

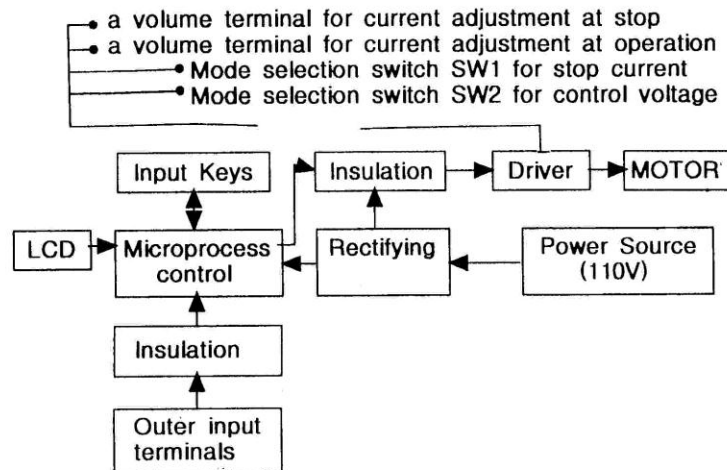
RoboCon Manual for use

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Abstract of the system

Step motors are widely used with low cost. Precise position control of X - Y table and Robot etc. can be performed by the step motors. The step motors are motors which rotate according to steps. For example, in case that a step motor needs 200 pulses(1.8 degree) for 1 rotation, when one step pulse is provided to a driving circuit of the step motor, the rotation axis of the step motor rotates 1.8 degree. Therefore the rotation angle can be controlled in the desired position by controlling the number of pulses provided to the step motors. (The present system is driven according to 2 phase exciting method. Thus the number of demanded pulses for 1 rotation is 400 in 1.8 degree step motor.) RoboCon can be used comfortably for precise control and various uses. RoboCon is a total system which can drive very easily a step motor according to a optional and free program of user. RoboCon has a following structure.



Characteristic of RoboCon

1. Free programmable function

This product is made assurance doubly sure for designing in order that ordinary persons operates it very easily.

This product can be apply to widespread machinery of industry field for total control of step motor. Especially, the present system is different from conventional complex method for program control. In the present system, if ordinary user selects only respective modes by using cursor and data keys on LCD display picture, he can perform various operation control technique with high level.

2. Forcibly total type drive

RoboCon is a new product which performs program control function and step motor driving function together. Thus RoboCon can be drives by outer input signals. RoboCon also uses high speed FETs(Field Effect Transistors) and high speed rotation can be performed. Step motors can be driven by a high voltage power source and they can be driven with high speed and high torque.

Just a moment! Please confirm following matters before beginning operation

VR 1 : a volume terminal for current adjustment at stop

VR 2 : a volume terminal for current adjustment at operation.

SW 1 : Mode selection switch sw 1 for stop current

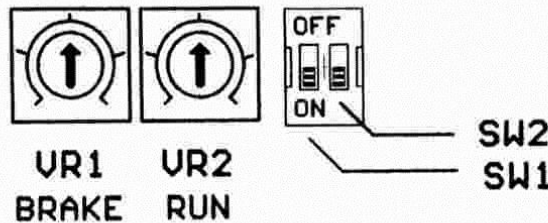
ON : Half (adjustment range : 0 (A) ~ 2(A))

OFF : Full (adjustment range : 2..5 (A))

