

ASTRO-E 400 / 500 SYSTEM

OPERATION MANUAL



OM-K0054E Rev.3



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※Specifications may be changed without notice.

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⚠️ IMPORTANT INSTRUCTIONS AND WARNING - Electric Devices

WARNING !

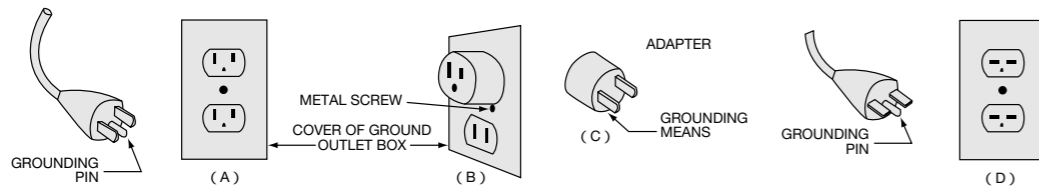
When using electric tools, basic safety precautions should always be followed to reduce the risk of fire, electrical shock and personal injury, including the following.

Read all these instructions before operating this product and save these instructions.

A. GROUNDING INSTRUCTIONS

- In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This tool is equipped with an electric cord with a grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordinances.
- Do not modify the plug provided - if it will not fit the outlet, have the proper outlet installed by a qualified electrician.
- Improper connection of the grounding conductor can result in electric shock. The conductor with insulation having an outer surface that is green with or without yellow stripes is the grounding conductor. If repair or replacement of the electric cord or plug is necessary, do not connect the grounding conductor to a live terminal.
- Check with a qualified electrician or service person if the grounding instructions are not completely understood, or if in doubt as to whether the tool is properly grounded.
- Use only 3-wire extension cords that have 3-prong grounding plugs and 3-pole receptacles that accept the tool's plug.
- Repair or replace damaged or worn cord immediately.
- This tool is intended for use on a circuit that has an outlet that looks like the one illustrated in Sketch A in Figure(below) (115V) The tool has a grounding plug that looks like the plug illustrated in Sketch A in Figure (below) A temporary adapter, which looks like the adapter illustrated in Sketches B and C, may be used to connect this plug to a 2-pole receptacle as shown in Sketch B if a properly grounded outlet is not available. The temporary adapter should be used only until a properly grounded outlet can be installed by a qualified electrician. The green-colored rigid ear, lug, and the like, extending from the adapter must be connected to a permanent ground such as a properly grounded outlet box.

Grounding Method



- USE PROPER EXTENSION CORD. Make sure your extension cord is in good condition. When using an extension cord, be sure to use one heavy enough to carry the current your product will draw. An undersized cord will cause a drop the line voltage resulting in loss of power and overheating. Table(below)shows the correct size to use depending on cord length and nameplate ampere rating. If in doubt, use the next heavier gage. The smaller the gage number, the heavier the cord.

Minimum gage for cord

Ampere Rating		Volts	Total length of cord			
		120V 240V	7.5m(25ft.) 15m(50ft.)	15m(50ft.) 30m(100ft.)	30m(100ft.) 60m(200ft.)	45m(150ft.) 90m(300ft.)
More Than	Not More Than					
0	6		18	16	16	14
6	10		18	16	14	12
10	12		16	16	14	12
12	16		14	12	Not Recommended	

Only the applicable parts of the Table need to be included. For instance, a 120-volt product need include the 240-volt heading.

B. OTHER WARNING INSTRUCTIONS

- For your own safety read instruction manual before operating tool.
- Wear eye protection.
- Replace cracked wheel immediately.
- Always use guards and eye shields.
- Do not overtighten wheel nut.
- Use only flanges furnished with the grinder.
- REMOVE ADJUSTING KEYS AND WRENCHES. Get in the habit of checking to see that keys and adjusting wrenches are removed from tool before turning it on.
- KEEP WORK AREA CLEAN. Cluttered areas and benches invite accidents.
- DON'T USE IN DANGEROUS ENVIRONMENT. Don't use power tools in damp or wet locations, or expose them to rain. Keep work area well lighted.
- Risk of injury due accidental starting. Do not use in an area where children may be present.
- DON'T FORCE TOOL. It will do the job better and safer at the rate for which it was designed.
- USE RIGHT TOOL. Don't force tool or attachment to do a job for which it was not designed.
- WEAR PROPER APPAREL. Do not wear loose clothing, gloves, neckties, rings, bracelets, or other jewelry that might get caught in moving parts. Nonslip footwear is recommended. Wear protective hair covering to contain long hair.
- ALWAYS USE SAFETY GLASSES. Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses. Also use face or dust mask if cutting operation is dusty.
- SECURE WORK. Use clamps or a vise to hold work when practical. It's safer than using your hand and it frees both hands to operate tool.
- MAINTAIN TOOLS WITH CARE. Keep tools sharp and clean for best performance and to reduce the risk of injury to persons. Follow instructions for lubricating and changing accessories.
- DISCONNECT TOOLS before servicing; when changing accessories, such as blades, bits, cutters, and like.
- REDUCE THE RISK OR UNINTENTIONAL STARTING. Make sure switch is in off position before plugging in.
- USE RECOMMENDED ACCESSORIES. Consult the owner's manual for recommended accessories. The use of improper accessories may cause risk of injury to persons.
- NEVER LEAVE TOOL RUNNING UNATTENDED. TURN POWER OFF. Don't leave tool until it comes to a complete stop.
- For recommended operating speed for various applications, please follow the instructions of bur manufacturers.
- Use Accessories suitable for Max. 40,000min⁻¹(ASTRO-E 400)and Max. 50,000min⁻¹(ASTRO-E 500)

