

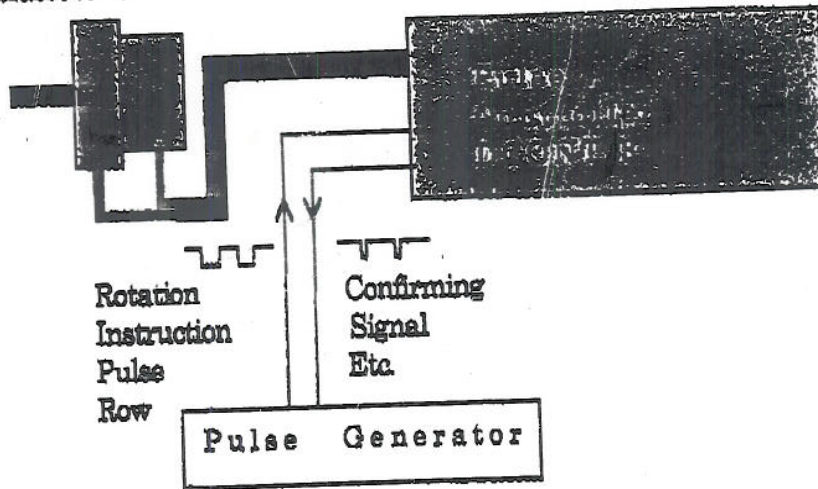
Handling Guidance For Position Regulating Controller

How to use

Rotary encoder built-in ultrasonic motor can control the positioning, repeat action, etc. by giving pulse signal, together with exclusive pulse controller (DCONT-3).

Remarks) Rotary encoder has the specification of A-phase, B-phase and Z-phase. Z-phase get output of signal from pulse controller (DCONT-3).

Rotary encoder built-in Ultrasonic Motor



Remarks) Kindly requested to prepare pulse generator at users.

Correspondence of Motor with Pulse Controller

Rotary encoder built-in ultrasonic motor consist of motor main body and pulse controller. Motor main body and pulse controller must be used with a corresponding pair. In this respect, you are kindly requested to confirm corresponding model No. of motor and controller as follows;

Motor Main Body



Pulse Controller



Motor Model No.	Corresponding Model	Pulse Controller Model No.
U S R . 3 0 E	Corresponding Model	DCONT-3-30(SD16)
U S R . 4 5 E	Corresponding Model	DCONT-3-45(SD15)
U S R . 6 0 E	Corresponding Model	DCONT-3-60(SD13)

Remarks) Above is the standard model combination. Besides the above models, please contact us. Rotary encoder built in ultrasonic motor has a basic function of 1,000 pulse per rotation. On Fukoku's shipment, please note it is adjusted to 4,000 pulse per rotation.

Lektor
Peder Pedersen

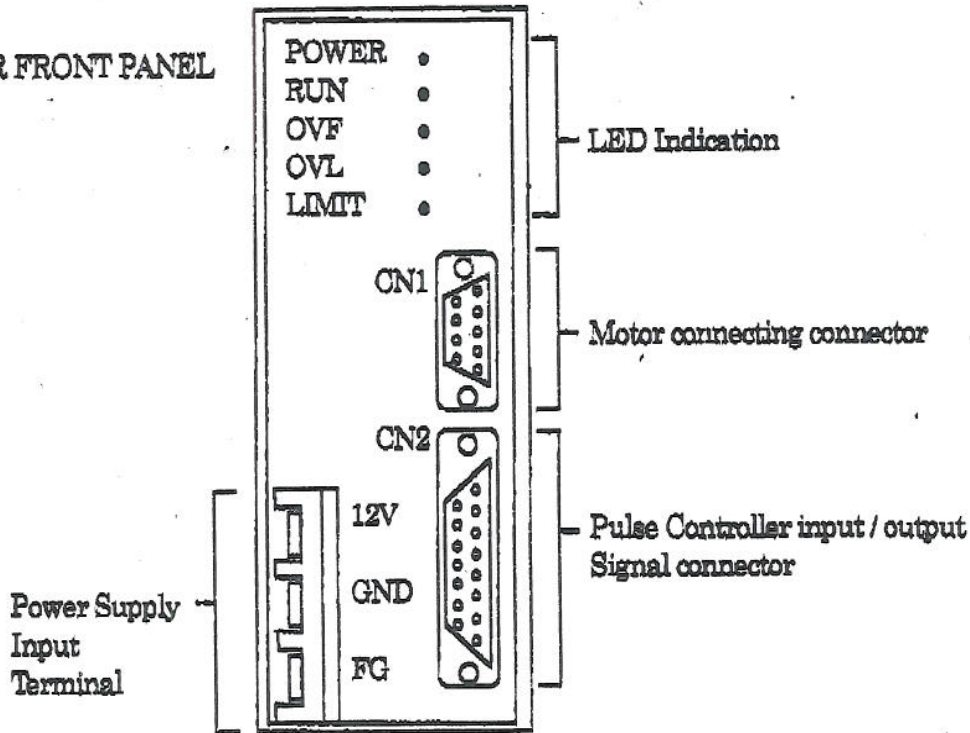
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AGE: 3/9 ATTN: MR. NORDDIN EL GHOUTI