SW 2 : inner outer selection switch for input power source for control

ON : At using power source in internal input portion

OFF : At using power source in outternal input portion



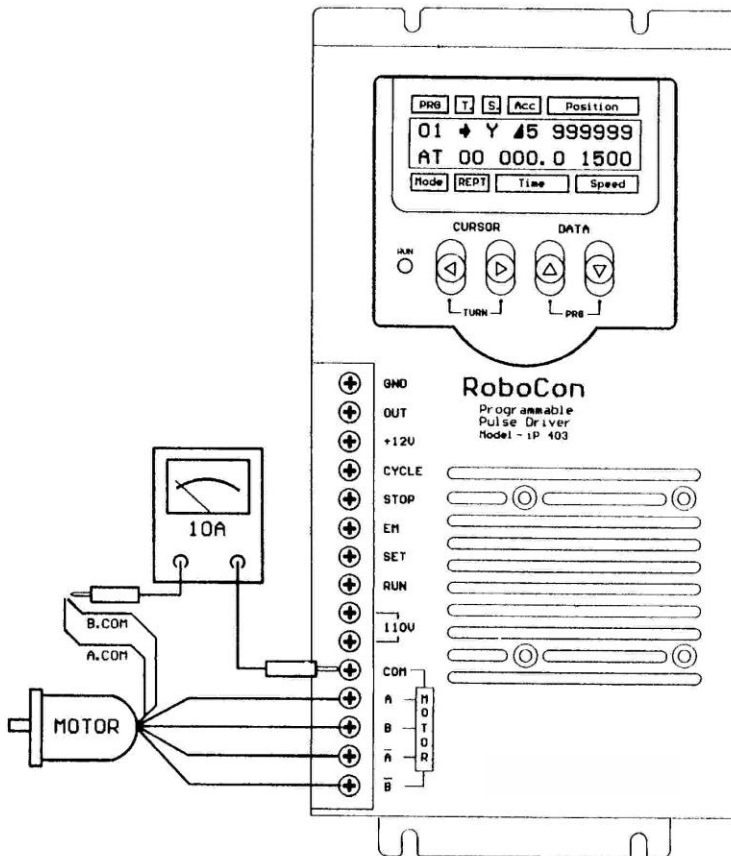
Measure method of current at the motor

Current selection for stop of the motors

When the variation of the position produces, it means that the current for stop of the motor is lower than the desired value. When the temperature of the motor is very high, it means that the current for stop of the motor is higher than the derived value. Then life of the motor might be short. Thus please select the current for stop of the motor corresponding to the characteristic of the motor.

Current selection for run of the motor

If torque which is applied to the axis of the motor at run of the motor is higher than the desired value, a driven load might break away from the axis. Please select the appropriate run current corresponding to the characteristic of the driven load. If the run current is excessive high, high heat become to produce from an out casing and the motor.



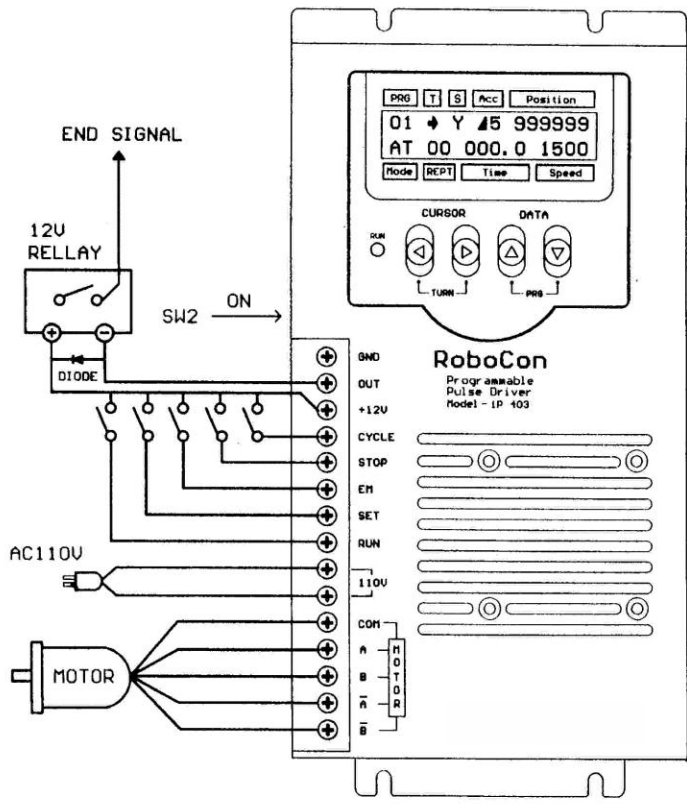
Wire connection of RoboCon

Wire connections between input terminals when the inner power source is used

When switches (a micro switch, a button switch etc.) are used for input, please connect electric wires using the inner power source as follow. Thick wires should be connected shortly and common impedance should not be formed. Any wires (high voltages) which might produce noise should be apart more than 10cm from the present wires.

NOTICE

Wires are connected for use of an outer power source (sw 2 : off) after producing products. Therefore please set the switch sw 2 ON in case that input terminals are used according to following connections.