C. Important Instructions and Warnings about ASTRO-E 400 / 500 SYSTEM

- LOCATING CONTROL UNIT NE52
The control unit NE52, NE52-500 is equipped with vents and a cooling fan to prevent overheating of its electronic circuitry. When choosing a mounting position, make sure that these vents at the rear of panel are kept open and free of obstruction so that air may flow freely. Failure to do so will result in overheating and failure of system.
- RESET SWITCH
Continuous "KICK OFF" of reset switch is an indication that the ASTRO-E 400 / 500 system is being used beyond its envelope of operation. Continuous use under such circumstances will only produce poor product finish and system failure.
- SPEED AND TORQUE
 - If speed requirements are under 2,000 min⁻¹, it is recommended that reduction gears ARG-01E or ARG-02E be used to assure proper torque at low end speeds.
 - Do not exceed 1.5 cN · m(in. · oz.)load for prolonged periods of time as this will overheat the EM-401,EM-405,EM-401A,EM-501,EM-505,EM-501A motor.
- TOOLING
 - When making a choice of tooling to be used with the ASTRO-E 400 / 500 system, make sure that such tooling are rated to maximum speeds above 40,000 min⁻¹ / 50,000 min⁻¹.
 - When using mounted stones, make sure that stones are properly dressed to assure good product finish. An undressed stone will cause bearing stress, vibration and poor finish.
 - Never use tooling that is bent chipped, or unrated as this will only result in a hazardous condition to operator and create a malfunction of the ASTRO-E 400 / 500 system.
 - Never extend tooling more than 13mm from base of collet cap as this will cause vibration on the tooling and good finish of product will not be achieved.

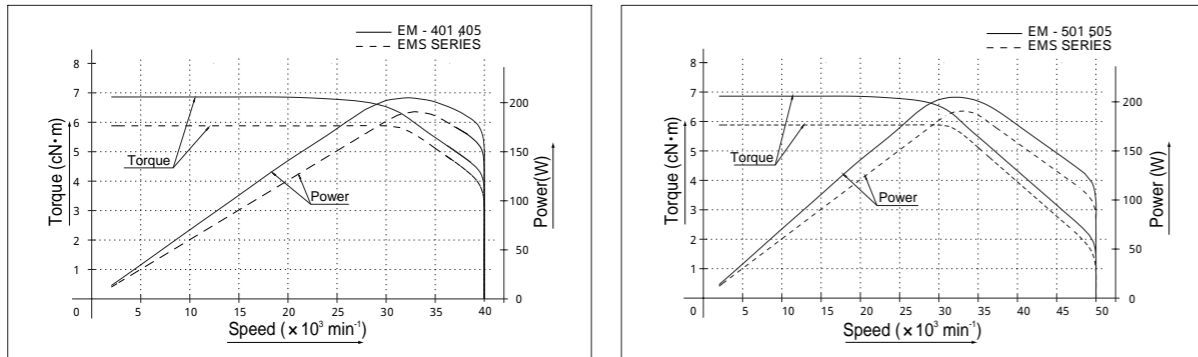
SPECIFICATION

PRODUCT	ASTRO-E 400		ASTRO-E 500	
MODEL	NE52		NE52-500	
POWER SOURCE	115/230VAC Switchable 50-60Hz		115/230VAC Switchable 50-60Hz	
POWER CONSUMPTION	170W		170W	
WEIGHT	5.5kg(12.1 lbs)		5.5kg(12.1 lbs)	
DIMENSION	W301 x D262 x H97 mm		W301 x D262 x H97 mm	
MOTOR MODEL	EM-401, EM-405, EM-401A	EMS-3041, EMS-3045, EMS-3040A, EMS-3051, EMS-3055, EMS-3050A	EM-501, EM-505, EM-501A	EMS-3052, EMS-3056, EMS-3052A
SPINDLE MODEL	NR-402E		NR-452E	
SPEED	0-40,000 min ⁻¹		0-50,000 min ⁻¹	
MAX. POWER OUTPUT	210W	195W	210W	195W
WEIGHT (incl. CORD)	1,120g(39.5 oz.)	1,000g(35.3 oz.)	1,120g(39.5 oz.)	1,000g(35.3 oz.)
DIMENSION	30 x 218mm	30 x 160mm	30 x 218mm	30 x 160mm

Cautions for each motor and spindle.

- Angular bearings are used for NR-402, EM-401 and EMS-3041.
- Ceramic bearings are used for NR-452E, EM-501, EMS-3051, EMS-3055 and EMS-3050A.
- Mid-joint connectors are equipped with EM-405, EMS-3045, EMS-3055, EM-505 and EMS-3056.
- EM-401A, EMS-3040A, EM-3050A and EMS-3052A, for HES high speed spindle, have emergency connectors.
- EMS is spindle united with motor.

