



MODELS FDV 16VB/FDV 16T/FDV 16

1. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

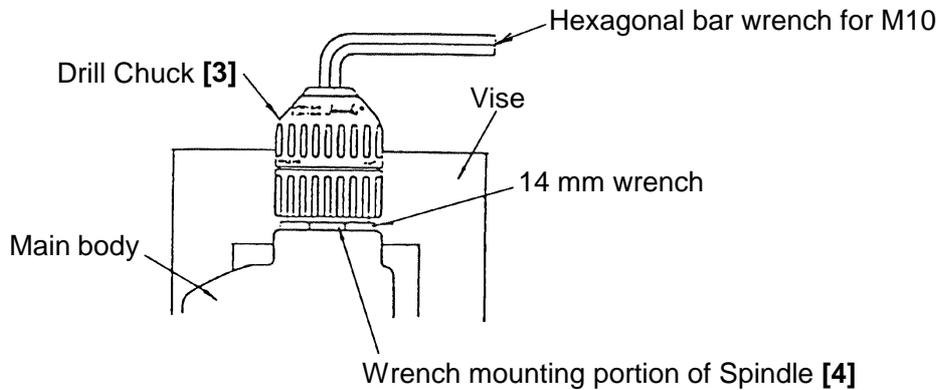
The **[Bold]** numbers in the descriptions below correspond to the item numbers in the parts exploded diagram of the FDV 16VB and the numbers in **<Bold>** to those in the parts exploded diagram of the FDV 16T and the numbers in **(Bold)** to those in the parts exploded diagram of the FDV 16.

1-1. Disassembly

1-1-1. Removal of the Drill Chuck

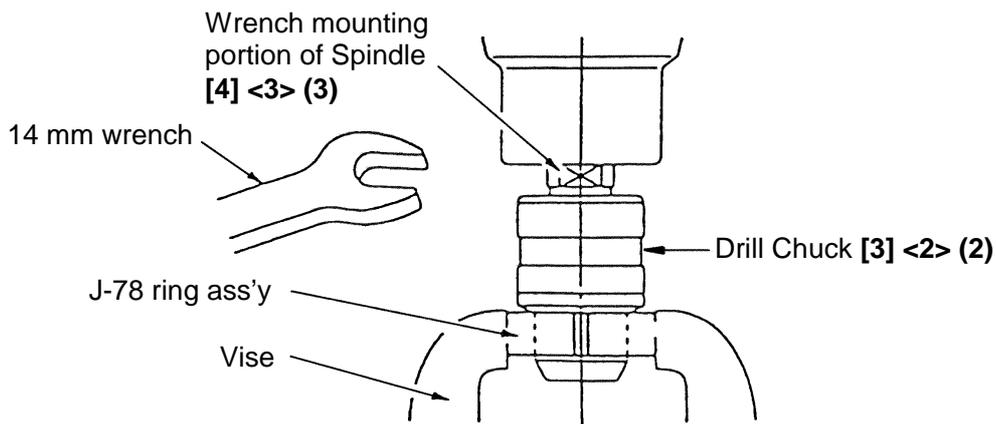
(1) For keyless chuck (FDV 16VB only)

The Drill chuck **[3]** (keyless chuck) is fixed to the Spindle **[4]** with a UNF 1/2"-20 right-hand thread and the Flat Hd. Screw (A) (Left hand) M6 x 25 **[1]**. First, open the jaws of the keyless chuck fully. Insert a 14 mm wrench into the wrench mounting portion of the Spindle **[4]** and turn the Flat Hd. Screw (A) clockwise to remove it. Then, fit the hexagonal bar wrench for M10 into the keyless chuck and turn it counterclockwise to loosen and remove the keyless chuck.



