Date 24.sep.1998
M-No KR525M-1998-001

5-Phase stepping Motor Driver

Type KR-525M

Manual

Thank you very much for having KR525M bought. Please read this manual often Without fail and use ahead of the use correctly. Please keep this manual in a place fixed as an uncertain point can be solved anytime.

TECHNO DRIVE Co.,Ltd

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1) Outline

KR525M is AC100-115V inputs, It is a 5-Phase microstep driver for the UL standard and CE. It is a low vibration, a low noise, and the high-resolution because of the micro-step method compared with a past driver. When a standard step angle uses the motor of 0.72 degrees, becomes one rotation 40000 pulses in the maximum. Driving object motor is Berger type 5 phase stepping motor of 0.5A/phase -1.4A/phase.Driving method changing can select ten kinds of step angle by changing the switch in the method of the drive in the bipolar Pentagon, and can select two kinds in ten kinds of in addition according to the signal. The stop position of the switch according to the signal never changes.

2) To have the safe use

The product is had to be used safely and correctly for this manual, and Please warn to Prevent the damage to harm and the property to the customer and other people beforehand, and use according to attention.

Warning

The content to which the possibility that the person owes the death or the Serious injury is assumed is shown that this display is disregarded, and wrong handling is done.

Caution

The content to which the occurrence only of a content and material damage To which The Possibility that the person owes the trouble is assumed is assumed is shown that this display is disregarded, and wrong handling is done.

Warning

(general)

1,Please do not use near the place and the combustible to which exploded atmosphere, atmosphere of ignited gas, corroded atmosphere, water, oil, and other liquids splash.
There is dread of the injury and a fire.

2,Please do not do the work of the connection, the movement, and the check by installing while energized. Please work after turning off the power supply.
There are an electric shock and dread of the injury.

3,Please do the work of the check and the connection by installing if you have expertise.
There is dread of the injury and a fire.

4,When stopping and driving, the Stepping Motor occasionally does stall according to the size of the load. The Transportation thing might fall when the Motor does stall when using for an upper and lower drive. Please use after confirming can examine enough under the load condition used, and the load surely be driven. There is dread of the injury and the device damage.

Warning

(Connection)

1,Please connect surely based on the connection diagram.
There is dread of the injury and a fire.
2,The power supply line and the motor interconnect line are pulled, and please do not place and do not crowd. There is dread of a fire.
3,Please do not use excluding displayed power supply (100V-115V).
There are an electric shock and dread of a fire.
4,Please ground the terminal FG. There is dread of the injury and the electric shock.

Warning

(Drive)

1,When the HO signal is input, the motor torque becomes 0 and might not be able to maintain the transportation thing. Especially, the transportation thing might fall when this signal is input while using for an upper and lower drive.
There is dread of the injury and the device damage.

Caution

1,Please use neither 1 nor the specification value of the driver excessively.
There is dread of the injury and the device damage.
2,Please put the finger or neither metals nor the one which burns easily in the opening such as vents of the driver. There is dread of the injury and a fire.
3,Please do not touch the motor and the driver be energizing and immediately after cutting of the power supply. There is dread of the burn.
4,Please do not touch the rotor and the movable body of the output axis while driving.
There is dread of the injury and the device damage.
5,The motor remarkably has the temperature by operating conditions, and has the dread of the damage of the burn and the motor especially according to a high-speed drive and driving rate. The temperature of the motor case must use at 100℃ or less.
6,Please do not change the function transfer switch while energizing. There is dread of the injury.
7,This device is the one which was designed to use indoors, and manufactured. Please set up in the place where an excessive vibration and the impact Do not join. The device might be damaged.

3) Confirmation of article

Please confirm whether all the following things become complete.
Please report to the nearest agency or our company office in case of the shortage.

1, driver	KR525M		1piscs
2, power supply connector	3P connector	(GMKDSA2.5/3-ST-7.62)	1 piece
3, motor connector	5P connector	(MKDSA2.5/5-ST-5.08)	1 piece
4, signal connector	12P connector	(MC1.5/12-ST/3.81)	1 piece
5, preliminary fuse 5A 125V(GGS-5)			2 pieces

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4) Name and function of each driver part

4-1 LED display

No	Display	LED name	Color	lighting condition
①	POWER	power supply input	green	green power supply is input.