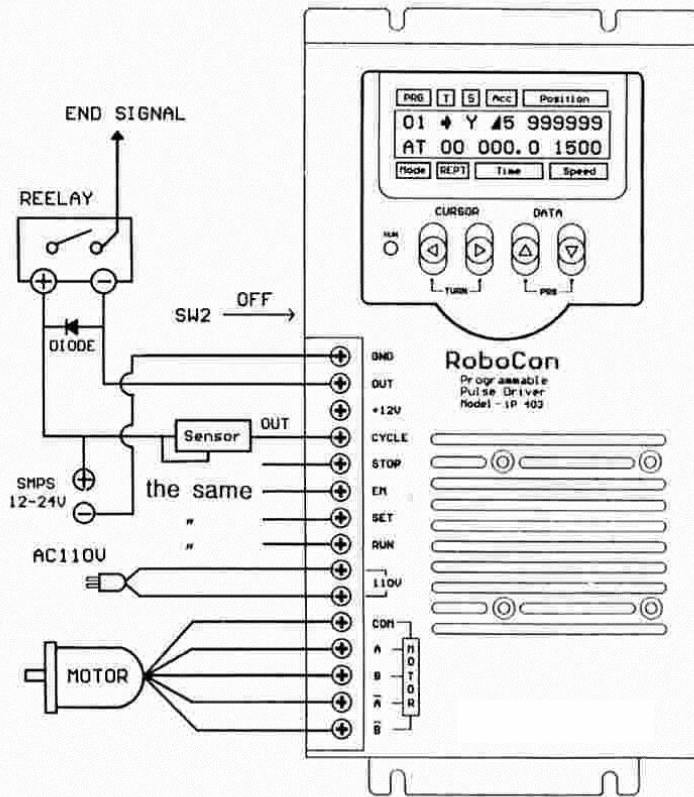
Twist wire connections are desirable.

Wire connections between input terminals with photo-sensor etc. when the outer power source is used.

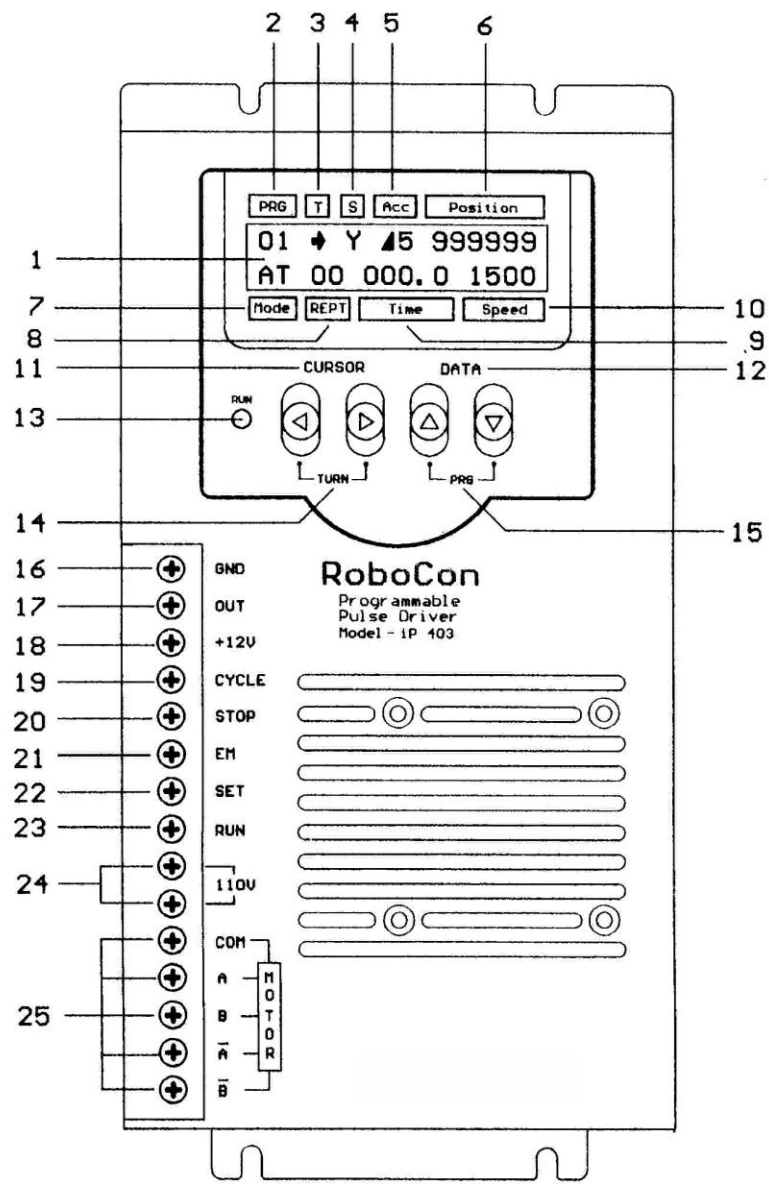
When sensors (photo-switches etc.) are used for input, please use an extra outer power source of 24V (SMPS) essentially in order to supply electric power to the sensors. The present inner power source is prepared for an inner circuit. Therefore if the inner power source of the product uses for the power source for the sensors, an obstacle might be produced at the inner power supplying device.