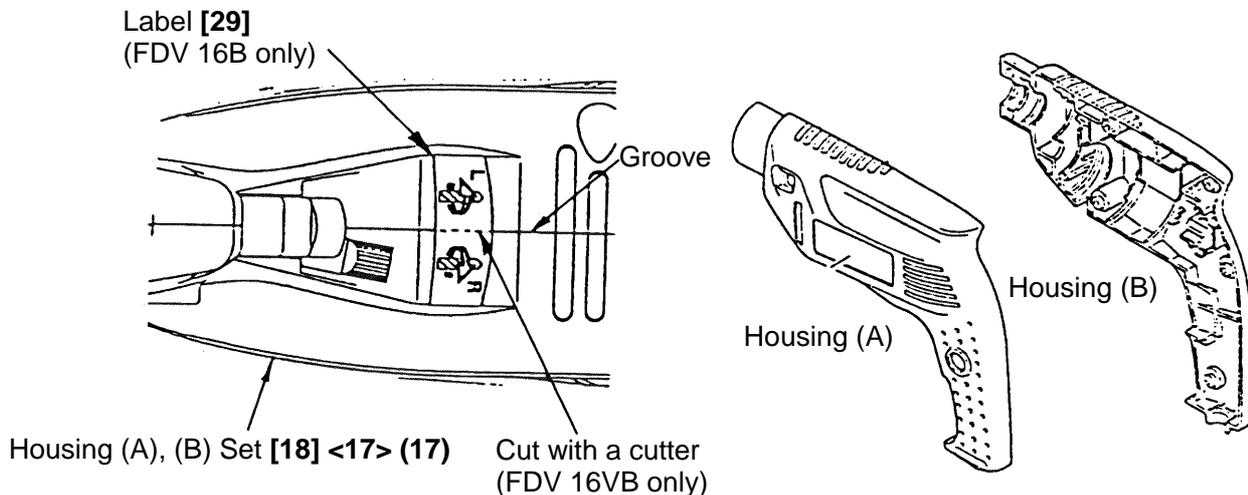
(2) For conventional chuck (with chuck wrench) (FDV 16VB, FDV 16T, FDV 16)

The Drill Chuck **[3] <2> (2)** is fixed to the Spindle **[4] <3> (3)** with a UNF 3/8"-24 right-hand thread and Flat HD. Screw (A) (Left hand) **[1]** (For FDV 16VB only). As shown in the figure below, fit a J-78 ring ass'y (special repair tools, Code No.970817 and 970818 are recommended.) onto the Drill Chuck body, and secure it in a vise. At this time, ensure that the pin of the ring ass'y is properly inserted into the chuck wrench mounting hole of the chuck. Open the jaws of the Drill Chuck **[3]** fully and turn the Flat Hd. Screw (A) **[1]** clockwise with a flat-blade screwdriver to remove it (For FDV 16VB only). Then, fit a 14 mm wrench to the flat surfaces on the Spindle, and rotate it counterclockwise to loosen and remove the Drill Chuck.



1-1-2. Removal of Housing (B) of the Housing (A), (B) Set [18] <17> (17)

- (1) Cut the Label [29] with a cutter along the groove between the assembled Housing (A) and (B) Sets [18] (For FDV 16VB only).
- (2) Remove the seven D4 x 20 Tapping Screws (W/Flange) [20] <19> (19) and take off Housing (B) of the Housing (A), (B) Set [18] <17> (17).



1-1-3. Disassembly of the Armature and Stator

- (1) Remove the two Brush Holders [22] <21> (21) by lifting them upward from Housing (A) of the Housing (A), (B) Set [18] <17> (17), and take out the two Carbon Brushes [20] <20> (20).
- (2) With the Change Plate [11] <10> (10), the Change Knob [10] <9> (9) and the Spring (A) [12] <11> (11) installed, remove the Holder [13] <12> (12), the Armature [15] <14> (14), the Stator [16] <15> (15) and the Gear [8] <7> (7) all together.
- (3) Remove the Spindle [4] <3> (3) and the Gear [8] <7> (7) together from the Holder [13] <12> (12). Be careful not to lose the Steel Ball D4.76 [9] <8> (8).
- (4) By pulling out the Armature [15] <14> (14) from the Holder [13] <12> (12), the Ball Bearing [14] <13> (13) can be removed together with the Armature. Remove the Ball Bearing from the Armature with the bearing remover.
- (5) Remove the Internal Wires [24] [26] [35] [36], <22> <23> <31> <32>, (22) (23) (31) (32) and the Choke Coils [23] [27] from the Stator [16] <15> (15).