4-2 switches

No	Display	Switch name	Setting when shipping	Outline of function
②	RUN	Drive current Regulation switch	C(1.4A)	It is a switch for the current Regulation when the motor is driven.
③	STOP	Stop current regulation switch	5(50%)	It is a switch for the adjustment of the Current of the motor when stopping for the current when the motor is driven.
④	M1	Step angle selection	5(division into ten)	It is a step angle selection switch. When Signal input DS is turning off, it is an effective switch.
⑤	M2	Step angle selection	0(full step)	It is a step angle selection switch. When Signal input DS is turning on, it is an effective switch.
⑥	TEST	Self-diagnosis switch	OFF	It is a switch for the operation Confirmation of the actuator.
⑦	2/1CK	Input pulsed system	OFF	It is a selection switch of two pulses/One pulsed system.
⑧	C.D	Current down	OFF	It is a switch by which the function to Decrease the motor driving current when the motor stops is released.
⑨	L/HV	Motor output	OFF	It is a switch which switches high power To the medium power as for the motor output.
⑩	M.SEL	MOTOR SELECT	OFF	Please use because of turning off usually.

4-4 Motor

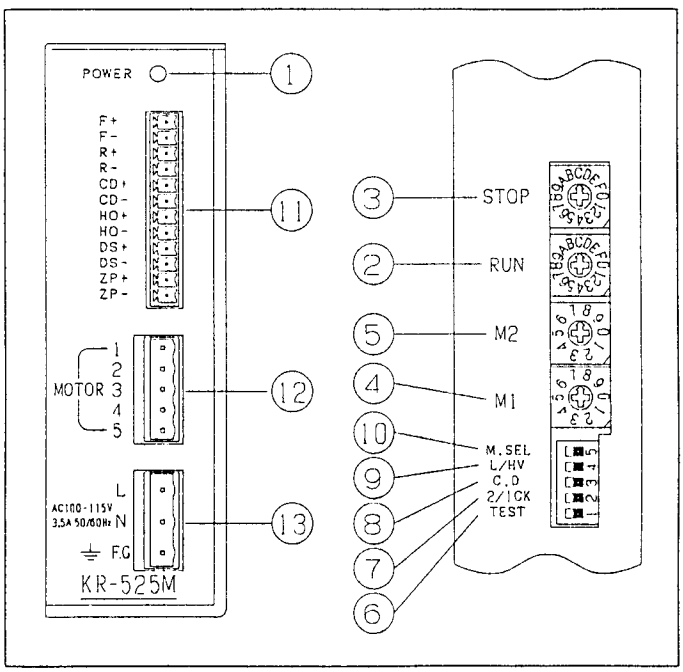
No	Display	Terminal	Name	Motor lead color
⑫	MOTOR	1	Motor connection terminal	BLE(BLE,BLK)/BLE
		2	Motor connection terminal	RED(RED,BRN)/RED
		3	Motor connection terminal	ORG(ORG,VIO)/WHT
		4	Motor connection terminal	GRN(YEL,GRN)/BRN
		5	Motor connection terminal	BLK(WHT,GRY)/BLK

4-3 Signal terminals

No	Display	Terminal	Name	Function details
⑪	SIGNAL	F+	CW pulse/ pulse signal	CW pulse signal input terminal for two pulsed Systems or it is an input terminal of the operation Command pulse of the motor for one pulsed system.
		F-		
		R+	CCW pulse/ Direction Signal	CCW pulse signal input terminal for two pulsed systems or it is an input terminal in the hand of cut of the motor for one pulse. CW rotates by the signal input.
		R-		
		CD+	Current down	It is a switch by which the function to decrease the motor driving current when current down OFF motor stops is released.
		CD-		
		HO+	Hold off	It is a signal terminal by which the current-feed to holding OFF motor is stopped.The motor in the signal's there in this terminal is not excited.
		HO-		
		DS+	Division select	It is a signal input terminal which selects the step angle selection signal step angle.
		DS-		
		ZP+	Excitation timing	It is a output terminal which shows that the excitation sequence of the motor is 0.
		ZP-		

4-5 Power

No	Display	Terminal	Name	Function details
⑬	Power	L	Power supply input line side.	AC100-115V line side is connected
		N	Power supply input neutral point side	AC100-115V neutral point side is connected.
		FG	Ground connection terminal	Connects with the Ground Terminal.



