

MODEL VTP-18, VTV-18

1. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

The **[Bold]** numbers in the descriptions below correspond to the item numbers in the parts exploded diagrams of the VTP-18 and VTV-18.

1-1. Disassembly

1-1-1. Disassembly of the Armature

- (1) Remove the Handle Cover

By loosening the M4 x 20 Tapping Screw **[40]**, the Handle Cover **[41]** can be removed.

- (2) Remove the Carbon Brushes

After loosening the M4 x 16 Tapping Screw **[43]**, remove the Holder Pieces **[44]**. Use a small screwdriver to extract the Brush Holders **[46]** while slightly lifting it.

Pull the stator lead wire connected to the terminal off the Carbon Brushes **[45]**, while pushing the Carbon Brushes **[45]** to the bottom of the Brush Holders **[46]**.

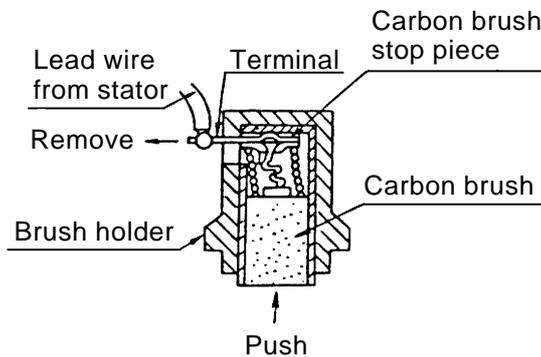


Fig. 1

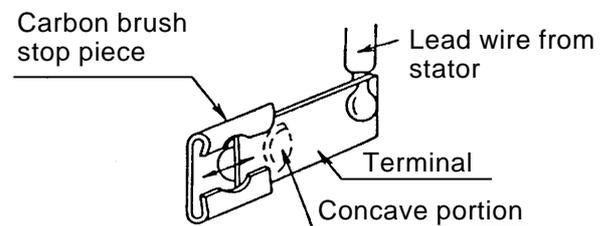


Fig. 2

- (3) Separate the Gear Cover from the housing ass'y

After loosening the M5 x 35 Tapping Screw **[14]**, separate the Gear Cover **[13]** from the housing ass'y. Then extract the Armature **[21]** forming a one-piece structure with the Inner Cover **[18]** from the Housing **[26]**.

- (4) Extract the Armature from the Inner Cover

Depress the pinion gear top end of the Armature **[21]** while supporting the Inner Cover **[18]** with the cylindrical fixture as shown in Fig. 3.

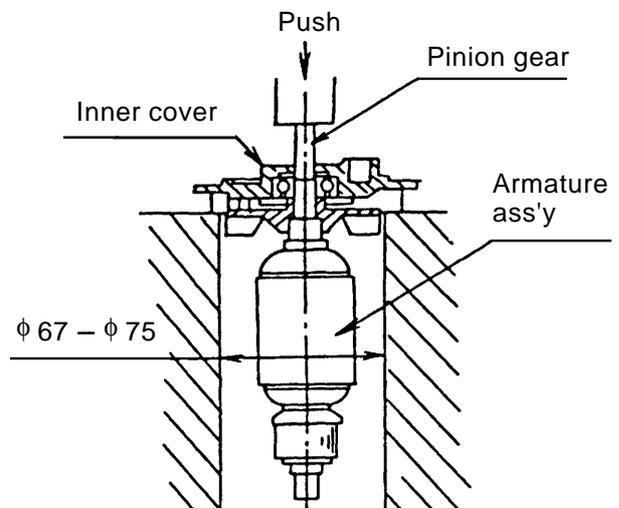


Fig. 3

1-1-2. Disassembly the Speed Change-Over Section

(1) Remove the Shift Plate

Loosen the M4 x 12 Seal Lock Flat Hd. Screw [28]. Since this screw is secured with a bonding agent, it cannot be easily loosened except by heating the overall gear cover section. After loosening the screw, the Shift Plate [32] which forms a one-piece structure with Spring (B) [31] and the Shift Lock [30] can be removed. Since it is easily removed, be careful not to misplace or lose Spring (B) [31].

(2) Extract the gears

By using a wooden hammer to tap gently the connecting portion of the Gear Cover [13], and the Inner Cover [18], the Second Pinion [35], Gear [15], Spring [16], Washer [17], Shift Arm [34], and Seal Plate [33] can be removed from the gear cover interior.

1-1-3. Disassembly the Hammering Section

(1) Drill Chuck disassembly

The Drill Chuck [2] is secured to the spindle with a UNF 1/2" - 20 screw (right-handed screw). Apply a J-78 ring ass'y (for VTV-13) or a J-90 ring ass'y (for VTV-13) to the body of the Drill Chuck and secure it with a vise as illustrated in Fig. 4. Insert the ring ass'y pin into the handle hole of the body. Then apply a slender 17 mm wrench to the wrench fitting surfaces of the Spindle [5] and turn it counterclockwise; thus, the Drill Chuck can be removed.