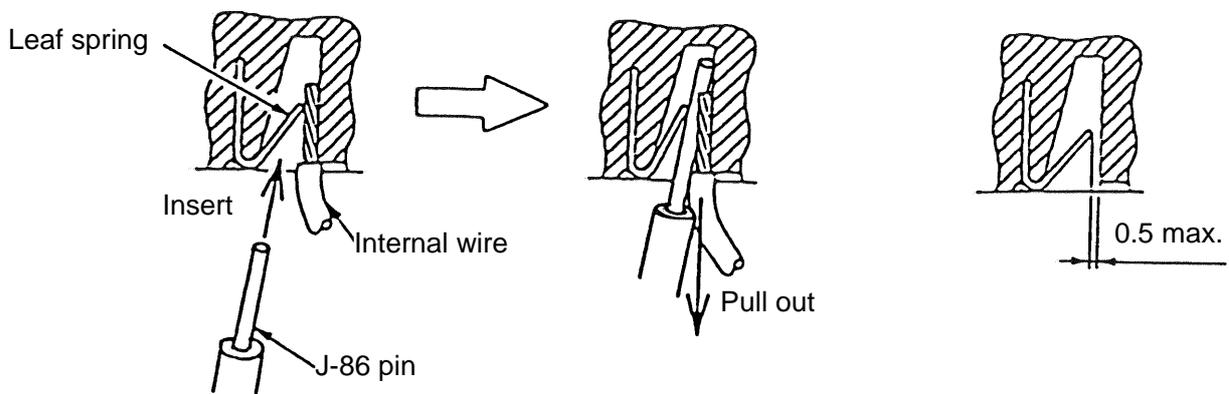
1-1-4. Disassembly of the Holder, Gear and Spindle

- (1) Remove the Change Plate [11] <10> (10), the Change Knob [10] <9> (9) and the Spring (A) [12] <11> (11) from the Holder [13] <12> (12).
- (2) By pushing the Spindle [4] <3> (3) toward the chuck while holding the chuck side surface of the Gear [8] <7> (7), the Gear can be removed. By removing the D12 Retaining Ring [7] <6> (6) from the Spindle [4] <3> (3), the Spring [5] <4> (4) and Ball Bearing [6] <5> (5) can be removed.

1-1-5. Disconnecting Internal Wires and Electrical Parts

(1) Disconnect the internal wires from the switch as follows.

Insert the J-86 pin into the hole for the internal wire of the Switch [25] <24> (24). Press the leaf spring so that the internal wire can be disconnected, then disconnect the Internal Wires [23] [24] [26] [27] [35] [36], <31> <32>, (31) (32) and the Internal Wires of the Choke Coil [23] [27] and the Noise Suppressor [37] <33> (33). (For the internal wire of the Cord [34] <30> (30), loosen and remove the terminal screw of the Switch [25] <24> (24) with a slotted screwdriver.) If the leaf spring is pressed too much, the leaf spring may be set permanently and the contact pressure with the internal wire will be reduced. Replace such switch whose leaf spring has clearance of 0.5 mm or more with new one.



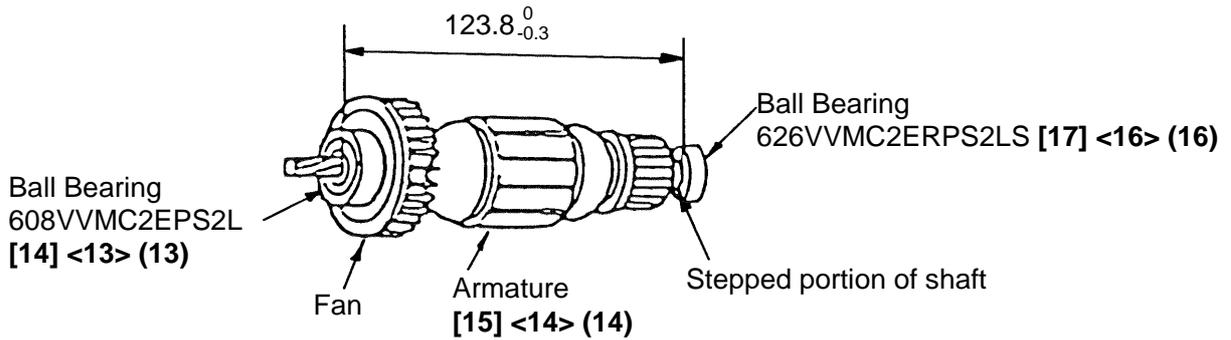
(2) After removing the two Tapping Screws (W/Flange) D4 x 16 [33] <29> (29), the Cord [34] <30> (30) and the Cord Clip [32] <28> (28) can be removed from the Housing (A) of the Housing (A), (B) Set [18] <17> (17).