Name of Each Part of Pulse Controller

P. 2/8

CONTROLLER FRONT PANEL



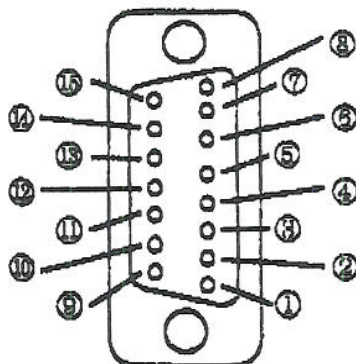
Function of Each Part of Pulse Controller

1. LED Indication

Indication	Function	Lamp Lighting Mode
POWER	Power Supply Indication	Lamp is on when power supply is put on.
RUN	Operating Indication	Lamp is on when Motor is put on.
OVF	Over-flow Indication	Lamp is on when Motor cannot follow to drive in accordance with instructed pulse speed.
OVL	Over-loaded Indication	Lamp is on when Motor cannot stop at the instructed position due to over loading to motor.
LIMIT	Limit Indication	Lamp is on when Limit switch for emergency stop is put on.

2. Controller Input / Output Signal Connector (I / O) (CN-2)

CN-2 Terminal Pin Lay out



Signal Name (Input / Output)

Function

- ① CW (Input) : Instruction of CW rotation pulse
- ② CCW (Input) : Instruction of CCW rotation pulse
- ③ LCW (Input) : Urgent stop limit switch of CW rotation
- ④ LCCW (Input) : Urgent stop limit switch of CCW rotation
- ⑤ RESET (Input) : Re-set for deviation counter or error
- ⑥ RUN (Output) : Start working when stored pulse q'ty Shows "Not Zero"

- ⑦ OVF (Output) : Start working when overflow of deviation counter
- ⑧ OVL (Output) : Start working when motor cannot stop at instructed position by over-load
- ⑨ LIMIT (Output) : Confirming signal for limit switch action
- ⑩ ASG (Output) : A-phase pulse output for rotary encoder
- ⑪ BSG (Output) : B-phase pulse output for rotary encoder
- ⑫ ZSG (Output) : Z-phase pulse output for rotary encoder
- ⑬ VCC (Input) : Power supply for control input / output signal (DC + 5V)
- ⑭ GND (Output) : Power supply for control input / output signal (GND)
- ⑮ GND (Output) : Power supply for control input / output signal (GND)

- Remarks)
- * Controller input / output is insulated by photo coupler
 - External DC power supply (DC 5V, over 0.2A) is necessary to drive I/O signal.
 - * Controller input / output signal line (wire) must be located apart from power line (code) by 80 cm distance at least.
 - * It is recommended to use shield twist pair line (wire) for controller input / output signal line (wire).