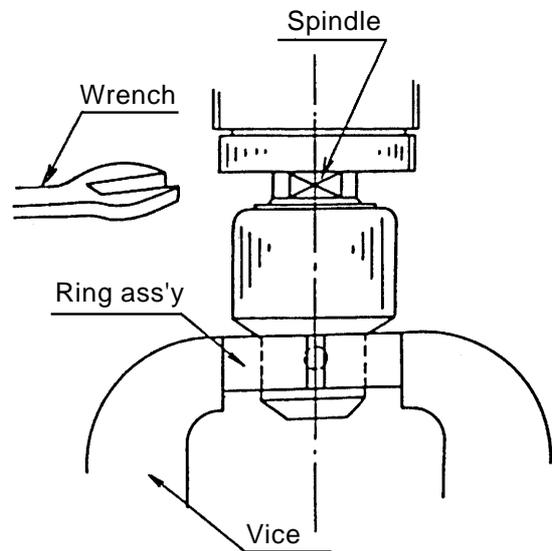


Fig. 4

(2) Extract the Spindle

Remove the C-type Retaining Ring for D32 hole [3] which supports the Dust Seal [4]. By using a wooden hammer to tap the inner cover side end of the Spindle [5] gently, both the Dust Seal [4] and the Spindle [5] can be removed. Both the Ball Bearing [6] and Ratchet (B) are mounted on the spindle.

(3) Remove Ratchet (B)

Remove Ratchet (B) by using a jig shown in Fig. 5.

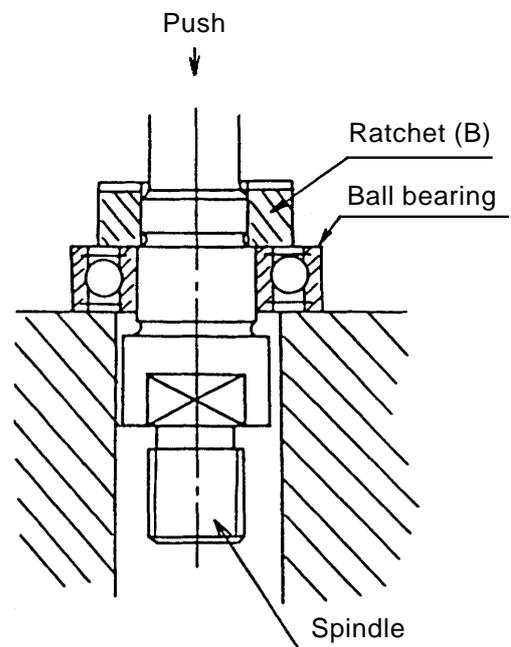


Fig. 5

(4) Remove Ratchet (A)

Since Ratchet (A) is secured to the Gear Cover [13] by an M20 left-hand-threaded screw, apply a J-94 special screwdriver to the groove on the side opposite the ratchet threaded portion, as shown Fig. 6. By turning the screwdriver counterclockwise, the left-hand-threaded screw is loosened. When securing the Gear Cover, be careful not to damage it.

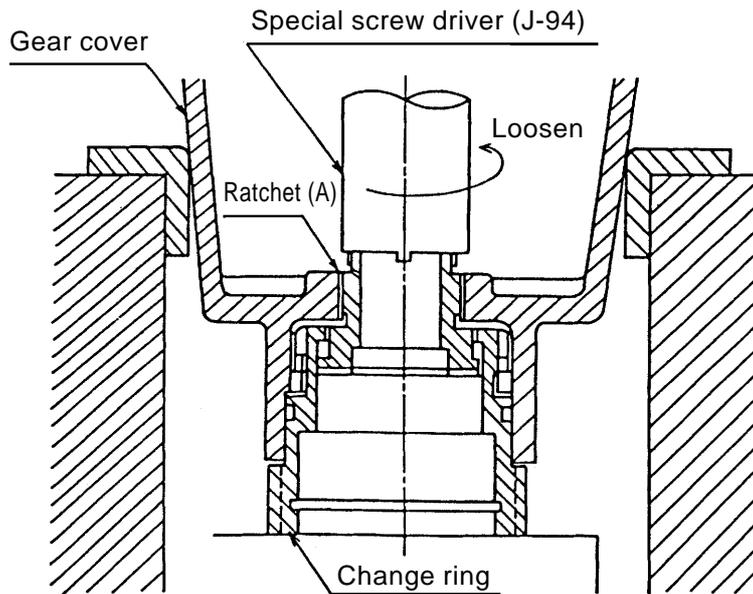


Fig. 6

(5) Remove the Change Ring

Since the Change Ring [10] is mounted to the Gear Cover [13] with a M34 double-threaded screw, it can be removed by turning the screw counterclockwise.