1-2. Reassembly

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

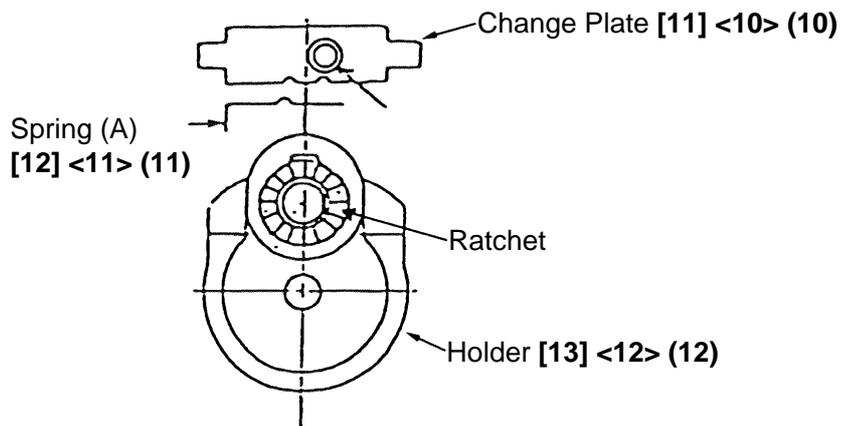
1-2-1. Reassembly of the Armature and the Stator

(1) Press fit Ball Bearing 608VVMC2EPS2L [14] <13> (13) and Ball Bearing 626VVMC2ERPS2S [17] <16> (16) onto the Armature [15] <14> (14). Stop pressing when Ball Bearing 608VVMC2EPS2L [14] <13> (13) comes in contact with the Fan. With a vernier caliper or similar tool, check that the press-fit dimension is $123.8 \begin{smallmatrix} 0 \\ -0.3 \end{smallmatrix}$ mm as shown in the following figure. As excessive press fitting can cause deformation or other damage to the Fan, particular attention is required. Also, if press fitting is insufficient, it will cause loss of thrust of the Armature [15] <14> (14), resulting in heat generation. Accordingly, press-fit Ball Bearing 626VVMC2ERPS2S [17] <16> (16) until it butts against the stepped portion of the shaft.



1-2-2. Reassembly of the Holder

- (1) When installing the Change Plate [11] <10> (10) and Spring (A) [12] <11> (11) to the Holder [13] <12> (12), be careful of the direction of each part.



- (2) Insert the Armature [15] <14> (14) and the gear spindle ass'y into the Holder [13] <12> (12), and insert them into the Stator [16] <15> (15). Be sure to reassemble the Steel Ball D4.76 [9] <8> (8) at this time. Apply ATTOLUB MS No.2 to the ball chamber of the Spindle [4] <3> (3) and then reassemble the Steel Ball D4.76.
- (3) Install the reassembly from the above step (2) in the Housing (A) of the Housing (A), (B) Set [18] <17> (17). Check that the fan of the Armature [15] <14> (14) can be turned freely by finger.

1-2-2. Other

When re-mounting Housing (A) of the Housing (A), (B) Set [18] <17> (17), be very careful to ensure that the lead wires are not excessively slack, and that they are not pinched between components during reassembly.

1-3. Lubrication

(1) Apply ATTOLUB MS No.2 (Code No.309922) to the following.