3. Power supply Input Terminal

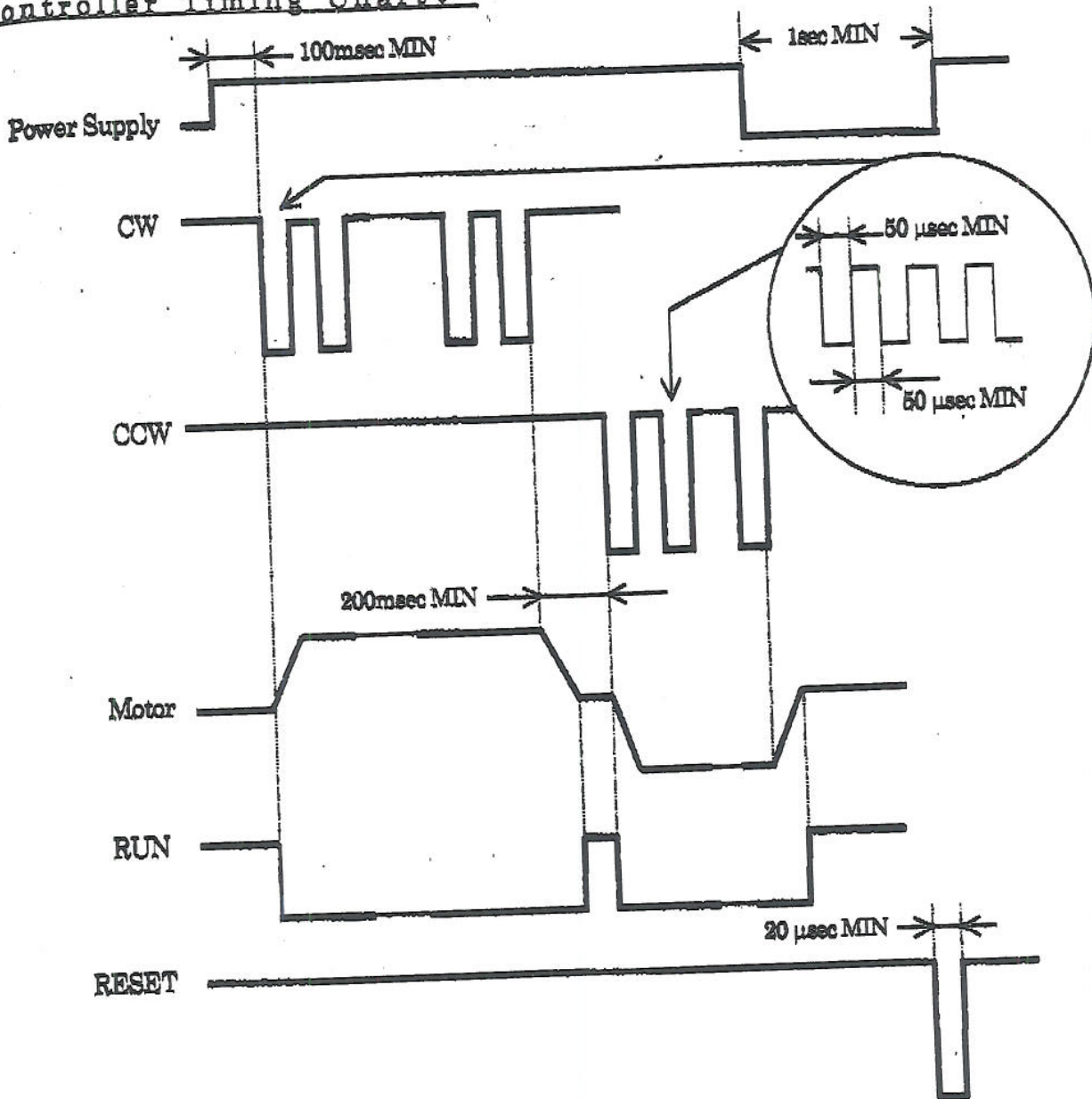
Name	Function	Connection
12V	DC12V Connection	Please connect to DC12V ± 0.5V power supply. Please do not use battery charger, power supply with large ripple. Capacitance must be as follows; * Dcont - 3 - 30 Over 1.5A * Dcont - 3 - 45 Over 2.0A * Dcont - 3 - 60 Over 3.0A
G	Ground Connection	Please connect ground of DC 12V
FG	Frame Ground Connection	

◆ Specification of Pulse Controller ◆

Controller Model No.	DCONT-3-30	DCONT-3-45	DCONT-3-60
Applied Motor Model No.	USR-30E	USR-45E	USR-60E
Power Supply Input	Voltage	DC 12V ± 0.5V	
	Current	1.5A	2.0A
Speed, Position Regulating Input	2 Pulse Input Method		
Input Allowance Range of Rotating Instruction Pulse	2.7~17.8 kpps	2.7~10 kpps	0.7~6.7 kpps
* Remarks			
Weight	550 g		