1-2. Reassembly

Reassembly can be accomplished by following the disassembly procedures in reverse. However, special attention should be given to the following items.

1-2-1. Reassembly of the Hammering Section

- (1) Prior to mounting the Change Ring [10], be sure to use a Washer [12]. Fully coat grease (Doubrex #251) on the O-Ring [11] to be mounted on the Change Ring [10].
- (2) When screwing in Ratchet (A), turn it clockwise by using the J-94 special screwdriver (applied to the groove provided on the opposite side of the ratchet surface) after confirming that one or more screw threads have correctly meshed with each other. Should the ratchet not be fully screwed in, the grooved ratchet end will protrude about 1 mm over the gear cover screw surface. Confirm that the Ratchet (A) has been screwed in by observing whether or not such protrusion exists.

1-2-2. Reassembly the Speed Change-Over Section

- (1) Insert the Seal Plate [33] into the sliding portion of the Shift Arm [34] within the Gear Cover [13]. Follow the instructions shown in the Fig. 7 for the seal plate inserting direction and the sponge surface direction.
- (2) Insert the Gear [15] through the Spindle [5] while supporting it between the both arms of the Shift Arm [34]. In other words, the Shift Arm [34] is inserted into the shift arm sliding portion, along with the Seal Plate [33]. (When inserting it, the sponge is pressed flat.) Be careful as to the difference in the arm length of the Shift Arm [34].
- (3) Insert the Shift Plate [32] (forming a one-piece structure with the Shift Lock [30] and D3 x 12 Roll Pin [29]) into the shift plate sliding portion provided outside the Gear Cover [13]. Be careful not to lose mounting Spring (B) [31]. After aligning the through hole for the shift plate screw and the shift arm screw hole, secure the Shift Plate with M4 x 12 Seal Lock Flat-Hd. Screw [28]. In this reassembling process, be careful not to pinch the Seal Plate [33] between the Shift Plate [32] and the Shift Arm [34].

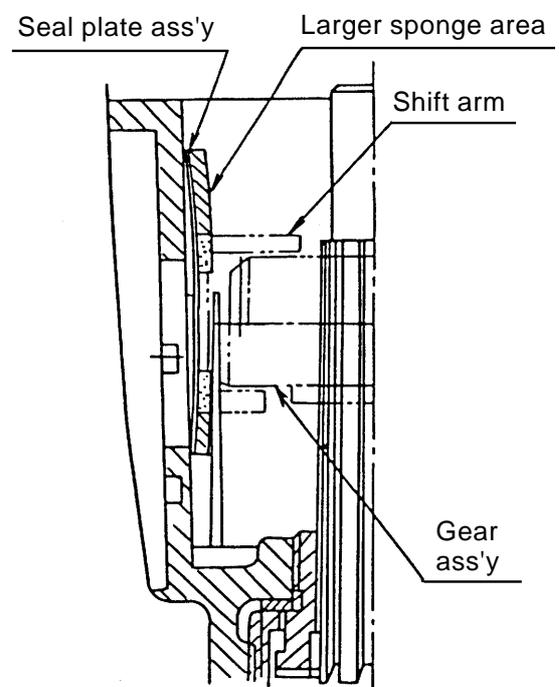


Fig. 7

Apply screw locking agent (Three Bond TB1401) to the M4 x 12 Seal Lock Flat Hd. Screw. Be careful as to the volume of bonding agent used. Do not apply such an excessive volume that the bonding agent is allowed to flow into the sliding portions, resulting in inferior sliding movement. After completion of tightening, attempt to slide the Shift Plate [32] several times to confirm that the nail of the Shift Lock [30] is hooked onto the groove of the Gear Cover [13].

Apply screw locking agent (Three Bond TB1401) to the M4 x 12 Seal Lock Flat Hd. Screw. Be careful as to the volume of bonding agent used. Do not apply such an excessive volume that the bonding agent is allowed to flow into the sliding portions, resulting in inferior sliding movement. After completion of tightening, attempt to slide the Shift Plate [32] several times to confirm that the nail of the Shift Lock [30] is hooked onto the groove of the Gear Cover [13].