NOTICE

Wires are connected for use of an outer power source (SW2 : off) after producing products. However, please confirm this again.



Description of an picture of the LCD and function of respective input terminals



(1) LCD Display

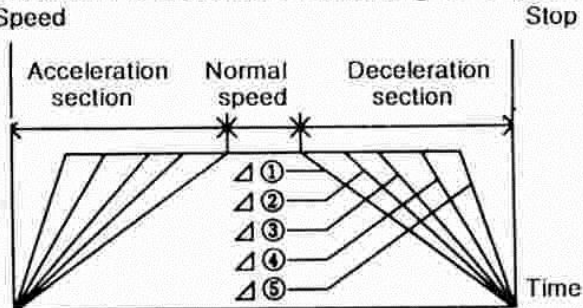
(2) PRG :This displays the number of the operation order of programs at edit of programs. Programs is running in order from the number of 01 at run. (But, the address of 00 is used specially for control of a reference point. Running speed at the reference point and the rotation direction of the motor can be controlled at the address of 00. (Setting Mode : MN))

(3) TURN :This select right · reverse rotation of the motor. The motor rotates to reverse direction by selection of " ← ". The motor rotates to right direction by selection of " → ".

(4) SIGNAL :If "Y"(Yes) is selected, a signal for END confirmation is produced during 0.3 second (PNP Open Emitter) to outer signal terminal. If "N"(No) is selected, the signal is not produced.

(5) ACC :Speed level of acceleration and deceleration is selected. The level can be selected according to the characteristic of the motor. Step motors has the characteristic that they runs by pulses. If high speed pulses input to a step motor suddenly, the motor cannot rotate and an trouble is produced in the motor. (Not related to low speed). There for the speed level (Speed, acceleration and deceleration) should be selected according to the characteristic of the motor. The characteristic of acceleration is described according to a graph as follow.

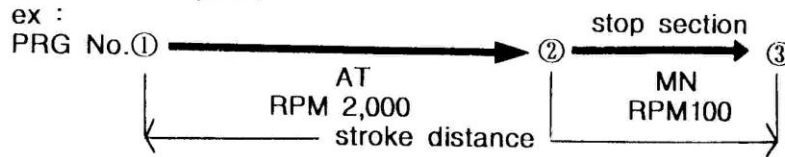
Δ1 to Δ5 can be selected. An section of acceleration and deceleration at Δ1 is longest. An section of acceleration and deceleration is shortest.



(6) POSITION :The rotation value(Pulse) of the motor can be input. The maximum value which is input is 999,999. For example, when user wants to rotate a step motor with 2 phase 50 turns at 2 phase mode, the rotation value is calculated as follow and inputted. $50 \text{ (rotation Turns)} \times 400 \text{ (the number of pulses which is needed for 1 rotation)} = 20000$. The numeral of 20000 is displayed in position mode by data buttons of "▲,▼".

(7) MODE :Two modes of AT and MN are supported. If AT(Auto)mode is selected, the motor rotates times corresponding to the number of said position setting pulses and stops. Then a program of next number is proceeded automatically. If MN(manual) mode is selected, the motor rotates continuously not related to the number of position pulses. Then the rotation of the motor is stopped when an outer stop signal is inputted. Then a program of next number is proceeded.

NOTICE) When the high speed is used in MN mode, if stop signal is inputted, a position error of stop might be occurred due to sudden stopping. Thus the stop operation should be performed gradually. Therefore the program may be divided to 2 step as follow and then the error cannot be occurred. (Not related to low speed)



(8)REPT :An program number can be selected repeatedly. Selected programs of 0 0 ~ 9 9 times can be repeated. An program of repeated times is finished and then an program with next number is proceeded.