5) Installation of driver

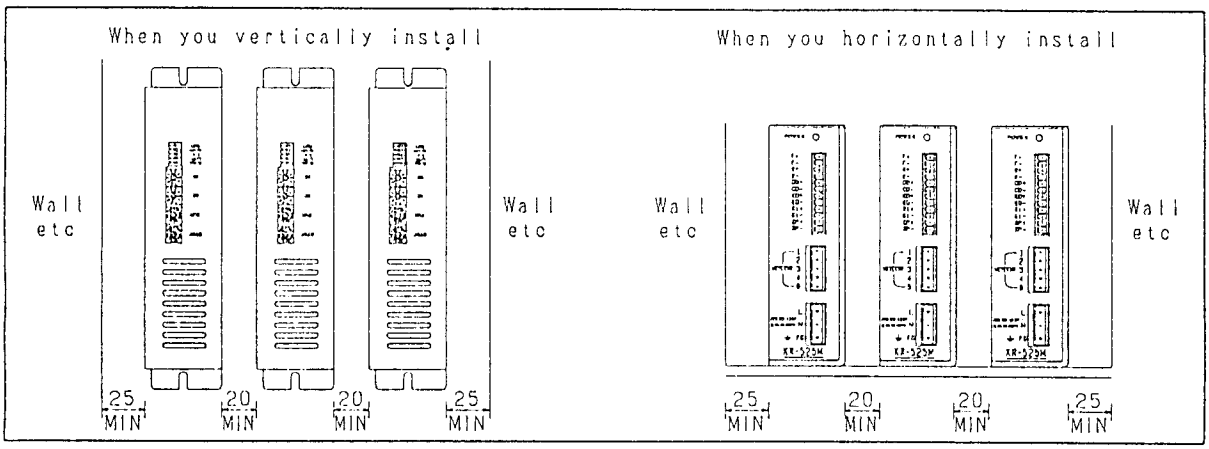
5-1 Environment of driver installation place

Please install the driver in the undermentioned condition.

① Indoors (This product is designed to use indoors, and manufactured).
② Operating temperature range 0-40°C (Does not freeze. Please cool with the fan etc, when the ambient temperature of use might exceed 40°C.)
③ Operating humidity range 0-85% (No do be dewy).
④ There must be a volatile gas or neither ignited gas nor corroded gas.
⑤ Neither dust,nor a metallic fragment, etc. must hang.
⑥ An excessive neither vibration nor impact must join.
⑦ The liquids such as water and oil must not splash.
⑧ It is easy for ventilation must to radiate heat and to radiate heat thoroughly.
⑨ Please do the noise measures of the connection to another power supply system etc. when there is a big noise source to be near.
⑩ This device must be 100-115V the power supply voltage, and use the insulation transformer when using by other power supply·voltages.
⑪ Please install the noise filter in the power supply of this device.
⑫ Please use the shielding wire for the signal cable and the motor cable.

5-2 Driver mounting arrangement

Please use in consideration of the flow of air so that heat should not shut oneself up in surroundings because the driver is a natural convection cooling method. Please fix the installation with M4 or an equal screw referring to figure. (The screw is not appended) Please set up 20mm or more between each driver with the driver, other equipments or the structures 25mm or more apart when you use the driver by the plural.



6) Function switch of driver

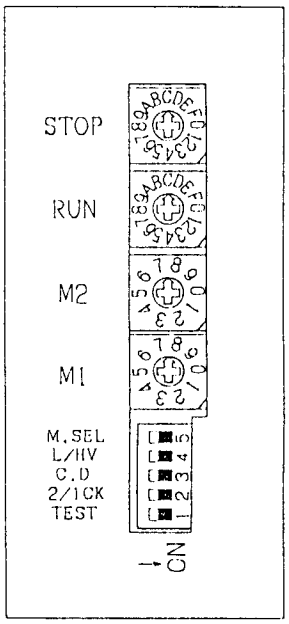
KR525M can easily do all the function setting of the driver suited to the use condition with the switch.