1-3. Lubrication

(1) Apply NPC SEP-3A (Code no. 930035) to the following

- Inside of the Gear Cover **[13]** (50 g)
- Pinion of the Armature **[21]**
- Teeth portions of the Gear **[15]** and the gear of the Second Pinion **[35]**
- Inner circumference of the metal of the Inner Cover Ass'y **[18]**
- Spline portion of the Spindle **[5]**

(2) Apply Doubrex 251 (Code No. 971042) to the following

- Teeth portion of the Ratchet **[7]**
- Screw portion of the Change Ring **[10]** and O-Ring **[11]**

1-4. Tightening Torque

- Ratchet, left-hand-threaded screw 2.0 - 4.9 N·m (20 - 50 kgf·cm)
- Tapping Screw M4 **[40]**, **[43]**, **[54]***, **<55>*** 2.0 ± 0.5 N·m (20 ± 5 kgf·cm)
- Tapping Screw M5 **[14]** 2.9 ± 0.5 N·m (30 ± 5 kgf·cm)
- M4 Machine Screw **[37]** 2.0 ± 0.5 N·m (20 ± 5 kgf·cm)
- M4 Seal Lock Flat Hd. Screw **[28]**, **[36]** 2.0 ± 0.5 N·m (20 ± 5 kgf·cm)

*The numbers of **[54]** and **<55>** correspond to the item numbers in the Parts Lists for VTP-18 and VTV-18.

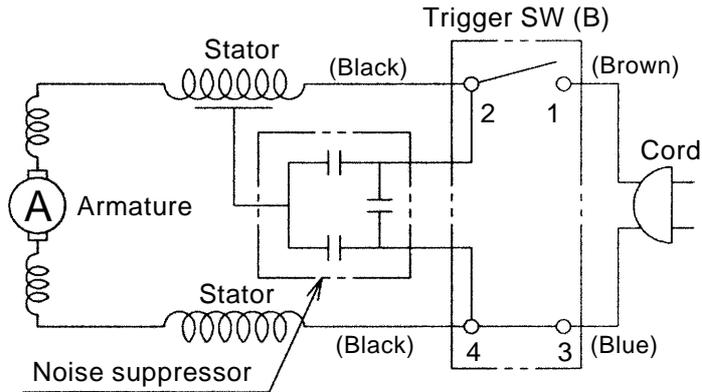
1-5. Wiring Diagrams and Lead Wire Arrangements

Conduct wiring in accordance with the diagrams and arrangements illustrated below.

1-5-1. Model VTP-18 Wiring and Schematic Diagrams

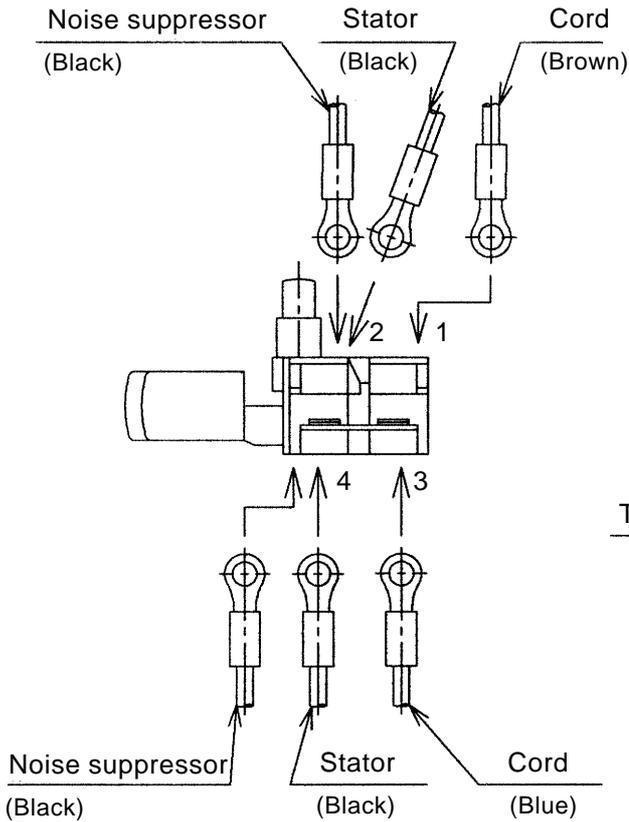
The symbols 1, 2, 3 and 4 in the diagrams correspond to switch terminal figures.