- Holder [13] <12> (12): Ratchet..... 1 g
- Gear [8] <7> (7): Teeth 2 g
Ratchet..... 0.5 g
- Spindle [4] <3> (3): Needle bearing contacting portion 1 g
Ball chamber..... 0.5 g
- Armature [15] <14> (14): Pinion 1 g

1-4. Tightening Torque

- Drill Chuck [3] <2> (2)..... 29.4 - 39.2 N·m (300 - 400 kgf-cm)
- Tapping Screw (W/Flange) D4 x 20 (Black) [20] <19> (19) } 2.0 ± 0.5 N·m (20 ± 5 kgf-cm)
- Tapping Screw (W/Flange) D4 x 16 [33] <29> (29) }

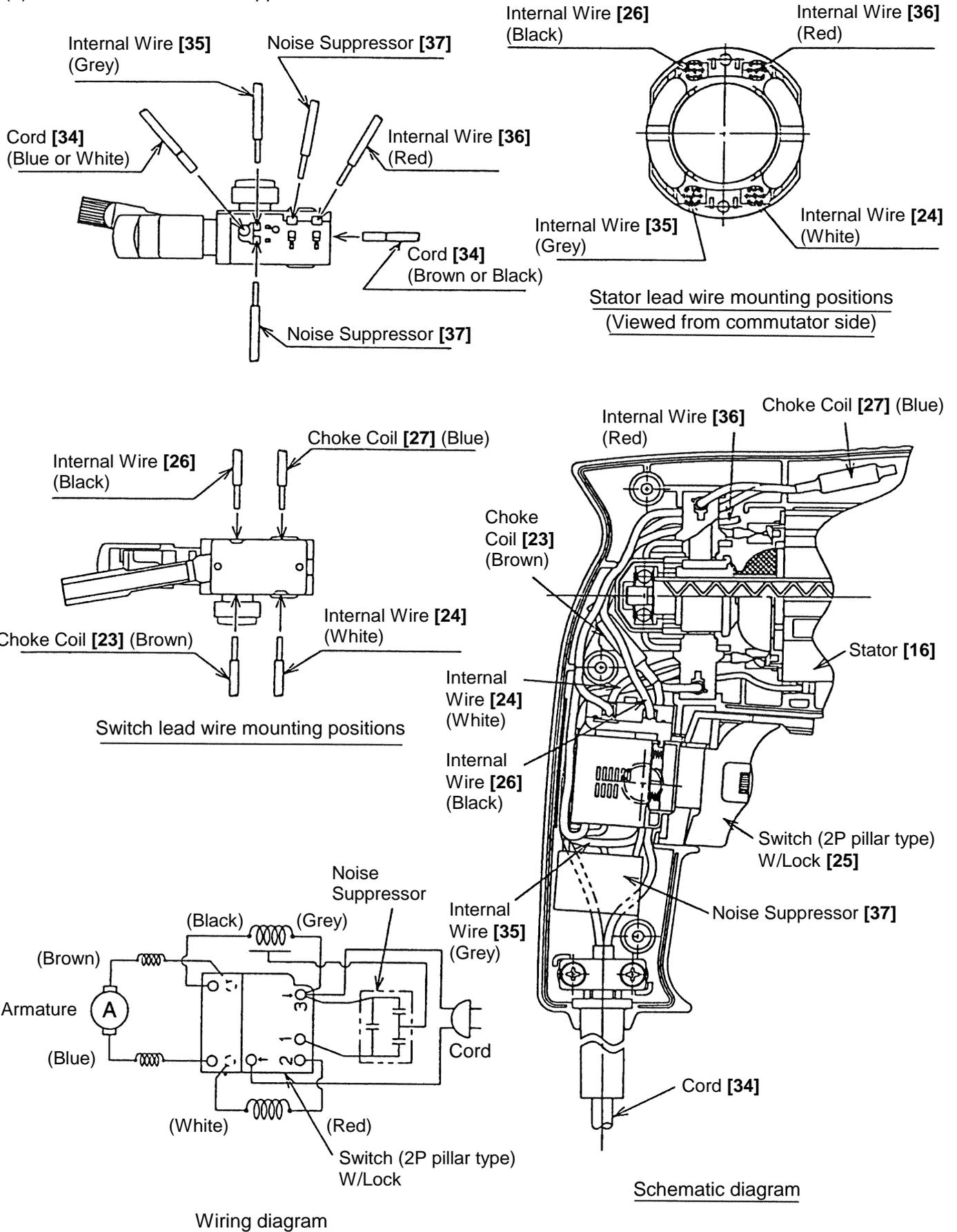
1-5. Wiring Diagrams and Lead Wire Arrangements

