Riveting Machine

US-66 vol.12

Instruction Manual for Riveting Machine US-66

Rivetronics

Riveting Machine Safety Precautions

- In order to use your Rivetronics Riveting Machine properly, be sure to read through and obtain a thorough understanding of the information contained in the safety precautions booklet and operating instruction manual before attempting to use or operate the equipment. Failure to do so could result in accident or injury, and may contribute to shortening the life or reducing the power of the riveting machine.

- You should keep this booklet and the operating instruction manual for your reference.

Safety Precautions

The precautions contained in this booklet should be observed in order to protect the equipment from damage while ensuring your safety as well as the safety of others. The precautions are catego-rized and labeled as "DANGER!", "WARNING!" or "CAUTION!" according to the severity and likelihood of damage or injury that could be incurred by failure to observe the corresponding warnings. All items concerning safety are important and must be observed.

	**DANGER!**	Situation which is likely to occur and which could result in death or injury if safety precautions are not observed.
	**WARNING!**	Situation which could potentially result in death or injury if safety precautions are not observed.
	**CAUTION!**	Situation which could potentially result in bodily injury or equipment damage if safety precautions are not observed.

Symbols

The symbols used to signify the type of precaution to be observed are as described below. Be sure to read through and obtain a thorough understanding of the contents before proceeding.

	Indicates a precaution involving "DANGER!", "WARNING!" or "CAUTION!"
	Indicates an action which is prohibited.
	Indicates a procedure which must be carried out without fail.

DANGER !

	Placing your hand or fingers underneath the head could result in injury. Be sure to take the proper precautions while the riveting machine is in operation.
	Do not open the door of the control box except when absolutely necessary. Doing so could result in electric shock. If you have to open the door, be sure to turn off the power and unplug the machine before doing so.

WARNING !

	The riveting machine should be firmly secured to the floor or workbench. If not, the machine could be accidentally knocked over, resulting in injury. We cannot guarantee that the riveting machine will not be damaged in the event of such an accident.
	Do not use power source or voltage other than those specified for that particular model. Using an improper power source could result in equipment damage or fire.
	Do not allow the wiring to be damaged. A short at a damaged portion could melt the cable and start a fire.
	Do not allow the riveting machine to get wet. Moisture can damage the machine, and could result in electrical shock or fire.
	In order to guard against fire or malfunction caused by faulty or improper repair, the riveting machine must not be disassembled or repaired by anyone other than a qualified professional. When repair becomes necessary, contact your nearest Rivetronics dealer.
	Do not touch the switches, etc., with wet hands. Doing so could result in electrical shock.

⚠ CAUTION !

⊘	Turn off the power before changing the head, insert or tools in order to ensure that the riveting machine is not accidentally actuated while doing so.
❗	Be sure to remove the head and check the motor's direction of rotation before performing test operation after setting up or moving the machine. If the motor turns in reverse, the head could come off, resulting in damage or injury.
⊘	Do not place your fingers or any other objects in the turning part of the motor while it is running. Doing so could result in injury or equipment damage.
⊘	The operating voltage for each model is factory-set. Be sure the setting does not become inadvertently changed. Using at a higher setting could result in equipment damage.
❗	Be sure to firmly connect wiring and connectors. Poor contact could cause the machine to malfunction or result in damage.
❗	When replacing worn or damaged parts, be sure to use only Rivetronics genuine parts. Replacing with substitutes could result in equipment damage. Treat discarded machines and parts as industrial waste.
❗	In the event of an accident or if the riveting machine becomes broken or damaged, immediately turn off the power and cease operation. For repairs, contact your Rivetronics dealer.

CONTENTS

Introduction

We thank you for adopting Yoshikawa's Riveting Machine US-66.

The US-66 is an excellent machine manufactured based on our experience and research over many years as a dedicated manufacturer of riveting machines.

This manual provides instructions and key points for the maintenance and operation of the machine. Wrong handling may cause an unexpected accident or failure. Read through this manual before use and handle the machine correctly.

Kindly give this manual to the operator and direct him to keep the manual.

Operational Principle

A head which spins together with the spindle is attached to the end of an air cylinder and an insert is inserted into the head so that the insert can revolve round the rotational axis of the head at an angle to the rotational axis. Since the insert itself rotates freely, the insert can stand still irrespective of head rotation. (Refer to Fig. 1b.)

Fig. 1a

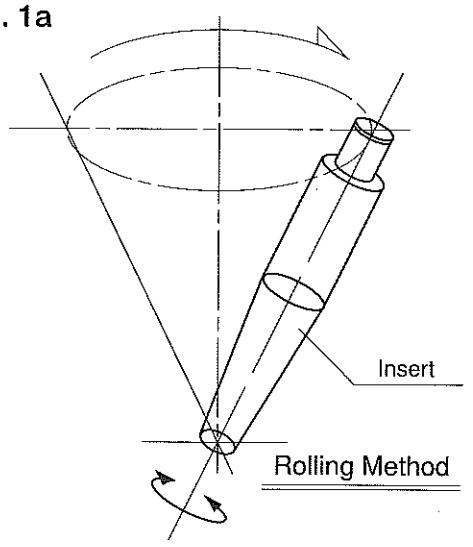
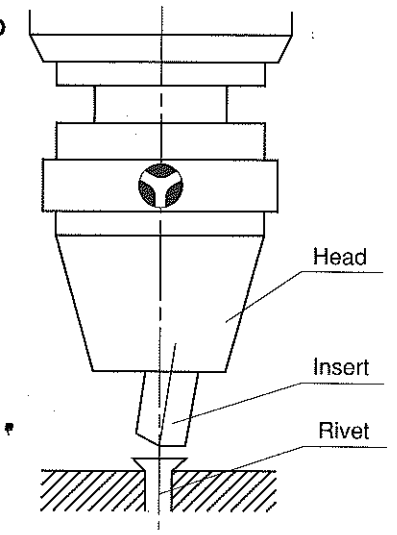


Fig. 1b



The insert usually rotates together with the head, but it stops rotation when it comes into contact with a rivet end and swings around the rivet end as if sliding over the surface of an inverted cone. (Refer to Fig. 1a.)

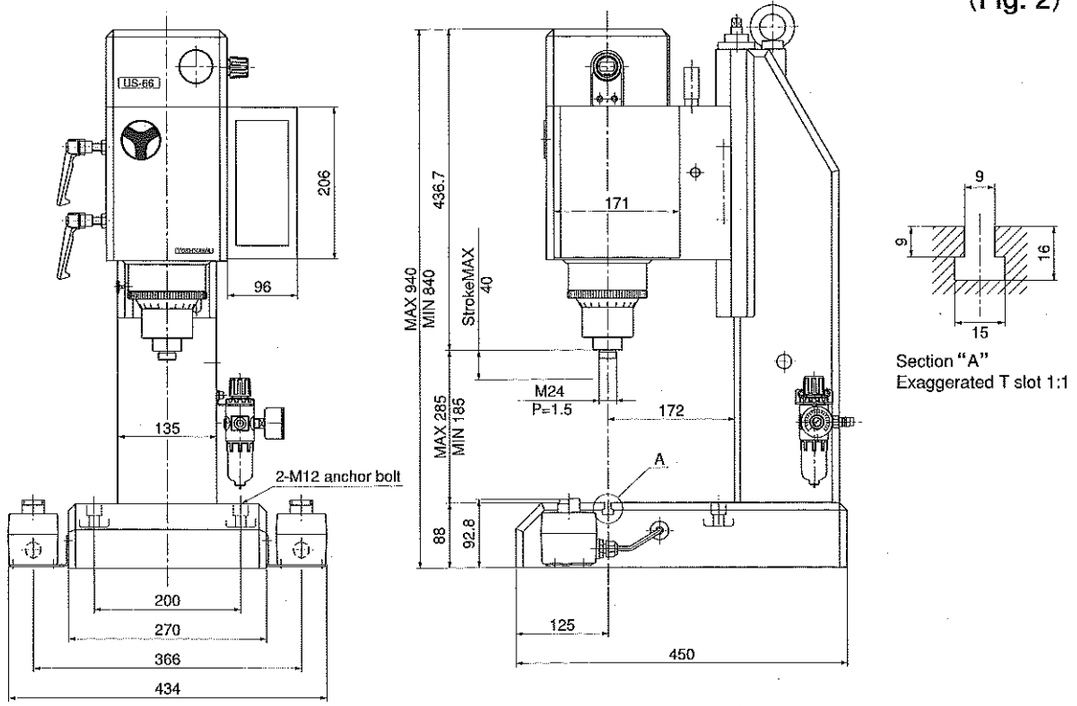
The end of the insert comes into contact with the rivet at a point on the surface of the end at first. The point contact grows to a line contact with the descent of the cylinder. The length of the contact line finally develops equal to the radius of the rivet point. A surface is shaped by the revolution of a contour, and the rivet end is formed to a flat point, round point, pan point, etc. according to the shape of the insert end.

The rivet is upset little by little by the movement of the contact contour line between the rivet and the insert to form a point, finishing riveting.

Specifications

US-66 Outline Drawing

(Fig. 2)



Specifications

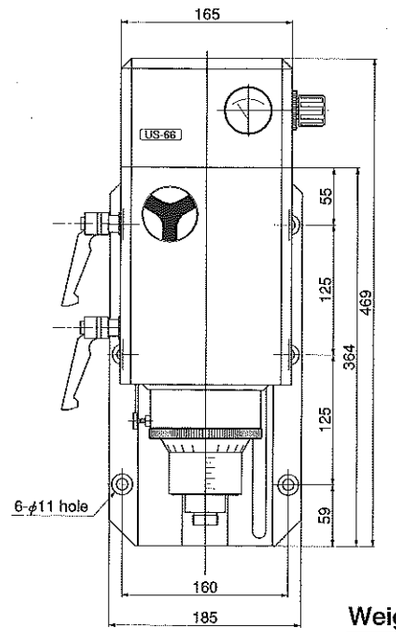
Riveting ability	Mild steel rivet d =0.5~5.0mm	Power supply	3φAC200V 50/60Hz 500VA (1φAC100V 50/60Hz 300VA)
Stroke S Driving pressure P	S =5~40mm P =MAX5,050N(515kgf)	Finish coating	Frame Japan Paint Maker Association No.332 Munsell 2.5Y9/2
Operation timer	t =0.2~9.99sec	Air pressure	0.412MPa 4.2kgf/cm²
Spindle motor	3φAC200V 50/60Hz 4P 120w (1φAC100V 50/60Hz 4P 80w)	Weight	108kg

◎ The design, dimensions, etc. may be altered without notice.
◎ Specially avaiable for single phase (100V) use.