ASTRO-E 400 / 500 CHARACTERISTIC CURVES



COMPONENT NAMES



Fig. 1

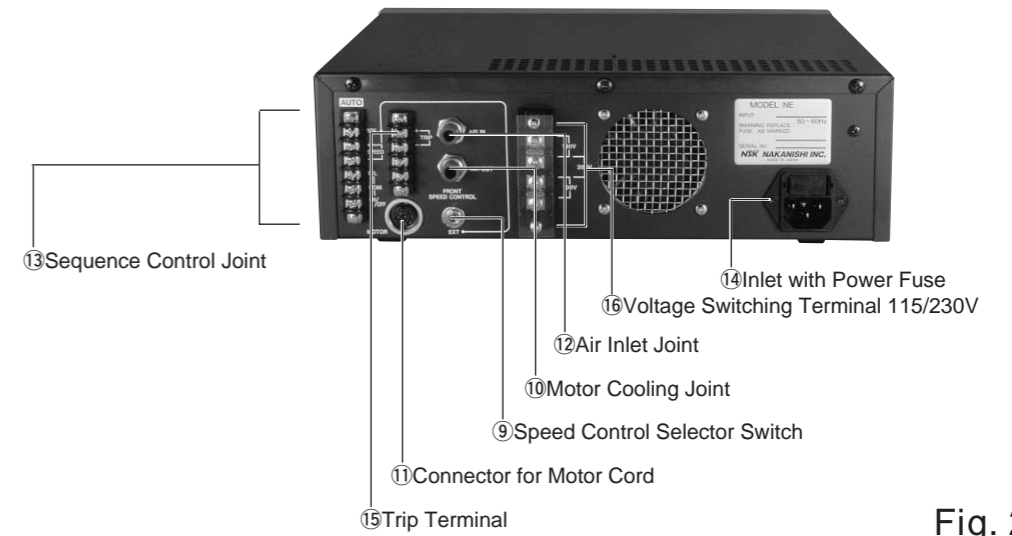


Fig. 2

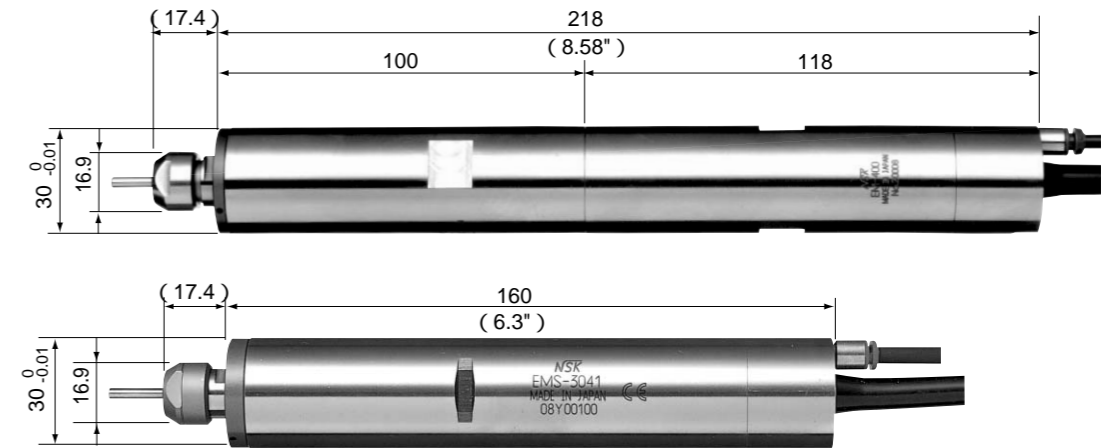


Fig. 3

INSTRUCTION FOR SWITCHING VOLTAGE

⚠ WARNING

This device can be used on either 115 V or 230 V. Be sure to follow the instruction below for switching voltage, because using with the voltage other than 115 V and 230 V may cause malfunction, electric shock and fire.

How to use Voltage Switching Terminal ⑯ (Power Supply Voltage)

A) 115V INPUT (110 V - 120 V)

Connect upper and bottom two terminals marked 115 V by connecting plates respectively.

(See Fig. 5.)

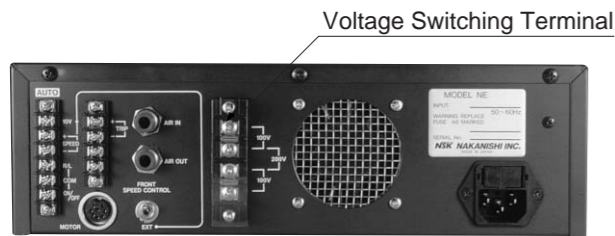


Fig. 4

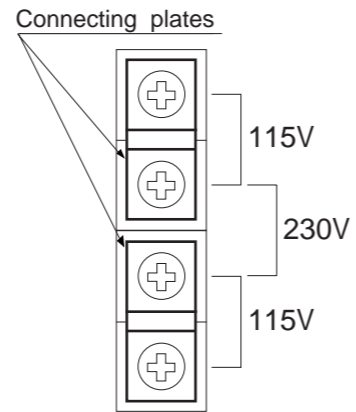


Fig. 5

B) 230V INPUT (220 V - 240V)