* Remarks : At 4,000 Pulse / Rotation of votary encoder

◆ Controller Timing Chart ◆

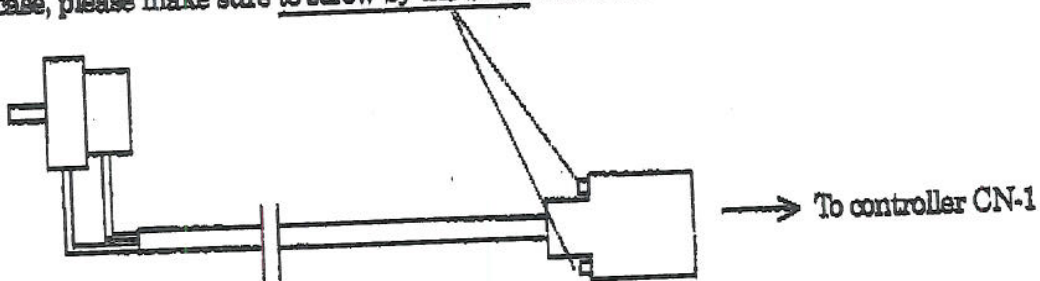


* Please regulate input / output of controller signal in accordance with above strictly.

◆ Connection ◆

1. Connection from Motor to Controller

9 pin connector coming from motor can be connected to CN-1 of controller.
 In this case, please make sure to screw by the bolts with connector as follows ;



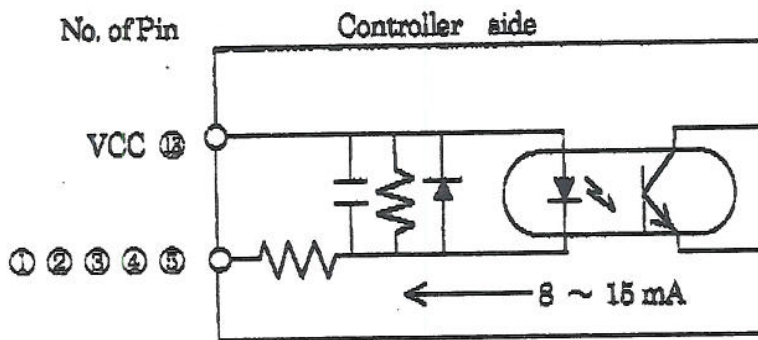
* In case line (wire) modifications such as distances, material, etc., should be necessary, please consult us. If line (code, wire) is extended by customer, it would create mis-matching problem between motor and controller.

2. Connection between Pulse Generator and Pulse Controller

Connection between pulse controller and pulse generator which is prepared by customer is made by using attached connector.

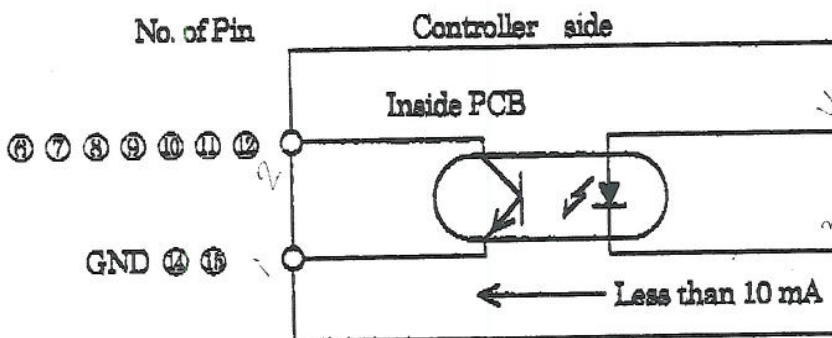
Following the instruction signal given by pulse generator, pulse controller is connected by re-confirming the pin number of connector. Please refer to the previous page describing "Controller Input / Output Signal Connector" for the details.

(1) Input signal circuit



* If input signal voltage of ⑬ is exceeding 5V, please put resistance to get current 8-15 mA. However, please do not use over 15V. Input of ① (CW), ② (CCW) must be made to give pulse either one of two strictly following timing chart.

(2) Output signal circuit



* In case output TTL level is secured, please use under 10 mA.

Input / Output signal to the controller is as above explained. Kindly requested to input pulse wave in accordance with timing chart after the confirmation. We are not in a position to take a responsibility for the mal-function and / or destroying of controller by applying the unidentified pulse input to the controller.

