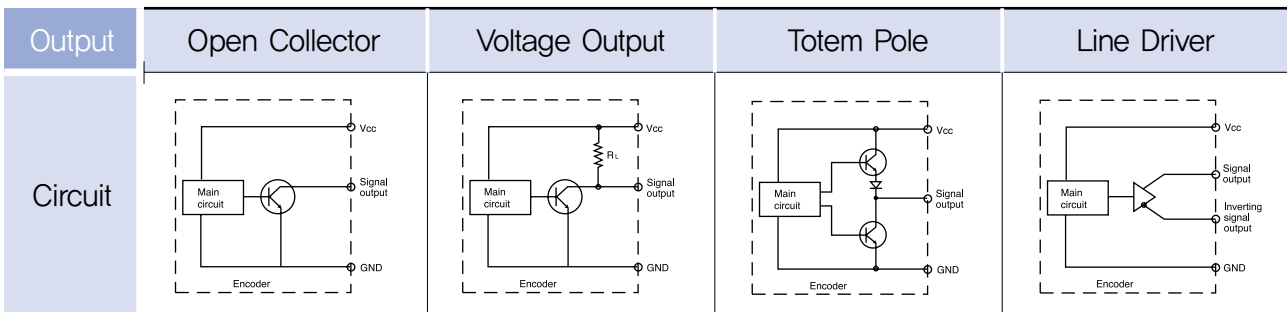


The sepcl of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Totem Pole	Line Driver
Power Supply	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +5[V] ~ 24[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz (10 ~ 2048 P/R)			
Output voltage	Less than $V_i \cdot 0.5[V]$ / More than $V_i \cdot 2.5[V]$ (In case of inputting +5V) / More than $V_i \cdot 10[V]$ (In case of inputting +15V) / More than $V_i \cdot 18[V]$ (In case of inputting +24V)			
Output current	Less than 20mA	Less than 20mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s	Less than 0.1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]			

Mechanical Spec.

Starting Torque	800g - cm Max
Maximum number of revolution	8000 rpm
Bearing lifetime	100,000[hr](In case of rotating by 6000rpm)
Allowable Shaft Load	Radial : 5kg Max Axial : 5kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	4P(AWG26) Shield CABLE
weight	620g

Rigid Spec.

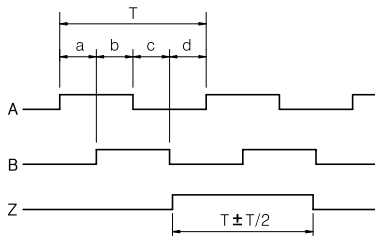
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ +85% RH
Preserving Humidity	30% ~ +90% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 50

Output Phase Shift

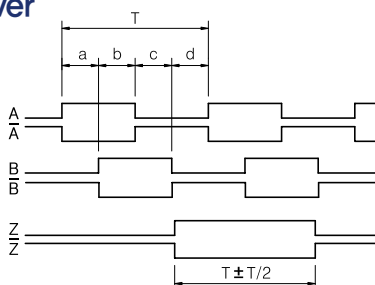
CW → Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Voltage Output Totem Pole



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector Voltage Output Totem Pole	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Blue	-	\bar{A} Sig
White	B Sig	B Sig
Pink	-	\bar{B} Sig
Yellow	Z Sig	Z Sig
Orange	-	\bar{Z} Sig
Shield	CASE Shield	CASE Shield

S78 Series

■ Features : Elevator, Industrial Machine



Model

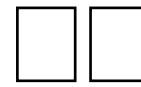
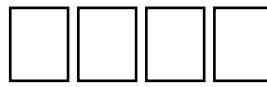
INCREMENTAL
SHAFT TYPE
Outer Diameter $\varnothing 78$

Shaft Size

8 : $\varnothing 8$

S78

- 8



Resolution(P/R)

0512

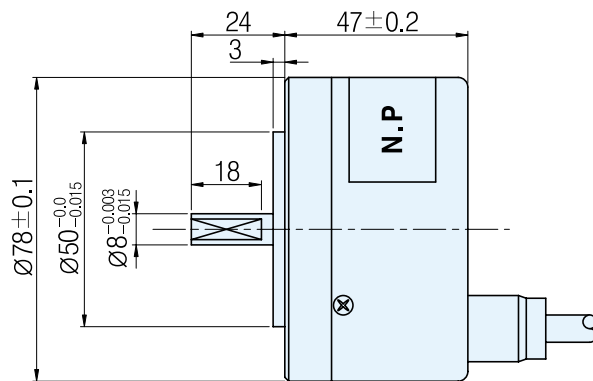
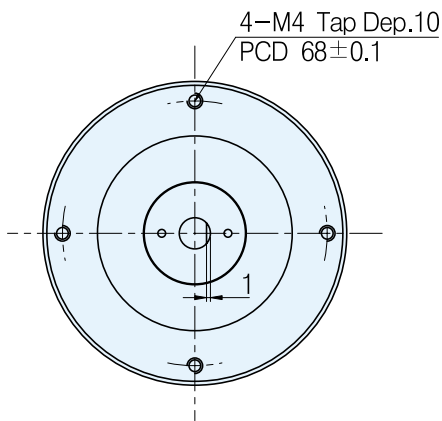
Output Signal

B : A, B

Output Form

C : Complemental

External Dimension

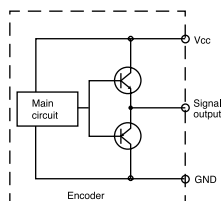


Output Circuit

Output

Complemental

Circuit



Electrical Spec.

Output type	Complemental
Power Supply	DC +15[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	150mA Max
Maximum Response Frequency	150 KHz
Output voltage	Less than V_L 0,5[V] / More than V_H 10[V]
Output current	Less than 10mA
Rising, decline time	Less than 1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	100g – cm Max
Maximum number of revolution	5000 rpm
Bearing lifetime	500,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 3.0kg Max Axial : 1.5kg Max
Position deflection of allowable shaft	Radial : Less than 0,05 mm Axial : Less than 0,2mm
Connection Table	4P(AWG26) Shield CABLE
weight	400g

Rigid Spec.

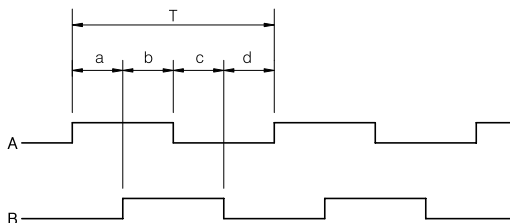
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ +85% RH
Preserving Humidity	35% ~ +90% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 50

Output Phase Shift

CW → Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Complemental



Connection Table

Cable's Color	Connection Table
Output Form	Complemental
Red	Vcc
Black	GND
Green	A Sig
Yellow	B Sig
Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H30 Series

- Features : AC, DC SERVO MOTOR
- Small sized, High-response frequency
- Easy to be attached, Customized design,
- Prompt delivery



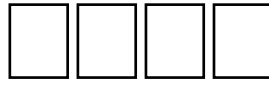
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter $\varnothing 30$

Shaft Size

6 : $\varnothing 6$

H30 - 6 -



Resolution(P/R)

2000 2048 2500
3000

Output Signal

V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}
W : A, \bar{A} , B, \bar{B} , Z, \bar{Z}
U, \bar{U} , V, \bar{V} , W, \bar{W}

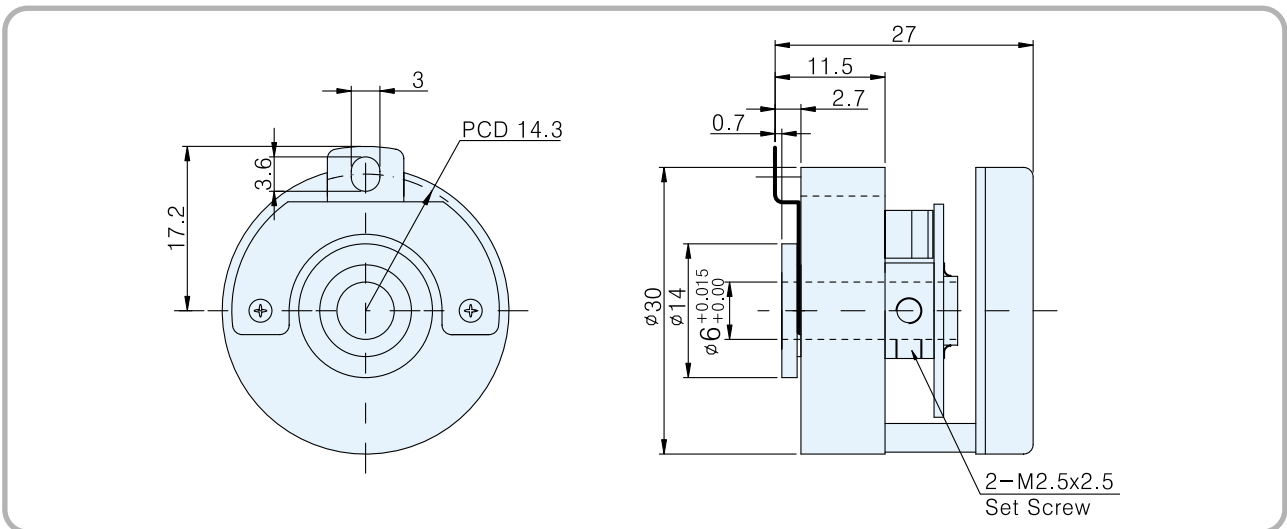
Output Form

L : Line Driver

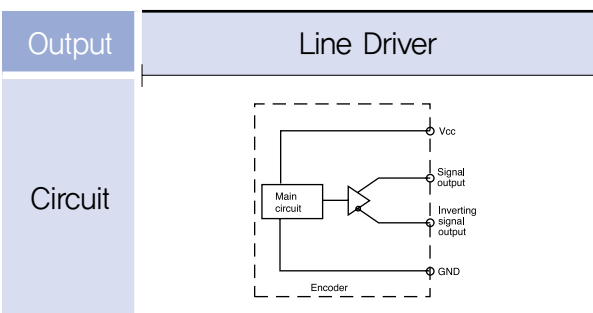
Cable Length

1 : 1[M]

External Dimension



Output Circuit



Electrical Spec.

Output type	Line Driver
Power Supply	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	300mA Max
Maximum Response Frequency	150 KHz
Output voltage	Less than V_L 0,5[V] / More than V_H 2,5[V]
Output current	Less than 20mA
Rising, decline time	Less than 1 μ s
Common conditions	Cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	120g – cm Max
Maximum number of revolution	3000 rpm
Bearing lifetime	30,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 3.0kg Max Axial : 1.5kg Max
Position deflection of allowable shaft	Radial : Less than 0,03mm Axial : Less than 0,2mm
Connection Table	7P(AWG26) Shield CABLE
weight	200g

Rigid Spec.

Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 70% RH
Preserving Humidity	30% ~ 80% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 00

Output Phase Shift

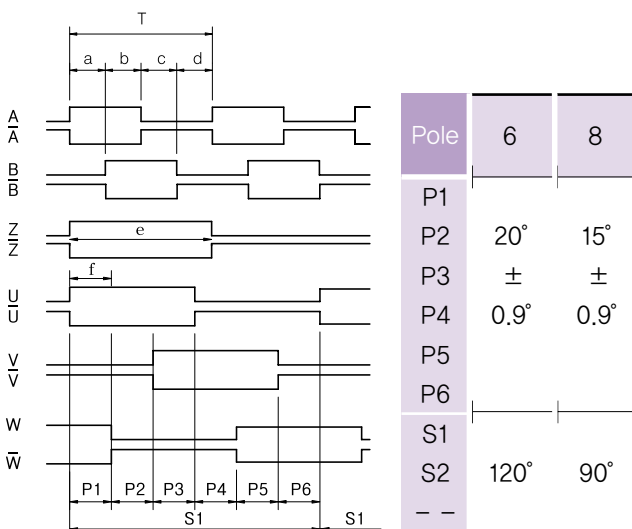
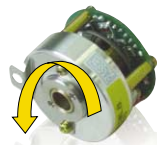
CCW \rightarrow Counterclockwise viewed from shaft end

$a + b, c + d = T/2 \pm T/10$

$a, b, c, d = T/4 \pm T/10$

$e = T \pm T/2$

f = The center of Z phase and U phase ($\pm 1^\circ$)
From Uch (rise point) to Zch center



Connection Table

Cable's Color	Connection Table
Output Form	Line Driver
Red	Vcc
Black	GND
Green	A Sig
White/Green	\bar{A} Sig
Gray	B Sig
White/Gray	\bar{B} Sig
Yellow	Z Sig
White/Yellow	\bar{Z} Sig
Brown	U Sig
White/Brown	\bar{U} Sig
Blue	V Sig
White/Blue	\bar{V} Sig
Orange	W Sig
White/Orange	\bar{W} Sig
Shield	CASE Shield

H35 Series

- Features : AC, DC SERVO MOTOR
Small sized, High-response frequency
Easy to be attached, Customized design,
Prompt delivery



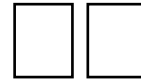
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter Ø35

Shaft Size

8 : Ø8 ※Option : 6 : Ø6

H35 - 8 -



Resolution(P/R)

0512 1000 1024
2000 2048 2500
3000

Output Signal

Z : A, B, Z
V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}
W : A, \bar{A} , B, \bar{B} , Z, \bar{Z}
U, \bar{U} , V, \bar{V} , W, \bar{W}

Output Form

O : Open Collector
V : Voltage Output
L : Line Driver

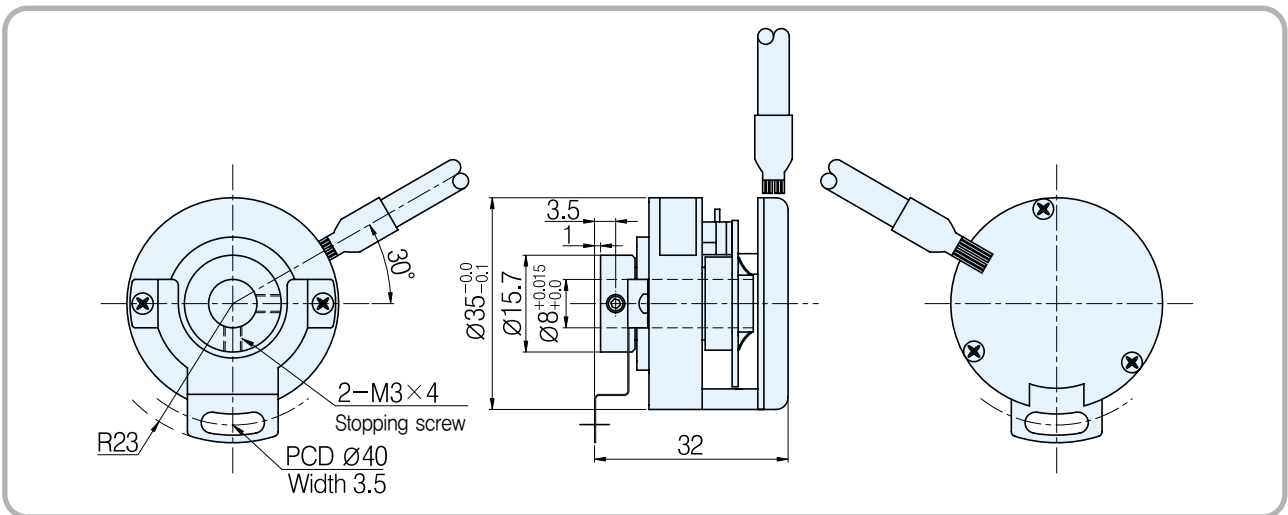
Cable Length

1 : 1[M]
2 : 2[M]
3 : 3[M]
4 : 5[M]
5 : 10[M]

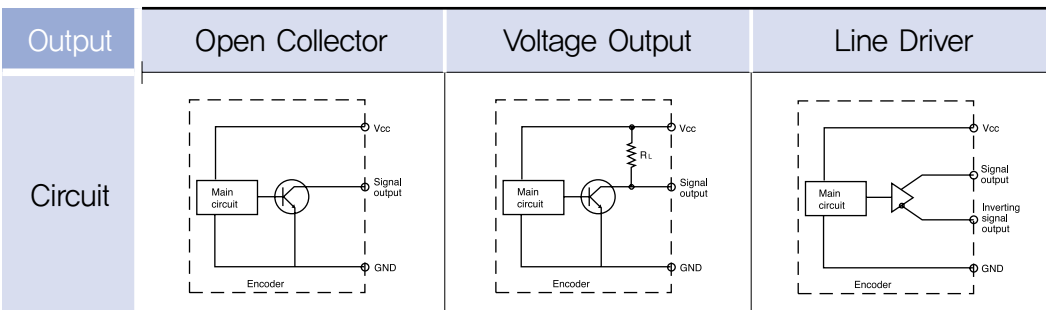


The sepc) of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Line Driver
Power Supply	DC +12[V] Ripple p-p : less than 5%	DC +12[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	200mA Max	300mA Max
Maximum Response Frequency	300 KHz		
Output voltage	Less than V_L 0.5[V] / More than V_H 2.5[V](In case of inputting +5V) / More than V_H 8[V](In case of inputting +12V)		
Output current	Less than 20mA	Less than 20mA	Less than 10mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]		

Mechanical Spec.