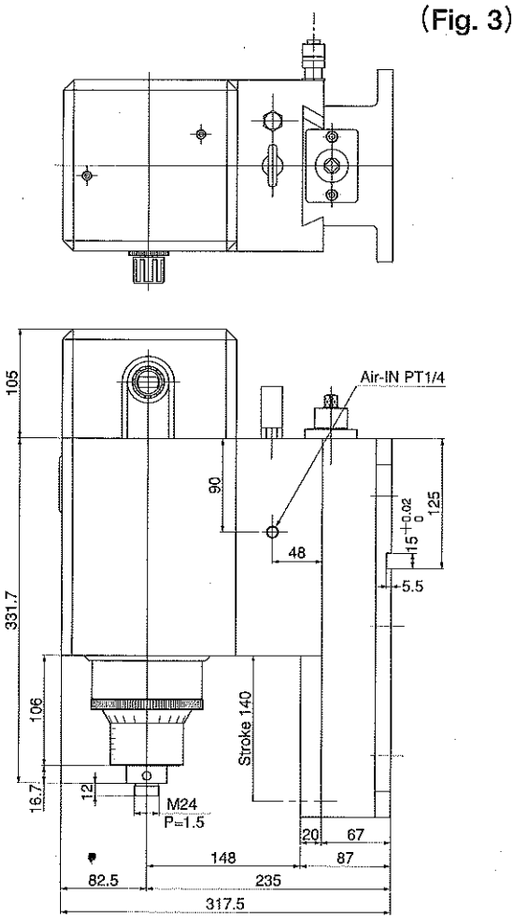
Specifications

US-66E Outline Drawing

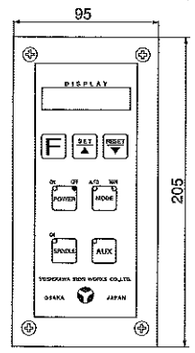
(Fig. 3)

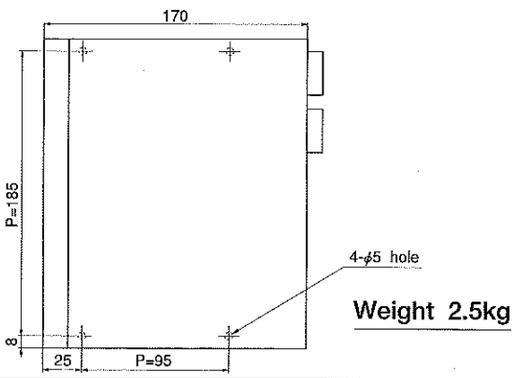


Weight 57kg



Controller Out Line Drawing





Weight 2.5kg

1. Installation and Ambient Conditions

Fig. 4-1

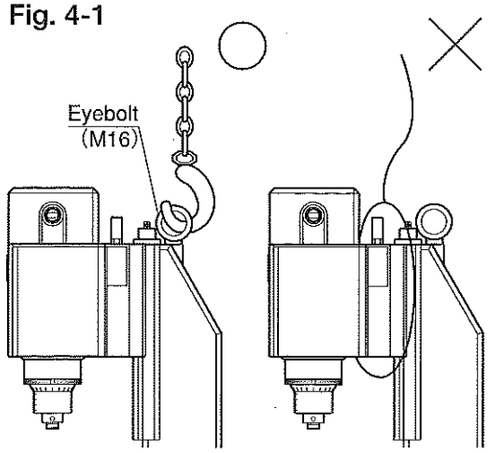


Fig. 4-2

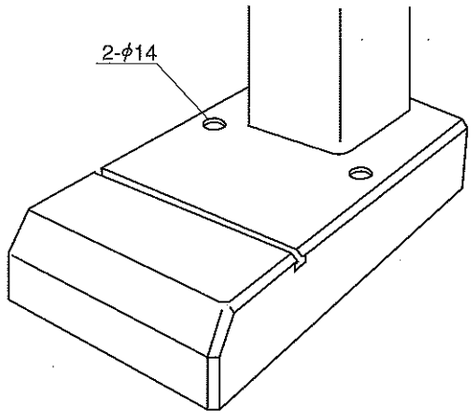
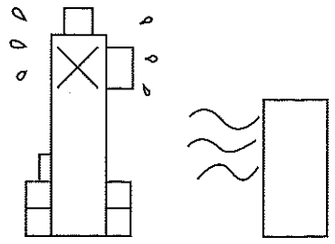


Fig. 5



1-1 Installation

1) Carrying (Fig. 4-1)

To carry the machine, hoist it by material handling equipment with a capacity of 300 kg or over, using the eyebolt (M16) provided on the machine column. Weight of US-66 = 108 kg, US-66E = 57 kg

⚠ Danger !

- When hoisting the machine, do not apply ropes etc. to other locations than specified.
- If hoisting equipment or tools are not available, contract a forwarding agent about carrying. Do not carry the machine in an easy-going method. Do not use the "E" bolt for hoisting the assembled machine because the bolt is designed to hoist only one cylinder.

2) Installation (Fig. 4-2)

a) Preparation

Provide a machine base such as the optional dedicated base before installing the machine.

b) Fixing (Fig. 4-2)

Secure the machine firmly with anchor bolts etc. using the two anchor bolt holes (diameter 17 mm) provided on the machine bed.

⚠ Danger !

- If the floor is rough and not stable, the machine may be fallen down by an earthquake etc.

1-2 Ambient Conditions (Fig. 5)

Operate or stow the machine at the ambient conditions outlined below.

Ambient Condition	Requirement
Temperature	0℃～+50℃
Humidity	90%RHmax. (No condensation)
Storage temperature	−10℃～+50℃
Storage humidity	90%RHmax. (No condensation)
Atmosphere	Indoor (to be protected from the direct rays of the sun) free from corrosive or flammable gases, heavy oil mist and dust

⚠ Danger !

- Do not locate the machine near a flame, or a fire may be caused.

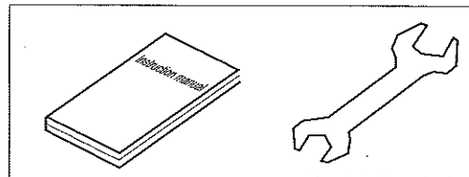
■Accessories

The following tools etc. are supplied with the machine. Confirm them.

US-66 and -66E Accessories

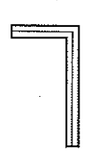
●Contained in Packaging Case

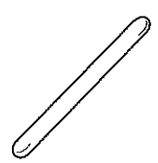
Instruction manual	1 copy
Double headed end wrench 13 x 17	1 pc
Allen wrenches ϕ8 x 200mm	1 pc
Lever handle	1 pc
Tool case	1 bag
Ratchet wrench, 10-mm square socket for	1 pc
Coupler 20SH	1 pc

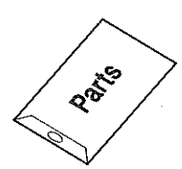


Instruction manual

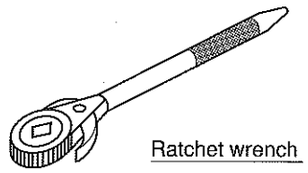
Double headed end wrench

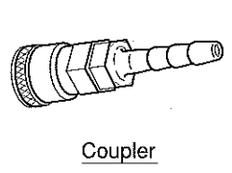

Allen wrench


Lever handle



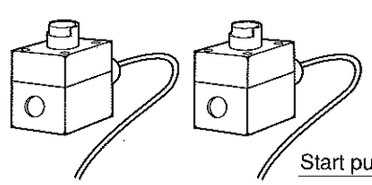
Tool case

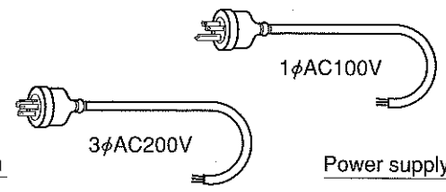

Ratchet wrench


Coupler

●Mounted on Machine

Start pushbutton switch (with bracket)	2 sets
Power supply cord, 3 m with 3-pole 4-wire grounding	1 pc


Start pushbutton switch

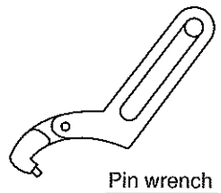


Power supply cord

●Head Accessory

The following accessory is furnished when the machine is purchased together with optional heads and inserts.

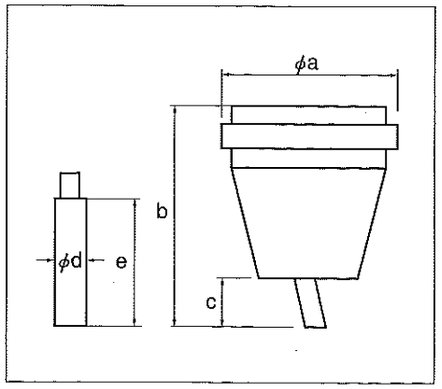
Pin wrench	5.5-mm dia.x200 or 8-mm dia.x200	1 p


Pin wrench

■Standard Heads and Inserts

Standard Heads

The standard heads and inserts compatible with the model US-66 riveting machine are shown below.



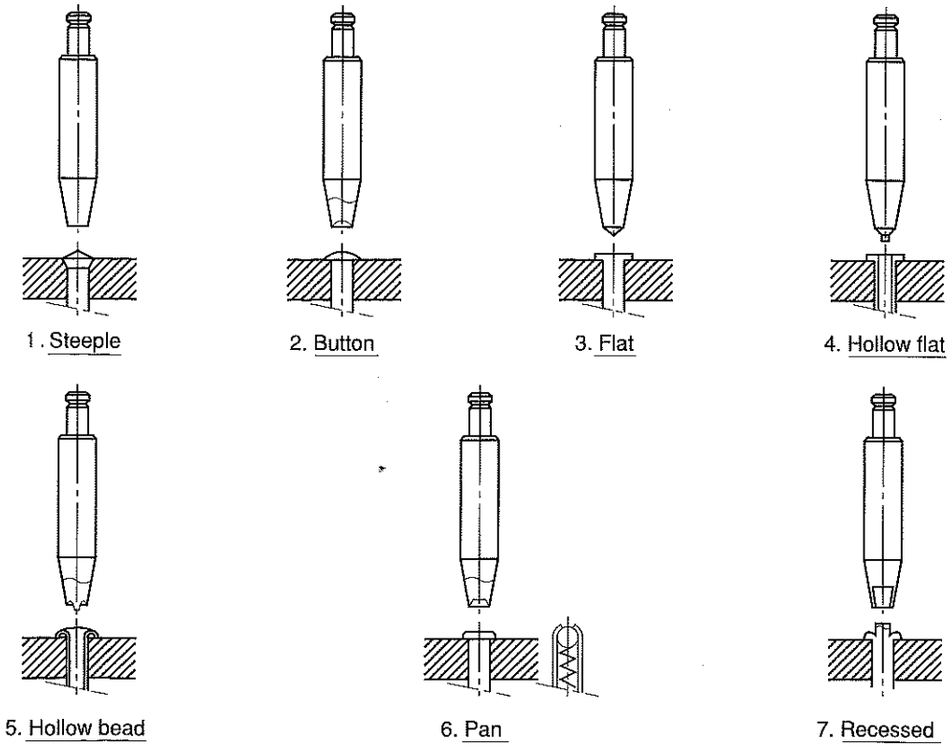
■Standard Head Table

Head Model No.	ϕa	b	c	ϕd	e
U-8	45	77	20	8	45
U-84	45	92	35	8	59
U-715	56	81	15	15	43
U-725	56	104	38	15	66
U-735	68	138	58	15	101

●Many other types of heads suiting various applications are also available.

Inserts

Rivet point shapes are roughly classified to the following 7 types.
The basic dimensions such as the diameter and the length of the insert depend on the point formed. However, the requirements for the rivet such as forming dimensions and material should be given to us beforehand.



■Options

In addition to the accessories, extra options suiting various purposes are offered.

Jigs and Tools

Name	Model No., Specifications	Qty
Anvil	25-mm dia.x30	1
Anvil base	For US-66 (with washers)	1
T bolt set	M8x35, M8 cap nut	2 ea
T nut	For US-66(M8)	2
Grease gun	With M6 mouth piece with grease filled	1
Dedicated base (a)	Type 20301 W800 x D580 x H700	1
Dedicated base (b)	Type 20302 W800 x D580 x H700 With Caster	1

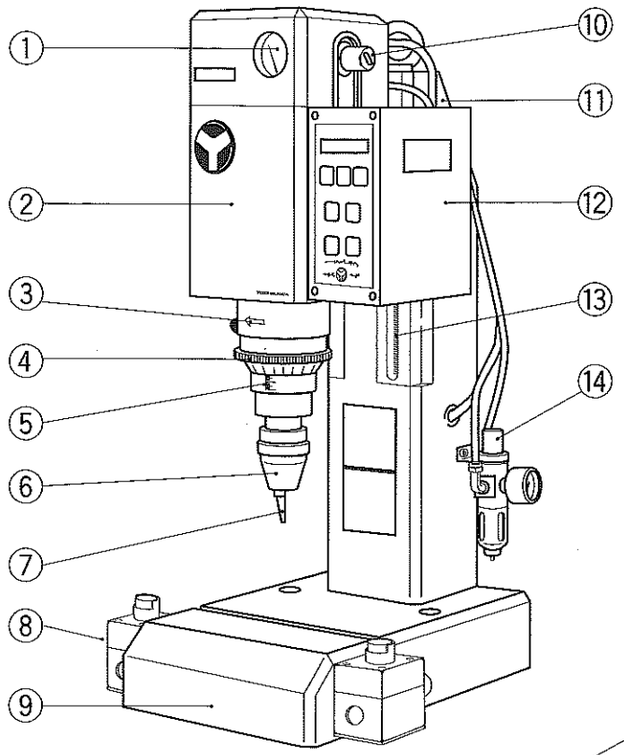
Control Switches

Name	Model No., Specifications	Qty
Emergency stop pushbutton	30-mm dia. mushroom type, push look return type	1
Foot switch *1	With cover	1

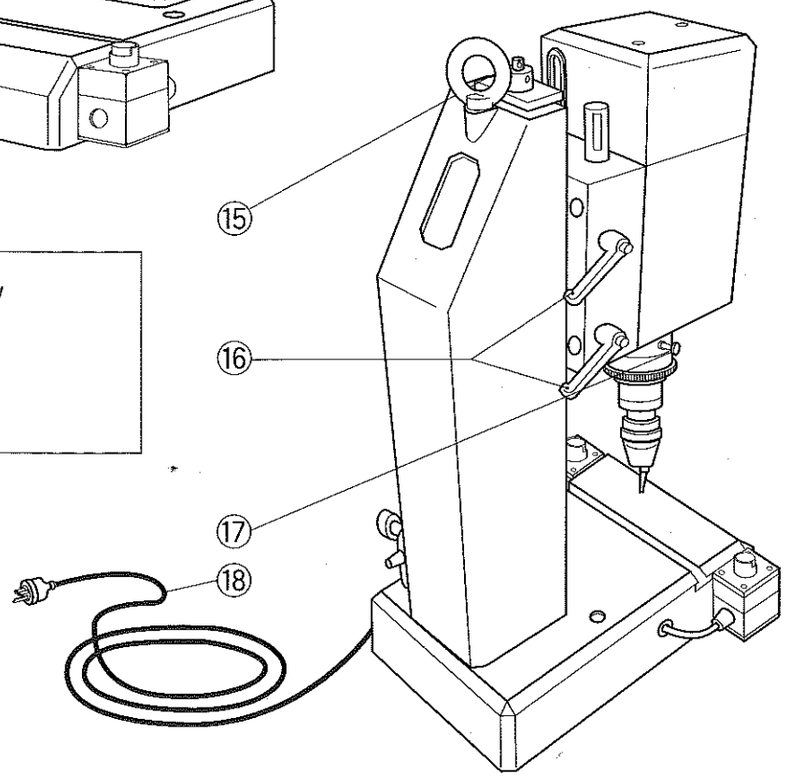
⚠ Danger !

