

CANON LASER ROTARY ENCODER TR-36

Thank you very much for purchasing the CANON Laser Rotary Encoder TR-36.

The TR-36 adopts a semiconductor laser for the light emitting device.

The TR-36 outputs the incremental signal of 3600 two-phase rectangular waves per rotation and Z-phase rectangular waves. This innovative laser rotary encoder features high resolution, ultra-compact size and easy installation.

The TR-36 is configured from the cylindrical scale (TS-36) and the optical head (TR-1).

<Precautions of Use>

1. Use the encoder main unit in the specified environmental conditions.
2. Maintain the supply voltage at $DC+5V \pm 5\%$.
3. Do not pull or push the cable strongly.
4. Attach a protective cover when using the encoder in an environment where dust, oil or water drops are present.
5. This product uses a laser. Never remove the main unit cover during operation.
6. Avoid modifying the connector and the cable of the rotary encoder as much as possible.
When modification is necessary, be sure to take measures against static electricity.
7. When handling the cylindrical scale, be sure to follow the instructions described below.

<Precautions to be taken with the cylindrical scale>

1. Never touch the inside of the cylindrical scale. Dust may be removed by blowing on the scale.
2. When fingerprints, dirt, etc. are attached to the periphery of the cylindrical scale, wipe it with cloth moistened with ethanol, being careful not to damage the peripheral surface.
3. Exercise care not to drop the cylindrical scale, strike it against other objects or apply an external force to the cylindrical scale.
4. Check that no dirt is attached to the scale area before mounting the encoder on the equipment.
Pay particular attention to the above precautions when handling the cylindrical scale.

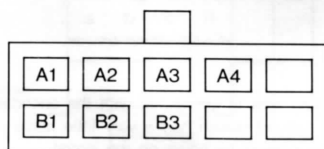
<Electrical Interface>

(Colors and functions of the cable)

Color	Function	Housing No.
Orange	+5V	A1
Gray	GND	B1
Green	A-phase signal	A2
Pink	B-phase signal	B2
White	Z-phase signal	A3
Yellow	Control input (*1)	B3
Shield	Case GND (*2)	A4

Cable length 0.8m
Conductor size AWG 28

(Connector housing area)



(Viewed from the socket-connecting surface)
Matching pin header
PS-10PE-D42T1-B1
(Nippon Koku Denshi) and others

(Note)

(*1), (*2): Refer to the "Recommended receiving circuit".

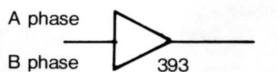
The voltage V_c applied to the control input should be in the range $0 \leq V_c \leq 5V$.

$V_c < 1.23V$...The laser goes off.

$V_c > 1.63V$...The laser goes on.

It is recommended that the laser be turned off by setting V_c below 1.23V while the equipment is powered and the encoder is not in use.

<Output circuit>

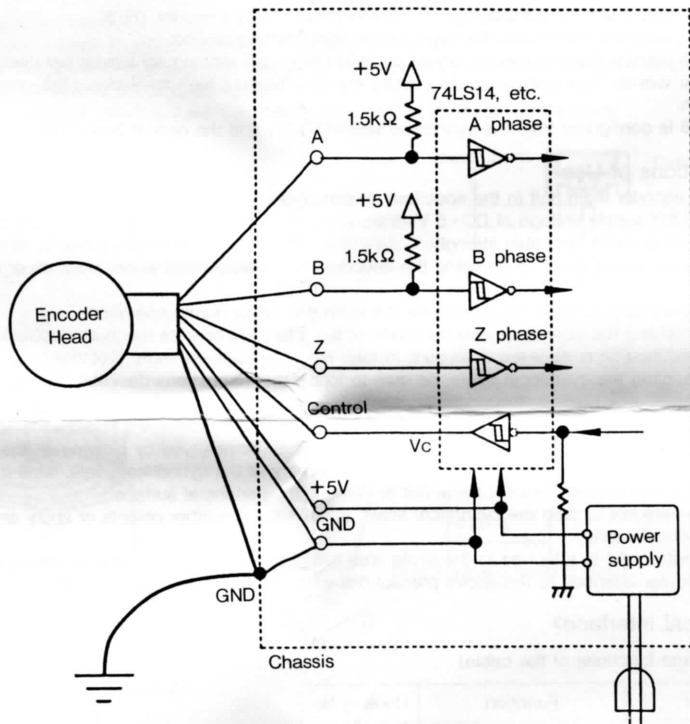


(Open collector comparator)