6-1 Drive current set switch (Setting when shipping :C)

Setting the motor drive current selects from the undermentioned table and sets the position of a rotary switch of RUN.

SW position	0	1	2	3	4	5	6	7
Run current(A)	0.5	0.58	0.66	0.75	0.81	0.88	0.96	1.03
SW position	8	9	A	B	C	D	E	F
Run current(A)	1.10	1.18	1.25	1.30	1.40	1.47	1.53	1.60

When the motor of 1.4A is used, setting is made C.



Caution

When setting is mistaken, the damage of the machine or the burn might be done by motor overheating.

6-2 Stop current set switch (Setting when shipping :5)

Setting the current when the motor stops selects from the under mentioned table and sets the position of a rotary switch of STOP.

SW position	0	1	2	3	4	5	6	7
Stop current(%)	27	31	36	40	45	50	54	58
SW position	8	9	A	B	C	D	E	F
Stop current(%)	62	66	70	74	78	82	86	90

Example, With the current when the drive current is stopped by 1.4A to 0.7A, setting is adjusted to 5. (The display is a ratio to the drive current.)

Note,

Heat of the motor decreases when the current when stopping is reduced, and the holding torque decreases.

6-3 Set switch of step angle(setting when shipping M1:5 and M2:0)

Setting the step angle selects from the undermentioned table and sets the position of a rotary switch of M1 and M2.

SW position	0	1	2	3	4	5	6	7	8	9
Division	1	2	4	5	8	10	20	40	80	16

Caution

The machine is damaged or it is likely to injure by the rotation which the motor does not anticipate that mistakes setting.

Note、

Drives in the number of division of M1 when there is no division number Selection signal DS.
Drives in the number of division of M2 when there is DS signal.
M1 and M2 can set an arbitrary value in the above-mentioned ten kinds of.

6-4 Self-diagnosis function switch (Setting when shipping :Turning off)

The operation of driving circuit of the driver can be confirmed.
When the switch is turned on, drives with 50pps regardless of the number of division.
Please use by turning off when you drive usually.

Note,

CW rotates when two pulses are input and CCW rotates when one pulse is Input, without other signals. The rotation speed of the motor axis changes depending on the number of division.

6-5 Pulse input method selection switch (setting when shipping Turning off)

Generally, it is possible to correspond to two kinds of pulse input methods used.
Suits to controller's pulse output form and sets.
The motor is driven being set to make to switch OFF in two pulse input method, and corresponding to the pulse signal of CW and CCW in two systems.
The motor is driven being set to turn on the switch in one pulse input method, and corresponding to the pulse and the signal in the direction of the rotation in two systems.

6-6 Automatic current down stop switch (Setting when shipping :Turning off)

Automatic current the down automatically decreases the current of the motor when the motor stops, and presses heat of the motor. When the switch is turned on, automatic current is not downed. The current of the motor decreases to the value directed by current setting (STOP) when automatically stopping because of about 150mS after the pulse input stops when the switch is turned off. Please use by turning off usually.

Note、

The holding torque decreases, too, when currently downing .

6-7 Drive voltage selector switch (Set when shipping :turn off)

Stepping Motor's high-speed torque greatly influences the drive voltage.
Driving voltage can be set high by turning on the switch to which heat of the motor increases, too though a high-speed torque increases if driving voltage is raised. High speed and a high torque are obtained. The drive by which heat of the motor is pressed can be done by turning off the switch.

6-8 Motor kind selector switch (Setting when shipping :Turning off)

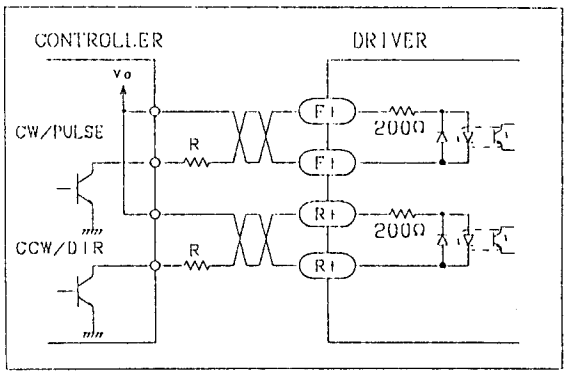
Please use with off usually.