Starting Torque	80g – cm Max
Maximum number of revolution	5000 rpm
Bearing lifetime	27,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2.2kg Max Axial : 1.1kg Max
Position deflection of allowable shaft	Radial : Less than 0.03 mm Axial : Less than 0.2mm
Connection Table	7P(AWG26) Shield CABLE
weight	100g

Rigid Spec.

Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 70% RH
Preserving Humidity	30% ~ 80% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 00

Output Phase Shift

CCW \rightarrow Counterclockwise viewed from shaft end

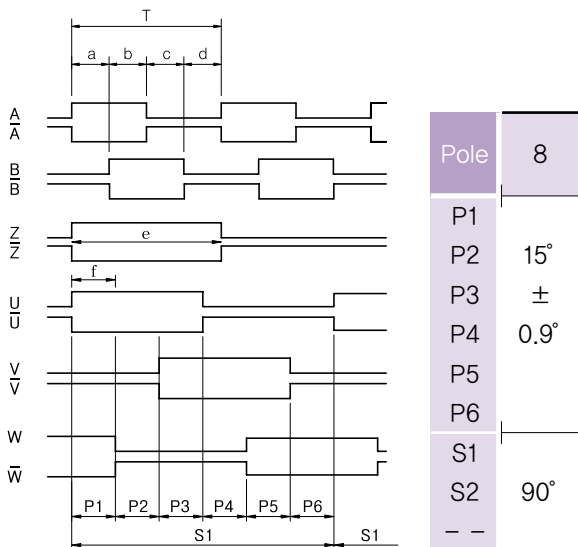
$a + b, c + d = T/2 \pm T/10$

$a, b, c, d = T/4 \pm T/10$

$e = T \pm T/2(\pm 1^\circ)$

f = The center of Z phase and U phase ($\pm 1^\circ$)

From Uch (rise point) to Zch center



Connection Table

Cable's Color	Connection Table	
	Servo Motor	DC Motor
Output Form	Line Driver	Open Collector Voltage Output Line Driver
Red	Vcc	A Sig
Black	GND	GND
Green	A Sig	B Sig
White/Green	\bar{A} Sig	
Gray	B Sig	
White/Gray	\bar{B} Sig	
Yellow	Z Sig	Z Sig
White/Yellow	\bar{Z} Sig	
Brown	U Sig	
White/Brown	\bar{U} Sig	
Blue	V Sig	\bar{B} , Sig GND
White/Blue	\bar{V} Sig	
Orange	W Sig	\bar{Z} , Sig GND
White/Orange	\bar{W} Sig	
White		Vcc
Pink		\bar{A} , Sig GND
Shield	CASE Shield	CASE Shield

H40 Series

- Features : Various resolution, 10~3600 P/R(29 class)
- Wide ranging power voltage, Customized design,
- Prompt delivery



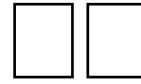
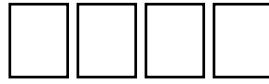
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter $\varnothing 40$

Shaft Size

8 : $\varnothing 8$ *Option: 5 : $\varnothing 5$ / 6 : $\varnothing 6$

H40 - 8 -



Resolution(P/R)
0010 0030 0048 0050 0060
0072 0075 0100 0120 0125
0192 0200 0250 0256 0300
0360 0400 0500 0512 0600
0720 1000 1024 1200 2000
2048 2500 3000 3600

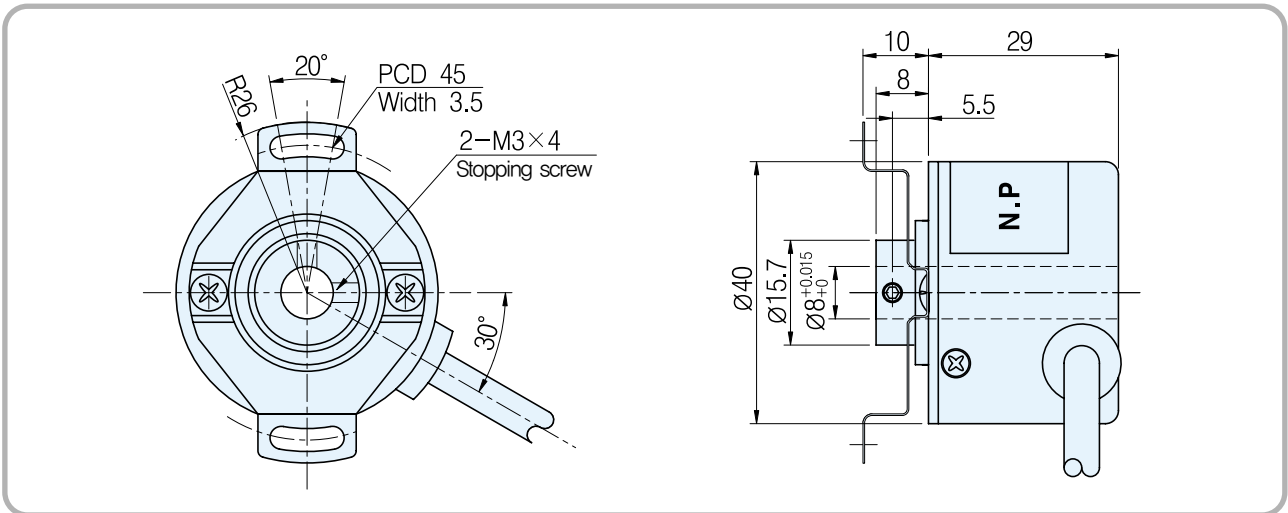
Output Signal
B : A, B
Z : A, B, Z
U : A, \bar{A} , B, \bar{B}
V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Output Form
O : Open Collector
V : Voltage Output
C : Complemental
T : Totem Pole
L : Line Driver

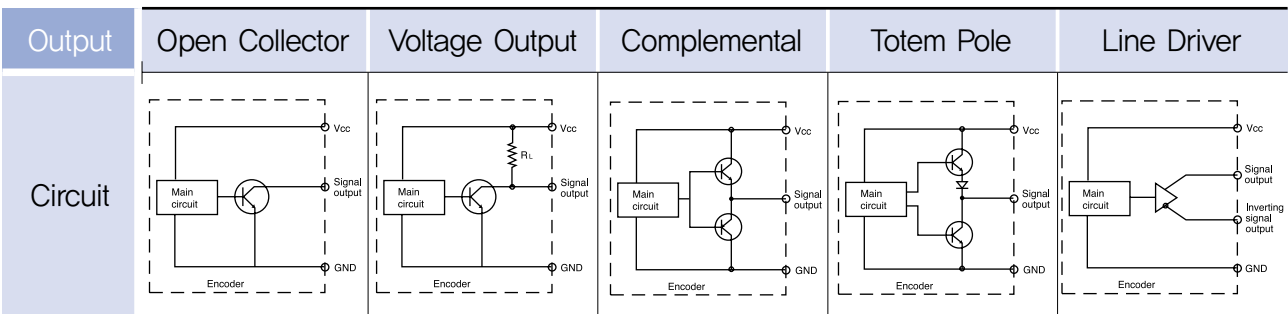
Cable Length
1 : 1[M]
2 : 2[M]
3 : 3[M]
4 : 5[M]
5 : 10[M]

The sepc) of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Complemental	Totem Pole	Line Drivet
Power Supply	DC +5[V] ~ +24[V] Ripple p-p : less than 5%	DC +5[V] ~ +24[V] Ripple p-p : less than 5%	DC +15[V], +24[V] Ripple p-p : less than 5%	DC +5[V] ~ 15[V], +24[V] Ripple p-p : less than 5%	DC +5[V],+5~24[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz (10 ~ 2048 P/R) / 300 KHz (2500 ~ 3600 P/R)				
Output voltage	Less than $V_i \cdot 0.5[V]$ / More than $V_i \cdot 2.5[V]$ (In case of inputting +5V) / More than $V_i \cdot 10[V]$ (In case of inputting +15V) / More than $V_i \cdot 18[V]$ (In case of inputting +24V)				
Output current	Less than 20mA	Less than 20mA	Less than 10mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s	Less than 1 μ s	Less than 0,1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]				

Mechanical Spec.

Starting Torque	80g – cm Max
Maximum number of revolution	6000 rpm
Bearing lifetime	27,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2.5kg Max Axial : 1.3kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	4P(AWG26) Shield CABLE
weight	150g

Rigid Spec.

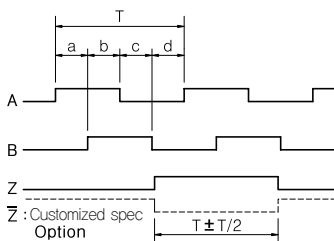
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 50

Output Phase Shift

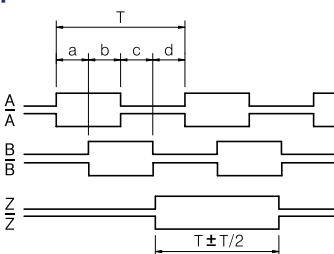
CW \rightarrow Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Voltage Output
 Complemental, Totem Pole



Line Driver



Connection Table

Cable's Color	Connection Table	
Output Form	Open Collector Voltage Output Complemental Totem Pole	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Blue	-	\bar{A} Sig
White	B Sig	B Sig
Pink	-	\bar{B} Sig
Yellow	Z Sig	Z Sig
Orange	-	\bar{Z} Sig
Shield	CASE Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H42 Series

- Features : AC, DC SERVO MOTOR
Small sized , High-response frequency
Easy to be attached, Customized design,
Prompt delivery →



Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter Ø42

Shaft Size

8 : Ø8

H42 - 8 -

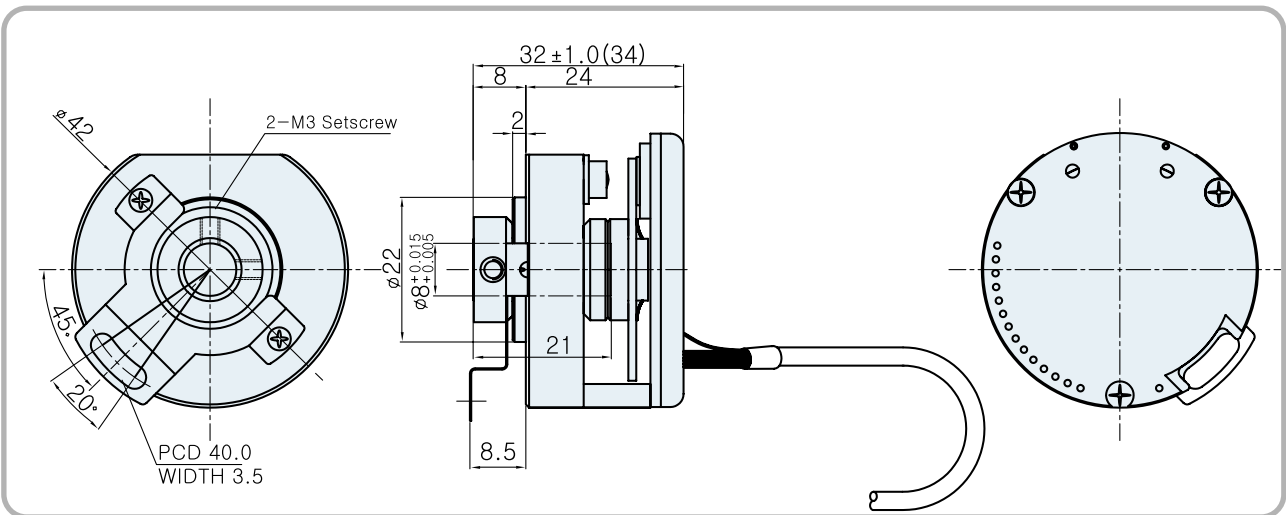
Resolution(P/R)	
2000	2048 2500
3000	

Output Signal
V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}
W : A, \bar{A} , B, \bar{B} , Z, \bar{Z} U, \bar{U} , V, \bar{V} , W, \bar{W}

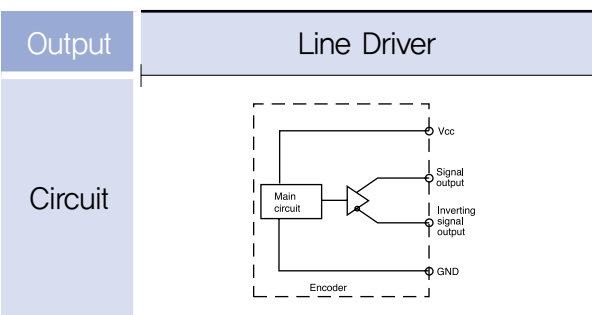
Output Form
L : Line Driver

Cable Length
1 : 1[M]
2 : 2[M]
3 : 3[M]
4 : 5[M]
5 : 10[M]

External Dimension



Output Circuit



Electrical Spec.

Output type	Voltage Output
Power Supply	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	300mA Max
Maximum Response Frequency	300 KHz
Output voltage	Less than V_L 0,5[V] / More than V_H 2,5[V]
Output current	Less than 20mA
Rising, decline time	Less than 1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	80g – cm Max
Maximum number of revolution	6000 rpm
Bearing lifetime	30,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2,2kg Max Axial : 1,1kg Max
Position deflection of allowable shaft	Radial : Less than 0,03 mm Axial : Less than 0,2mm
Connection Table	7P(AWG26) Shield CABLE
weight	200g

Rigid Spec.

Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 70% RH
Preserving Humidity	30% ~ 80% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 00

Output Phase Shift

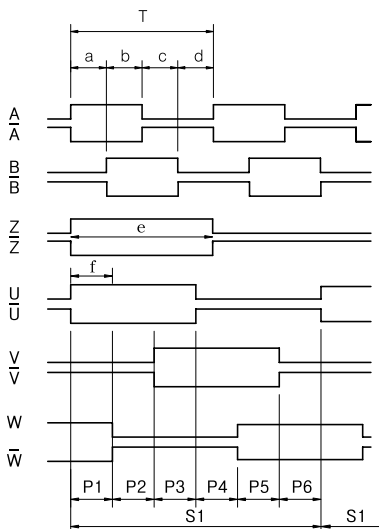
CCW \rightarrow Counterclockwise viewed from shaft end

$a + b, c + d = T/2 \pm T/10$

$a, b, c, d = T/4 \pm T/10$

$e = T \pm T/2$

$f =$ The center of Z phase and U phase ($\pm 1^\circ$)
From Uch (rise point) to Zch center



Pole	6	8
P1		
P2	20°	15°
P3	\pm	\pm
P4	0,9°	0,9°
P5		
P6		
S1		
S2	120°	90°
--		

Connection Table

Cable's Color	Connection Table
Output Form	Line Driver
Red	Vcc
Black	GND
Green	A Sig
White/Green	\bar{A} Sig
Gray	B Sig
White/Gray	\bar{B} Sig
Yellow	Z Sig
White/Yellow	\bar{Z} Sig
Brown	U Sig
White/Brown	\bar{U} Sig
Blue	V Sig
White/Blue	\bar{V} Sig
Orange	W Sig
White/Orange	\bar{W} Sig
Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H45A Series

- Features : AC, DC SERVO MOTOR
- Small sized , High-response frequency
- Easy to be attached, Customized design,
- Prompt delivery

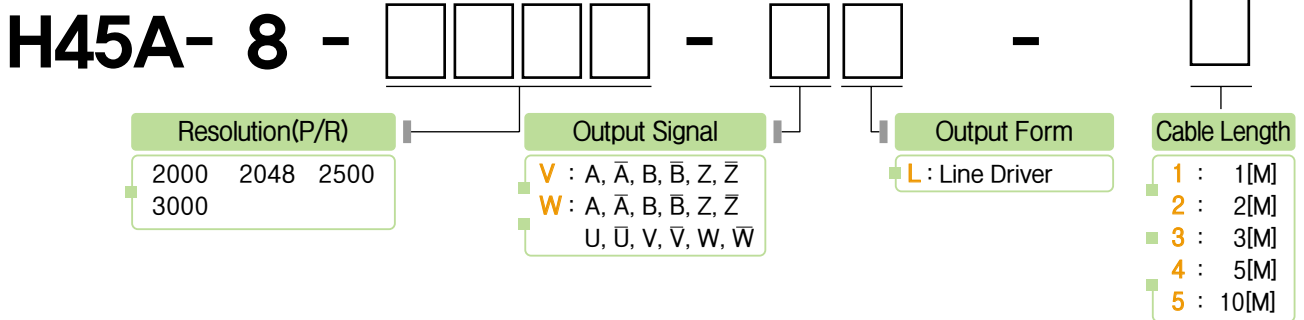


Model

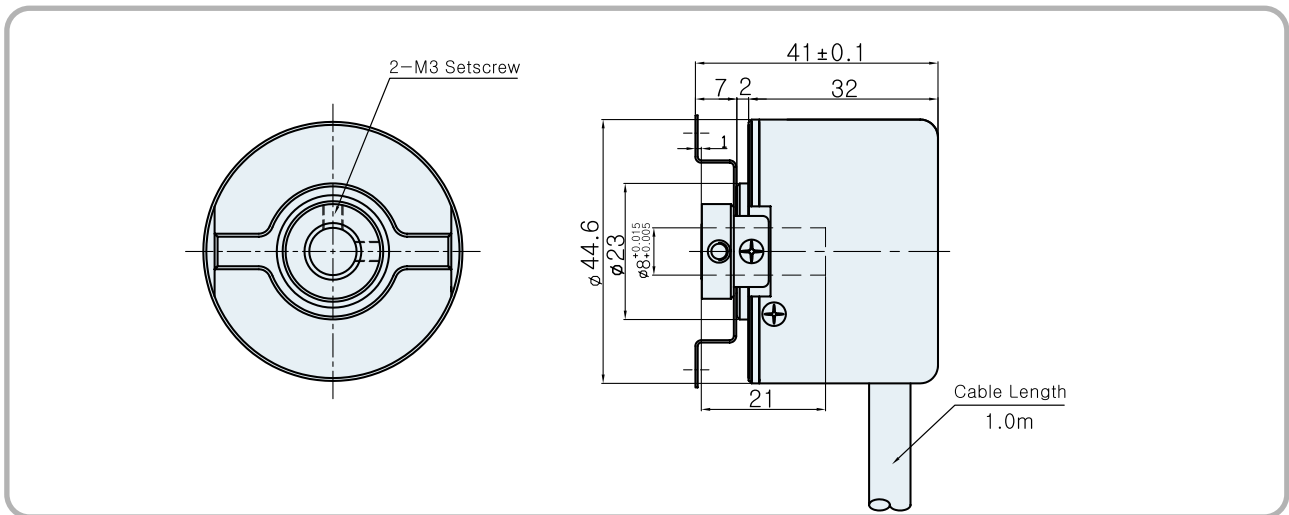
INCREMENTAL
HOLLOW TYPE
Outer Diameter $\varnothing 45$

Shaft Size

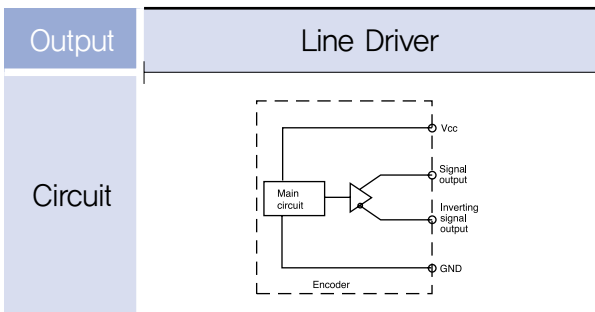
8 : $\varnothing 8$



External Dimension



Output Circuit



Electrical Spec.

Output type	Voltage Output
Power Supply	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	300mA Max
Maximum Response Frequency	300 KHz
Output voltage	Less than V_L 0,5[V] / More than V_H 2,5[V]
Output current	Less than 20mA
Rising, decline time	Less than 1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	80g – cm Max
Maximum number of revolution	6000 rpm
Bearing lifetime	30,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2,2kg Max Axial : 1,1kg Max
Position deflection of allowable shaft	Radial : Less than 0,03 mm Axial : Less than 0,2mm
Connection Table	7P(AWG26) Shield CABLE
weight	200g

Rigid Spec.

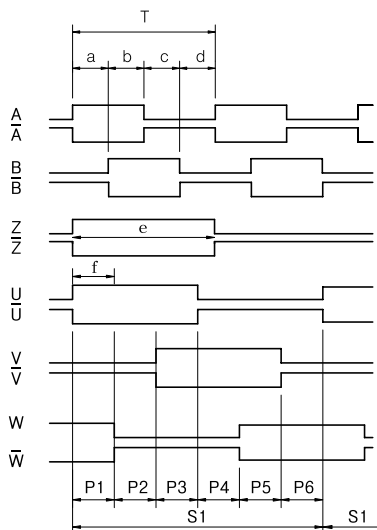
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 70% RH
Preserving Humidity	30% ~ 80% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 00

Output Phase Shift

CCW → Counterclockwise viewed from shaft end

$a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$
 $e = T \pm T/2$

f = The center of Z phase and U phase ($\pm 1^\circ$)
 From Uch (rise point) to Zch center



Pole	6	8
P1		
P2	20°	15°
P3	±	±
P4	0,9°	0,9°
P5		
P6		
S1		
S2	120°	90°
--		

Connection Table

Cable's Color	Connection Table
Output Form	Line Driver
Red	Vcc
Black	GND
Green	A Sig
White/Green	\bar{A} Sig
Gray	B Sig
White/Gray	\bar{B} Sig
Yellow	Z Sig
White/Yellow	\bar{Z} Sig
Brown	U Sig
White/Brown	\bar{U} Sig
Blue	V Sig
White/Blue	\bar{V} Sig
Orange	W Sig
White/Orange	\bar{W} Sig
Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H48 Series

- Features : AC, DC SERVO MOTOR
- Small sized , High-response frequency
- Easy to be attached, Customized design,
- Prompt delivery



Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter $\varnothing 48$

Shaft Size

8 : $\varnothing 8$

H48 - 8 -

Resolution(P/R)

5000 6000

Output Signal

V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}
W : A, \bar{A} , B, \bar{B} , Z, \bar{Z}
U, \bar{U} , V, \bar{V} , W, \bar{W}

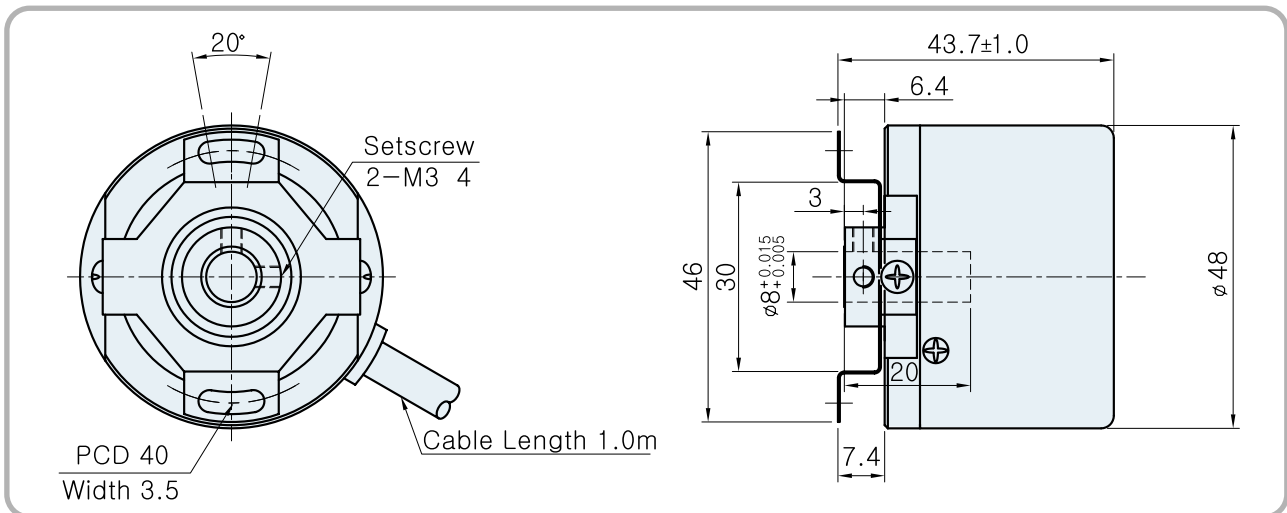
Output Form

L : Line Driver

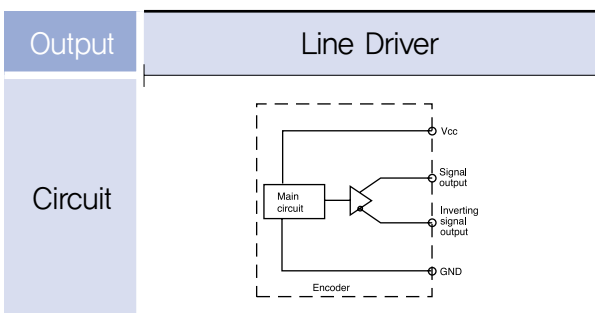
Cable Length

1 : 1[M]
2 : 2[M]
3 : 3[M]
4 : 5[M]
5 : 10[M]

External Dimension



Output Circuit



Electrical Spec.

Output type	Voltage Output
Power Supply	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	300mA Max
Maximum Response Frequency	300 KHz
Output voltage	Less than V_L 0,5[V] / More than V_H 2,5[V]
Output current	Less than 20mA
Rising, decline time	Less than 1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	80g – cm Max
Maximum number of revolution	6000 rpm
Bearing lifetime	30,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2,2kg Max Axial : 1,1kg Max
Position deflection of allowable shaft	Radial : Less than 0,03 mm Axial : Less than 0,2mm
Connection Table	7P(AWG26) Shield CABLE
weight	200g

Rigid Spec.

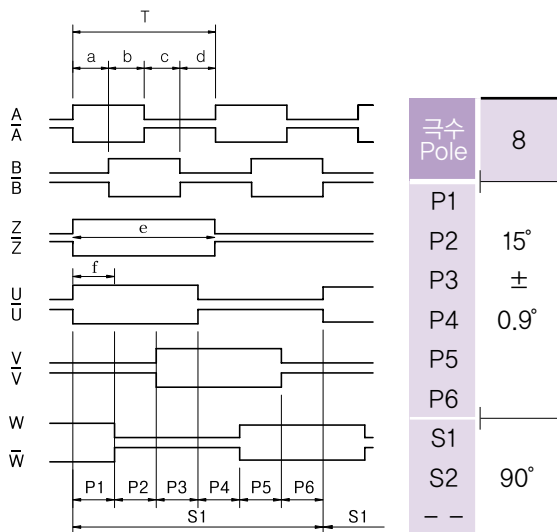
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 70% RH
Preserving Humidity	30% ~ 80% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 00

Output Phase Shift

CCW → Counterclockwise viewed from shaft end

$a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$
 $e = T \pm T/2$

$f =$ The center of Z phase and U phase ($\pm 1^\circ$)
 From Uch (rise point) to Zch center



Connection Table

Cable's Color	Connection Table
Output Form	Line Driver
Red	Vcc
Black	GND
Green	A Sig
White/Green	\bar{A} Sig
Gray	B Sig
White/Gray	\bar{B} Sig
Yellow	Z Sig
White/Yellow	\bar{Z} Sig
Brown	U Sig
White/Brown	\bar{U} Sig
Blue	V Sig
White/Blue	\bar{V} Sig
Orange	W Sig
White/Orange	\bar{W} Sig
Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H60 Series

- Features : AC, DC SERVO MOTOR
- Small sized, High-response frequency
- Easy to be attached, Customized design,
- Prompt delivery



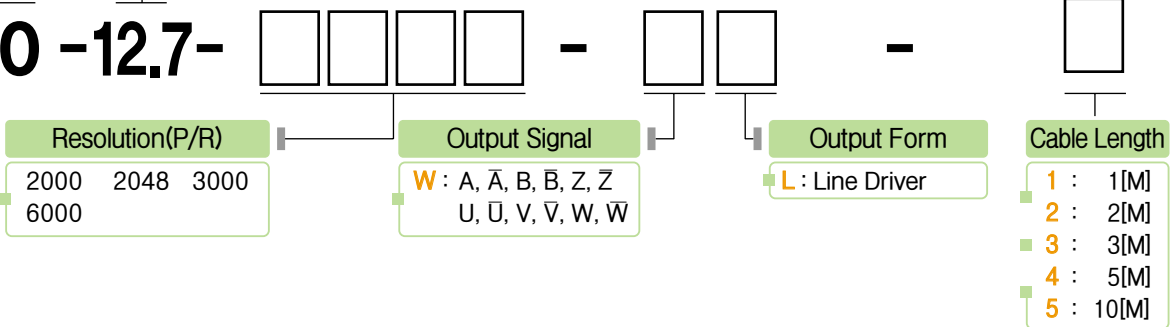
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter Ø60

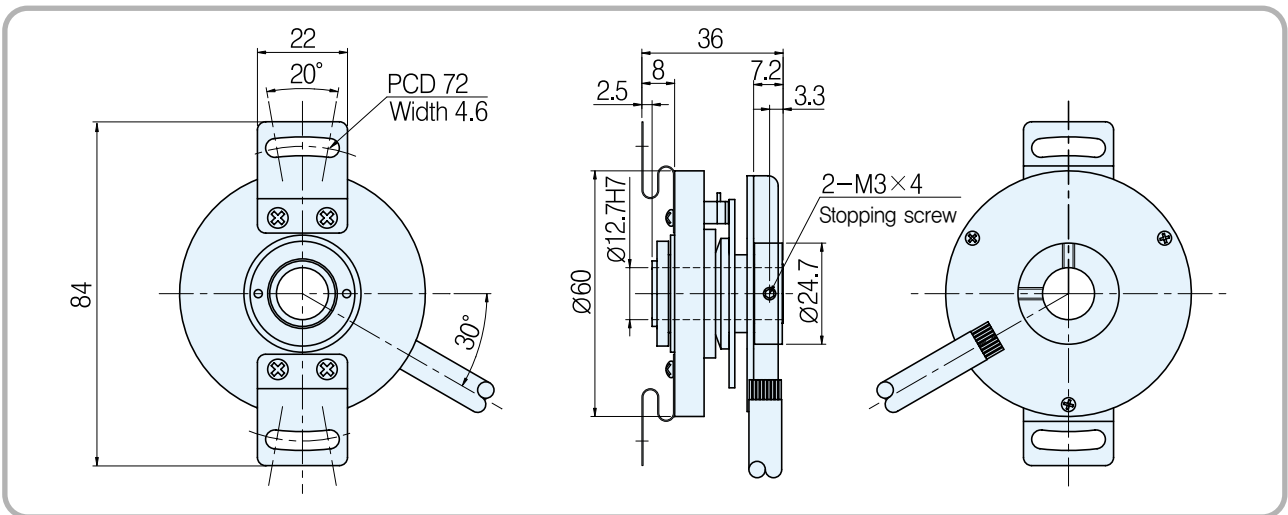
Shaft Size

12.7: Ø12.7

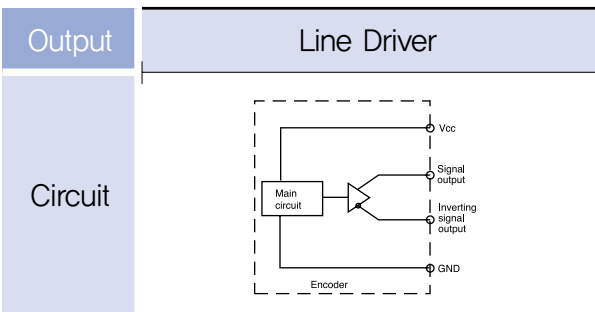
H60 -12.7-



External Dimension



Output Circuit



Electrical Spec.