(1) For models with noise suppressor

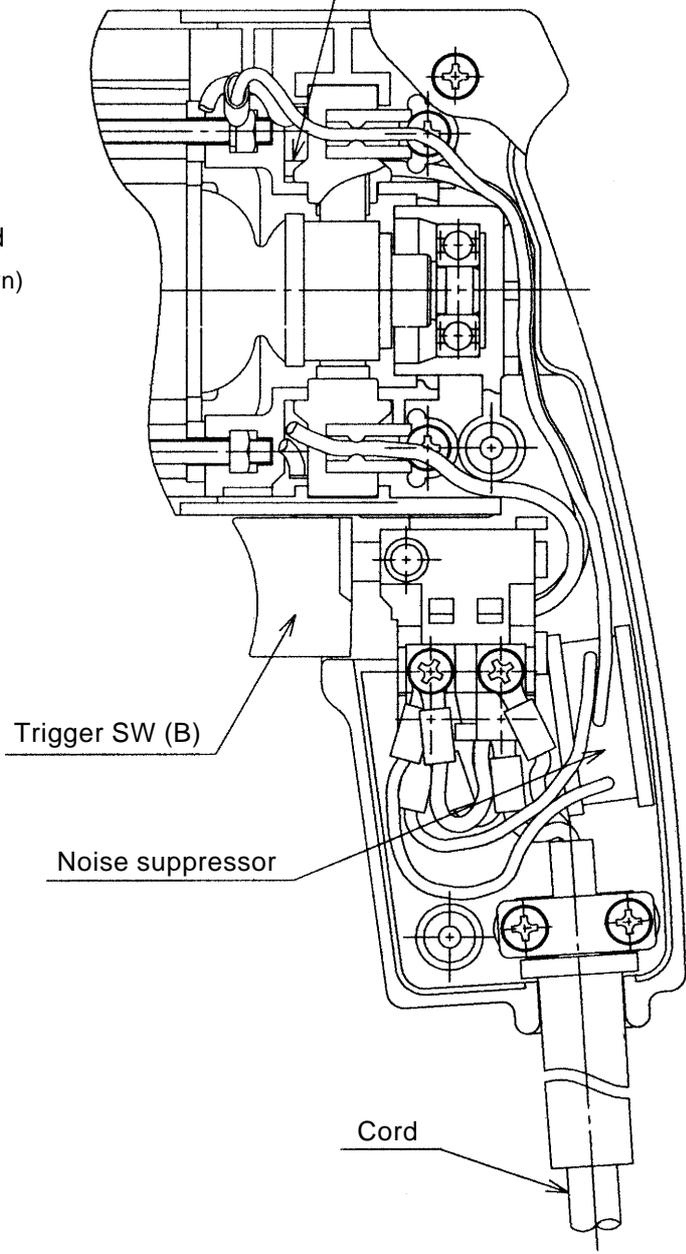


Wiring diagram

Pass the lead wire of the stator under the brush holder