Conduct wiring in accordance with the diagrams and arrangements illustrated below. However, be particularly careful not to confuse the different arrangements for Models FDV 16VB, FDV 16T and FDV 16.

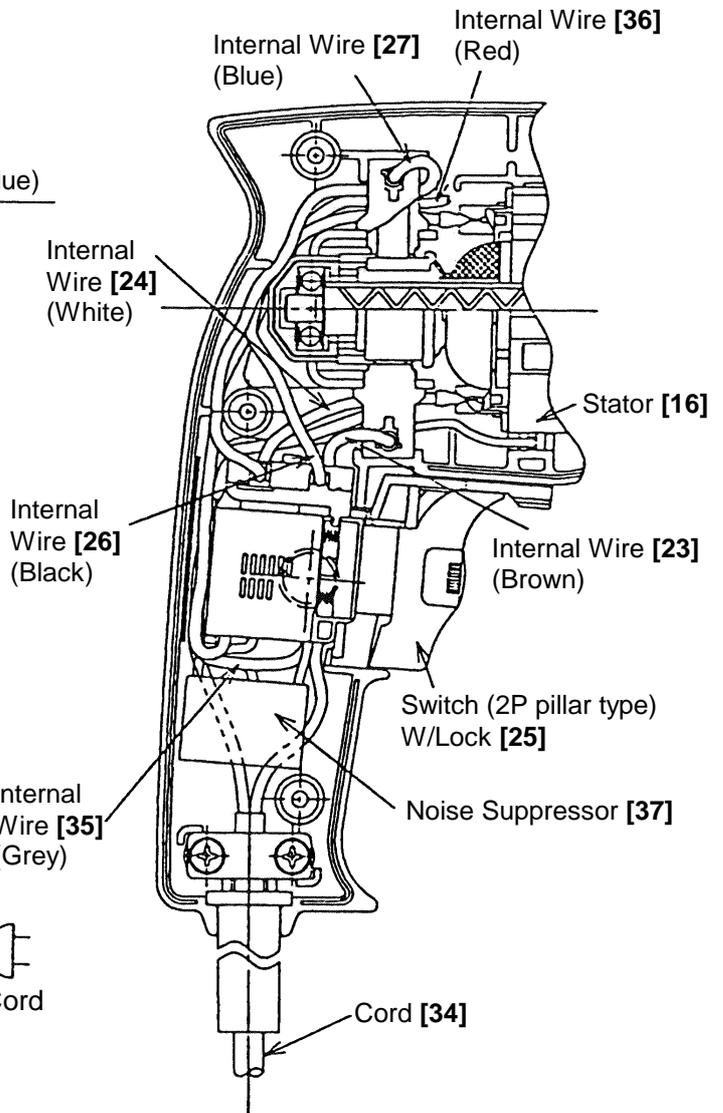
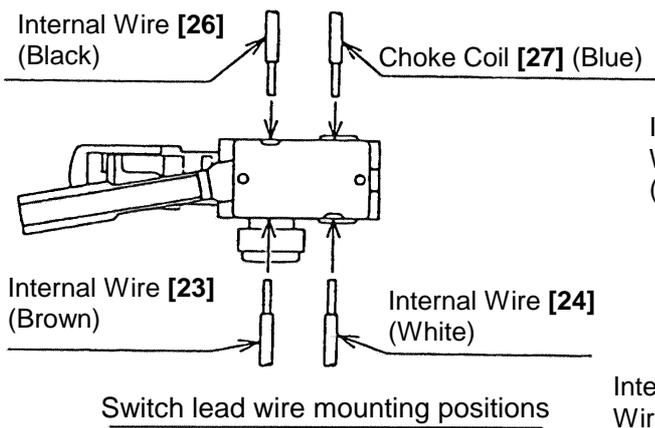