Output type	Line Driver
Power Supply	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	300mA Max
Maximum Response Frequency	300 KHz
Output voltage	Less than V_L 0,5[V] / More than V_H 2,5[V]
Output current	Less than 20mA
Rising, decline time	Less than 1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	150g – cm Max
Maximum number of revolution	6000 rpm
Bearing lifetime	40,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2,0kg Max Axial : 1,0kg Max
Position deflection of allowable shaft	Radial : Less than 0,03 mm Axial : Less than 0,2mm
Connection Table	7P(AWG26) Shield CABLE
weight	200g

Rigid Spec.

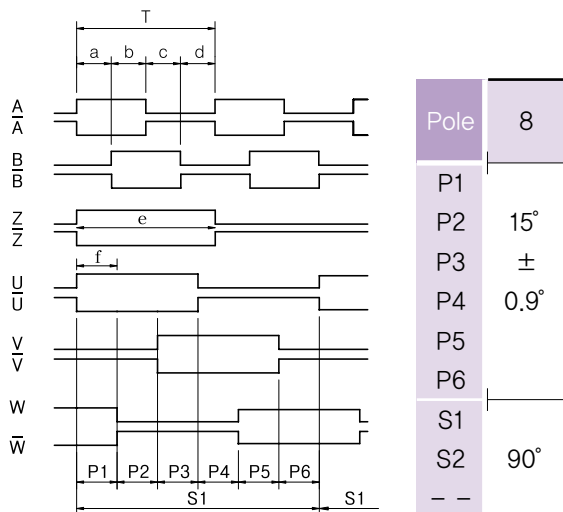
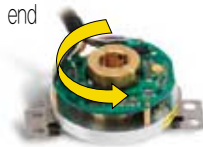
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 70% RH
Preserving Humidity	35% ~ 80% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 00

Output Phase Shift

CCW → Counterclockwise viewed from shaft end

$a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$
 $e = T \pm T/2$

$f =$ The center of Z phase and U phase ($\pm 1^\circ$)
 From Uch (rise point) to Zch center



Connection Table

Cable's Color	Connection Table
Output Form	Line Driver
Red	Vcc
Black	GND
Green	A Sig
White/Green	\bar{A} Sig
Gray	B Sig
White/Gray	\bar{B} Sig
Yellow	Z Sig
White/Yellow	\bar{Z} Sig
Brown	U Sig
White/Brown	\bar{U} Sig
Blue	V Sig
White/Blue	\bar{V} Sig
Orange	W Sig
White/Orange	\bar{W} Sig
Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H62 Series

- Features : Elevator, A, G, V
- Rigid type, Strengthened anti-Noise characteristic
- Customized design, Prompt delivery



Model

INCREMENTAL
HOLLOW TYPE

Shaft Size

Outer Diameter Ø62

10 : Ø10 ※Option : 8 : Ø8 / 95 : Ø9.525

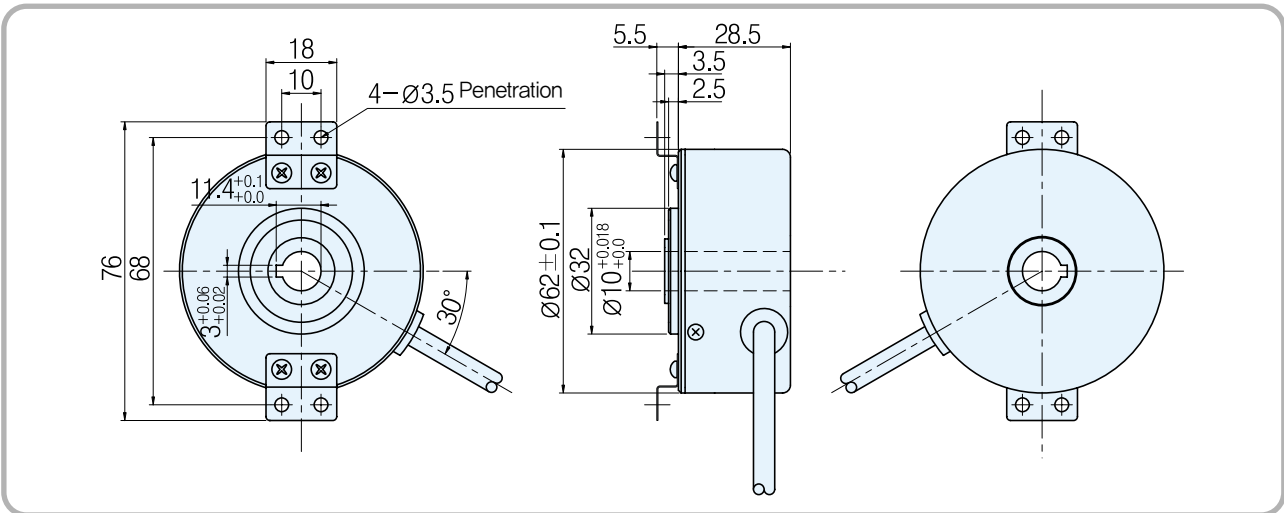
H62 - 10 -

Resolution(P/R)	Output Signal	Output Form	Cable Length
1000 1024 2048	<ul style="list-style-type: none"> B : A, B Z : A, B, Z U : A, \bar{A}, B, \bar{B} V : A, \bar{A}, B, \bar{B}, Z, \bar{Z} 	<ul style="list-style-type: none"> O : Open Collector V : Voltage Output C : Complemental L : Line Driver 	<ul style="list-style-type: none"> 1 : 1[M] 2 : 2[M] 3 : 3[M] 4 : 5[M] 5 : 10[M]

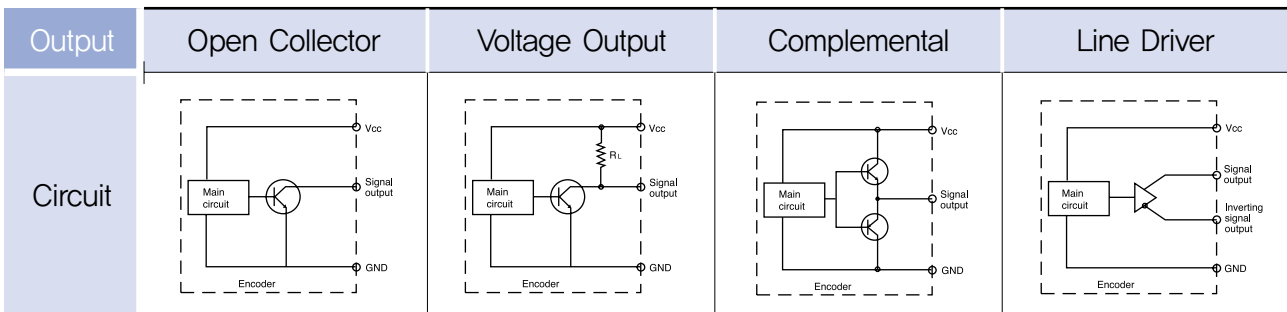


The sepc) of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Complemental	Line Driver
Power Supply	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +12[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max	200mA Max
Maximum Response Frequency	300 KHz			
Output voltage	Less than V_L 0.5[V] / More than V_H 2.5[V] (In case of inputting +5V), /More than V_H 10[V](In case of inputting +5V)			
Output current	Less than 20mA	Less than 20mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s	Less than 1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]			

Mechanical Spec.

Starting Torque	120g – cm Max
Maximum number of revolution	5000 rpm
Bearing lifetime	40,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 3.0kg Max Axial : 1.5kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	4P(AWG26) Shield CABLE
weight	400g

Rigid Spec.

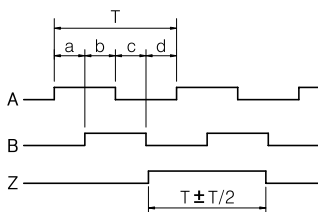
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 50

Output Phase Shift

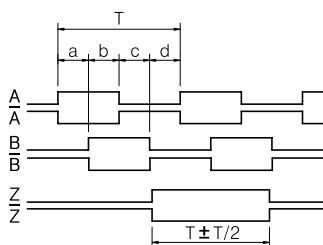
CW \rightarrow Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Voltage Output
Complemental



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector Voltage Output Complemental	Line Driver
Red	Vcc	A Sig
Black	GND	GND
Green	A Sig	A Sig
Blue	-	\bar{A} Sig
White	B Sig	B Sig
Pink	-	\bar{B} Sig
Yellow	Z Sig	Z Sig
Orange	-	\bar{Z} Sig
Shield	CASE Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H70 Series

- Features : Textile machine, Industrial application
- Rigid type, High reliability
- Customized design, Prompt delivery



Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter $\varnothing 70$

Shaft Size

6 : $\varnothing 6$

H70 - 6 -

Resolution(P/R)

0045

Output Signal

B : A, B

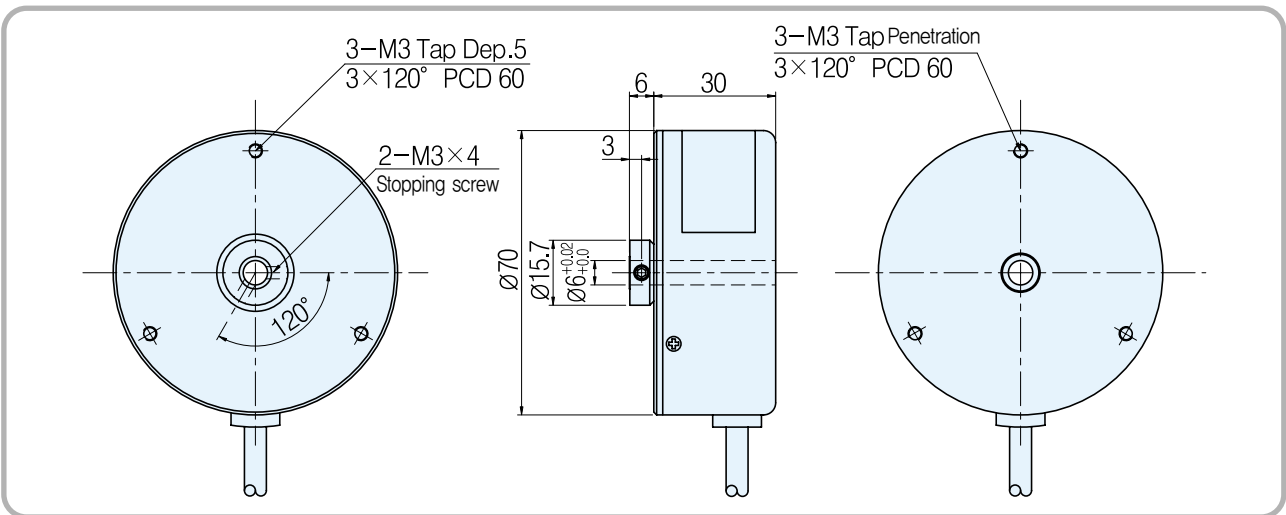
Output Form

C : Complementary

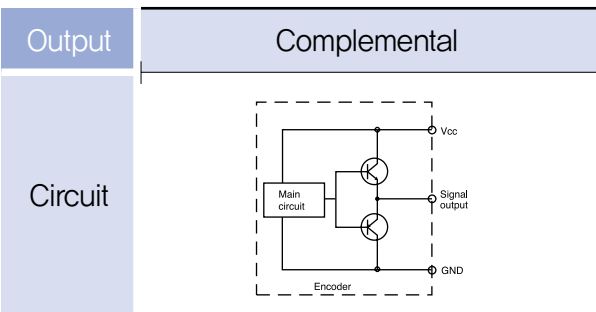
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

External Dimension



Output Circuit



Electrical Spec.

Output type	Complemental
Power Supply	DC +15[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	150mA Max
Maximum Response Frequency	5 KHz
Output voltage	Less than V_L 0,5[V] / More than V_H 10[V]
Output current	Less than 10mA
Rising, decline time T_R / T_F	Less than 1 μ s In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	80g – cm Max
Maximum number of revolution	6000 rpm
Bearing lifetime	27,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 2,2kg Max Axial : 1,1kg Max
Position deflection of allowable shaft	Radial : Less than 0,05 mm Axial : Less than 0,2mm
Connection Table	4P(AWG26) Shield CABLE
weight	400g

Rigid Spec.

Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	35% ~ 85% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 50

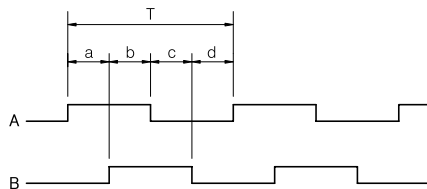
Output Phase Shift

CCW → Counterclockwise viewed from shaft end

$a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Complemental



Connection Table

Cable's Color	Connection Table
Output Form	Complemental
Red	Vcc
Black	GND
Green	A Sig
Blue	-
White	B Sig
Pink	-
Yellow	-
Orange	-
Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H88-18 Series

- Features : Elevator, Parking system, Industrial motor
Easy to be attached, Customized design,
Prompt delivery →



Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter Ø88

Shaft Size

18 : Ø18

H88 - 18 -

Resolution(P/R)

0512 1024

Output Signal

- B : A, B
- Z : A, B, Z
- U : A, \bar{A} , B, \bar{B}
- V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Output Form

- O : Open Collector
- V : Voltage Output
- C : Complemental
- T : Totem Pole
- L : Line Driver

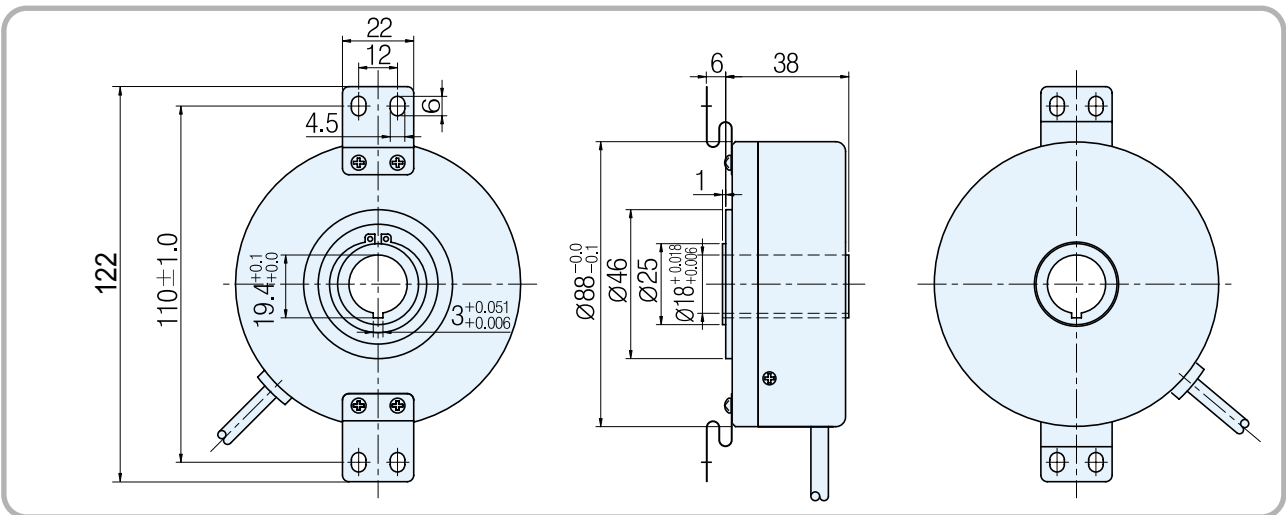
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

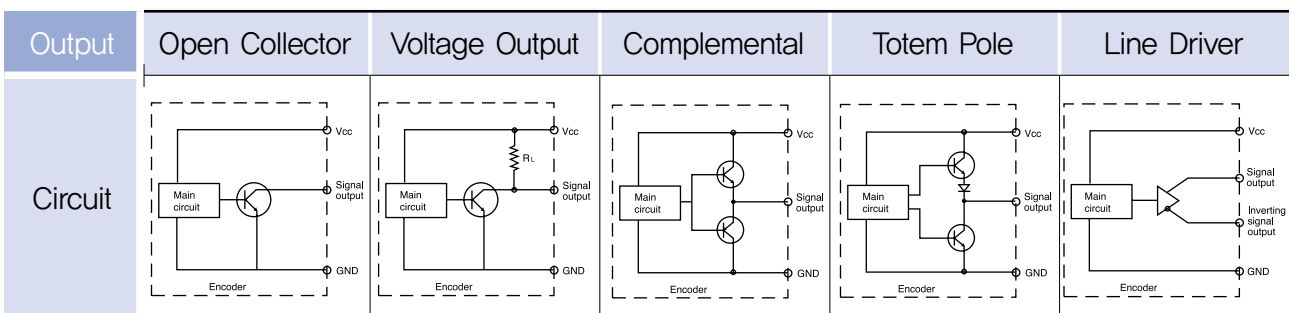


The sepcl of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Complemental	Totem Pole	Line Driver
Power Supply	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz				
Output voltage	Less than V_L 0.5[V] / More than V_H 2.5[V] (In case of inputting +5V), /More than V_H 10[V](In case of inputting +15V)				
Output current	Less than 20mA	Less than 20mA	Less than 10mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s	Less than 1 μ s	Less than 0.1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]				

Mechanical Spec.

Starting Torque	200g – cm Max
Maximum number of revolution	3000 rpm
Bearing lifetime	40,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 3.8kg Max Axial : 1.9kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	4P(AWG26) Shield CABLE
weight	550g

Rigid Spec.

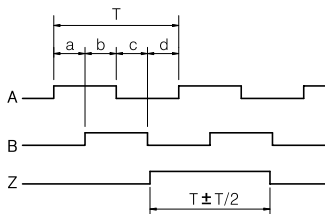
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 50

Output Phase Shift

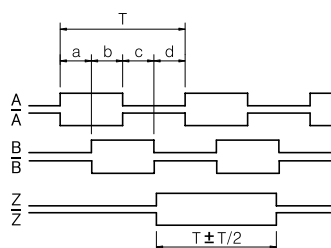
CCW \rightarrow Counterclockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Voltage Output
Complemental, Totem Pole



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector Voltage Output Complemental Totem Pole	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Blue	-	\bar{A} Sig
White	B Sig	B Sig
Pink	-	\bar{B} Sig
Yellow	Z Sig	Z Sig
Orange	-	\bar{Z} Sig
Shield	CASE Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H88A-18 Series

- Features : Elevator, Parking system, Industrial motor
- Easy to be attached, Customized design,
- Prompt delivery

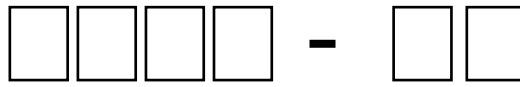


Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter Ø88

Shaft Size
18 : Ø18

H88A-18-

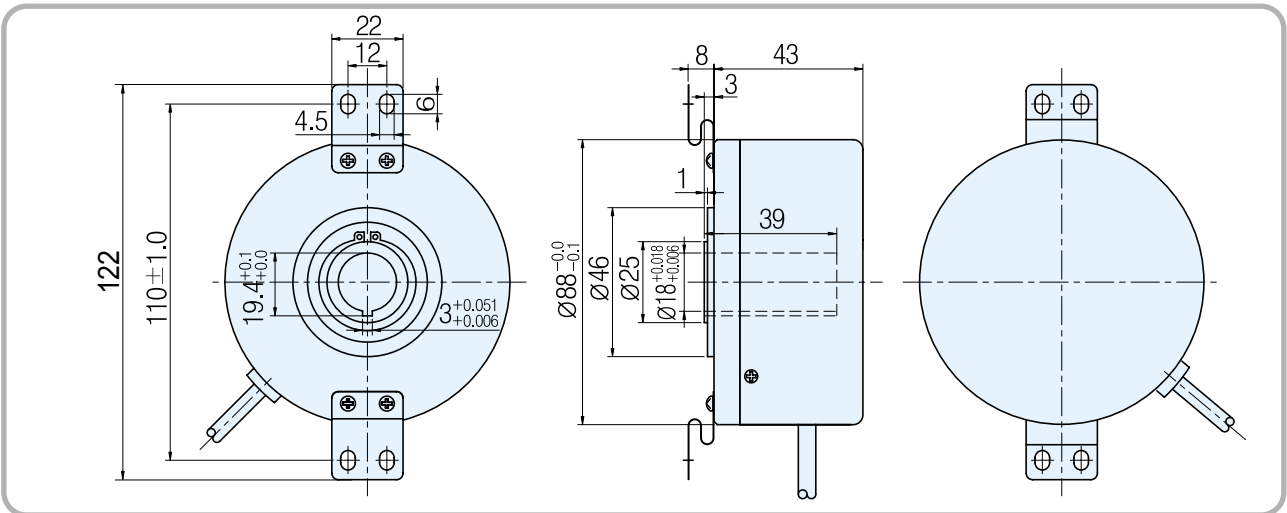


Resolution(P/R)	Output Signal	Output Form	Cable Length
0512 1024	<ul style="list-style-type: none"> B : A, B Z : A, B, Z U : A, \bar{A}, B, \bar{B} V : A, \bar{A}, B, \bar{B}, Z, \bar{Z} 	<ul style="list-style-type: none"> O : Open Collector V : Voltage Output C : Complemental T : Totem Pole L : Line Driver 	<ul style="list-style-type: none"> 1 : 1[M] 2 : 2[M] 3 : 3[M] 4 : 5[M] 5 : 10[M]

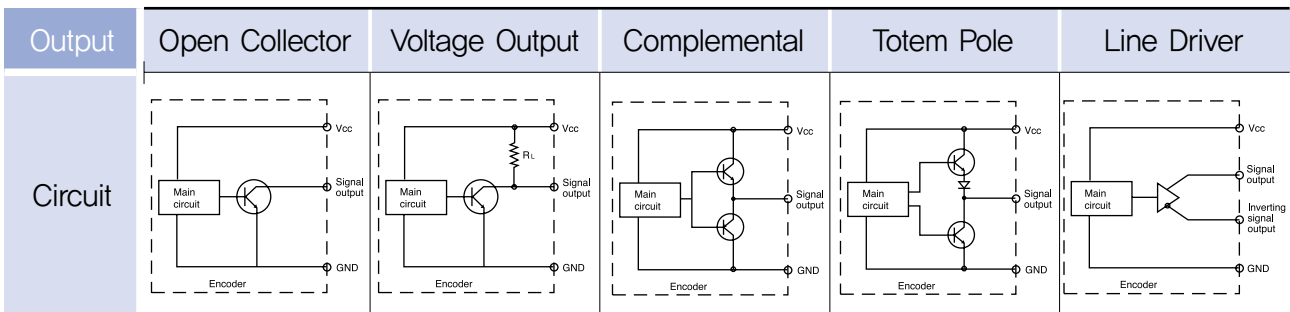


The spec of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Complemental	Totem Pole	Line Driver
Power Supply	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz				
Output voltage	Less than V_L 0.5[V] / More than V_H 2.5[V] (In case of inputting +5V), /More than V_H 10[V](In case of inputting +15V)				
Output current	Less than 20mA	Less than 20mA	Less than 10mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 3 μ s	Less than 1 μ s	Less than 1 μ s	Less than 0.1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]				

Mechanical Spec.

Starting Torque	200g – cm Max
Maximum number of revolution	3000 rpm
Bearing lifetime	40,000[hr](In case of rotating by 5000rpm)
Allowable Shaft Load	Radial : 3.8kg Max Axial : 1.9kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	4P(AWG26) Shield CABLE
weight	550g

Rigid Spec.

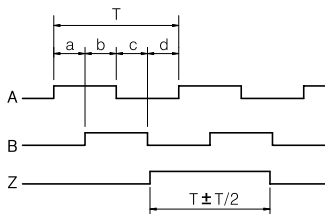
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 50

Output Phase Shift

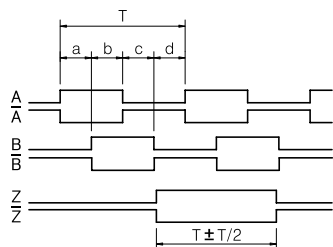
CCW \rightarrow Counterclockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Voltage Output
Complemental, Totem Pole



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector Voltage Output Complemental Totem Pole	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Blue	-	\bar{A} Sig
White	-	B Sig
Pink	-	\bar{B} Sig
Yellow	B Sig	Z Sig
Orange	-	\bar{Z} Sig
Shield	CASE Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H88-30B Series

■Features : Elevator, Parking system, Industrial motor
Easy to be attached, Customized design,
Prompt delivery →



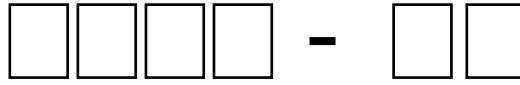
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter Ø88

Shaft Size

30 : Ø30

H88 - 30B -



Resolution(P/R)

0512 1024

Output Signal

B : A, B

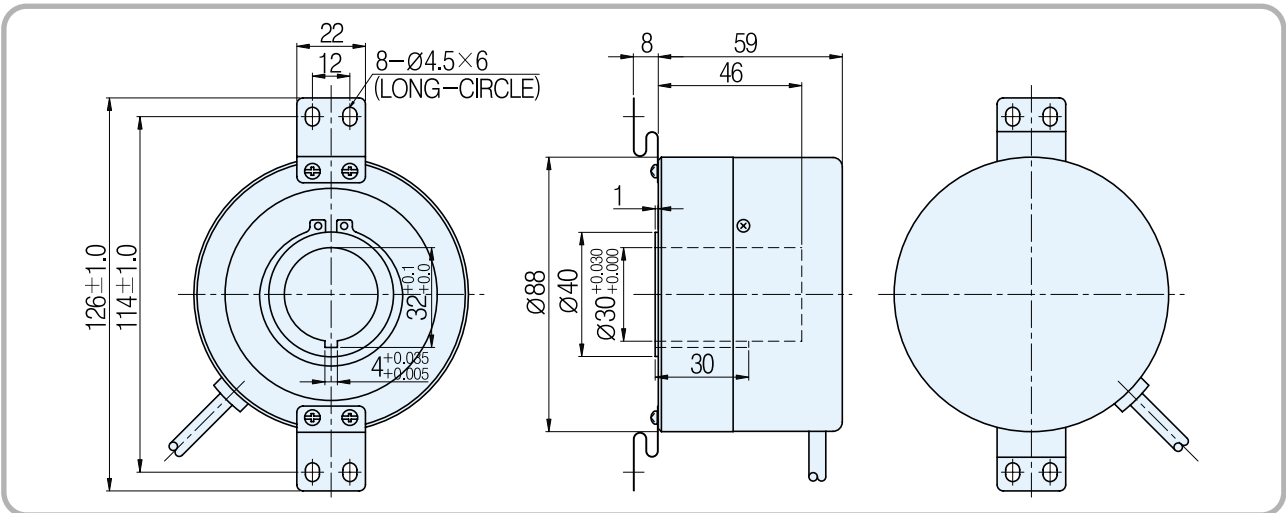
Output Form

O : Open Collector

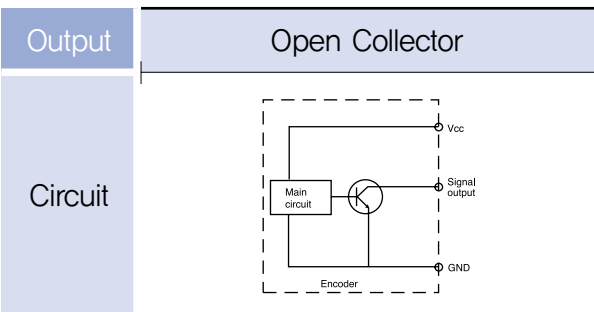
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector
Power Supply	DC +15[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max
Maximum Response Frequency	100 KHz
Output voltage	Less than V_L 0,5[V] / More than V_H 10[V]
Output current	Less than 20mA
Rising, decline time	Less than 3 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	800g – cm Max
Maximum number of revolution	3000 rpm
Bearing lifetime	50,000[hr](In case of rotating by 3000rpm)
Allowable Shaft Load	Radial : 5.0kg Max Axial : 2.5kg Max
Position deflection of allowable shaft	Radial : Less than 0,05 mm Axial : Less than 0,2mm
Connection Table	3P(AWG26) Shield CABLE
weight	900g

Rigid Spec.