7) I/O signal

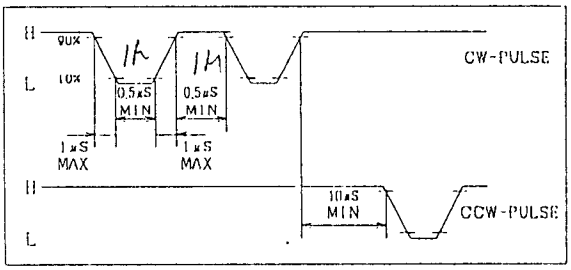
7-1 F and R signal input

7-1-1 For two pulse input method

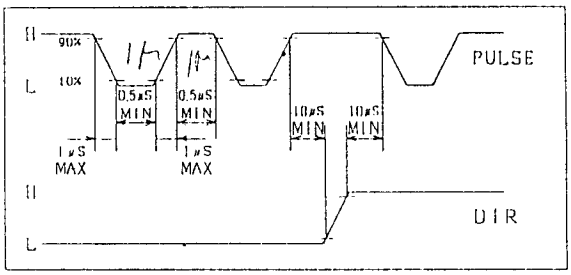
The motor works in the direction of CW by Standing up about the pulse when the pulse signal is input to F signal input. The motor works in the direction of CCW by standing up about the pulse, when the pulse signal is input to R signal input. (Standing up of the pulse shows the time which flows to the optical coupler circuit the current and starts)



2-PULSE INPUT



1-PULSE INPUT



7-1-2 For one pulse input method

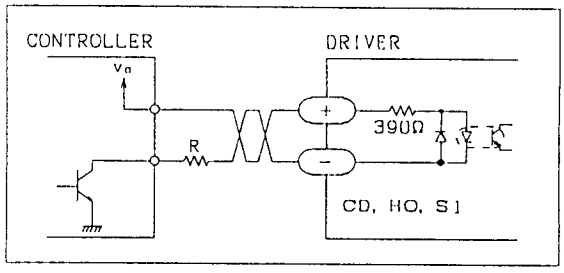
The motor works by standing up about the pulse when the pulse signal is input to F signal-input. The direction where the motor is rotated depends on R signal input. R signal input becomes a rotation direction input. The motor works in the direction of CW when the signal is input to R signal input.

Note,

Please connect external resistance R when Vo Exceeds 5V. The calculation type of external Resistance R(standard value) is as follows. Please use the resistance of above-mentioned R1 a value of ±20% to install R1=(Vo-1.5)/0.018-200 actually.
Note, The pulse voltage is assumed to be H=4V-5V and L=-5V-0.5V.
Please assume 0.5μS or more to be 1μS or less to 0.5μS or more about the pulse width at the risetime at pulse intervals. Please give the direction reversing time (Two pulses/ both of one pulse method) of the interval as 10μS or more. Time the above-mentioned value necessary for the circuit's responding, and time necessary for motor responding change greatly depending on inertia and the pulse speed etc. of the load.
A normal operation cannot be done. Please do when the pulse is not input by one pulse input method as for the switch of the direction of the rotation to use.

7-2 Current down stop signal CD

when the input is done or switch CD is turning on. Please put the signal when the holding torque is a lot necessary when the motor stops. Please turn on switch CD and use when no always downing . Ther When the motor stops, the signal is not currently downed to the CD input terminal e is no

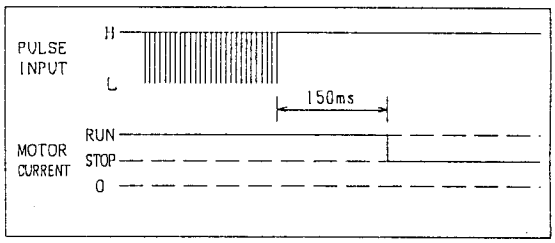


limitation in timing by which the signal is put.
The current down circuit operates after 150mS
after the pulse signal stops.