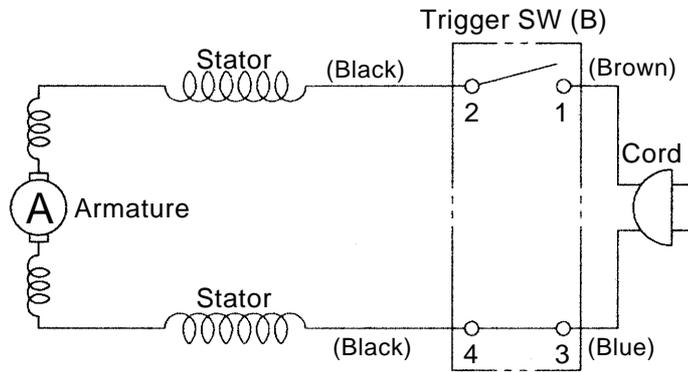
Lead wire mounting positions



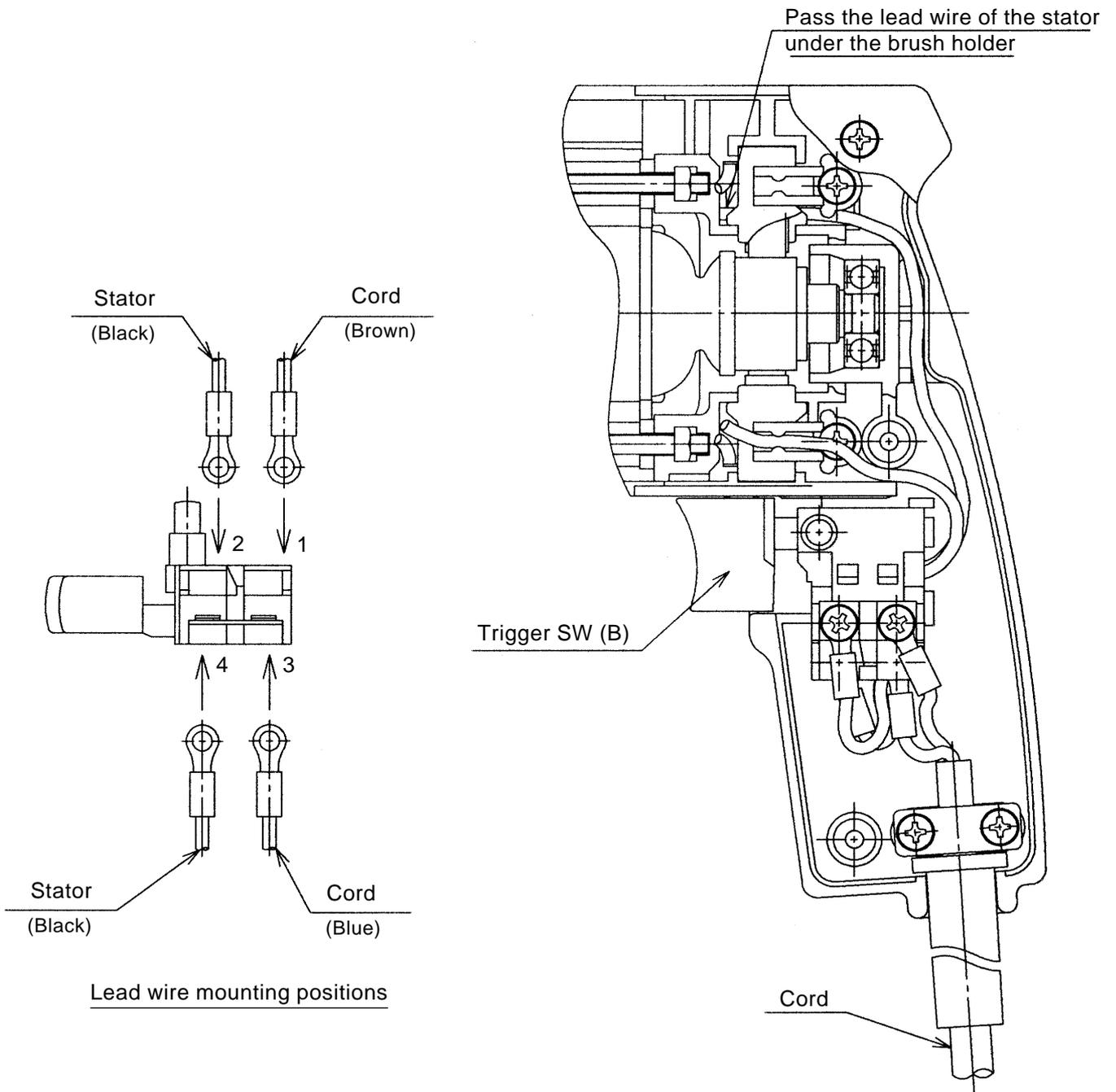
Schematic diagram

(2) For models without noise suppressor

(For Singapore)