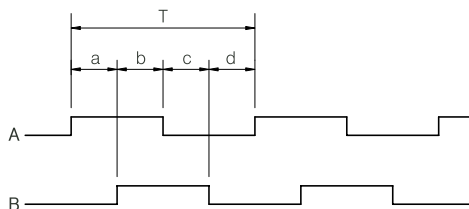
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	35% ~ 85% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 50

Output Phase Shift

CCW \rightarrow Counterclockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector



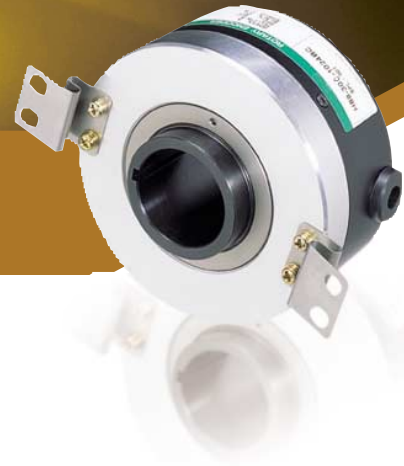
Connection Table

Cable's Color	Connection Table
Output Form	Open Collector
Red	Vcc
Black	GND
Green	A Sig
Orange	A Sig GND
Brown	B Sig
White	B Sig GND
Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H88-30C Series

- Features : Elevator, Parking system, Industrial motor
- Easy to be attached, Customized design,
- Prompt delivery



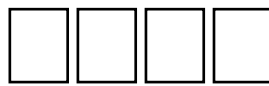
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter Ø88

Shaft Size

30 : Ø30

H88-30C-



Resolution(P/R)

0512 1024

Output Signal

- B : A, B
- Z : A, B, Z
- V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Output Form

- O : Open Collector
- C : Complemental
- L : Line Driver

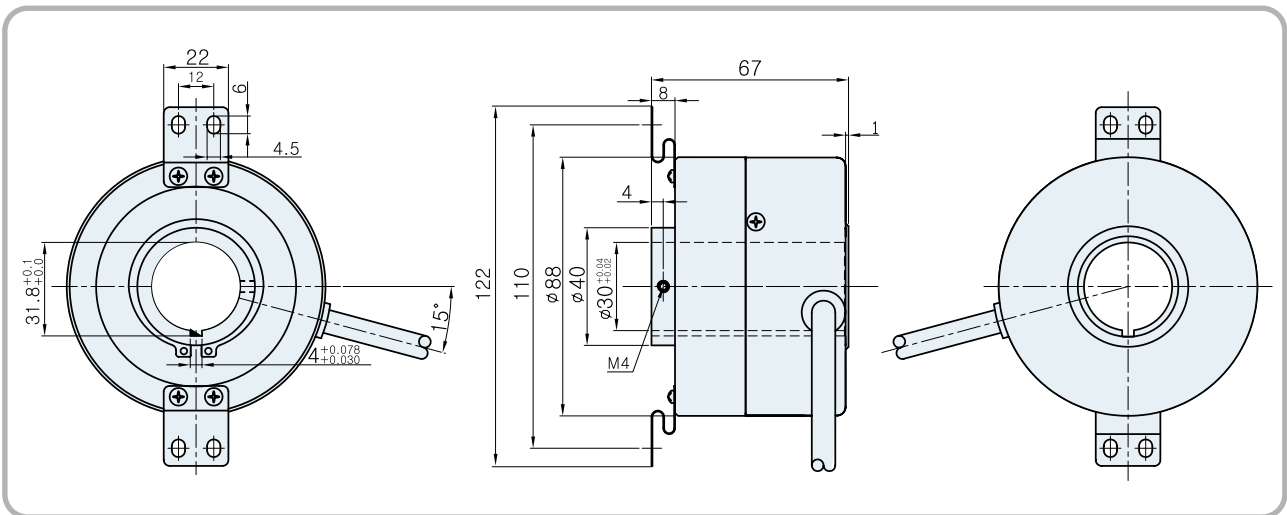
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

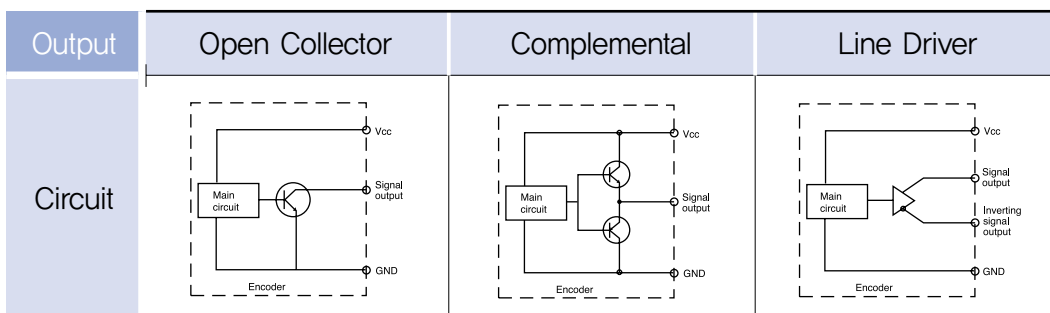


The sepcl of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Complemental	Line Driver
Power Supply	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +5[V], +5~24[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz		
Output voltage	Less than V_L 0.5[V] / More than V_H 2.5[V] (In case of inputting +5V), /More than V_H 10[V](In case of inputting +15V)		
Output current	Less than 20mA	Less than 10mA	Less than 20mA
Rising, decline time T_R / T_F	Less than 3 μ s	Less than 1 μ s	Less than 0.1 μ s
	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]		

Mechanical Spec.

Starting Torque	800g - cm Max
Maximum number of revolution	3000 rpm
Bearing lifetime	50,000[hr](In case of rotating by 3000rpm)
Allowable Shaft Load	Radial : 5.0kg Max Axial : 2.5kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	4P(AWG26) Shield CABLE
weight	600g

Rigid Spec.

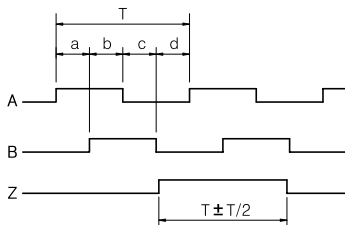
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 50

Output Phase Shift

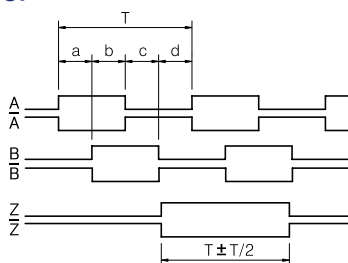
CW \rightarrow Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Voltage Output
Complemental, Totem Pole



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector Voltage Output Complemental	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Orange	A Sig GND	\bar{Z} Sig
Yellow	B Sig	Z Sig
White	B Sig GND	B Sig
Blue	-	\bar{A} Sig
Pink	-	\bar{B} Sig
Shield	CASE Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H88-38 Series

- Features : Elevator, Parking system, Industrial motor
- Easy to be attached, Customized design,
- Prompt delivery



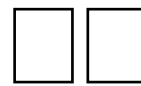
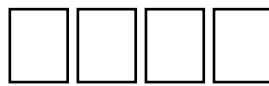
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter Ø88

Shaft Size

38 : Ø38

H88 - 38 -



Resolution(P/R)

0512 1024

Output Signal

- B : A, B
- Z : A, B, Z
- V : A, \bar{A} , B, \bar{B} , Z, \bar{Z}

Output Form

- O : Open Collector
- C : Complemental
- L : Line Driver

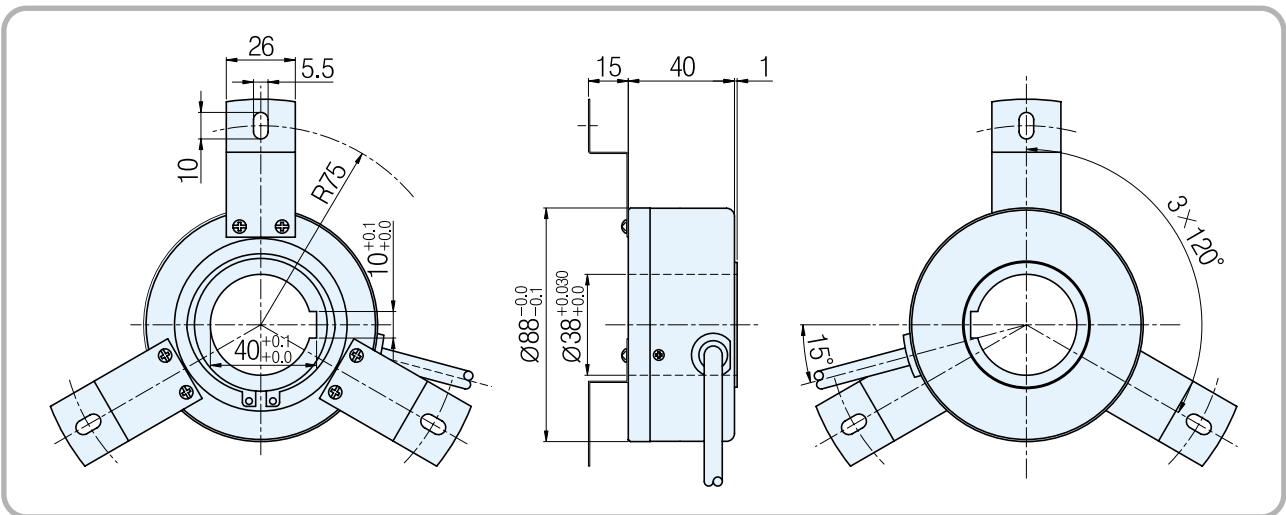
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

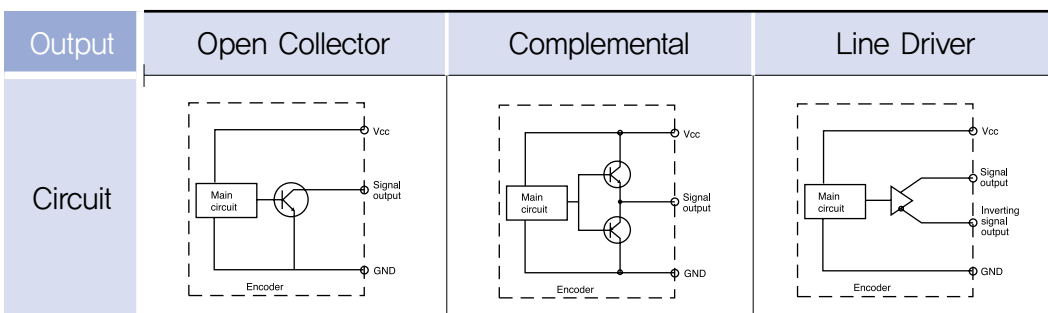


The spec of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Complemental	Line Driver
Power Supply	DC +15[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +5[V], +5~24[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	150mA Max	150mA Max
Maximum Response Frequency	100 KHz MAX		
Output voltage	Less than V_L 0.5[V] / More than V_H 2.5[V] (In case of inputting +5V), /More than V_H 10[V](In case of inputting +15V)		
Output current	Less than 20mA	Less than 10mA	Less than 20mA
Rising, decline time T_R / T_F	Less than 3 μ s	Less than 1 μ s	Less than 0.1 μ s
	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]		

Mechanical Spec.

Starting Torque	800g – cm Max
Maximum number of revolution	3000 rpm
Bearing lifetime	50,000[hr](In case of rotating by 3000rpm)
Allowable Shaft Load	Radial : 5.8kg Max Axial : 1.9kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	3P(AWG26) Shield CABLE
weight	930g

Rigid Spec.

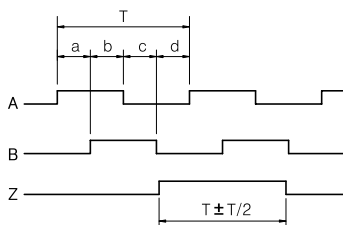
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 50

Output Phase Shift

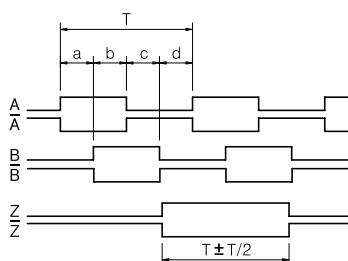
CW \rightarrow Clockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector



Line Driver



Connection Table

Cable's Color	Connection Table	
	Open Collector	Line Driver
Red	Vcc	Vcc
Black	GND	GND
Green	A Sig	A Sig
Orange	A Sig GND	\bar{Z} Sig
Yellow	B Sig	Z Sig
White	B Sig GND	B Sig
Blue	-	\bar{A} Sig
Pink	-	\bar{B} Sig
Shield	CASE Shield	CASE Shield

H100 Series

- Features : Elevator, Parking system, Industrial motor
- Easy to be attached, Customized design, prompt delivery



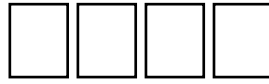
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter Ø100

Shaft Size

40 : Ø40

H100-40-



Resolution(P/R)

0512 1024

Output Signal

B : A, B
U : A, \bar{A} , B, \bar{B}

Output Form

O : Open Collector
T : Totem Pole
L : Line Driver

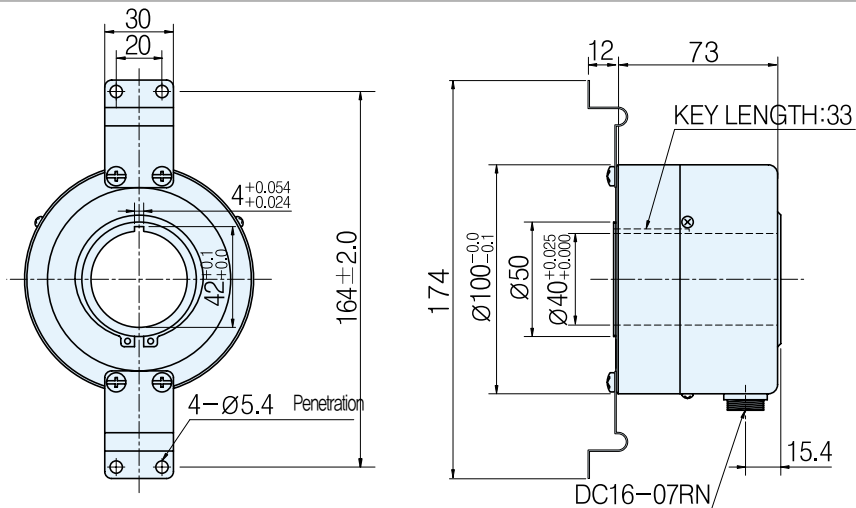
Cable Length

1 : 1[M]
2 : 2[M]
3 : 3[M]
4 : 5[M]
5 : 10[M]

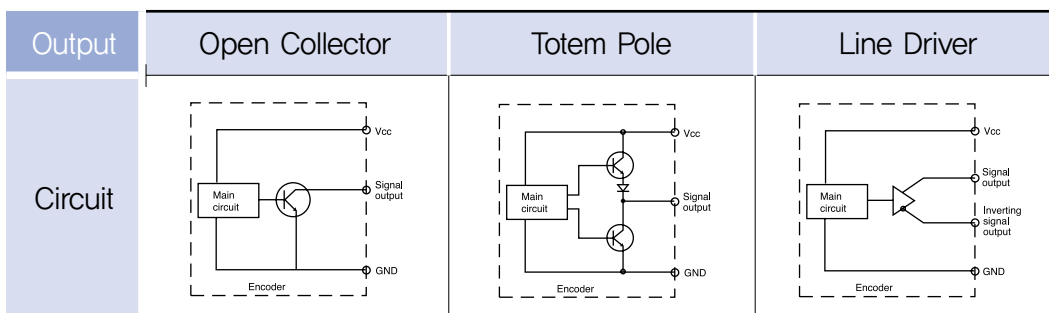


The spec of power may be different depending on the type of output and be sure to check the electric spec.

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Totem Pole	Line Driver
Power Supply	DC +5[V] Ripple p-p : less than 5%	DC +15[V] Ripple p-p : less than 5%	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max	150mA Max	150mA Max
Maximum Response Frequency	150 KHz		
Output voltage	Less than V_L 0.5[V] / More than V_H 2.5[V] (In case of inputting +5V), /More than V_H 10[V](In case of inputting +15V)		
Output current	Less than 20mA	Less than 10mA	Less than 20mA
Rising, decline time	Less than 3 μ s	Less than 1 μ s	Less than 0.1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]		

Mechanical Spec.

Starting Torque	800g – cm Max
Maximum number of revolution	3000 rpm
Bearing lifetime	50,000[hr](In case of rotating by 3000rpm)
Allowable Shaft Load	Radial : 5.0kg Max Axial : 2.5kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	3P(AWG26) Shield CABLE
weight	1.2kg

Rigid Spec.