(9)TIME :A function that start delays selected time is performed. Proceeding program is delayed the predetermined time when run signal input or program input is inputted. The delayed time can be predetermined among 0.1 ~ 999.9 second.

(10)SPEED :RPM of rotation number per a minute is displayed. The rotation numbers corresponding to respective program can be selected between 30 steps from 10 to 2,000 rpm. (The rotation number of the motor can be used up to 1200 rpm in application of motor with level of more than 3 Ampere.)

Description of keys

(11)CURSOR :This keys are used when cursor is moved among positions of respective modes by buttons of " ◀, ▶ ".

(12) DATA :This keys are used when data are inputted by buttons of " ▲, ▼ ".

(13) RUN Lamp :Run display lamp which is lighted at run of motor

(14) TURN :This key is used when motor is rotated forcibly to a right or reverse direction according to outer emergency input signal. (The RPM of forcible right or reverse rotation is fixed to 100.)

(15) PRG :This keys are used when an program is edited. Program mode begins when a power switch is ON with pressing buttons of " ▲, ▼ " simultaneously.

✦ Program Save

For example, in case that one wants to save programs after programs to an number of 10 are edited, number of program is changed to 9 or 11 and a power switch become OFF. Then the programs is saved.

✦ Program All Clear

Four buttons of " ▲, ▼, ◀, ▶ " are pressed simultaneously and the power switch become ON. Then all edited data are erased.

Description of outer input terminals

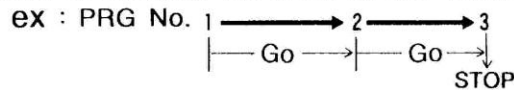
(16)GND :A terminal which is connected to outer minus power source for use of photo-sensor etc.

(17)OUT :A terminal which produces a signal confirming program number end. Electric wires are connected as wiring diagram of pages 4 and 5 for controlling outer load. When a multiple of outer load are connected to this terminal, program steps can be maintained correctly.

(18)+12 :A terminal which is commonly connected to respective input terminals when inner power source is connected to micro switches etc.

(19)Cycle terminal :All edited programs stop after proceeding of 1 cycle if one pulse is inputted in this terminal by one touch of user.

(In case of inputting one pulse by one touch of user)



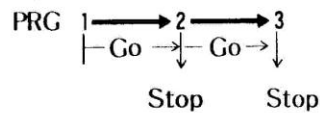
(20)STOP Terminal :STOP signal input terminal at running of motor in MN mode

(21)EMERGENCY Terminal :All operations are stopped when an emergency signal is inputted to this terminal by an emergency switch.(If the emergency switch is ON, the right and reverse rotation of the motor can be performed manually by keys of "◀" "▶".

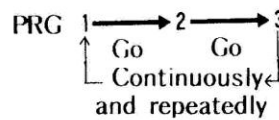
(22)SET Terminal :This terminal is used for control of an initial position when the power switch become ON/OFF. If the input switch corresponding to this terminal is ON, the motor stops at the initial position. (The initial position can be changed whenever an power switch is ON)

(23) RUN Terminal :RUN can be performed by 2 kinds of mode. Whenever one pulse is inputted in this terminal by one touch of user, an program edited by user is running 1 step. If pulses is continuously inputted in this terminal by touches of user, an program is running automatically, continuously and repeatedly.

ex: (In case of inputting one pulse by one touch of user)