Connect middle two terminals marked 230 V by connecting plate. (See Fig.6)

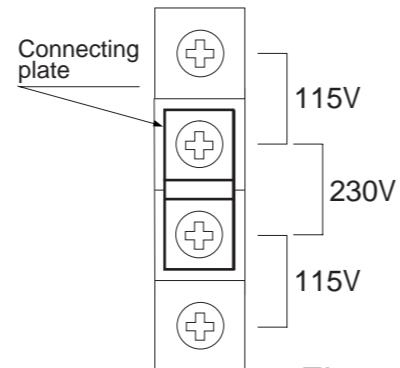


Fig. 6

CONNECTING MOTOR CORD AND POWER CORD

Connect the motor cord to Connector for Motor Cord ⑪ and fasten with the cord nut.(Fig. 7)
Plug the power cord for 115 V or 230 V in Inlet with Power Fuse ⑭.



Fig. 7

CONNECTION OF AIR HOSE

- Connect a 4.0 air hose from the motor to Motor Cooling Joint ⑩ at the back of the control unit by using a 6/4 adaptor.
Connect the air supply joint of Air Line Kit (AL-0201) and Air Inlet Joint ⑫ by using a 6.0 air hose, and supply air between 0.2 - 0.5 MPa (2-5kg/cm² · 29-71psi).
The motor would not rotate without cooling air for protecting the motor.
- When using the selector unit, insert a 6.0 air hose to Motor Cooling Joint ⑩ at the back of the control unit. Air pressure should be 0.5 MPa (71 psi).

⚠ CAUTION

Cooling air protects the motor and spindle from debris. Care should be exercised to prevent cutting oil into the spindle, when Power Switch ⑧ is OFF, because cooling air stops and does not go to the spindle.

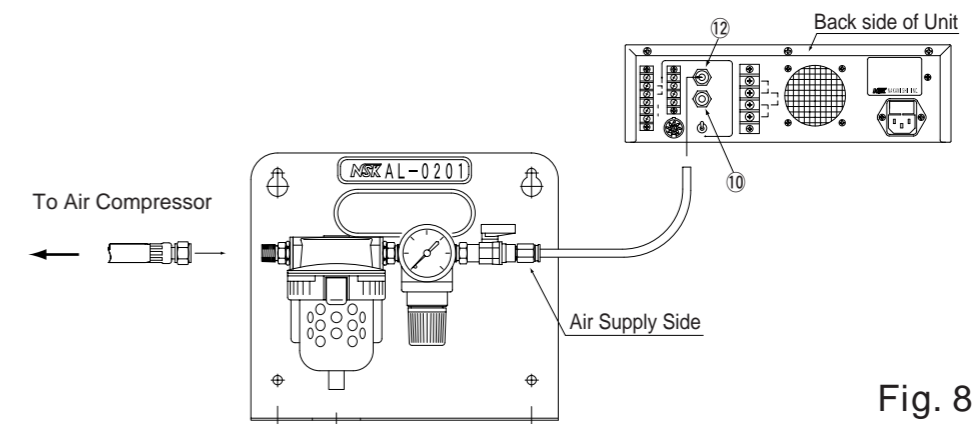


Fig. 8

SEQUENCE CONTROL CONNECTION

- Speed between 0-40,000 min⁻¹ (ASTRO-E 400,) or 0-50,000 min⁻¹ (ASTRO-E 500) can be controlled variably when an external voltage (0-10 VDC, 1 mA Max.) is connected to the SPEED terminal.(Fig.9)
- Motor runs in the reverse direction when 24 VDC is applied between the R/L and COM terminals, and in the forward direction when 0 VDC is applied.(Fig.9)
- Motor starts to run when 24 VDC is applied between ON/OFF and COM terminals, and stops when 0 VDC is applied.(Fig.9)

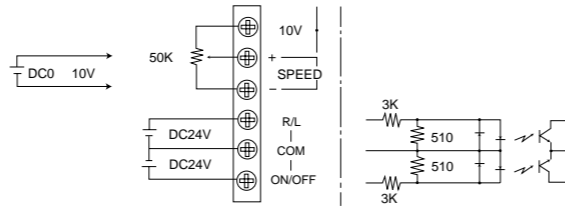


Fig. 9

TRIP TERMINAL ⑮

The transistor connected to the TRIP terminals is turned on, when RESET functions during motor rotation.

This function can be used to control the other machines that are used with this motor.

The maximum rating of the transistor is $V_{CE0}=50$ VDC, $I_c=50$ mA and $P_c=100$ mW. Do not exceed the maximum rating.

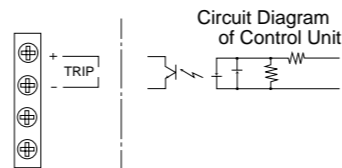


Fig. 10

MOUNTING BRACKET (FOR RACK MOUNT)

Remove 4 screws from each side of left and right on the control unit and fix the bracket on the control unit as shown on Fig.11.