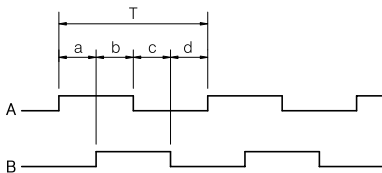
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 50

Output Phase Shift

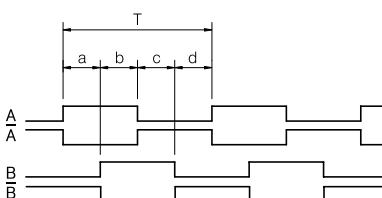
CCW → Counterclockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector, Totem Pole



Line Driver



Connection Table

PIN NO	Cable's Color	Connection Table	
		Open Collector Totem Pole	Line Driver
1	Red	Vcc	Vcc
2	Black	GND	GND
3	Green	A Sig	A Sig
4	Orange	A Sig GND	\bar{A} Sig
5	Brown	B Sig	B Sig
6	White	B Sig GND	\bar{B} Sig
7	Shield	CASE Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H108 Series

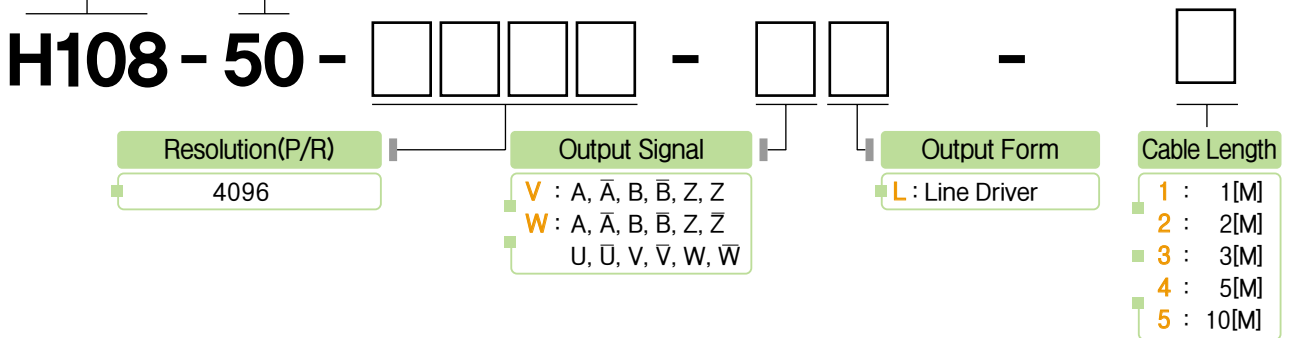
- Features : Elevator
- High resolution, High response
- Customized design, Easy to be attached



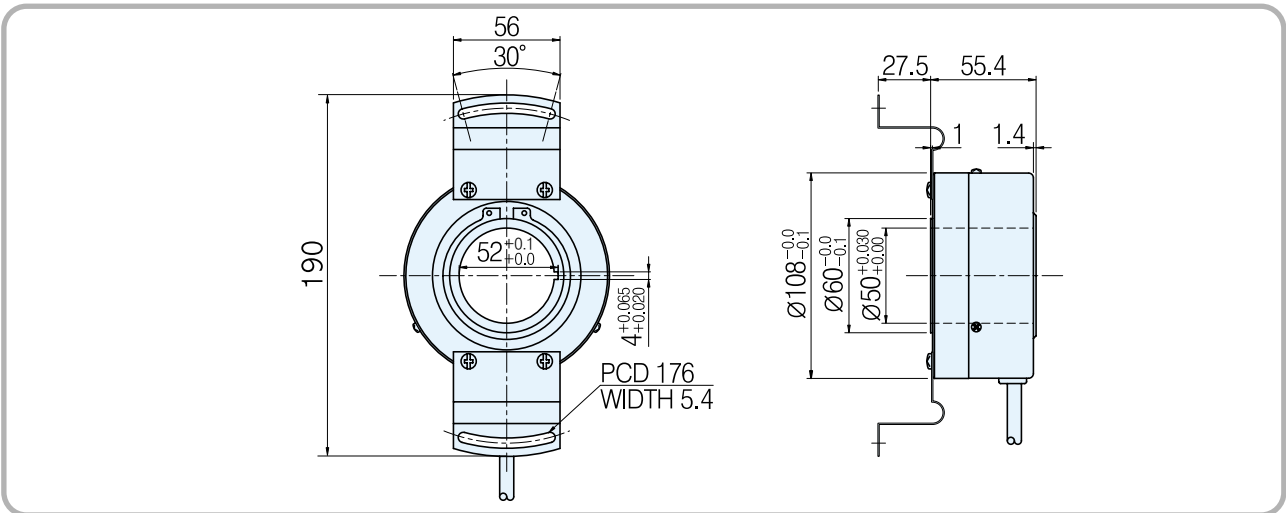
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter $\varnothing 108$

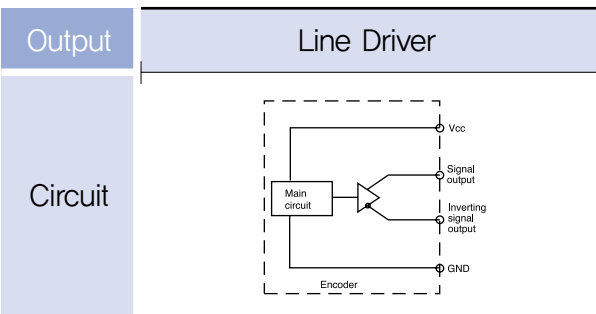
Shaft Size
50 : $\varnothing 50$



External Dimension



Output Circuit



Electrical Spec.

Output type	Line Driver
Power Supply	DC +5[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	200mA Max
Maximum Response Frequency	300 KHz MAX
Output voltage	Less than V_L 0,5[V] / More than V_H 2,5[V]
Output current	Less than 20mA
Rising, decline time	Less than 0,1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	800g – cm Max
Maximum number of revolution	1200 rpm
Bearing lifetime	50,000[hr](In case of rotating by 3000rpm)
Allowable Shaft Load	Radial : 5.0kg Max Axial : 2.5kg Max
Position deflection of allowable shaft	Radial : Less than 0,05 mm Axial : Less than 0,2mm
Connection Table	7P(AWG26) Shield CABLE
weight	1.0kg

Rigid Spec.

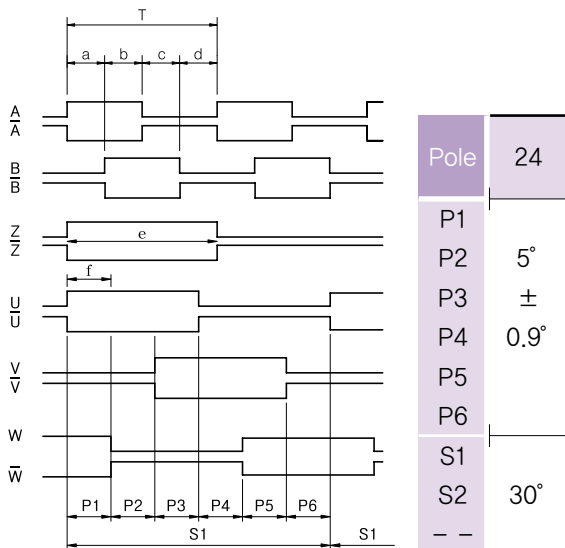
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 50

Output Phase Shift

CCW → Counterclockwise viewed from shaft end

$a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$
 $e = T \pm T/2$

$f =$ The center of Z phase and U phase ($\pm 1^\circ$)
 From Uch (rise point) to Zch center



Connection Table

Cable's Color	Connection Table
Output Form	Line Driver
Red	Vcc
Black	GND
Green	A Sig
White/Green	\bar{A} Sig
Gray	B Sig
White/Gray	\bar{B} Sig
Yellow	Z Sig
White/Yellow	\bar{Z} Sig
Brown	U Sig
White/Brown	\bar{U} Sig
Blue	V Sig
White/Blue	\bar{V} Sig
Orange	W Sig
White/Orange	\bar{W} Sig
Shield	CASE Shield

INCREMENTAL
HOLLOW TYPE

H128 Series

- Features : Elevator, Parking system
High resolution, Customized design,
Easy to be attached



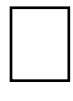
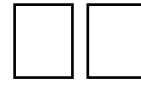
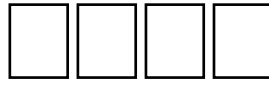
Model

INCREMENTAL
HOLLOW TYPE
Outer Diameter $\varnothing 128$

Shaft Size

52 : $\varnothing 52$

H128 - 52 -



Resolution(P/R)

1024 8192

Output Signal

B : A, B

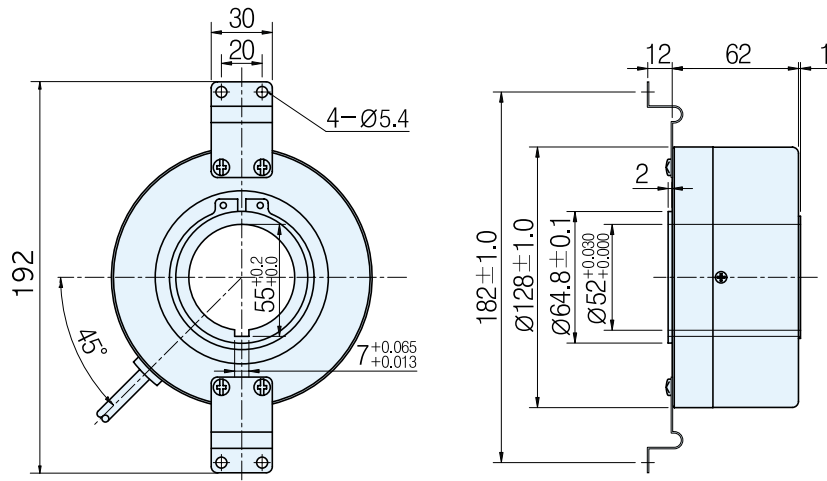
Output Form

O : Open Collector

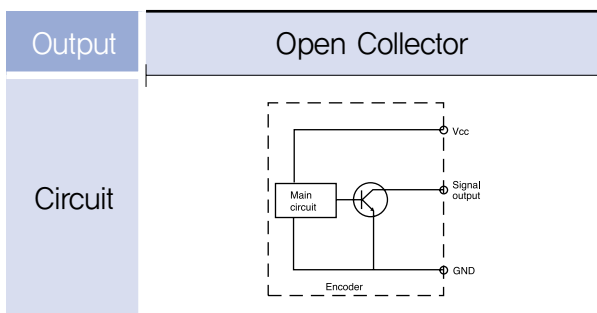
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector
Power Supply	DC +15[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	70mA Max
Maximum Response Frequency	100 KHz
Output voltage	Less than V_L 0,5[V] / More than V_H 10[V]
Output current	Less than 20mA
Rising, decline time	Less than 0,1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	800g – cm Max
Maximum number of revolution	800 rpm
Bearing lifetime	50,000[hr](In case of rotating by 3000rpm)
Allowable Shaft Load	Radial : 5.0kg Max Axial : 2.5kg Max
Position deflection of allowable shaft	Radial : Less than 0,05 mm Axial : Less than 0,2mm
Connection Table	3P(AWG26) Shield CABLE
weight	1.5kg

Rigid Spec.

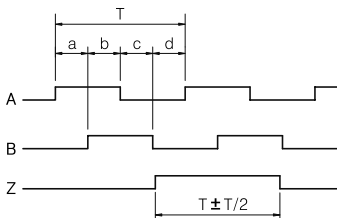
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	35% ~ 85% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 50

Output Phase Shift

CCW → Counterclockwise viewed from shaft end
 $a + b, c + d = T/2 \pm T/10$
 $a, b, c, d = T/4 \pm T/10$



Open Collector



Connection Table

Cable's Color	Connection Table
Output Form	Open Collector
Red	Vcc
Black	GND
Green	A Sig
Orange	A Sig GND
Brown	B Sig
White	B Sig GND
Shield	CASE Shield

SA58 Series

- Features : Index table, Textile machine
- Gray code output(10 Bit)
- Easy to be attached



Model

ABSOLUTE
SHAFT TYPE
Outer Diameter $\varnothing 58$

Shaft Size
10 : $\varnothing 10$

SA58 - 10 -

Resolution(P/R)
1024(10Bit)

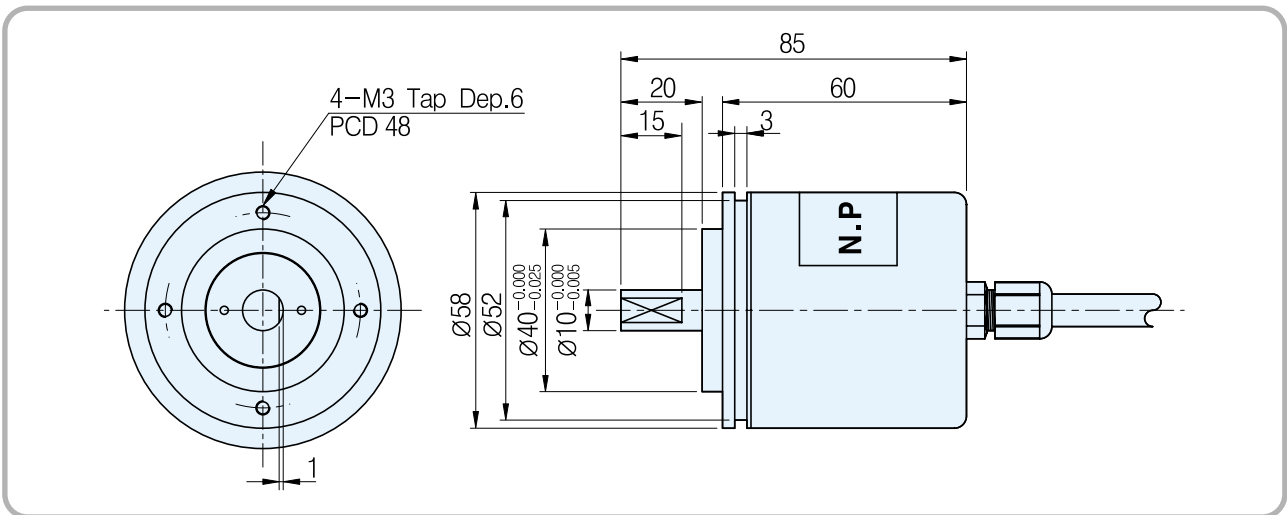
Output Signal
G : Gray Code

Output Form
O : Open Collector

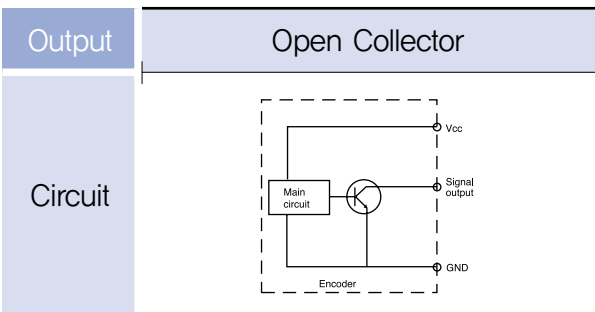
Cable Length

- 1 : 1[M]
- 2 : 2[M]
- 3 : 3[M]
- 4 : 5[M]
- 5 : 10[M]

External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector
Power Supply	DC +5[V] ~ 24[V] Ripple p-p : less than 5%
Consuming Current (In case of no load)	150mA Max
Maximum Response Frequency	10 KHz MAX
Output voltage	Less than V_L 0.5[V] / More than V_H 2.5[V](Based on inputting 5[V])
Output current	Less than 20mA
Rising, decline time	Less than 0.1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]

Mechanical Spec.

Starting Torque	800g – cm Max
Maximum number of revolution	3000 rpm
Bearing lifetime	30,000[hr](In case of rotating by 3000rpm)
Allowable Shaft Load	Radial : 5.0kg Max Axial : 2.5kg Max
Position deflection of allowable shaft	Radial : Less than 0.05 mm Axial : Less than 0.2mm
Connection Table	7P(AWG26) Shield CABLE
weight	500g

Rigid Spec.