●Placing hands or fingers under the head is dangerous and likely to result in serious injury. In particular, be warned that use of the optional foot switch greatly increases the risk, so the utmost care must be taken.

Names of Parts

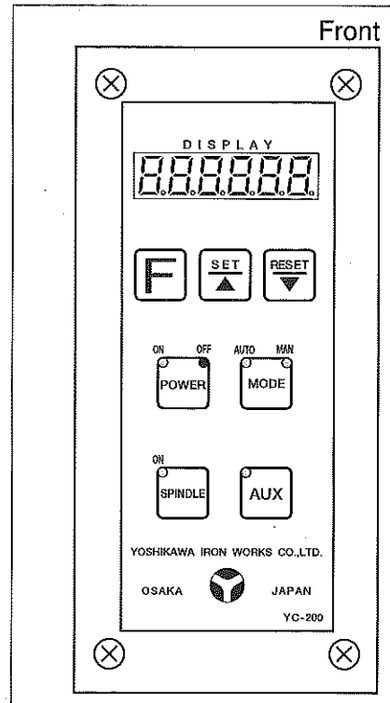


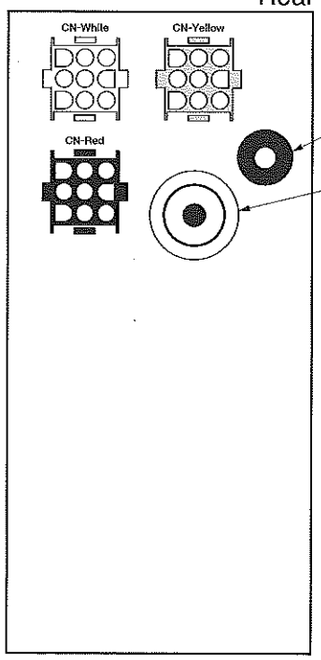
① Pressure gage
② Cylinder
③ Arrow to show spindle rotation
④ Stroke adjusting ring
⑤ Scale (For stroke adjusting)
⑥ Head (Option)
⑦ Insert (Option)
⑧ Both-hand operating pushbutton switch
⑨ Bed
⑩ Pressure adjusting knob for work
⑪ Column
⑫ Control panel
⑬ Height setting scale
⑭ Air control unit



⑮ Cylinder up-down screw
⑯ Clamp hadle
⑰ Set screw
⑱ Power supply cord

Names of Parts on Control Panel





Display
Indicates counts or set values.

F — Function key
Selects a function by pressing together with other key.

SET — Set/up key
Sets a function or increments a value indicated.

RESET — Reset/down key
Resets a function or a counter, or decrements a value indicated.

POWER — Power supply switch
Turns on or off the machine and indicates power on or off.

MODE — Operation mode selector switch
Selects an operation mode, automatic or manual.

SPINDLE — Spindle on/off switch
Turns on or off the spindle.

AUX — Auxiliary switch
Turns on or off an auxiliary unit manually if installed.

Caution !

- Do not operate the switches on the control panel with a sharp tool such as a screwdriver, as the control panel is made of a film sheet.

CN-white — Spindle motor power cable, LS signal

CN-Yellow — External auxiliary input/output signal

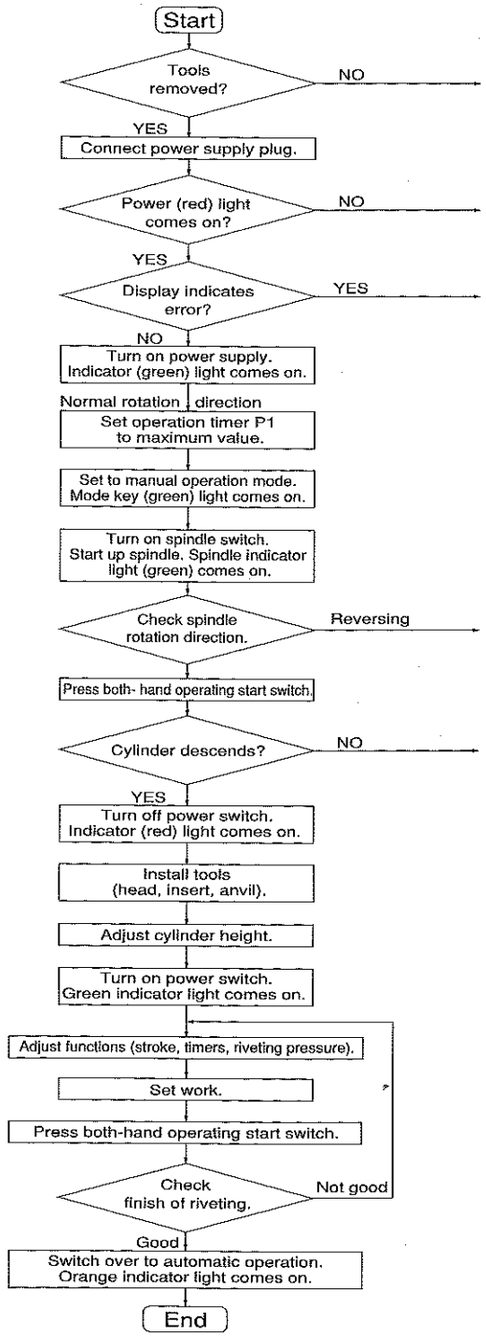
CN-red — Hydraulic pump motor power cable, SOL output signal

Caution !

- Wiring and maintenance of the controller shall be made by an electric engineer.
- Do not disassemble or modify the controller, or it may cause an accident or a failure.

2. Operation Preparation

2-1 Operation Flow Chart



Caution !

Before start, piease check the primary air.

◎ Remove tools (head, insert, and anvil) for safety.

◎ Disconnect power supply plug and check power source. Reconnect power supply plug.

◎ If Err-** is indicated, press RESET key to initialize controller.

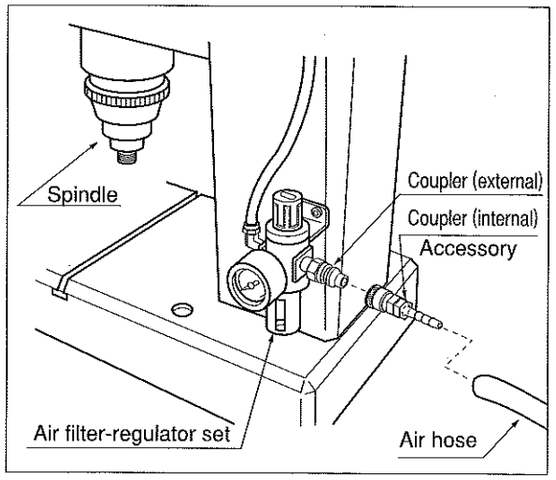
◎ Turn off power supply. Disconnect power supply plug, and reverse connections of two wires (red and black) in plug.

◎ Turn off power supply and disconnect power supply plug. Check start switch connection or controller function setting.

2-2 Air Supply Connection

Caution !

- Connect the compressed air line before connecting power supply.
- Use dry air free from moisture,oil,etc. Poor quality air may deteriorate or break down an internal machine part resulting in a machine failure.



(1) Preparation

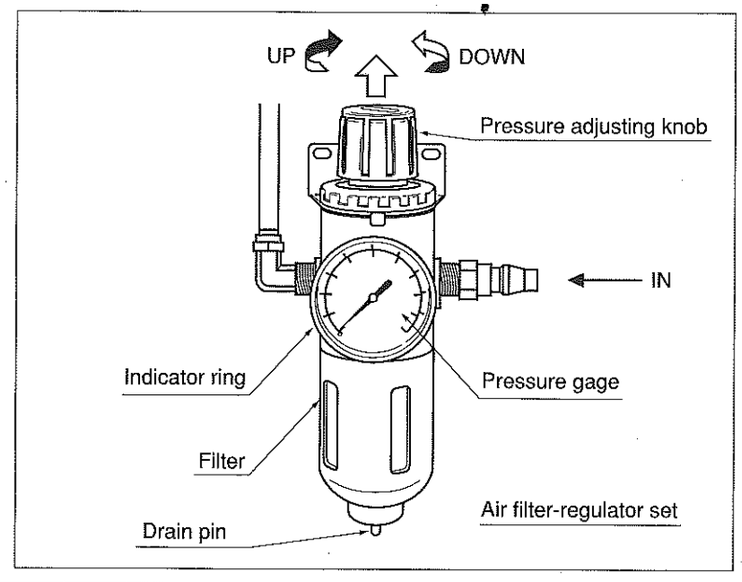
The US-66 riveting machine requires stable compressed air supply at 0.412Mpa (4.2kgf/cm²) min. Install a compressed air supply hose (diameter 9mm or over) to the machine installation location.

(2) Connecting Coupler

Slip the hose on to the root of supplied coupler (internal) positively and secure the hose with a metallic clamp or the like. Slip the coupler on to the plug of filter-regulator set till it clicks.

(3) Supply Pressure Setting

The air regulator (reducing valve) was set to 0.412Mpa before shipment and requires no readjustment. However,make sure that the reading of the pressure gage is correct. If the reading is less than specification,adjust the reducing valve or check the air source pressure. To adjust the pressure,pull up and turn the knob of the reducing valve clockwise to raise pressure. On completion of setting,press down the knob,and the knob is locked.

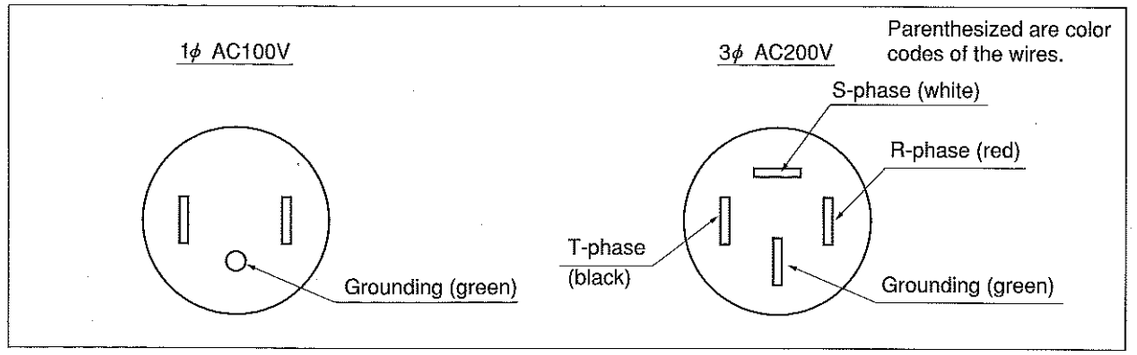


2-3 Power Supply Connection

The power supply cord supplied with the US-66 riveting machine is provided with a two-pole grounding type plug (single-phase 100 V) or a three-pole grounding type plug (three-phase 200V) depending on the power supply rating of the machine. Connect the plug to the power supply outlet at the installation location.