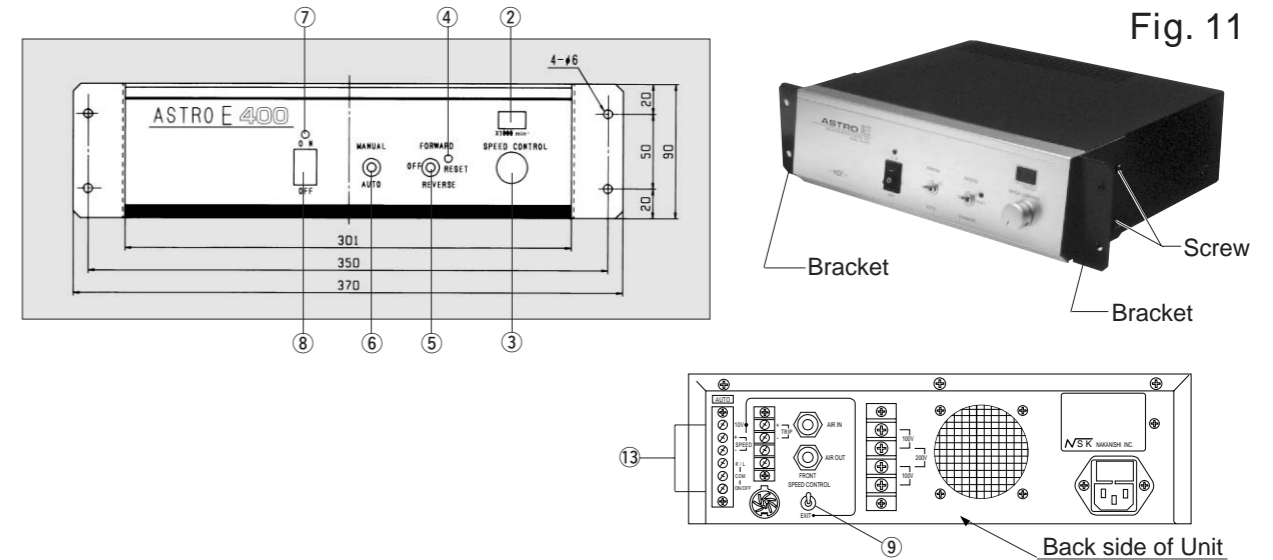


Fig. 11

OPERATION PROCEDURES

Operation 1 Manual Operation (See Fig. 11)

- (1) Turn Power Switch ⑧ ON.(Green Lamp ⑦ lights.)
- (2) Select MANUAL/AUTO Selector Switch ⑥ to MANUAL side.
- (3) Adjust Speed Control Knob ③ to the lowest (counterclockwise)
- (4) Select Manual FWD/REV Switch ⑤ to either FORWARD or REVERSE direction.
- (5) Turn Speed Control Knob ③ clockwise gradually and adjust to required motor speed.
Speed Display ② shows the motor speed through 1-4Q (ASTRO-E 400), 1-5Q (ASTRO-E 500).
Speed Display ② allows to confirm required motor speed for grinding and cutting.
- (6) To stop operation, select Manual FWD/REV Switch ⑤ to OFF.(To restart, repeat the steps of (3), (4) and (5).)

⚠ CAUTION

- The motor stops rotation to protect when overloading and Red Lamp ④ lights.
Release circuit breaker after lightening loading.
- How to release circuit breaker
Select Manual FWD/REV and Circuit Breaker Release Switch ⑤ to RESET and Red Lamp ④ is off. Select either direction of FWD/REV Switch ⑤ for restart.

Operation 2 Automatic Operation(See Fig. 11)

- (1) Turn Power Switch ⑧ ON.(Green Lamp ⑦ lights.)
- (2) Select MANUAL/AUTO Selector Switch ⑥ to AUTO side.
 - Operate under the external control equipment (sequence control).See P7 Connecting Sequence Control Terminal ⑬ for connection.
 - When Speed Control Selector Switch ⑨ is on EXT side, the motor speed and switching FWD/REV can be controlled under Sequence Control.
 - Only motor speed can be controlled by Speed Control Knob ③, when Speed Control Selector Switch ⑨ is on FRONT SPEED CONTROL side.
 - Manual FWD/REV Switch ⑤ of the control unit can not be used.

⚠ CAUTION

- The motor stops rotation to protect when overloading and Red Lamp ④ lights. Release circuit breaker after lightening loading.
- How to release circuit breaker
Apply 0 VDC(OFF)ON/OFF and COM terminal(Fig. 9)for reset and Red Lamp ④ is off. Apply 24 VDC(ON)ON/OFF and COM terminals for re-start.

⚠ CAUTION

- The motor would stop rotation without Red Lamp ④ lighting or with Green Lamp ⑦ off, if it receives overloading frequently. Leave the motor for a while till Red Lamp ④ would light and follow the procedure to release the circuit breaker.

CHANGING FUSES

INLET BOX has a fuse(250V-T2.5A)in it. It is removed by squeezing the small latches at both sides of the fuse box and pull out.