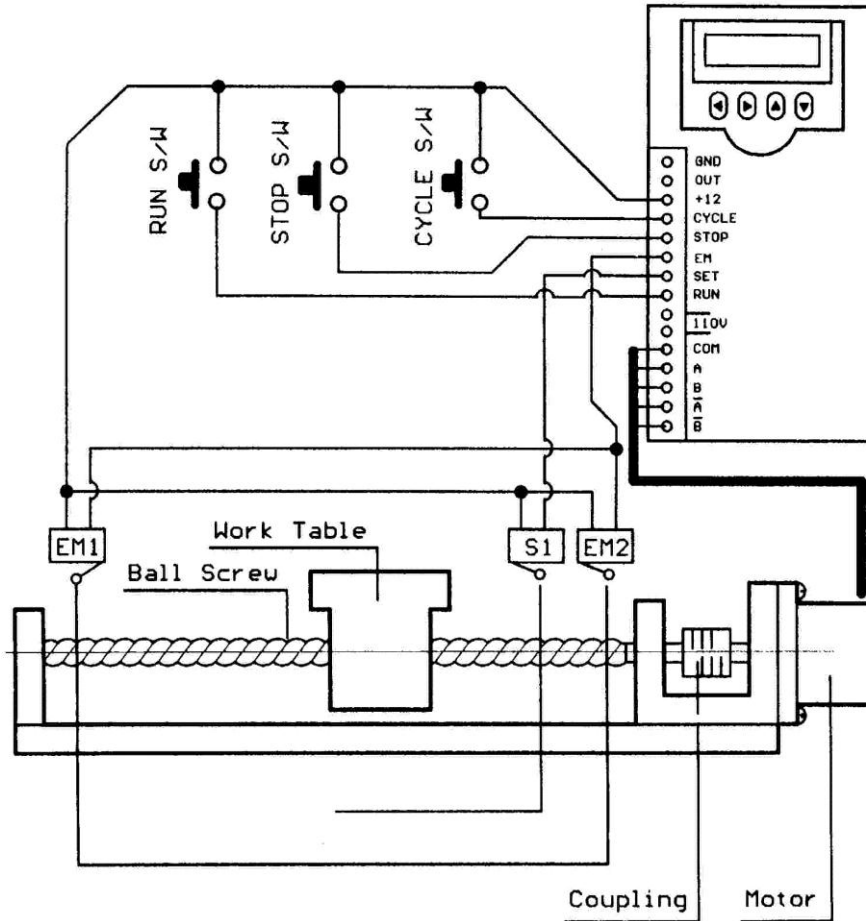
(continuous inputting)



(24)Power source terminal :The present product is used under only 110V is accordance with high voltage driving method of a power source. If you want to use 220V, please use a voltage down transformer (more than 200VA).

(25)Motor :Motor connection terminal.

Example For Editing Program



(Example1 : One Axis Control)

1. POWER ON → Auto Run Starting Point (RPM:200)
2. Run Terminal Touch → 1.2Sec Delay → Motor is Left 1Turns (RPM:100) → 10 Repeat Run → Stop
3. Run Terminal Touch → 2.5Sec Delay → Motor is Left 10Turns (RPM:300) → Stop
4. Run Terminal Touch → Motor is Right 20Turns (RPM:1500) → Stop

1. Four buttons of "◀,▶,▲,▼" are pressed simultaneously and the power switch become ON. Then all edited data are Clear → POWER OFF.
2. Two buttons of "▲,▼"(Data) are pressed simultaneously and the power switch ON. → "Program Mode" → Editing Program → PRG05 Move → POWER OFF → SAVED.