⚠ Warning !

Ground the machine. Otherwise, there is a fear of electric shock or mis-operation of the control components.



1) Check of Power Source

If power supply is applied, the OFF indicator light (red) of POWER switch comes on. If the light does not come on, check the power source.

2) Error Indication

If Err-** is shown on the controller display when power supply is applied, press RESET key. The memory is initialized and the error message is cleared.

As far as the error message is shown, the machine can not be turned on. The controller must be reset.

2-4 Machine On/Off

1) Turning on Machine

Press POWER switch on the control panel. The ON indicator light (green) comes on and the machine is turned on. Another press of the switch turns off the machine and the OFF indicator light comes on.

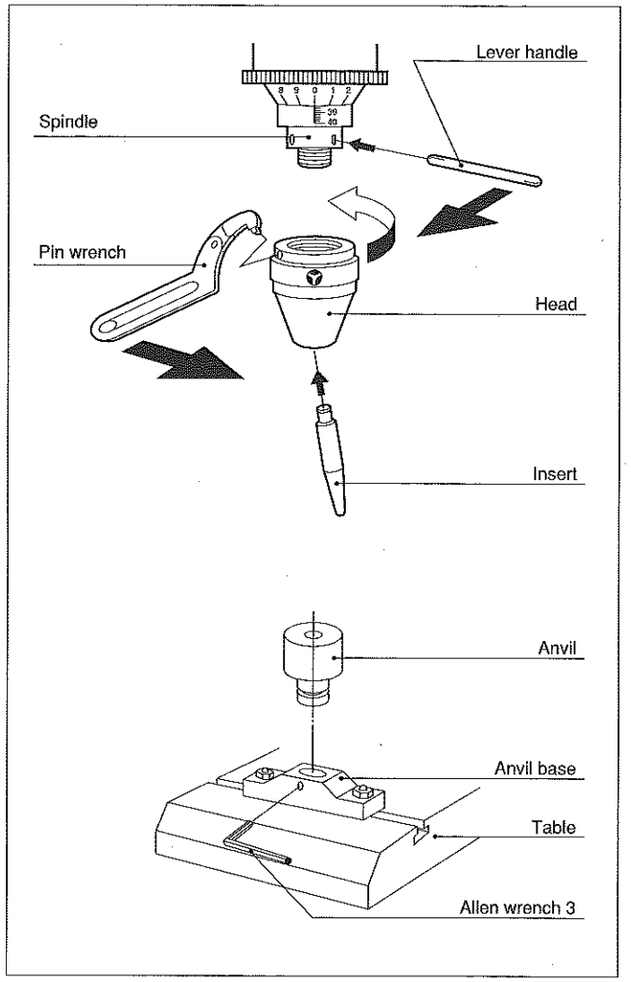
2) Check of Motor Rotation Direction

The spindle motor of the riveting machine US-66 are wired so that they generally spin in the normal direction when the plug is connected to the service outlet. However, if the phase sequence of the power source is reversed, the motor reverse and the tools may come off. Coming off of the tools, the head in particular, is dangerous. The tools should be removed before applying power supply. If reverses, turn off the POWER switch immediately, disconnect the plug, and interchange the connections of two (red and black) of the three wires in the plug.

⚠ Danger !

- Connect or disconnect the power supply plug holding the plug and do not pull the cord. Do not place an object on the cord also. Otherwise, open wire or short circuit may be caused.

2-5 Riveting Tool Setting



Set the jigs and tools necessary for riveting in the following steps.

1) Head

Screw the head on to the spindle end. Insert the lever handle into the spindle as illustrated and hold it by one hand. Hook the pin wrench on the head and hold it by the other hand. Fasten the head to the spindle firmly by the two hands.

2) Insert

Put the insert in the head till feeling a click.

⚠ Caution !

- Install the head and the insert firmly, or they may come off when the machine is operated.
- To remove the insert on completion of riveting, leave it on the head for a while because it is heated hot by operation with a fear of getting burnt.

3) Anvil (Extra Option)

Insert the anvil in the anvil base and fasten it with the set screw(M6).

(Install the special jig with T-nuts, extra options.)

⚠ Danger !

Disconnect the power supply plug to install the jig to the riveting machine. Injury may be caused by mis-operation if power supply is applied.

Ⓘ Caution !

The anvil and the anvil base are extra options and require alignment as with the special jig.

3. Adjustment

3-1 Stroke Adjustment

Machine Adjustment

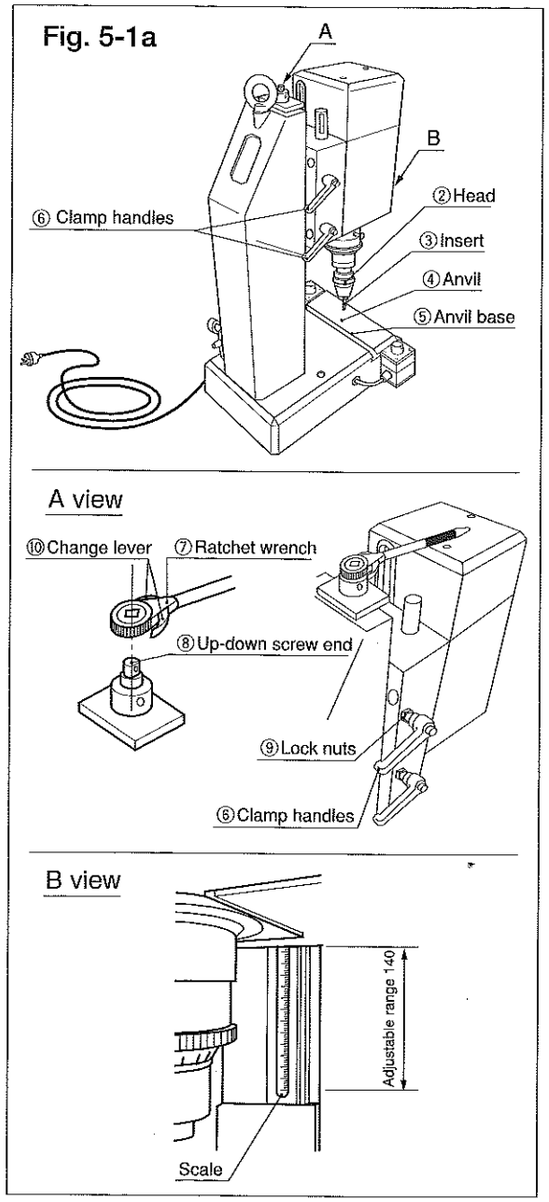
Stroke, riveting pressure, and pressure applying time are three principal factors dominating the quality of riveting.

Adjust the three factors in the following steps for satisfactory riveting.

Caution!

Supply air to raise the head and turn the POWER switch of the controller off before adjusting the height of the cylinder slide.

Fig. 5-1a



3-1 Stroke Adjustment

(1) Spindle Height Adjustment
(Cylinder Slide Mechanism)

a. Unclamping Cylinder

Loosen the lock nuts ⑨ of the upper and lower clamp handles ⑥, and loosen the clamp handles.

b. Raising or Lowering Cylinder Slide

Set the supplied wrench ⑦ to the up-down screw end ⑧. Turn the wrench clockwise to raise and counterclockwise to lower the cylinder. The turning direction of the wrench can be changed with the change lever ⑩.

c. Cylinder Slide Height Adjustment

As a rule of thumb,adjust the cylinder height so that the work can be easily set and removed between the insert ③ and the anvil ④ or a jig.

(Adjustable range of the side 140mm)

However,note that riveting is disabled if the spacing exceeds the cylinder stroke (40mm).

d. Locking Cylinder Slide

On completion of setting the cylinder position, tighten the clamp handles ⑥ and the lock nuts ⑨ to lock the cylinder.

e. Locking Up-Down Screw

Turn the ratchet wrench ⑦ (in the cylinder lowering direction) to eliminate a play and lock the up-down screw certainly.

If the machine is operated in presence of a play,positional deviation may be caused by vibrations etc.

By the above step, table height adjustment is completed. However, align the anvil ④ and the anvil base ⑤, options, or the special jig etc. with the head ② and insert ③ prior to adjusting table height.

(2) Cylinder Stroke Adjustment (Refer to Fig. 5-1b)

Caution!

◎Supply compressed air and raise the spindle prior to adjusting the stroke.

a. Unlocking Adjusting Ring

Loosen the set screw ①.

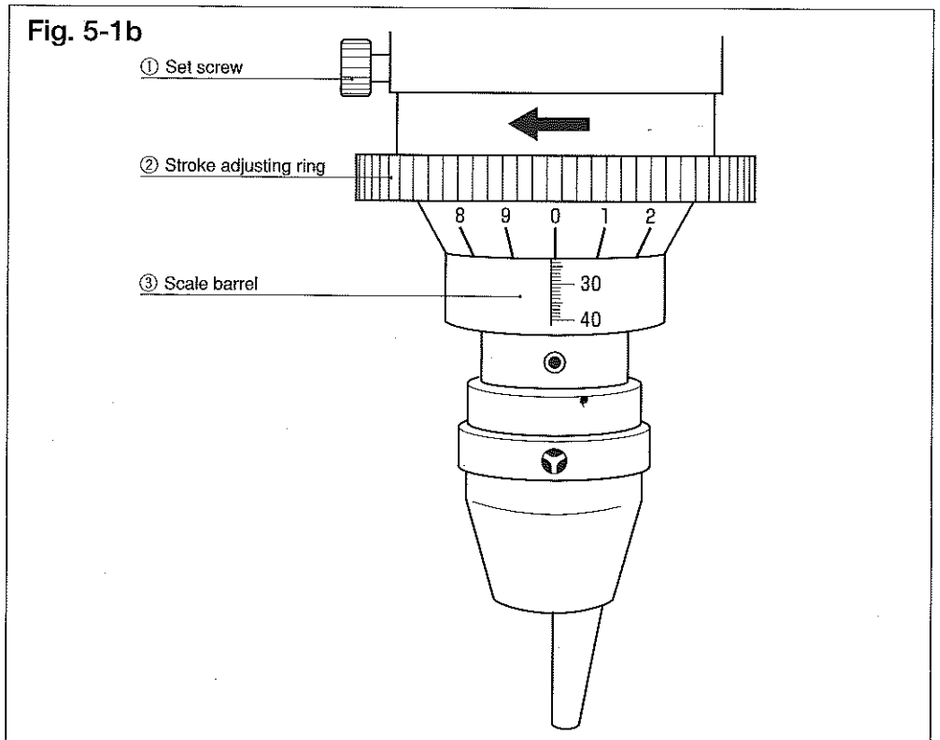
b. Stroke Adjustment

Adjust the stroke by turning the stroke adjusting ring ② to right or left.
The stroke is extended by turning left and shortened by turning right. The stroke is extended or shortened 2-mm by one turn. The range of the scale on the scale barrel ③ is 5~40mm in increments of 1mm, and the scale on the ring is graduated in increments of 0.1mm.

c. Locking Adjusting Ring

On completion of adjusting the stroke, tighten the set screw to lock the ring.

Fig. 5-1b



(3) Caution on Stroke Adjustment

To adjust the stroke, extend the stroke gradually starting with about 5 on the scale.
The insert, anvil, etc. may be damaged if the machine is idled with a long stroke.
On the US-66 riveting machine, the stroke is not adjustable in a range of 0 to 5mm structurally. Accordingly the minimum stroke is 5mm.

3-2 Riveting Pressure Adjustment

Adjust riveting pressure optimum according to the following steps, because the pressure has a dominant effect on the finish of works and the operation time.

⃠ Caution !

The maximum compressed air supply pressure of the US-66 riveting machine is 0.412Mpa (4.2kgf/cm²). Set the pressure correctly according to the reading of the pressure gage of the filter-regulator set. If the maximum supply pressure is exceeded, the machine may be broken down.

(1) Operating Pressure Adjustment

The operating pressure is a force applied to the work in riveting, requiring adjustment the type of the work.