Fig. 12

CONNECTING SPINDLE TO MOTOR

Align the threads on the front end of the motor and the rear of the spindle, and turn the spindle clockwise. If the drive shaft of the motor does not engage the drive dog on the spindle, you may only be able to turn it about 2 turns. DO NOT FORCE. Turn the spindle back a few threads, rotate the spindle by hand to engage the drive shaft and the drive dog, and screw them together.

⚠ CAUTION

Clean hands and the connecting parts, before connecting the spindle to the motor (the speed reducer)to prevent entry of debris into the motor and spindle.

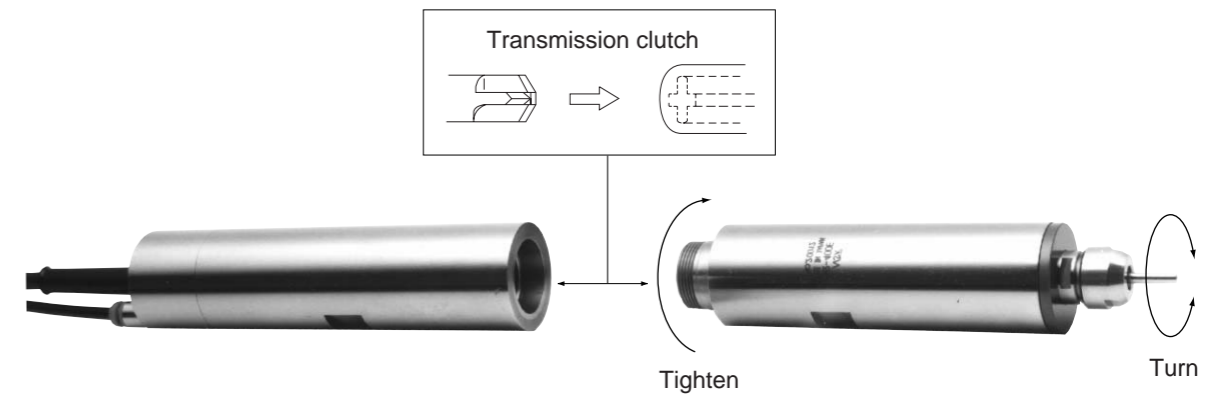


Fig. 13

REPLACING CUTTING TOOL

- (1) Set the provided spanner wrench 12 mm on the spindle.
- (2) Place the provided spanner wrench 14 mm on the collet cap and turn it counterclockwise to loosen the collet chuck, and pull out the cutting tool.
- (3) Insert a new cutting tool and fasten the collet chuck clockwise by turning.

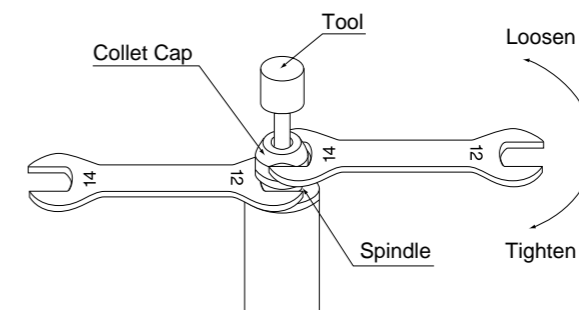


Fig. 14

REPLACING COLLET CHUCK

- (1) Loosen and remove the collet cap with cutting tool according to the "Replacing Cutting Tool" steps above.
- (2) Remove the cutting tool from the collet chuck.
- (3) To remove the collet chuck from the collet cap, hold the collet cap in one hand and incline the collet chuck toward the spanner slit of the collet cap.
- (4) To mount a new collet chuck, incline the collet chuck toward the spanner slit of the collet cap and insert.

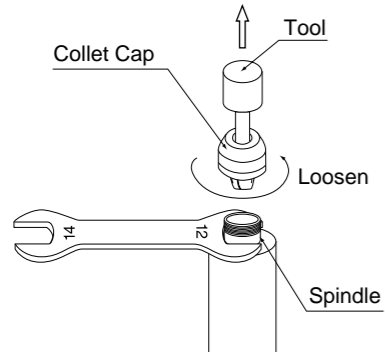


Fig. 15

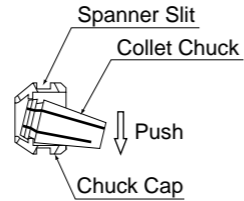


Fig. 16

*

Standard collet chuck is 3.0mm.

(Standard collet chuck is 3.175mm for USA.)

Optional collet chucks are available in 0.1mm increment from 0.5mm- 6.0mm and 2.35mm(3/32") and 3.175mm(1/8") and 6.35mm(1/4")

Optional Collet Chuck No. CHK- (Fill I.D. in)

INSTALLATION OF SPINDLE

To install the spindle on a holder, the installation as shown in Fig. 17 is recommended.

(If it is not possible, install it as shown in Fig. 18.) Do not use mounting screws pushing directly on the spindle as shown in Fig. 19, because it could damage the housing and may result in failure of rotation and overheating.