74LS221

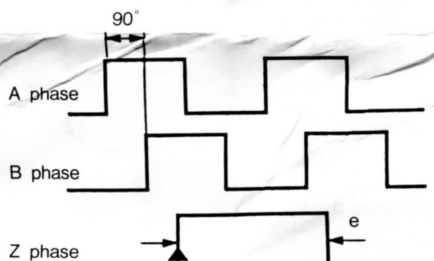
<Recommended receiving circuit>



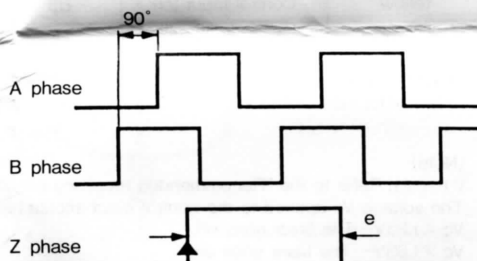
(Note)

The shielding wire is connected with the encoder case. Always be sure to ground the shielding wire or connect it to a quiet ground (which has a very little noise current) to prevent deterioration of the semiconductor laser or malfunction caused by noise on the signal.

<Output waveform>



Clockwise rotation viewed from the shaft side



Counterclockwise rotation viewed from the shaft side

(*) One Z-phase signal pulse is output rotation.

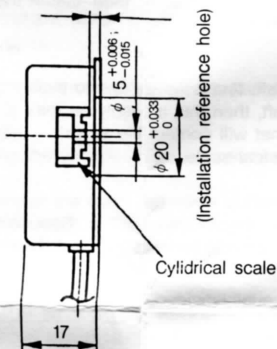
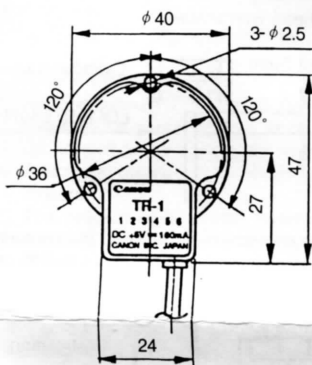
The Z-phase signal is not synchronized with the A-phase and B-phase signals.

The Z-phase signal has a pulse width of 330 μ sec (typ). However, the pulse width decreases as the speed of rotation increases above 600 rpm.

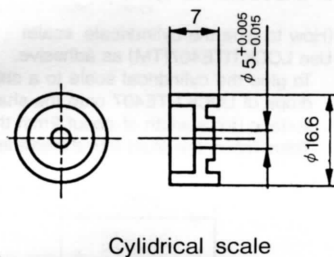
The Z-phase signal rises at the origin.

<Dimensions of the main unit>

TR-1



TS-36



<Specifications>

1. Resolution..... A phase, B phase 3,600 pulse/ rotation (without interpolator)
Z phase 1 pulse/ rotation

2. Max. Rotation Response..... 300KHz

3. Max. Rotation Rate..... 5000rpm

4. Output Signal

1) A phase and B phase

Open collector output $I_{SINK} = 6mA (MIN.)$

Signal Width $a = (1/4 \pm 1/8)P$

$c = (1/4 \pm 1/8)P$

$0.25 \leq (a+b)/P \leq 0.75$

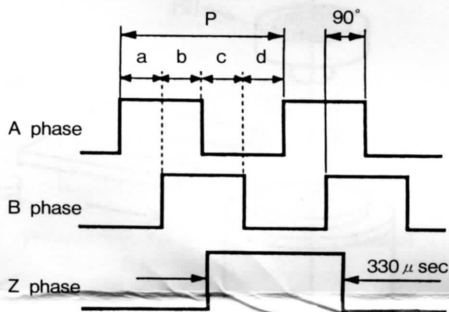
2) Zphase

TTL output $I_{OL} = 8mA (MAX.)$

Signal Width $330 \mu sec \pm 100 \mu sec$

Z phase is not synchronized with either

A phase or B phase



5. Weight..... Cylindrical Scale 0.8g

Head unit 33.5g

6. Installation shafts size..... $\phi 5^{+0.006}_{-0.010}$ (The attachment metal flanges are ready for $\phi 3, \phi 4$ shafts)