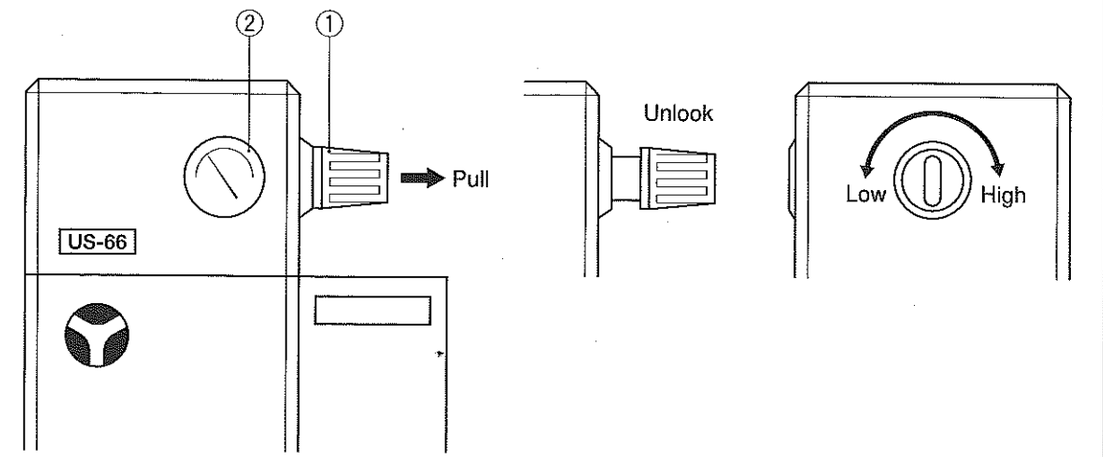
a. Operating Pressure Adjusting Procedure

The pressure adjusting knob ① on the side face of the cylinder is unlocked by pulling as shown in Fig. 5-2a. Turn the knob clockwise to raise pressure and counterclockwise to lower. The pressure set is shown on the front pressure gage ②.

The head return speed is not affected even if the working pressure is set very low. Also, the working pressure never exceeds the level set by the filter-regulator set even if the knob is set to the counterclockwise extremity.

On completion of setting, push the knob to lock.

Fig. 5-2a



b. Machine Thrust

Cylinder thrust is calculated from the operating pressure setting according to the thrust-operating pressure line diagram given later.

3-3 Operation Timer Adjustment

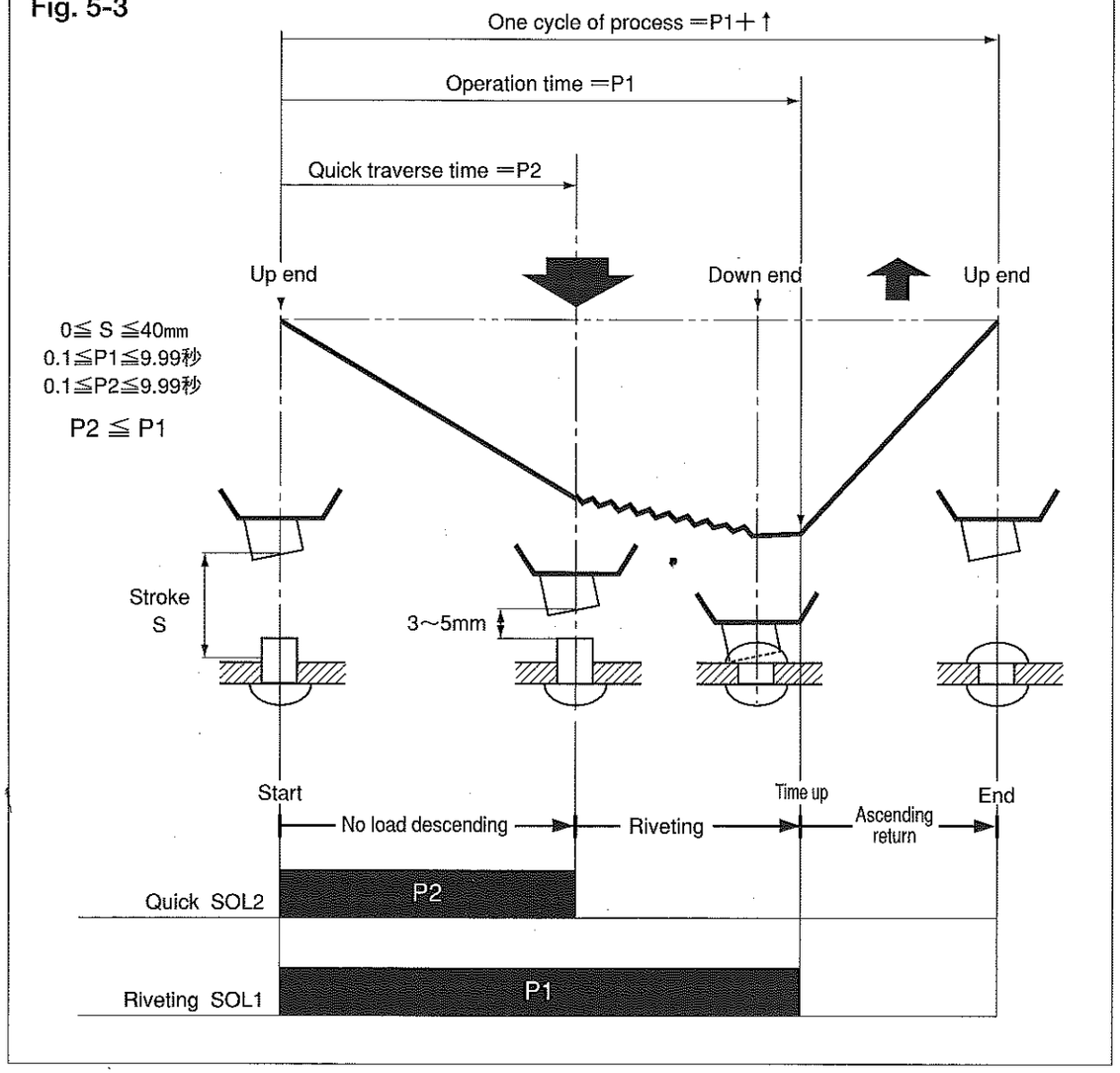
Operation time required for riveting is dependent on the material and shape of rivet (work), cylinder stroke, speed, and pressure. Find out an optimum time by riveting actually.

(1) Timer Setting

The features of the US-66 riveting machine include a quick timer (P2) for setting a quick traverse time from start to coming into contact with the work,and an operation timer (P1) for setting an operation time.

Relation between the timers and the working processes is shown in Fig. 5-3. The setting procedure of the timers is given in the paragraph "Timer Setting" of Section 4 "Operating Procedure of Controller YC-200."

Fig. 5-3



4. Operating Procedure of Controller YC-200

4-1 Operation of Panel

1) Power Supply

If power supply is turned on, the red LED of the [POWER] key is lit up. Warning or an error number is indicated on the display in the case of a controller input error or a CPU error. (Refer to Para. 4-2-(4) Failures for the details.)

2) Machine On/Off

Turning On/Off from Control Panel

Press the [POWER] key. The green LED comes on and the machine is turned on. The machine is turned off by another press of the key.

Control by External Signal (Option)

The machine is turned on by closing the power-supply-on input signal (across ON and GND) with the external power-supply-off signal (across OFF and GND) closed.

Caution !

◎If the external power-supply-off signal (across OFF and GND) is opened, the machine can not be turned on because the off signal takes precedence over key operation and the external ON signal.
◎Avoid frequent turning on and off the machine, or the machine may fail.

3) Mode Selection (AUTO-MAN)

Each time the [MODE] key is pressed, the mode is changed from AUTO to MAN or MAN to AUTO. The mode is also changed by closing the external mode signal (across MODE and GND).

However, since the manual mode has precedence over the automatic mode during riveting operation, change from AUTO to MAN is possible but change from MAN to AUTO is not possible until riveting is finished.

4) Spindle ON/OFF

Each time the [SPINDLE] key is pressed, the spindle is turned on or off.

If the spindle interlock function (F04) is turned on, the spindle remains motionless even if the key is turned on (green LED is lit), but starts up with the starting up of riveting.

5) Auxiliary ON/OFF (Option)

If the optional auxiliary cylinder, etc. is installed, it is turned on or off each time the [AUX] key is pressed in the manual mode of the machine.

6) Input of External Riveting Enable Signal (IL)

Riveting is disabled when the IL signal (across IL and GND) is opened. If the starting signal is turned on in the OFF condition, DISPLAY IL is indicated on the display.

The display turns to the ordinary condition when the IL signal is turned on but restarting is not admitted unless the start signal (SW1 and 2) is turned off once.

7) Input of External Emergency Stop Signal (STP)

If the STP signal (across STP and GND) is opened, power supply is turned off on the spot, and also DISPLAY E StoP is indicated on the display. Power on is not workable until the STP signal is closed.

4-2 Display

DISPLAY 0.0.0.0.0.0 usually indicates count values but serves also as a riveting timer, function setting, or LS monitor and an error indicator.

1) Counter Setting

Ⅰ) 6-Digit Output Counter (0～999999)

Each time on normal completion of one riveting cycle (start to P1 time up), 1 is added. Reading returns to 0 if 999999 is exceeded. The count value is stored in the memory and not cleared by turning off power supply.

Remarks : If the start signal is turned off before the time up of the operation timer (P1) in the manual mode, count is not made.

Ⅱ) Counter ON/OFF Setting and Resetting

If the [RESET] key is pressed once when the display shows a count value, the count function is turned off and the display shows DISPLAY -. If the [RESET] key is pressed, the count function is turned on indicating the current count value.

＊The counter ON/OFF setting is memorized and held even after power supply is turned off.

Counter Resetting

To reset the count to 0, continue to press the [SET] key for about 2 seconds.

2) Timer Setting

Continue to press the [F] key for 3 seconds with power supply turned on, and the display will show DISPLAY P.1.-2.00 ＊1.

DISPLAY P.1.-2.00
Timer setting 0.00～9.99 sec (in steps of 0.01 sec)
Timer No. 0～9 10, types (on extra option machine)

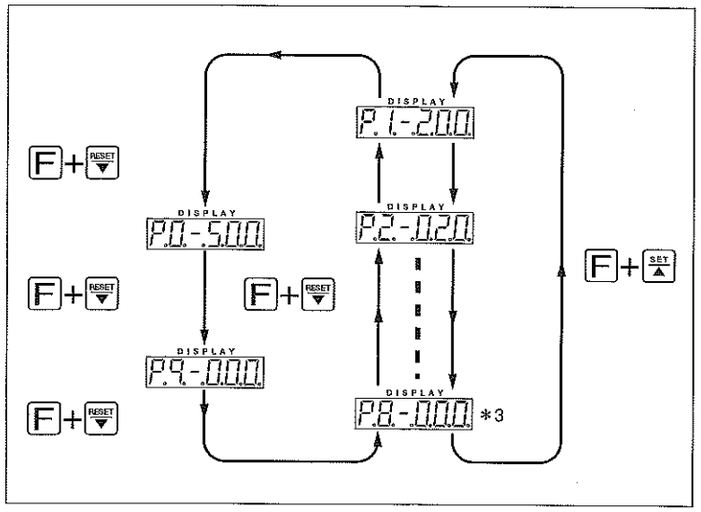
Timer No.

Timer type	No.	Specification
Riveting timer	P1	Standard
	P3	Option (F08) Function of selecting from 4 timers
	P5	
	P7	
Quick traverse	P2	Standard
	P4	Option (F08) Function of selecting from 4 timers
	P6	
	P8	
End signal timer	P9	Standard
Testing intermittent timer ＊2	P0	

＊1 P1-2.00 is a default value.
＊2 The timer P0 is intended for factory shipping test and can not be used for other purpose.

Ⅰ) Selection of Timer No.

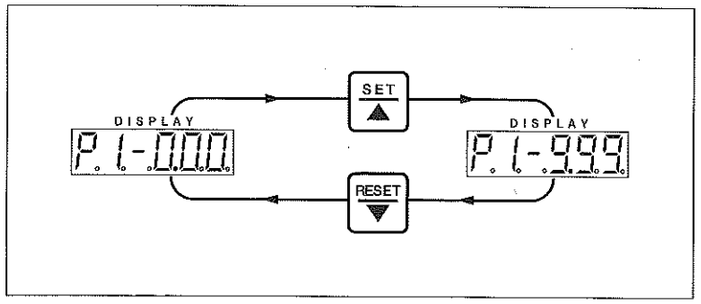
P0 and P9 can be selected only by decrementing from P1.



Ⅱ) Timer Value Setting

Set a value desired with the SET key incrementally or RESET key decrementally in steps of 0.01 sec from the default timer value DISPLAY P.1-2.00 indicated on the display.