3. Kind of Input / Output Signal between Generator and Controller

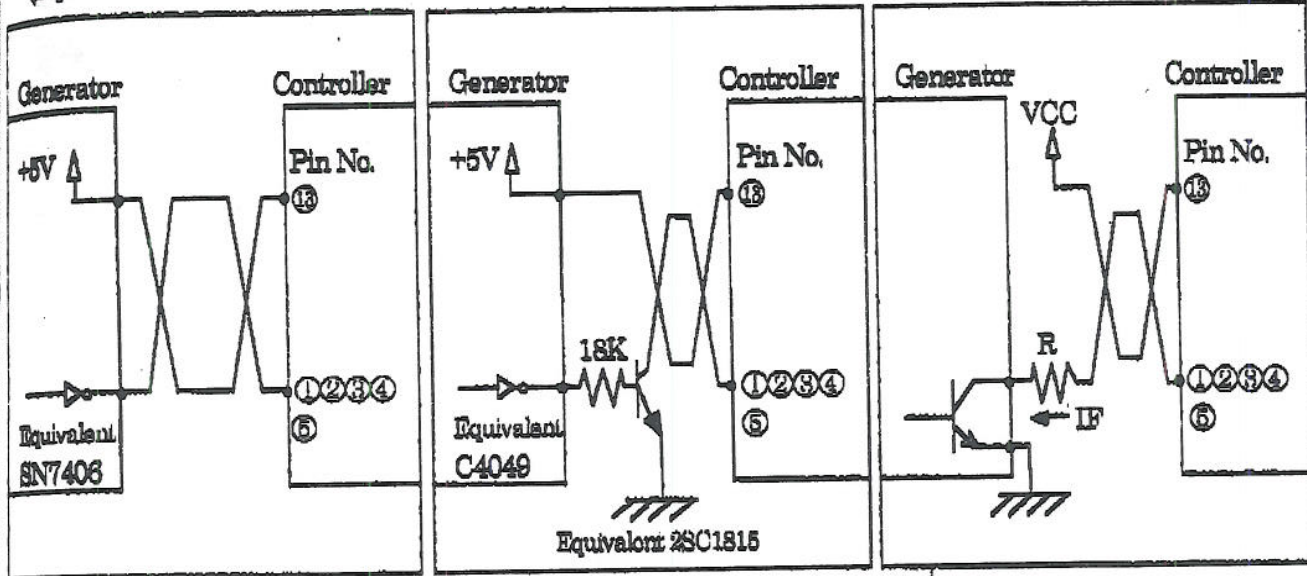
Connecting method between generator and controller is different depending on input / output method of generator. Please connect as follows;

(1) Output Method of Generator

* TTL
(Equivalent SN 7406)

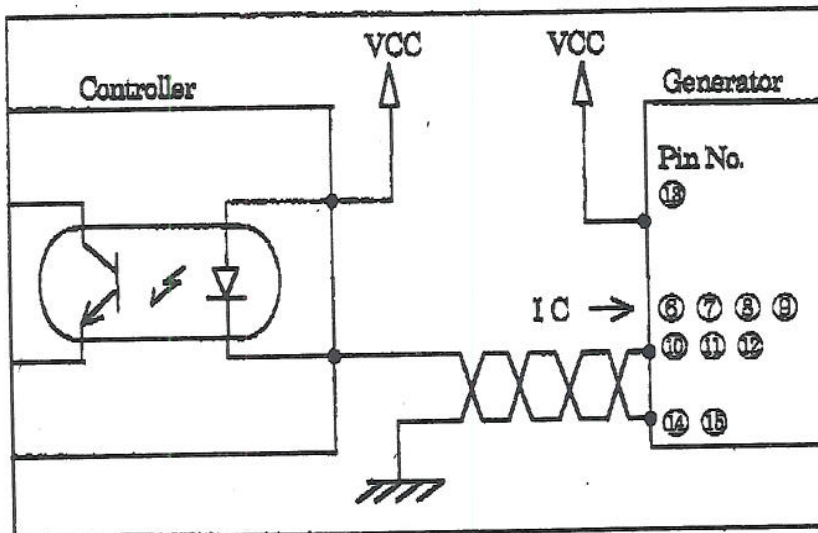
* C-MOS
(Equivalent C4049)

* Open Collector



Remarks) When VCC is 5V~15V, please adjust to get IF current be 8 ~ 15mA by connecting external resistor R.

(2) Input Method of Generator (Photo Coupler's case)



* Please use VCC at 5V ~ 15V. But exceeding 5V, please adjust IC current to be below 10mA.