7. Inertial Moment..... $0.4g \text{ cm}^2$

8. Power Supply Voltage..... $DC +5V \pm 5\%$

9. Power Supply Current..... $+5V \cdots 180mA (MAX.)$

10. Light Source..... Semiconductor Laser

Wave Length 785nm Maximum Output Power 5mW

11. Environmental

Operating Temp..... $0^\circ C \sim 50^\circ C$

Storage Temp..... $-30^\circ C \sim 80^\circ C$

Humidity..... $< 90\% RH$

Vibration..... $10G, < 250Hz$

Shock..... $60G, 11msec$

<Installation>

(Example)

Mounting the encoder on the motor

1. Attach the cylindrical scale to the specified position with adhesive.

At this time, put the positioning tool on the installation surface and lightly press the cylindrical scale from above. Then, slowly remove the positioning tool.

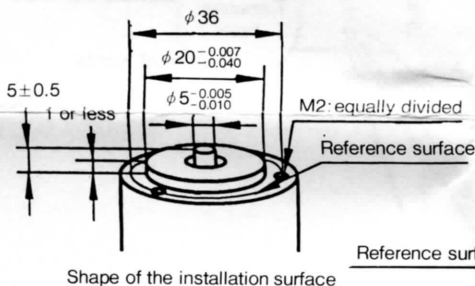
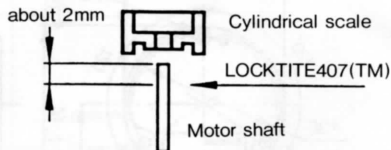
2. Check that the cylindrical scale is fixed completely, then fasten the head with screws.

(How to glue the cylindrical scale)

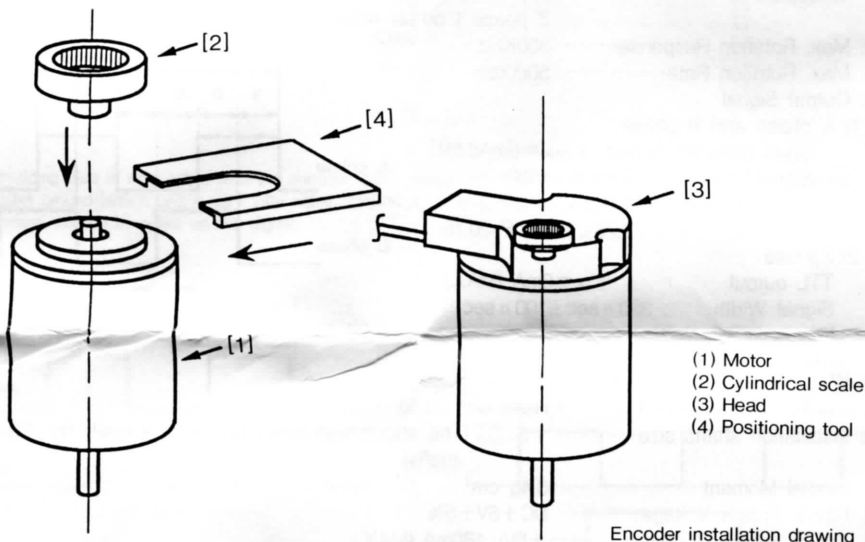
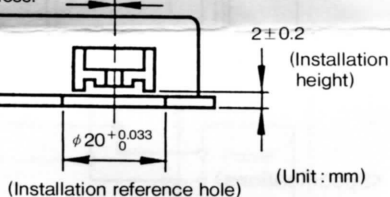
Use LOCKTITE407(TM) as adhesive.

To glue the cylindrical scale to a shaft, first squeeze one to two drops of LOCKTITE407 onto the shaft, then thin it evenly on the surface (for a width of about 2mm that will contact the scale).

Then, insert the shaft into the cylindrical scale.



Reduce the displacement between the centers of the cylindrical scale and the head to 0.15 or less.



Encoder installation drawing

Canon

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