PRG	T	S	Acc	Position
00	▶	Y	▲5	000000
MN	00	000.0	0200	
Mode	REPT	Time	Speed	



PRG	T	S	Acc	Position
01	◀	Y	▲5	000400
AT	09	001.2	0100	
Mode	REPT	Time	Speed	

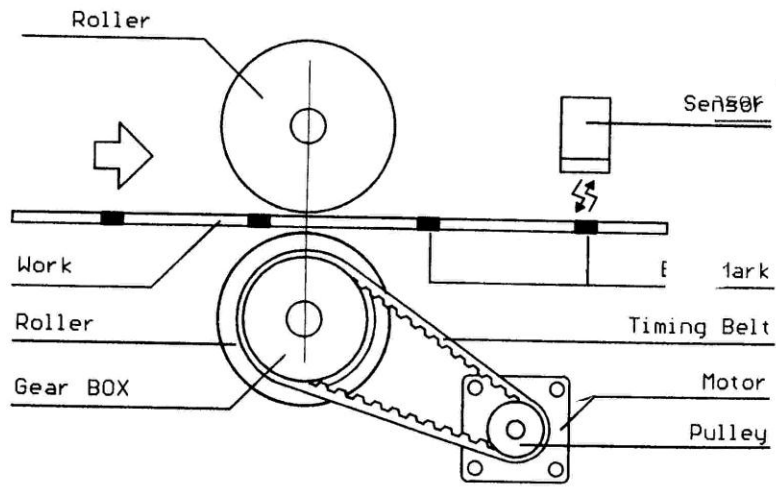


PRG	T	S	Acc	Position
02	◀	Y	▲5	004000
AT	00	002.5	0300	
Mode	REPT	Time	Speed	



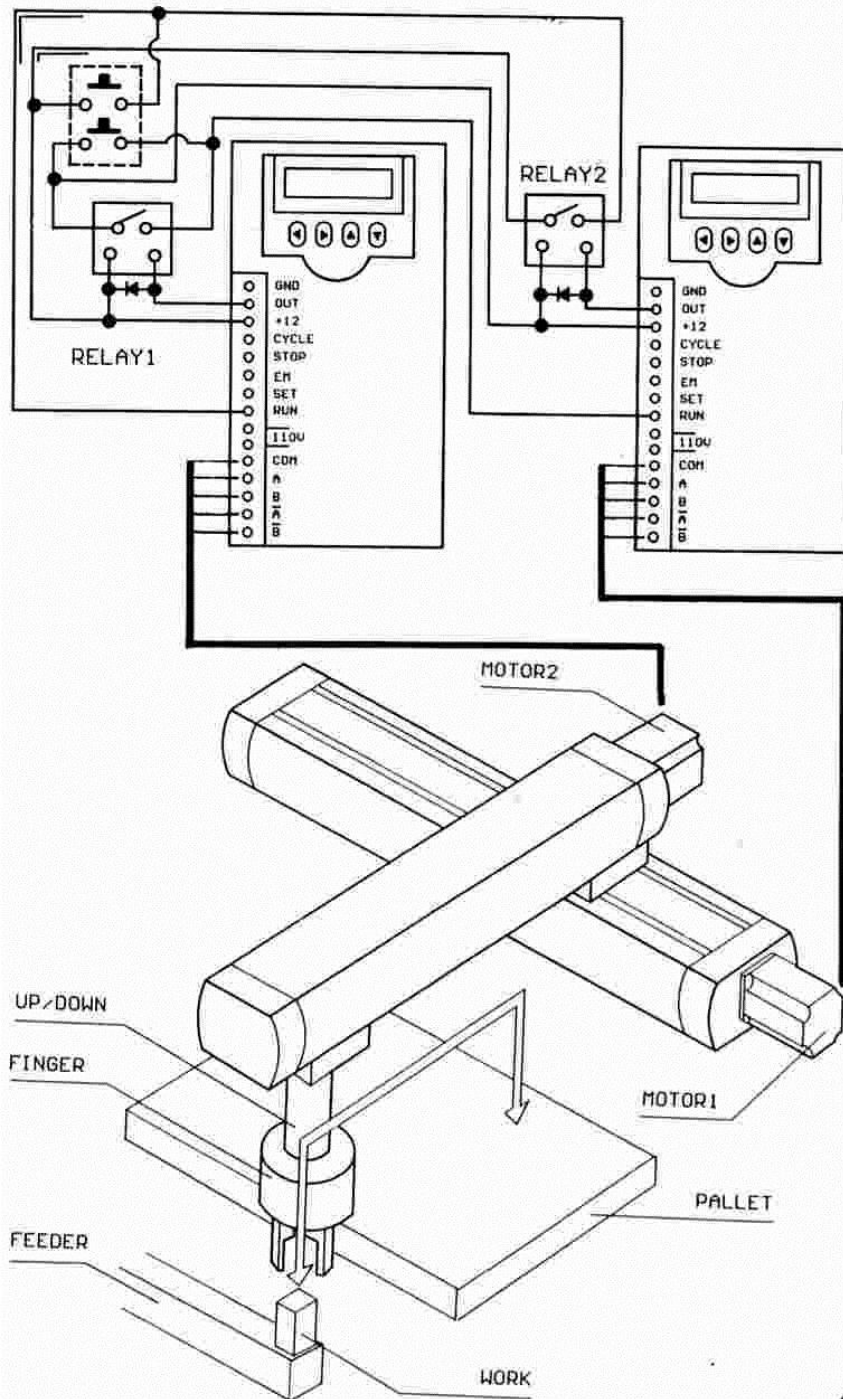
PRG	T	S	Acc	Position
03	▶	Y	▲5	008000
AT	00	000.0	1500	
Mode	REPT	Time	Speed	

(Example2: Eye Mark's Control)