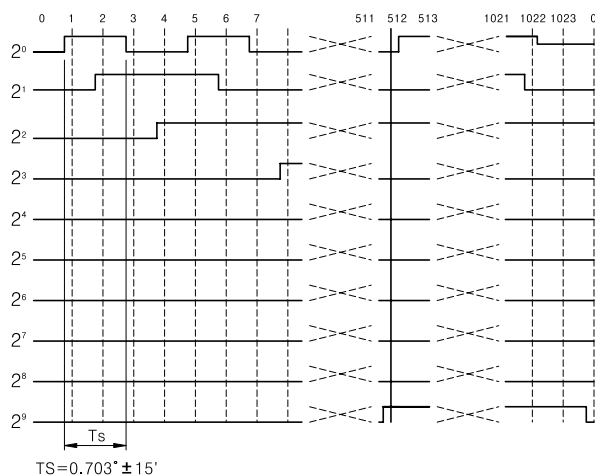
Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	35% ~ 85% RH
Internal Vibration	5G
Internal Shock	100G
Degree of Protection	IP 54

Output Phase Shift

CW → Clockwise viewed from shaft end



Open Collector



Connection Table

Cable's Color	Connection Table
Output Form	Open Collector
Red	Vcc
Black	GND
Green	2 ⁰
White/Green	2 ¹
Gray	2 ²
White/Gray	2 ³
Yellow	2 ⁴
White/Yellow	2 ⁵
Brown	2 ⁶
White/Brown	2 ⁷
Blue	2 ⁸
White/Blue	2 ⁹
Shield	CASE Shield

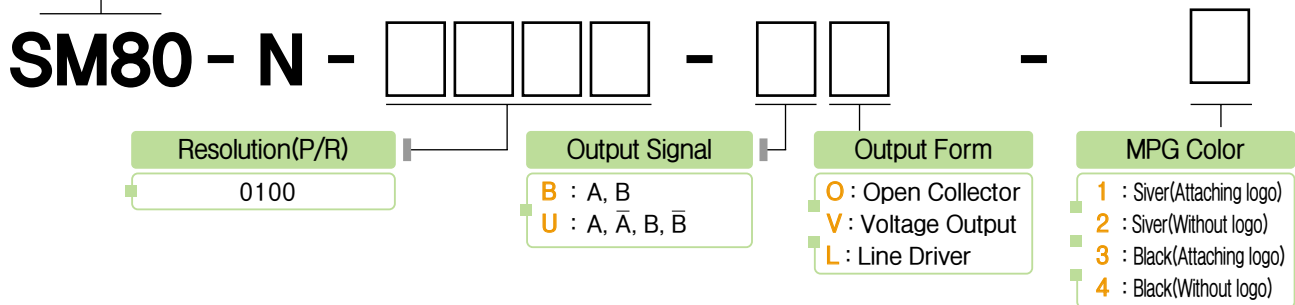
SM80 Series

- Features : NC tooling machine, Industrial application
- High reliability, Customized logo can be available
- Half permanent durability

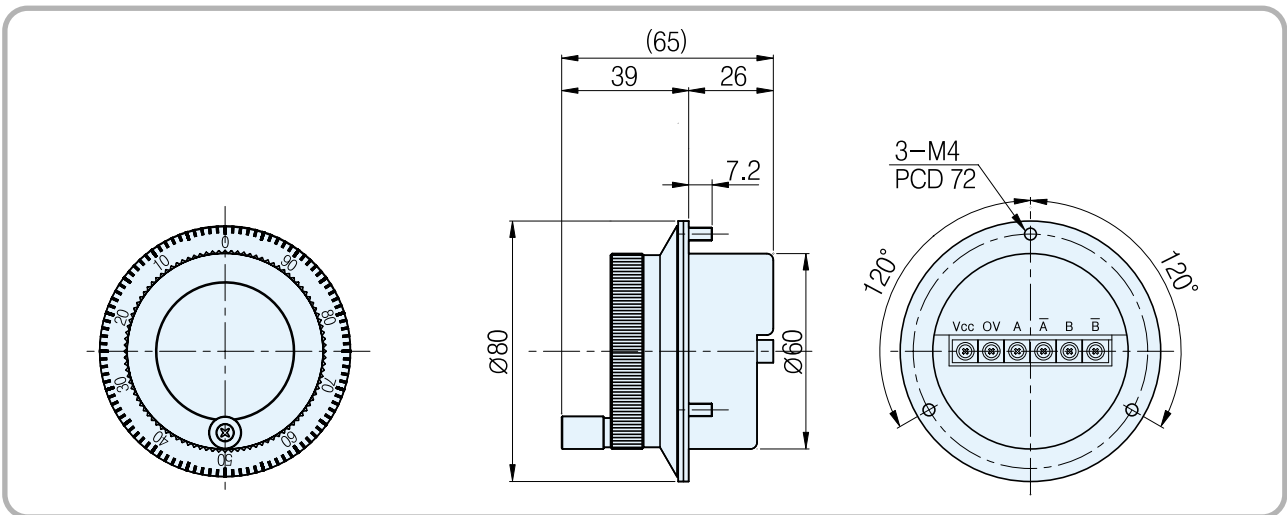


Model

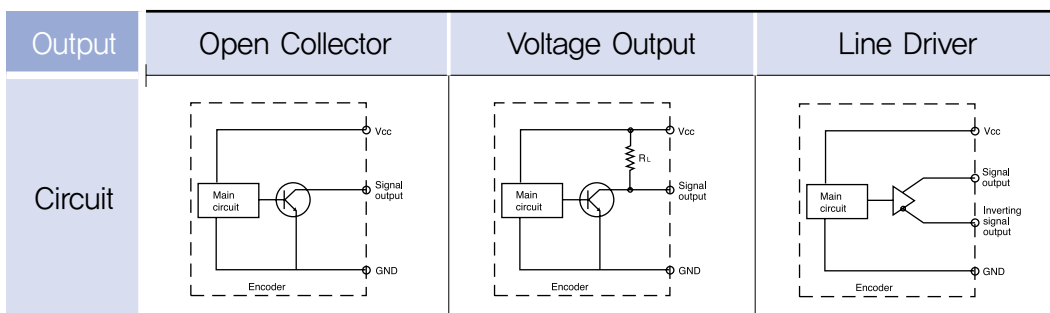
MANNUAL
PULSE GENERATOR
Outer Diameter Ø80



External Dimension



Output Circuit



Electrical Spec.

Output type	Open Collector	Voltage Output	Line Driver
Power Supply	DC +5[V] Ripple p-p : less than 5%		
Consuming Current (In case of no load)	70mA Max	70mA Max	150mA Max
Maximum Response Frequency	5 KHz MAX	5 KHz MAX	5 KHz MAX
Output voltage	Less than V_L 0,5[V] / More than V_H 2,5[V]		
Output current	Less than 20mA	Less than 20mA	Less than 20mA
Rising, decline time	Less than 0,1 μ s	Less than 0,1 μ s	Less than 0,1 μ s
Common conditions	In case that the cable length of output side is 1[M] and load resistance is less than 1[k Ω]		

Mechanical Spec.

Starting Torque	50g – cm Max
Maximum number of revolution	600 rpm
Bearing lifetime	50,000[hr](In case of rotating by 600rpm)
Connection Table	6P board
weight	600g

Rigid Spec.

Operating Temp. Range	-10°C ~ +70°C (No freezing)
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	50G
Degree of Protection	IP 50

Output Phase Shift

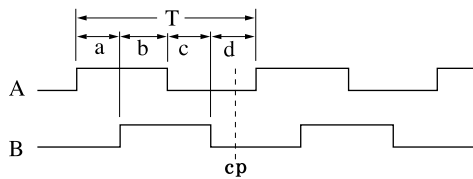
CW ➡ Clockwise viewed from shaft end

$a + b, c + d = T/2 \pm T/8$

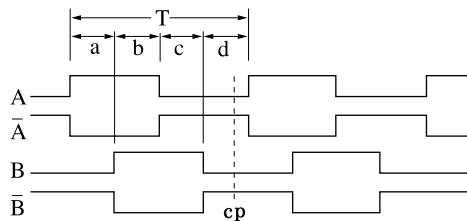
$a, b, c, d = T/4 \pm T/8$



Open Collector, Voltage Output



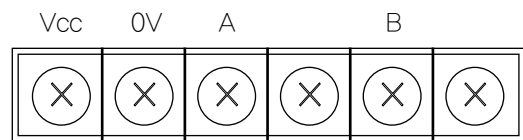
Line Driver



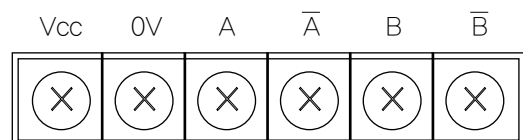
Color	Silver	Black
The logo by color can be attached and detached		

Connection Table

Cable Configuration
Open Collector, Voltage Output



Line Driver



SPM Series

- Features : NC tooling machine, Industrial application
- High reliability, Customized logo can be available
- Half permanent durability



Model

SPM

S01

A

L

M

1

Spec

IP Grade

Output Form

Magnet

Cable Length

S01 : Standard
S02 : Standard + EMG + Enable
S03 : Standard + EMG
S04 : Standard + Enable
M01 : Standard + JOG

A : IP 50
B : IP 65

L : Line Driver

M : With Magnet
O : Without Magnet

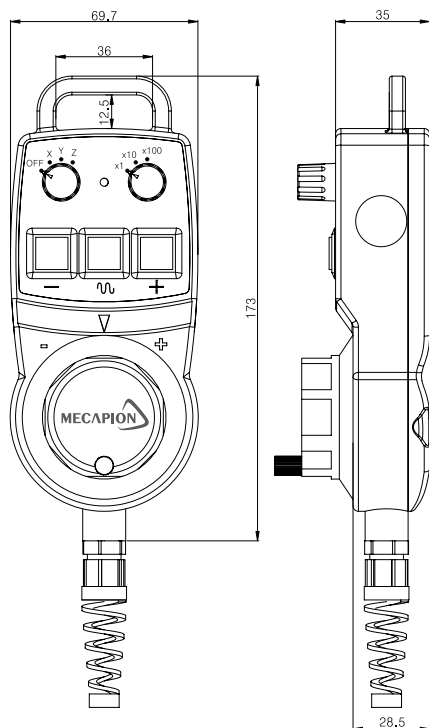
1 : 0.7m
2 : 1.0m



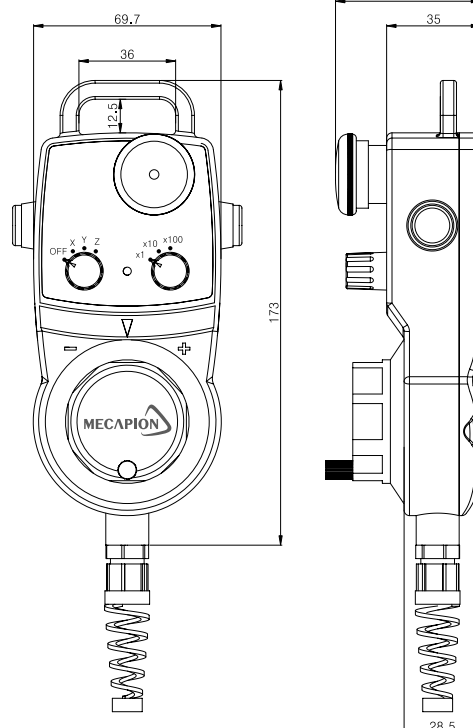
*Note) S/W Spec
Axes : 3axes(OFF,X,Y,Z)
Multipulation : X1, X10, X100
Enable S/W : OR type

External Dimension

<JOG Type>



<Standard+EMG+ENA Type>



Electrical Spec.

Output type	Line Driver		
Power Supply	DC +5[V]		
Consuming Current (In case of no load)	50mA Max		
Maximum Response Frequency	5 KHz MAX		
Output voltage	Less than V_L 0.5[V]/ Over than V_H 2.5[V]	Multipulation	X1, X10, X100 (Rotary Switch)
Output current	Less than 20mA		Emergency S/W
Rising, decline time	Less than 0.1 μ s	S/W	Enable S/W
Axis	X, Y, Z		JOG S/W

Mechanical Spec.

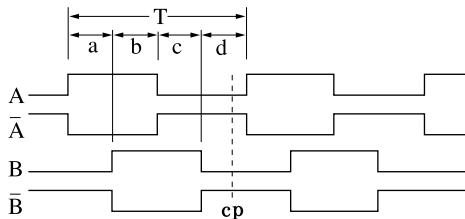
Starting Torque	50g – cm Max
Maximum number of revolution	600 rpm
Bearing lifetime	50,000[hr]
Terminal Block	5268–6(Molex)
Magnet	With / Without

Rigid Spec.

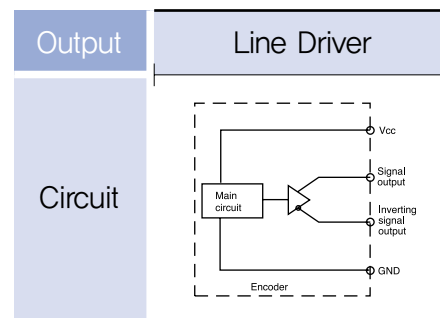
Operating Temp. Range	-10°C ~ +70°C
Preserving temp	-20°C ~ +85°C
Using humidity	35% ~ 80% RH
Preserving Humidity	30% ~ 85% RH
Internal Vibration	5G
Internal Shock	10G
Degree of Protection	IP 50

Output Phase Shift

Line Driver



Output Circuit



Connection Table

Wiring Diagram

NO.	Signal	Color
1	H+5V	Red
2	HOV	Black
3	HA	White
4	HB	Brown
5	/HA	Yellow
6	/HB	Gray
7	COM	Pink
8	AX1	Blue
9	AX2	Violet
10	AX4	Green
11	MP1	Red/Blue
12	MP2	White/Green
13	L+	Gray/Pink
14	L-	White/Gray
15	F1	White/Yellow
16	F2	Yellow/Brown
17	F3	Gray/Brown
18	Shield	Case Shield

<JOG Type>

Wiring Diagram

NO.	Signal	Color
1	H+5V	Red
2	HOV	Black
3	HA	White
4	HB	Brown
5	/HA	Yellow
6	/HB	Gray
7	COM	Pink
8	AX1	Blue
9	AX2	Violet
10	AX4	Green
11	MP1	Red/Blue
12	MP2	White/Green
13	L+	Gray/Pink
14	L-	White/Gray
15	RES1	White/Yellow
16	RES2	Yellow/Brown
17	EN1	Gray/Brown
18	EN2	Brown/Green
	Shield	Case Shield

<Standard+EMG+ENA Type>

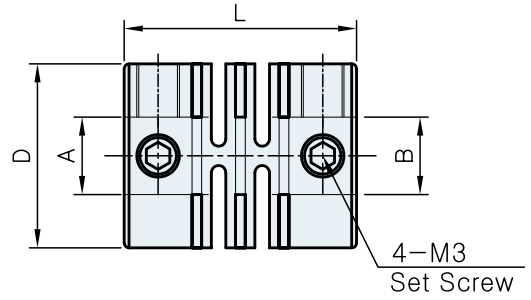
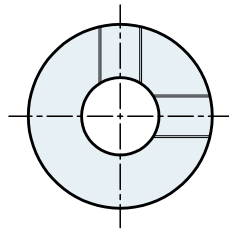


Coupling

■ Option

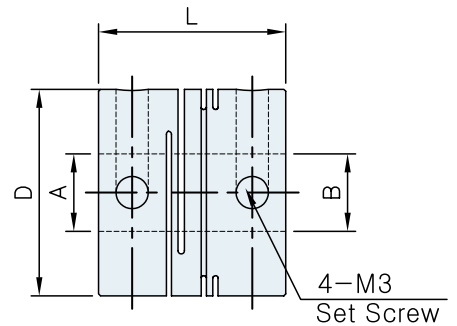
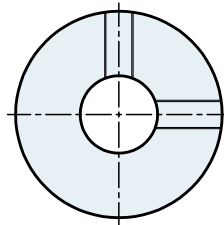
Plastic coupling

Model	A	B	D	L
P6-6	∅ 6	∅ 6	∅ 15	21.6
P8-8	∅ 8	∅ 8	∅ 19	24



Helical coupling

Model	A	B	D	L
H6-6	∅ 6	∅ 6	∅ 19	22.2
H8-8	∅ 8	∅ 8	∅ 22.2	22.2
H6-10	∅ 6	∅ 10	∅ 22.2	22.2
H6-10	∅ 8	∅ 10	∅ 22.2	22.2



Disk coupling

Model	A	B	D	L
D6-6	∅ 6	∅ 6	∅ 26	22.5
D8-8	∅ 8	∅ 8	∅ 26	22.5
D6-10	∅ 6	∅ 10	∅ 26	22.5
D8-10	∅ 8	∅ 10	∅ 26	22.5