Note,

When the current down operation is not done, the temperature of the motor might become a high temperature. Please use in consideration of the drive environment and the condition. There is no problem when the signal, input is not used even if nothing is connected.

CURRENT DOWN TIMING



7-3 Motor holding stop input HO

When there is HO signal, the current does not flow to the motor, and the motor axis can be turned by external force. Time when wants to move the motor axis from the outside and uses for a manual positioning etc.
Please make to turning off whenever you drive the motor.

Note,

There is no change in the motor excitation aspect by turning the HO signal on and off.
There is no problem when the signal input is not used even if nothing is connected.
When the motor axis is turned by the outside power after the HO signal is input, holds at the position which rotated by the integer twice 7.2° at the position before inputting the HO signal (When you do not input the pulse signal when the HO signal is input).

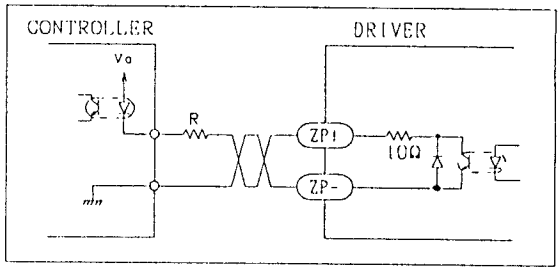
7-4 Step angle switch signal DS

When the DS signal is input, the step angle of the drive can be changed.
It is possible to use for fast-forwarding at the reciprocation work etc.
When the DS signal is not input, the step angle is decided by setting M1 When the DS signal is input, the step angle is decided by setting M2.
M1 at DS OFF、 M2 at DS ON.

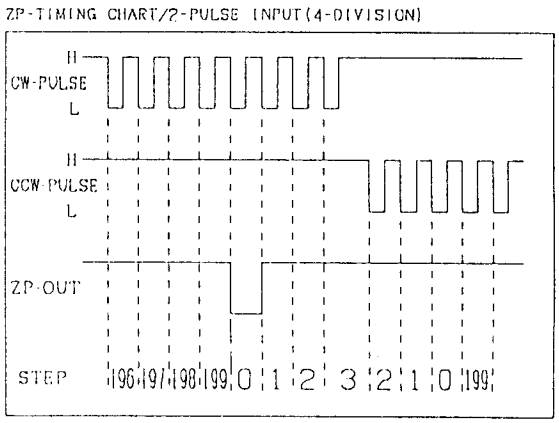
Note,

There is no change in the motor Excitation aspect by turning the DS signal on and off.
Please take the time of 20μS or more in the I/O of the DS signal for the pulse signal input.
Please set the step angle with M1 when you do not change the step angle used.
There is no problem even if the S1 signal input terminal does not connect, anything.
Note, Please connect external resistance R2 when Vo exceeds 5V by CD, HO, and the S1 signal.
The calculation type of external resistance R2 (standard value) is as follows.
Please use the resistance of above-mentioned R2 a value of ±20% to install
R2=(Vo-1.5)/0.008-390 actually.
The pulse voltage is assumed to be H=4V-5V and L=-5V-0.5V.

7-5 Excitation timing signal ZP



The output circuit chart and the connection example with the controller are occupied to the figure below. Excitation timing signal ZP is a signal which shows that the excitation sequence of the motor is a position of (0). When a more accurate starting point is detected by the agreement of machine starting point on the device side and excitation starting point (ZP) of the motor, uses. When the excitation sequence is (0) synchronizing with the input pulse, the signal is output. Each angle ten times the basic step of motor angle is output. Example, Becomes 0.72X10=7.2° when a basic Step angle of the motor is 0.72° and 50 Pieces are output by every 7.2° and one revolution.



Note,

Please give Vo as 30V or less.
The current value must adjust the value of external resistance R and become 5ma or less.
The ZP signal might not be output when setting in a different value by operating the step angle switch when the DS signal is put after the power supply is turned on, the step angle is switched, and drives. Whenever setting the step angle is adjusted to maximum value (80), is output. The KR525M type designs a basic number of division of micro steps and coming back of the sequence is designed by 80 by 800.

8) Connection of motor, driver, and power supply

8-1 Connection of motors

Corresponds to four kinds of motors of undermentioned ①-④.