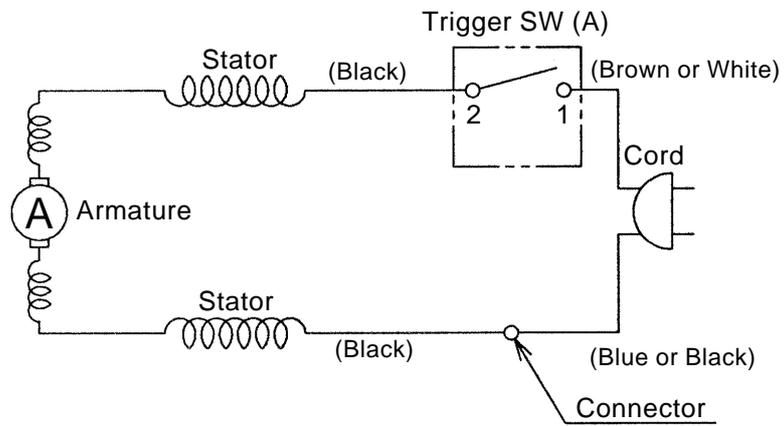


Wiring diagram

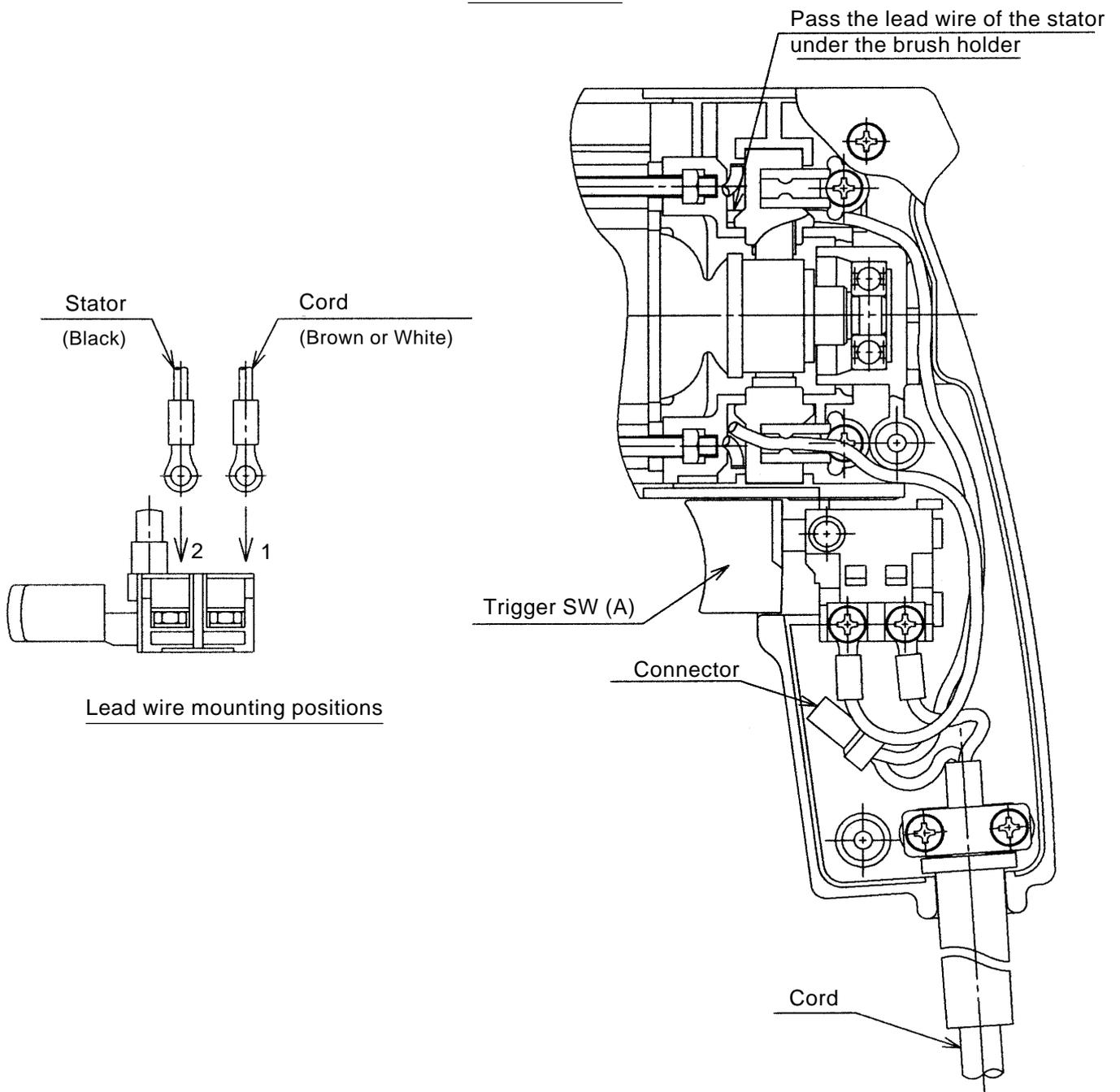


Schematic diagram

(3) For models without noise suppressor
 (For other countries)