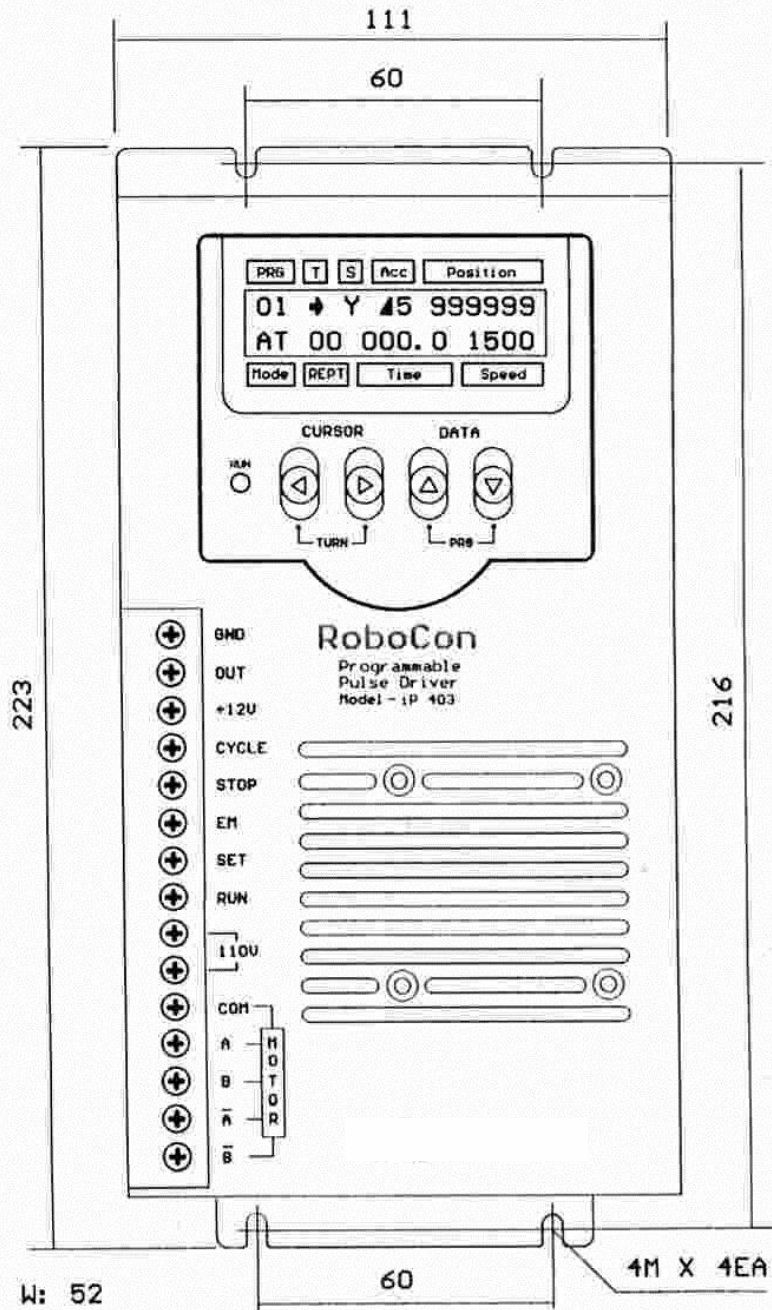


PRG	T	S	Acc	Position
01	→	Y	▲5	000000
MN	00	000.0	0	0500
Mode	REPT	Time	Speed	

(Example3: X Y Stage Control)



Dimension of outer casing



Specific

Power source	110V \pm 10(%) 50Hz, 60Hz Fuse: 250V 3A
Consumption power	AC 110V 50(W)
Control input power source	12V ~ 24V, \oplus COM
Insulation method	photo-coupler DC
Used motor	2/4 phase step motor(3A)
Driver form	Uni-polar Drive
Start delay Timer	0.1 ~ 999.9 sec (To support 99 Timers)
Maximum number of designated pulses	999,999 (6 digits)
Signal output	Transistor PNP open Collector
Acceleration/deceleration range	Δ 1 ~ Δ 5 (5 steps)
The number of programs	00 ~ 99 (100 Step)
The repeated number of Step program	00 ~ 99 (100 Step)
Designation range of speed	10 ~ 100 (10 steps), 100 ~ 200 (20 steps) (Total 30 steps)
Allowable temperature	0 ~ 60°C
Storage temperature	-10°C ~ +70°C
Notice of humidity of use	5 ~ 95 % RHC (Relative Humidity) Dewdrops should not be formed.
Structure	Aluminum Case
Used EEPROM	28C64 (Non-volatile ROM)
Weight	950 g