Continue to press the SET or RESET key, and the value is successively varied slowly for a while and then rapidly.



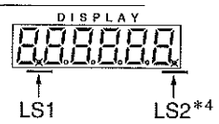
Ⅲ) Entering Timer Value

Continue to press the F key for 3 seconds to end setting, and the display turns to the counter mode. Setting is also automatically ended if the key is not operated for 20 seconds after setting.

Remarks : Riveting can be carried out while the display is in the timer setting mode but the count value is not incremented.

3) Monitor Function

Ⅰ) LS Monitor



ON or OFF of the limit switches LS1 (down end) and LS2 (up end) can be monitored with the decimal points of the 6th and 1st digits of the counter mode display.

ON = Bright, OFF = Dark

*3 P3 through to P9 timers can be shown only on the extra option machine.

*4 If the up end limit switch LS2 is not installed, the LS2 signal is short-circuited and the decimal point is bright all the time.

4) Error Indication

The display shows an error code or message in the case of controller internal failure, external emergency stop, or machine failure.

Error indication (memory error) is made only when the power supply is turned on.

If an error occurs, press the RESET key to initialize the error data and turns off the indication. Power supply can not be turned on unless the error data is initialized.

Power supply is turned off when an error message is indicated.

Power supply can not be turned on unless the error cause is removed and the indication is cleared.

■List of Error Indications

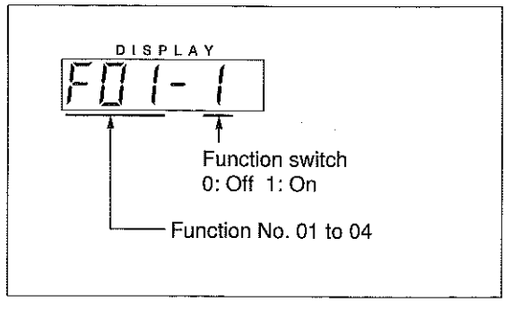
Indication	Description	Remedy
Err-01	Memory data error	Press the RESET key to initialize the data.
Err-10	Count value error	
Err-11	Timer P1 data error	
Err-12	Timer P2 data error	
Err-13	Timer P3 data error	
Err-14	Timer P4 data error	
Err-15	Timer P5 data error	
Err-16	Timer P6 data error	
Err-17	Timer P7 data error	
Err-18	Timer P8 data error	
Err-19	Timer P9 data error	
Err-20	Version data error	
Err-21	Function data error	
OL-1	Hydraulic pump motor overload	Remove cause of overload and reset thermal relay 1.
OL-2	Spindle motor overload	Remove cause of overload and reset thermal relay 2.
E StoP	Emergency stop	Reset external emergency stop.

*Timer P0 data error is automatically reset.

4-3 Function Setting

The following functions are selectable.

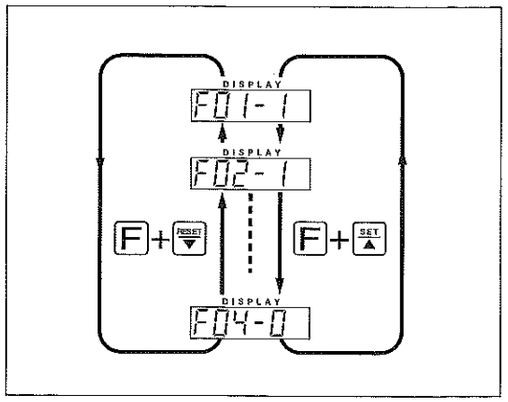
F No.	Function	Description
F01	Start input signal 1 (SW1) enabled	Start signal from SW1 is admitted.
F02	Start input signal 2 (SW2) enabled	Start signal from SW2 is admitted.
F03	Key operation memorizing	Status of mode and spindle key is memorized.
F04	Synchronous spindle run	Spindle spin is synchronized with riveting.



1) Function Selection and Setting

Press the POWER key while pressing the F key, and power supply is turned on and the display indicates as illustrated on the left. (Default option)

Ⅰ) Selection of Function No.



Each time the F key and the SET or RESET key are pressed, the function No. is incremented or decremented.

Ⅱ) Setting of Function Switch

Press the SET key to set "1" for turning the function on.

Press the RESET key to set "0" for turning the function off.

Ⅲ) Confirmation and Activation

Function selection and setting are confirmed by turning the power off after the completion of Ⅱ) above and become active the next time the power is turned on.

F01 and F02 are fixed to "1" (on) and the setting can not be changed.

2) Key Lock

The keys except for the POWER key can be locked to avoid misoperation or mis-setting of the control panel.

Ⅰ) Indication of Key Locked Condition

When the keys are locked, the green indicator light of the POWER key flashes when power supply is turned on, and the red indicator light when power supply is turned off. When the keys are unlocked, each indicator is lit steadily.

Ⅱ) Key Locking and Unlocking

Locking : When power supply is turned off and the keys are not locked, press the POWER key for about 5 seconds, and the keys are locked and the ON LED (green) flashes.

Unlocking : When power supply is turned on and the keys are locked, press the POWER key for about 5 seconds, and the keys are unlocked and the OFF LED (red) flashes.

> Remarks : Five seconds is a rough guide. Confirm locking or unlocking according to whether the indicator is steady or flashes.

3) Memory Initialization

Press the F and RESET key at the same time for 3 seconds to initialize all the memory data to default values. This does not affect the function setting. The values set last are held.

The default values of each memory are shown below.

Memory		Default Value
Counter		0
Counter on/off		ON
Key lock on/off		OFF
Mode (auto/man)		MAN
Spindle (on/off)		OFF
Timer	P0	5.00
	P1	2.00
	P2	0.20
	P3	0.00
	P4	0.00
	P5	0.00
	P6	0.00
	P7	0.00
	P8	0.00
	P9	0.00

⃠ Caution !

The memories can not be initialized if the keys are locked.

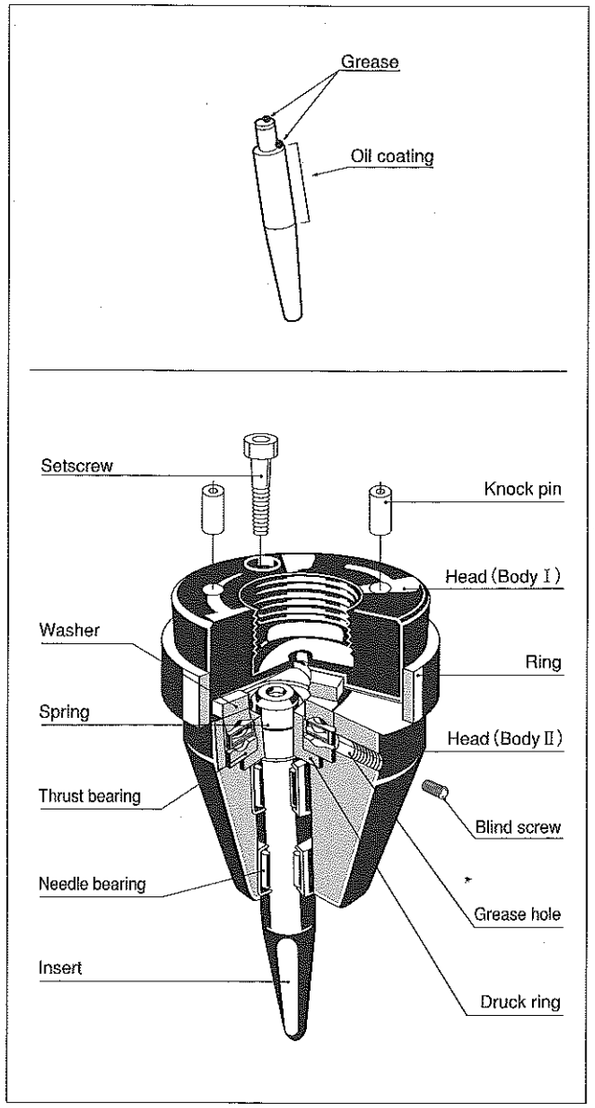
■Maintenance of Head

The head incorporates bearings for carrying the insert. If the lubricant in the head is used up or the bearings are worn out, intended finish of riveting is not obtained.

Carry out maintenance such as lubrication at regular intervals to secure satisfactory finish always.

⚠ Danger !

●It is very dangerous if the machine is operated by mistake during maintenance. Must disconnect the power supply plug before starting maintenance.



◎Relubrication

Lubricate the head every week (ever approx. 50 operation hours) as a roug guide.

The following two types of lubricants are recommended.

Grease: Lithium grease (Alvania 2)

Oil : Class 3 petroleum lubricating oil (e.g. T&D-S from BIRL)

Coat the upper end of the insert with a little amount (0.2 cc) of grease. If excessiv amount of grease is applied, spin of the insert ma get worse deteriorating the finish of riveting, if the rivet diameter is small (5 mm or less).

If the rivet diameter is small (5 mm or less), coat the entire insert with lubricating oil.

◎Spare Parts

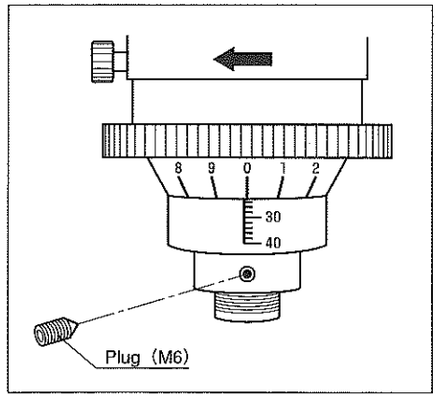
The parts used in the head are all expendable. They need be replaced at regular intervals.

■Maintenance of Machine

Comply with the following instructions to maintain the ability of the riveting machine over many years.

⚠ Danger !

●It is very dangerous if the machine is operated by mistake during maintenance. Must disconnect the power supply plug before starting maintenance.



1) Lubrication of Spindle Section

Lubricate the spindle section every six months (approx. 1,500 operation hours) as a rough guide though the relubrication frequency depends on the operating frequency of the machine.

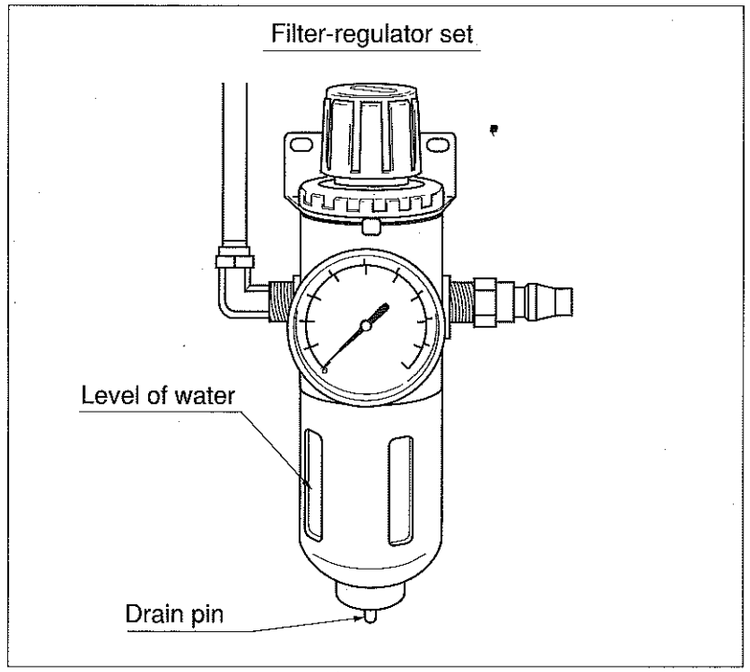
◎Lubrication Procedure

As shown in the left illustration, a lubrication port is provided at the lower portion of the spindle. Remove the plug and screw the mouth piece of the grease gun in the port. An amount of grease supplied by one stroke of the grease gun handle is adequate.

- Grease : Lithium grease (Alvania 2)
- Grease gun: Our recommendation (extra option)

(2) Air Filter Cleaning

The filter of the filter-regulator set removes dirt and separates water from compressed air, and the water accumulates in the filter. Pay attention to the level of the accumulated water and drain the water by pushing up the drain pin on the under side of the filter.



■Daily Inspection

Carry out the inspection outlined below before starting the day's operation to maintain stable finish of riveting and detecting a machine failure early.