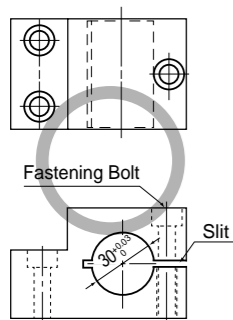


Fig. 17

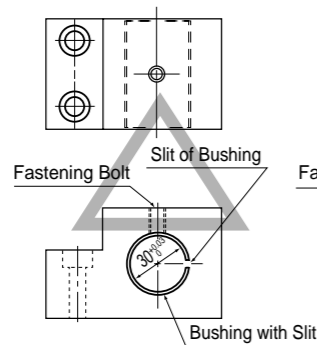


Fig. 18

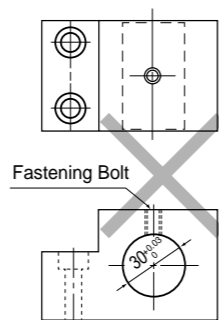
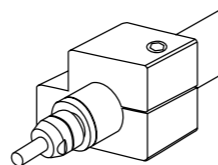
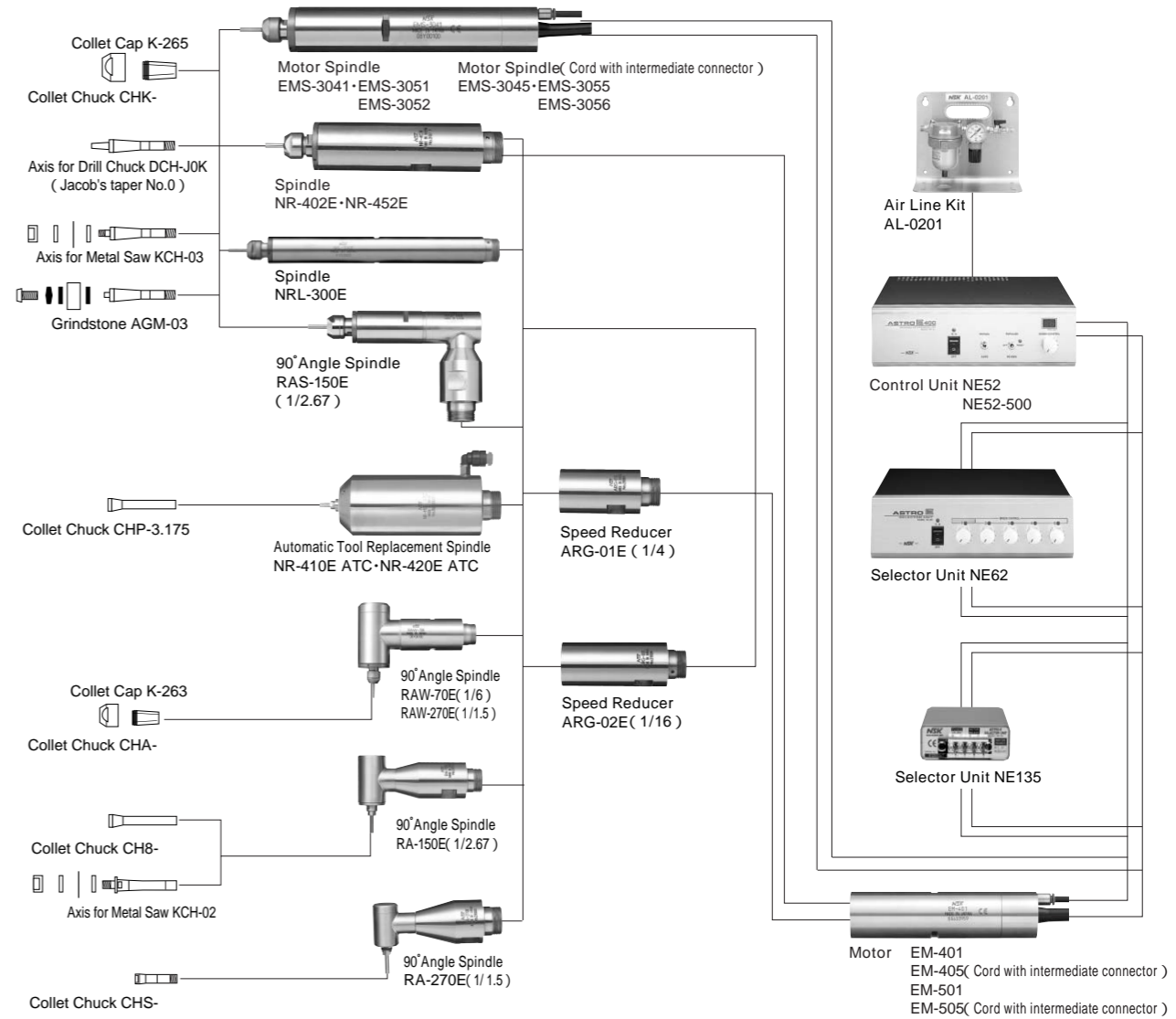