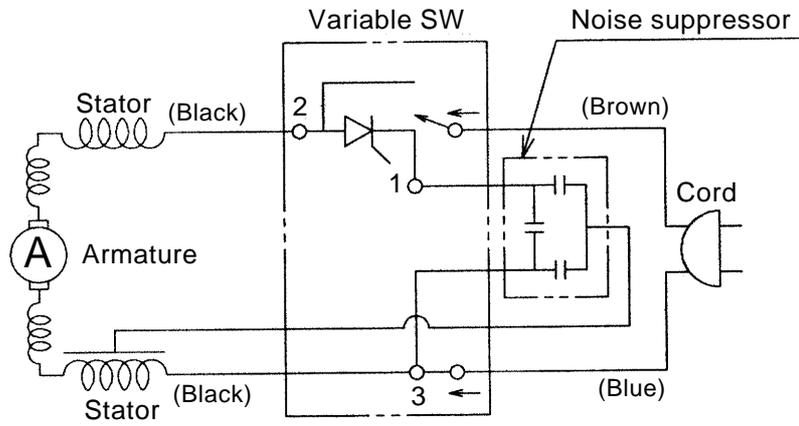
Wiring diagram



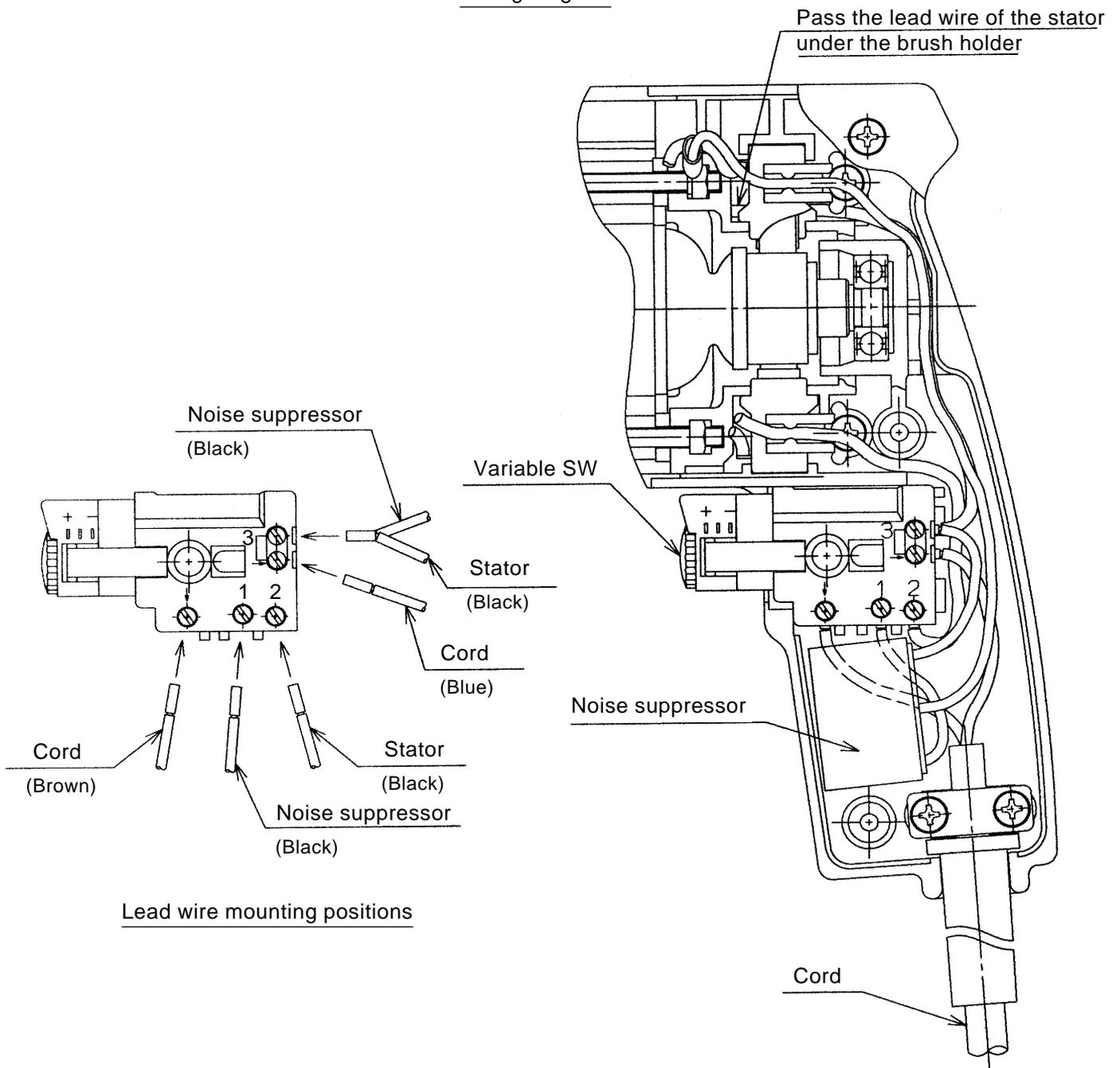
Schematic diagram

1-5-2. Model VTV-18 Wiring and Schematic Diagrams

The symbols 1, 2, 3 and † in the diagrams correspond to switch terminal figure.



Wiring diagram



Lead wire mounting positions

Schematic diagram

1-6. Insulation Test

On completion of reassembly after repair, measure the insulation resistance and dielectric strength.

Insulation resistance: 7MΩ or more with DC 500 V Megohm Tester

Dielectric strength: AC 4,000 V/1 minute, with no abnormalities 220 V, 230 V, 240 V
(and 110 V for U.K. products)
AC 2,500 V/1 minute, with no abnormalities 110 V

1-7. No-Load Current Values

After 30 minutes of no-load operation, current values should be as follows.

110 V Less than 2.2 A
220 V }
230 V } Less than 1.2 A
240 V }

2. STANDARD REPAIR TIME (UNIT) SCHEDULES

MODEL	Variable		10	20	30	40	50	60 min.
	Fixed							
VTP-18 VTV-18	General Assembly	Work Flow						
		Switch Cord						
					Housing Stator			
				Armature Ball Bearing (608VV) x 2 Inner Cover				
				Second Pinion Gear Spring Ball Bearing (608VV)				
				Dust Seal Retaining Ring	Spindle Ball Bearing (6002DD) Ratchet (A).(B) Set	Change Ring Gear Cover		