◎ Check before Power On

Item	Procedure	Key Point
Head	Turn insert by fingers to make sure that it turns smoothly.	Clean inside of head or replace bearings if turns heavy or sticks.
Insert	Ensure that insert end is free from plating dust or swarf.	If not removable by wiping with cloth, grind insert end. Do not remove by file etc.
Filter-regulator set	Check pressure gage if air supply pressure is adequate. check level of water in filter.	If water accumulates rapidly, provide dryer to air supply source.
Operating pressure	Check pressure gage if pressure set is indicated.	

■Trouble Shooting

Machine trouble	Cause			What to do
Machine not turned on	Power off indicator (red) LED	Off	1. Power supply interrupted	Check power source.
			2. Power supply plug not connected	Check power supply plug.
			3. Fuse blown out	Replace fuse.
		On	1. Error message on display	Refer to Para. 4-2-4) List of Error Indications.
			2. Control equipment failure	Replace or repair.
Head remains motionless	1. Spindle switch in off position			Turn on.
	2. Single-phase power supply			Correct to 3-phase power supply.
	3. Motor failure or coupling in cylinder broken			Replace or repair.
Cylinder not ascending when power supply is turned on	1. Air supply pressure is too low			Adjust pressure.
	2. Solenoid valve faulty			Replace or repair.
	3. Quick exhaust valve faulty			Replace or repair.
Riveting cylinder not descending	1. Low riveting pressure setting			Adjust pressure.
	2. Operation timer is too short			Adjust timer.
	3. Solenoid valve faulty			Replace or repair.
	4. Pressure reducing valve faulty			Replace or repair.
	5. Quick exhaust valve faulty			Replace or repair.
	6. Packing in cylinder faulty			Replace or repair.
Head stops when riveting	1. Bearing in head faulty			Replace or repair.
	2. Bearing in spindle section faulty			Replace or repair.
	3. Single phasing			Correct to three phases.
Poor riveting				
Scatter of finish	1. Stroke adjusting screw and cylinder clamp loosened			Check lock screw, nut.
	2. Anvil or jig not matching rivet			Correct jig etc.
Burrs produced	1. Cylinder descends excessively			Adjust cylinder stroke.
	2. Insert end shape improper			Correct insert.
	3. Caulking allowance of work excessive			Correct work.
	4. Riveting center misaligned			Align.
Rough point surface	1. Swarf on insert end			Clean, or repair.
	2. Grease in head excessive			Wash and fill adequate amount of grease.
	3. Bearing in head faulty			Check and replace bearing.
Riveting failure	1. Low riveting pressure			Increase pressure.
	2. Bearing in head faulty			Inspect, replace bearing.
	3. Rivet turning with insert			Improve anvil or jig.
	4. Rivet material hard			Machine capacity insufficient

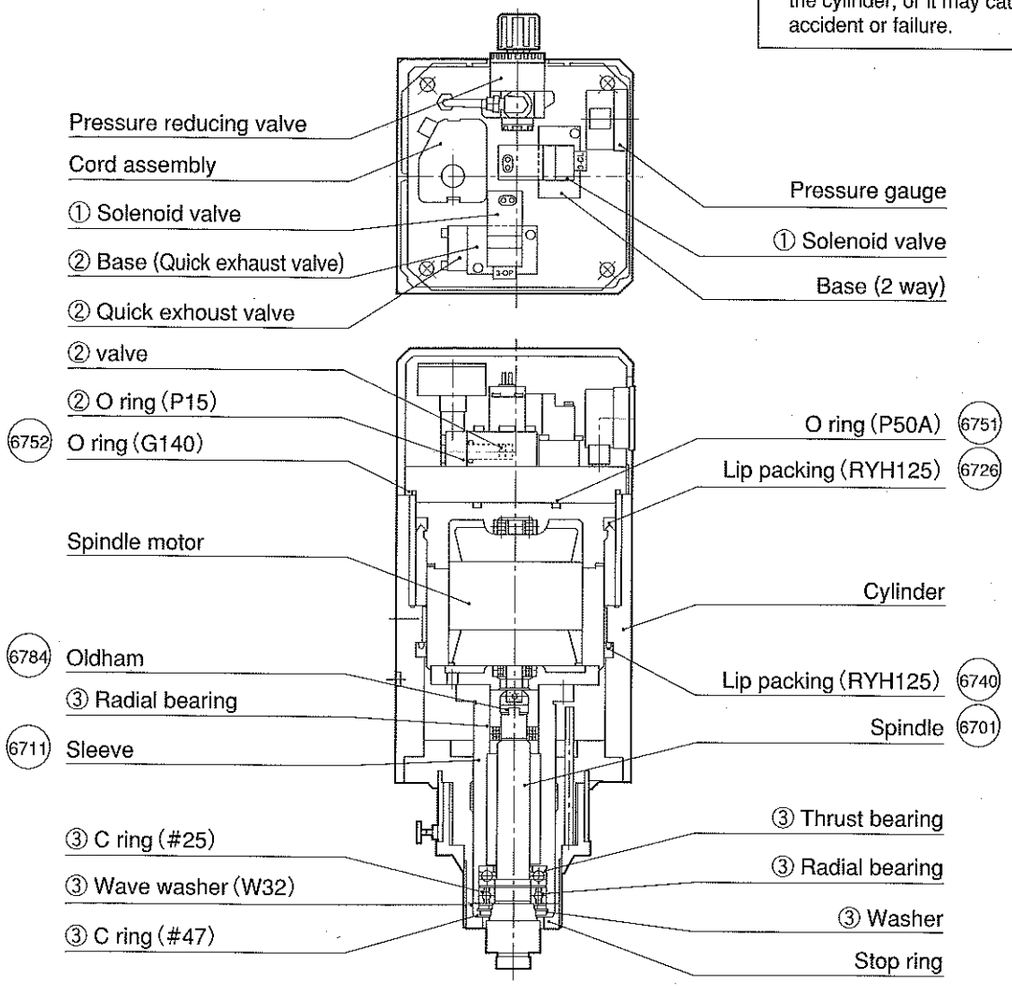
◎ Refer to the corresponding descriptions in the text for adjusting procedures.

Cross-sectional Diagram of Cylinder

○The parts with encircled part number are expendable items and need to be replaced at regular intervals.

Caution !

●Do not disassemble nor modify the cylinder, or it may cause an accident or failure.



Parts ①, ②,and ③ should be replaced in a set listed below.

① Valve maintenance set

Part No.	Part	Model No./Spec	Qty
6767	Solenoid valve		2

② Quick exhaust valve set

Part No.	Part	Model No./Spec	Qty
6768	Base Iguick exhaust valve	with O ring (P9)	1
6769	Quick exhaust valve	with O ring (P9)	
6773	valve		
6771	O valve	P15	

③ Bearing maintenance set

Part No.	Part	Model No./Spec	Qty
6713	Radial bearing	#6003LLU	1
6708	Thrust bearing	#51205	
6706	Radial bearing	#6005LLU	
6707	C ring	#25	
6705	Wave washer	W32	
6704	Washer		
6703	C ring	#47	

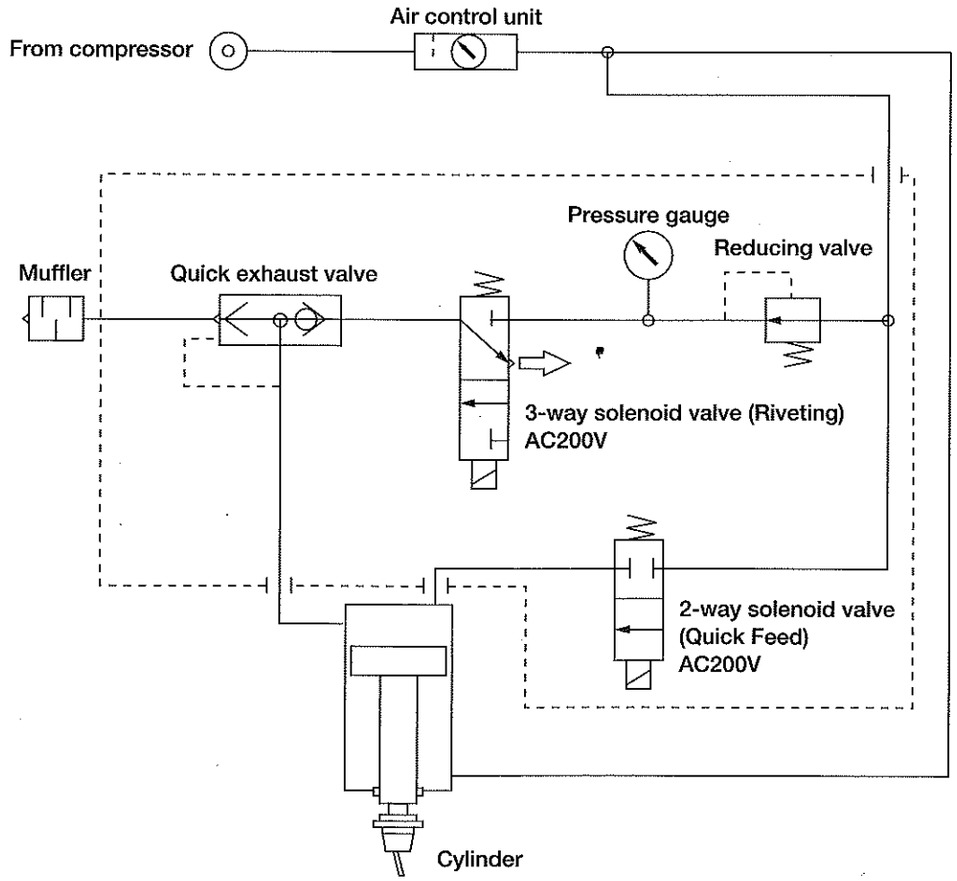
Air Circuit Diagram

Air circuit is as drawing.
The air is only consumed when the spindle goes up. When the spindle goes down, the air is not consumed.
So the necessary air consumption is less than other machine.

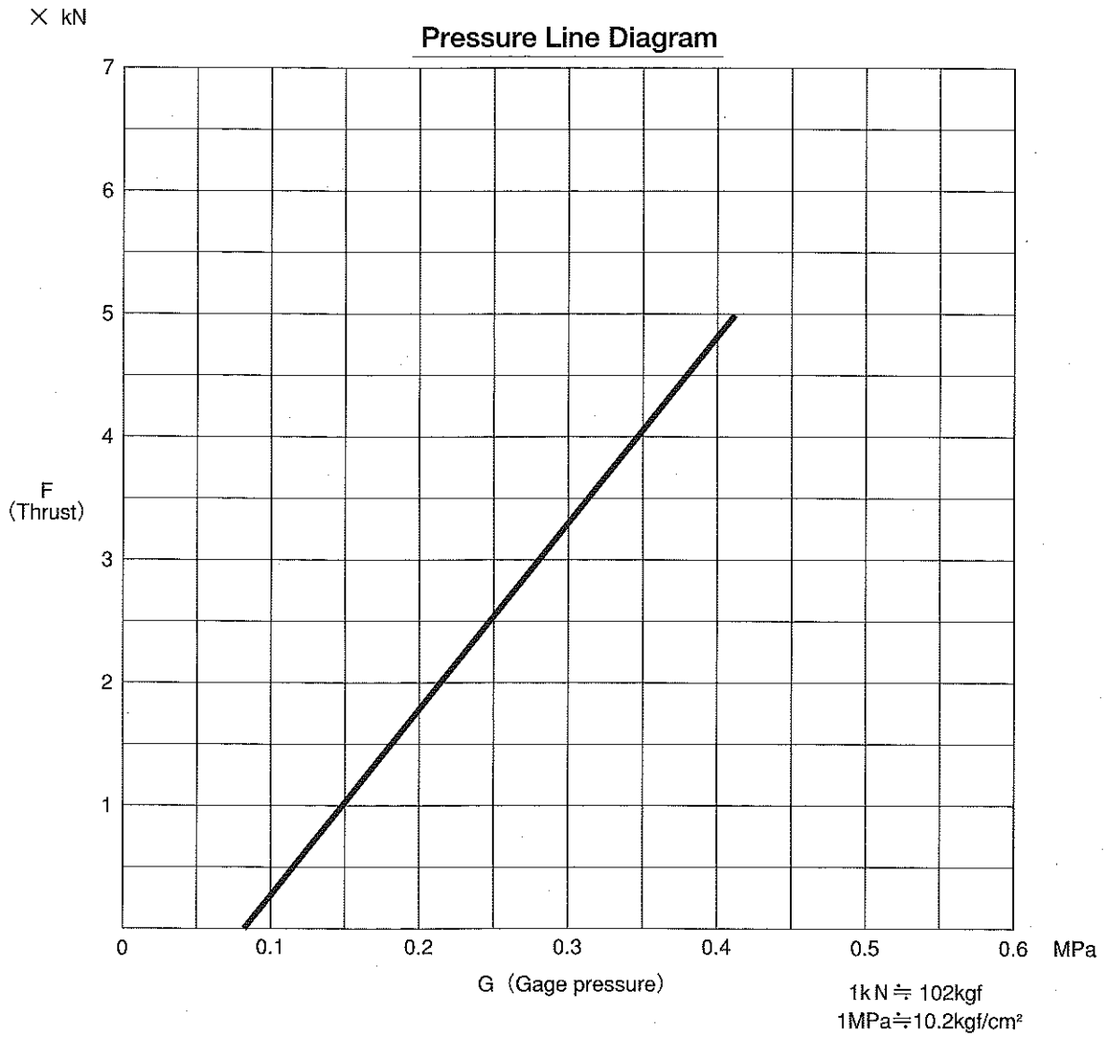
EX: Air consumption in case of air pressure 4.2kg /cm²