Fig. 19



ASTRO-E 400/500 SYSTEM CHART



ACCESSORIES

Collet Chucks List

Product	Model	Size of Inside Diameter ϕ (mm)	Fit to
	I.D.= d CHS-	2.35, 3.0, 3.175 0.8- 2.9 every 0.1mm	RA-270E
	I.D.= d CHP-	2.0, 3.0, 3.175	NR-410E ATC NR-420E ATC
	I.D.= d CH8-	2.35, 3.0, 3.175 0.8- 2.9 every 0.1mm	RA-150E
	I.D.= d CHK- with Collet Cap K-265	2.35, 3.0, 3.175, 6.0, 6.35 0.8- 5.9 every 0.1mm(Other than above)	NR-402E · NR-452E · RAS-150E EMS-3041 · EMS-3051 · EMS-3045 · EMS-3055 EMS-3040A · EMS-3050A EMS-3052 · EMS-3056 · EMS-3052A
	I.D.= d CHA- with Collet Cap K-263	2.35, 3.0, 3.175 0.8- 4.0 every 0.1mm(Other than above)	RAW-70E · RAW-270E

Special Axis List

Product	Description · Model	Fit to
	Special Drill Chuck Axis; DCH-J0K For drill Chuck Jacob's Taper No. 0 Run-out Accuracy : Within 0.05mm	NR-402E · NR-452E · RAS-150E EMS-3041 · EMS-3051 · EMS-3045 · EMS-3055 EMS-3040A · EMS-3050A EMS-3052 · EMS-3056 · EMS-3052A
	Special Metal Saw Axis KCH-02 Dimensions of Metal Saw 1/4"(I.D.) × 1.18"(O.D.) Run-out Accuracy : Within 0.02mm Order AS11436 for 1/4"	RA-150E
	Special Metal Saw Axis KCH-03 Dimensions of Metal Saw 1/4(I.D.) × 1.18"(O.D.) Run-out Accuracy : Within 0.02mm	NR-402E · NR-452E · RAS-150E EMS-3041 · EMS-3051 · EMS-3045 · EMS-3055 EMS-3040A · EMS-3050A EMS-3052 · EMS-3056 · EMS-3052A
	Grindstone Axis AGM-03 Run-out Accuracy : Within 0.02mm For Grindstone with 5.0mm I.D.	NR-402E · NR-452E · RAS-150E EMS-3041 · EMS-3051 · EMS-3045 · EMS-3055 EMS-3040A · EMS-3050A EMS-3052 · EMS-3056 · EMS-3052A
	Special Axis for Drill Chuck DCH-J0A Drill Chuck For Jacob's Taper No. 0 Run-out Accuracy : Within 0.05mm	RAW-70E · RAW-270E
	Special Axis for Metal Saw KCH-01A Dimension of Metal Saw 6.0(I.D.) × 30mm(O.D.) Run-out Accuracy : Within 0.02mm	RAW-70E · RAW-270E
	Grindstone Axis AGM-01A Run-out Accuracy : Within 0.02mm For Grindstone with 5.0mm I.D.	RAW-70E · RAW-270E

Axis of 5 mm and 8 mm are also available for metal saw in addition to 6 mm.

TROUBLESHOOTING

Check the following table for any abnormalities. If problem persists, please contact your local distributor for service.

Control Unit NE52, NE52-500 and Motor

Trouble	Check Point	Cause	Countermeasure		
Motor and Handpiece do not run. Pilot Lamp Lights	Power Lamp does not light when power switch is ON.	Power cord is unplugged.	Connect power plug.		
		Blow out of fuse.	Change fuses.(Page 9)		
		Continuous overloading.	System will automatically turn on after a pausing period.		
	Motor does not run when R/L terminal is selected on manual mode. or Motor does not run when ON/OFF terminal at sequence control is selected on remote mode.	Red Lamp lights.	Motor cord nut is not secured.	Release activated circuit breaker. (Page 9)	
				Plug motor cord securely and tighten motor cord nut. If motor cord is not properly plugged and secured, Red Lamp will not turn off.	
		Red Lamp does not turn off even after releasing circuit breaker.	Multiple overloads thermal overload.	The circuit breaker will automatically reset after approx. 20 minutes. When the circuit breaker resets, Red Lamp will turn on, then reset the breaker by switching the FWD/REV Switch to the neutral position and then back to the desired direction of rotation.	
				Red Lamp is off fan running at high speed.	
		Low cooling air pressure or no air flow.	Regulate air pressure between 0.2-0.5 MPa. Properly connect air input.		
		Sequence Terminal	ON/OFF terminal: On position, no power	EXT position selected.	Check voltage between 0V-10V DC.
				ON/OFF terminal is not properly connected.	Connect ON/OFF terminal properly.
When R/L terminal is ON, motor does not operate.	R/L terminal is not properly connected.		Connect R/L terminal properly.		
Manual speed control on front panel is not operational.	Speed Control Selector Switch on EXT position.	Turn Speed Control Selector Switch to FRONT SPEED CONTROL.			

Spindle

Trouble	Cause	Countermeasure
Excessive bur run-out.	Foreign particles or dirt inside collet chuck and spindle.	Clean collet chuck and spindle.
	Collet chuck is not properly positioned inside collet cap.	Secure collet chuck into collet cap as shown in Fig. 16 in Page 11.
	Worn bearings.	Return to Service Center.
	Bent bur or unbalanced grinding stone.	Replace bur.
During operation, high noise level and vibration present.	Foreign objects in bearings. Worn bearings.	Return to Service Center.
	Bent bur or unbalanced grinding stones.	Replace bur.