4. Pulse Input Method

This controller enables motor to stop at arbitrary position by giving pulse signal. It is controlled by 2 pulse input method, i.e. CW pulse and CCW pulse. If CW pulse is input, it rotate with clock-wise direction in view from motor output shaft and CCW pulse goes vice versa. 1 pulse input method cannot be applied to this motor. Each motor model specifies the range of input pulse to controller. Therefore, kindly requested to input rotation instructed pulse to controller by following range without fail :

Motor Model No.	USR-30E	USR-45E	USR-60E
Applied Controller	DCONT-3-30	DCONT-3-45	DCONT-3-60
Input allowance Range of Rotating Instruction Pulse	2.7 kpps ~ 17.3 kpps	2.7 kpps ~ 10 kpps	0.7 kpps ~ 6.7 kpps

On the shipment of this motor, rotary encoder is adjusted to 4,000 pulse per rotation. Motor revolution speed (r.p.m.) N is in proportion to the number of input pulse S. Relationship between pulse speed and r.p.m. is approximately formulated as follows ;

$$N = \frac{60 \times S}{4000}$$


Pulse Speed S (pps)	Motor revolution N (rpm)
7 0 0	Approx. 10.5
2 0 0 0	Approx. 30.0
6 7 0 0	Approx. 100.5

5. Connection of Power Supply

Power supply to drive motor is DC 12V ± 0.5V. Power supply for battery charger (half-wave rectifier) or the one with large ripple ratio cannot be used for this motor. If capacitance of power supply is not sufficient enough, motor cannot drive normally so please pay special attention to the minimum requirement as follows ;

- USR-60E (DCONT-3-60) over 3.0A
- USR-45E (DCONT-3-45) over 2.0A
- USR-30E (DCONT-3-30) over 1.5A

◆ Guidance For Installation ◆

- (1) Installation of controller should be made by screwing installation hole of 4 place located at controller upper and another 4 place located at controller down. Kind of screw must be M3 and end depth projected inside of controller must be within 3 mm.
- (2) Operating temperature atmosphere is 0°C ~ 40°C with good ventilation, but, no frozen atmosphere.
- (3) Operating humidity atmosphere is less 85%, but, no due atmosphere.
- (4) Please do not use under atmosphere of corrosive gas, over-humid and dusty.

- (5) Please use power supply with specification of DC 12V \pm 0.5V. Power supply capacitance differs depending on motor model No. so please refer to "Power Supply Input Terminal" in the previous page by getting affordable capacitance. Half-wave rectifier or power supply with large ripple might destroy the PCB so please do not use them.
- (6) Frame Ground (FG) must be connected without fail.
- (7) Standard connecting cable between motor and controller is 1 m. If cable exceeding 1 m is required, please inform us the length you require.
In the occasion that cable length is changed at customer side, matching between motor and controller would be spoiled.
- (8) Location to install motor unit is close to the vibration source. In this case, kindly requested to set shock absorbing measures to avoid vibration conveyance to controller.
- (9) In case noise generating sources such as electromagnetic valve, high frequency welder, etc. is located nearby controller, kindly requested to equip with noise filter or change the line (cable, wire, code) distribution.
- (10) Please do not drop conductive material pieces (pin, metal scrap, waste metal, etc.) into the controller.
- (11) Please keep distance of at least 30 cm between controller input, output line (code) and power line (code).
- (12) Controller input, output line is insulated by photo coupler. External DC power supply (DC 5V, over 0.2A) is necessary to drive controller input / output signal.
- (13) Controller input / output line (wire, code) is connected by as short length as possible.

◆ Guidance For Handling ◆

- (1) Rotary encoder built-in motor has A-phase, B-phase and Z-phase. Z-phase is only for output from controller (DCONT-3).
- (2) Rotary encoder built-in Motor is 1,000 pulse per rotation, however, on the shipment, it is adjusted by 4,000 pulse per rotation.
- (3) Please design surrounding circumstances for motor drive to have motor smoothly operating, by referring to the motor operative range described with motor torque curve. If motor starts with overloaded condition, motor itself might be damaged, so special attention is requested.
Ultrasonic motor has a characteristics that over current is not generated like traditional motor in case of over loaded (Even rotation axle is locked). Therefore, please note that surveillances on overload condition cannot be detected by current change.
- (4) Please do not use motor under receiving extreme momentum load or pulsating load.
- (5) Please pay attention to the handling of this motor, controller not giving shock or drop as those are precision equipment.
- (6) Motor and controller is precisely adjusted one by one before shipment. Therefore kindly requested to take note that we are not in a position to take any responsibility on the occasion that motor / controller is dis-assembled or PCB is modified, etc., without manufacturer's knowledge.
- (7) With regard to pulse input or control signal input, please pay special attention to pick up appropriate pulse to meet control signal specified at "Timing chart" in the previous page.