Please make the color of the lead wire of the motor which uses sure and set switch (M,SEL).

Display of name plate	M,SEL=OFF	M,SEL=OFF	M,SEL=ON	M,SEL=ON
1	BLE	BLE/BLK	BLE	BLK
2	RED	RED/BRN	RED	BLE
3	ORG	VIO/ORG	WHT	YEL
4	GRN	YEL/GRN	BRN	ORG
5	BLK	WHT/GRY	BLK	RED
	①	②	③	④

Note,

Please use the wire rod of AWG20(0.5mmsq) or more for connecting the motor. Please do not bring the motor line close to the signal line to avoid the operation by the noise etc. Please do not come in contact with the case or the earthing conductor of the motor line. The driver might be damaged.
Please connect the motor line for motor connection terminal 1-5 to become 5-1 to substitute the direction of the motor rotation without substituting the signal input.

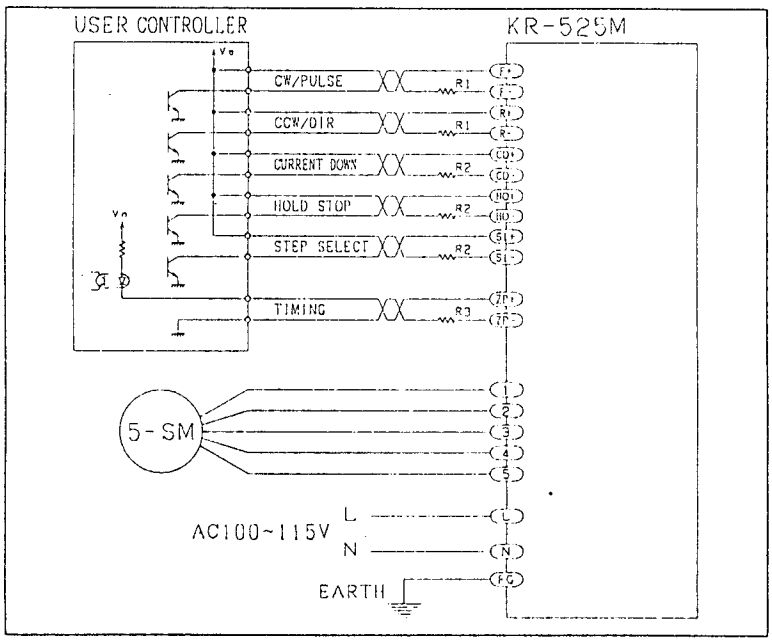
8-2 About the power supply

Please connect the power supply of AC100-115V 50/60Hz between L and N.
Please connect the neutral point side of the power supply with the line side and N side of the power supply on L side. Please connect the earth line with FG.

Note,

Please use the wire rod of AWG20(0.5mmsq) or more for connecting the power supply and use the wire rod of AWG16(1.25msq) or more for connecting the earthing conductor.

8-3 Connection example



Date 24.sep.1998
M-No KR525M-1998-001

9) Specification

Name	5-Phase Stepping Motor Driver
Type	KR-525M
Driving method	Bipolar chopper microstep drive
Input power supply	AC100～115V 50/60Hz 3.5A
Driving current	0.5-1.4A/phase
Step angle	0.72, 0.36, 0.18, 0.144, 0.09, 0.072, 0.036, 0.018, 0.009
Input signal	Optical coupler input [1]1:4-6V [0]:-6-0.5V Input resistance F, R 200Ω 5 CD, HO, and S1 390Ω
Maximum response frequency	500Kpps
Output signal	Optical coupler opening collector output External working condition From DC30V max, 5ma max
Function	Pulse input method switch, automatic current down, step angle switch, drive voltage switch, and self-diagnosis function
Cooling system	Natural convection air cooling method
Weight	750g
Insulation resistance	The value measured by DC500V megger between the AC input and the case is 50MΩ or more.
Withstand voltage	It is not above even if AC1000V is impressed to the AC input for one minute between cases.
Operating temperature range	0～40℃ Do not freeze.
Operating humidity range	0-85% No do be dewy.

※ The power supply current is a current value of the maximum driver.
Differs depending on the pulse speed and the motor load.

10) Externals chart