Stroke mm	Working / min	Air consumption Nℓ/ min
40	10	25.9
30	10	19.4
20	20	25.9
10	20	12.9

US-66 Drawing Air Circuit



Thrust—Operating Pressure Line Diagram



1kN ≒ 102kgf
1MPa≒10.2kgf/cm²

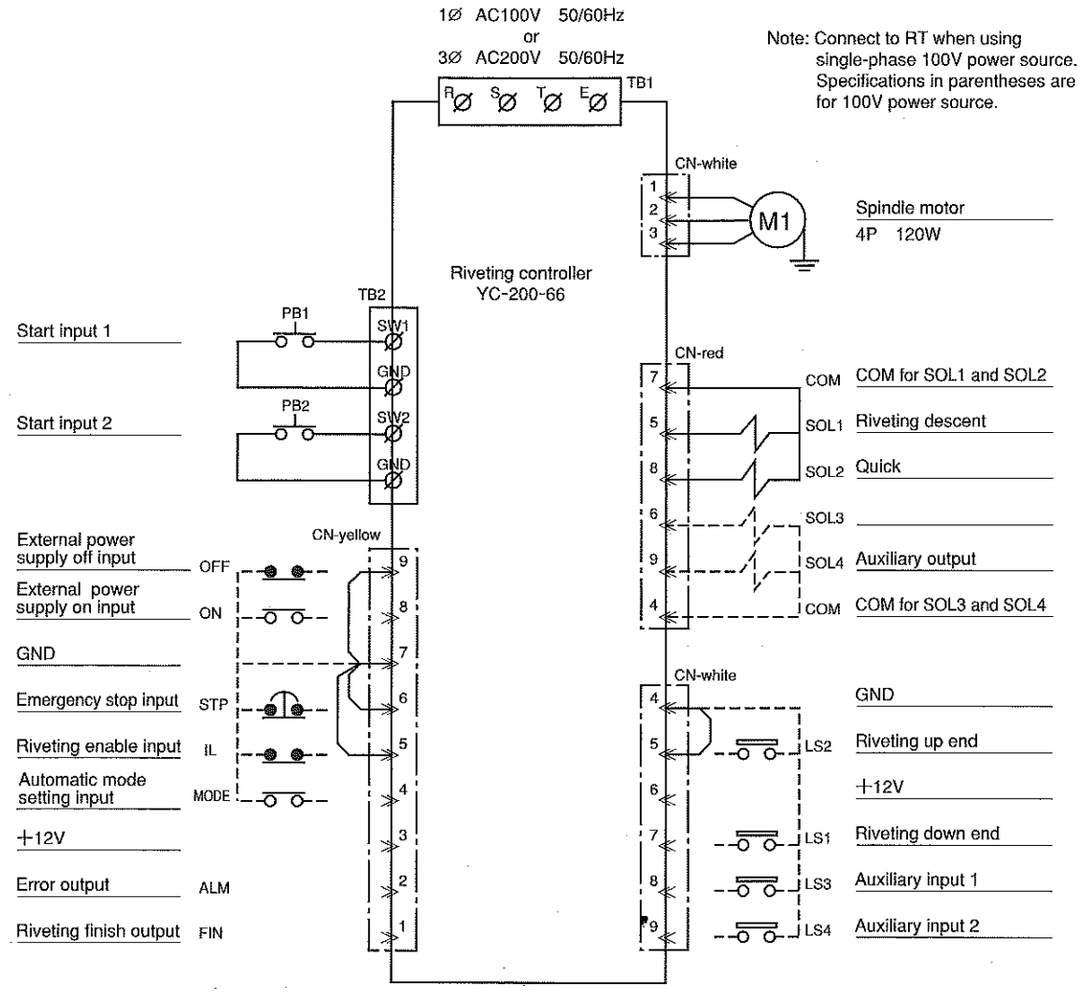
Thrusts for Various Rivet Materials

Unit × kN

Material \ Rivet dia mm	0.5	1.0	2.0	3.0	4.0	5.0	6.0		
Mild steel	0.8	1.0	2.0	3.0	4.0	5.0	—	—	—
Stainless steel	1.0	2.0	3.0	4.0	5.0	—	—	—	—
Brass	0.7	0.8	1.8	2.5	3.5	4.0	5.0	—	—

Remarks : The above thrusts are reference values presuming that the insert shape is flat, the rivet is solid, and the upsetting allowance = rivet dia. x 1/3. Riveting pressure to be adopted shall be adjusted each time.

Electric Circuit Diagram



Input and Output Specifications

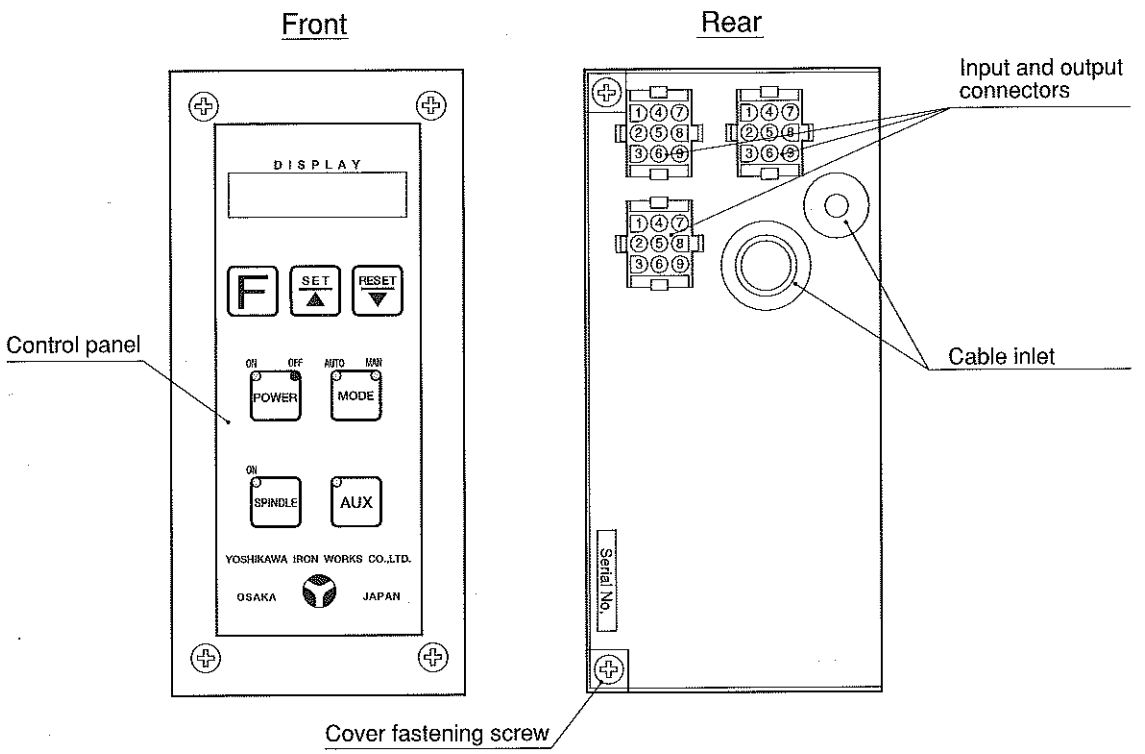
Power supply Allowable voltage fluctuation Fuse Operating temperature		AC200V 50/60Hz ±10% 5A glass tube −10~+50℃ No condensation
Auxiliary power supply		Across+12V and GND DC12V 100mA
Input	Contact input	(Photo coupler isolation) x 11 Max. off current 0.8 mA Min. input pulse width 80 ms
Output	For SOL	SSR x 2 Load voltage rating AC100~240V Max. current rating 2 A (Min. 0.1 A)
	Finish output	Open collector Max. current rating 100mA Max. voltage rating DC24V
	Error output	Open collector Max. current rating 100mA Max. voltage rating DC24V

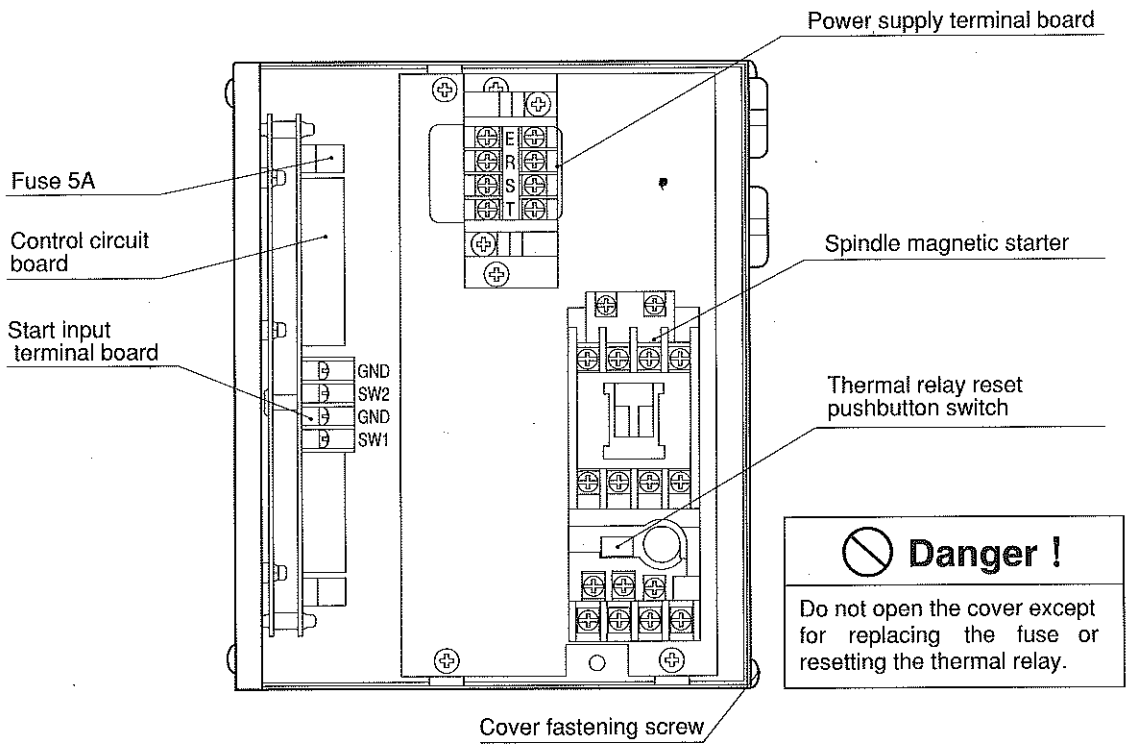
In the diagram, CN-red, -white, and -yellow show connector color codes, and numerals 1~9 indicate pin numbers at the portions marked ⊰.

Recommended external connection parts

⊰ section Universal MATE-N-LOCK connector 9P plug
model No. 1-480706-0 from AMP Ltd.
Pin contactors
model No. 350705-1 from AMP Ltd.
TB1 section Crimp terminals
model No. 2Y-3.5 equivalents from NICHIFU Co., Ltd.
TB2 section Crimp terminals
model No. 1.25Y-3 equivalents from NICHIFU Co., Ltd.

Controller Component Layout Diagram





Danger !

Do not open the cover except for replacing the fuse or resetting the thermal relay.