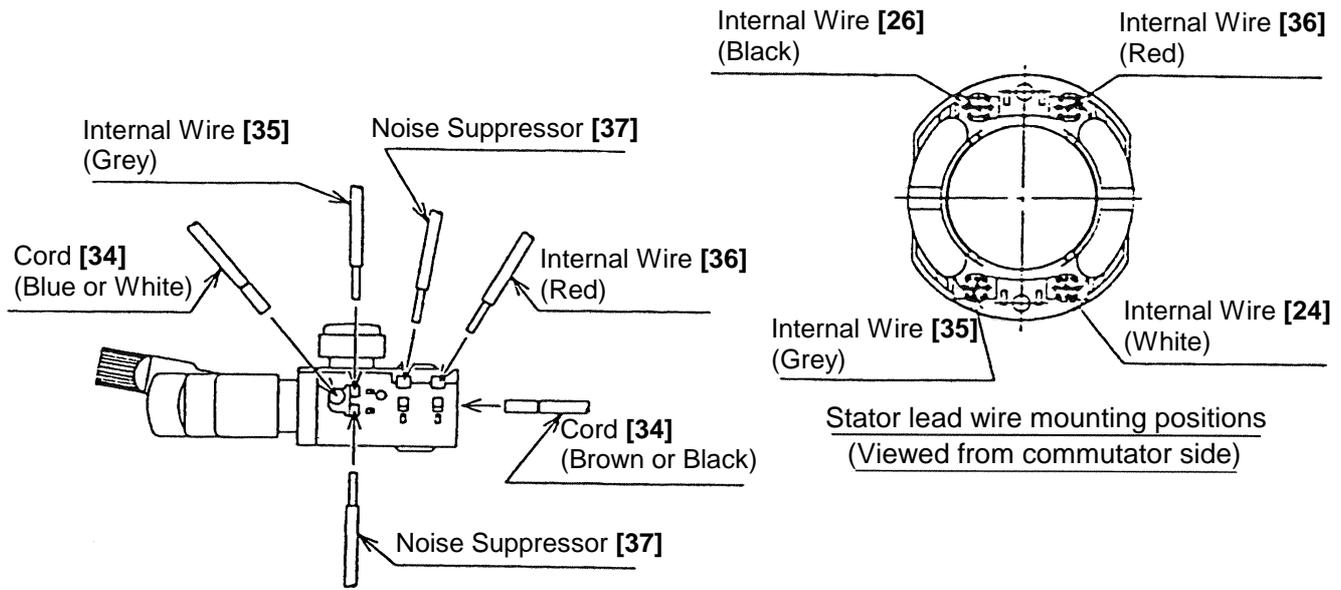
1-5-1. Model FDV 16VB Wiring and Schematic Diagrams

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

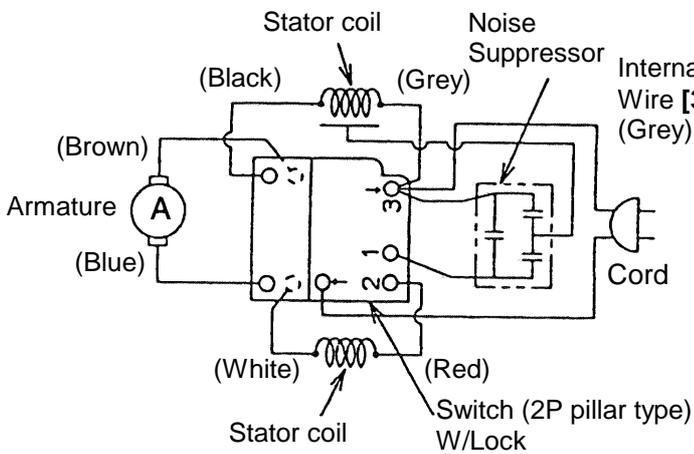
(1) For Models with Noise Suppressor and Choke Coils



(2) For Models with a Noise Suppressor and without Choke Coils

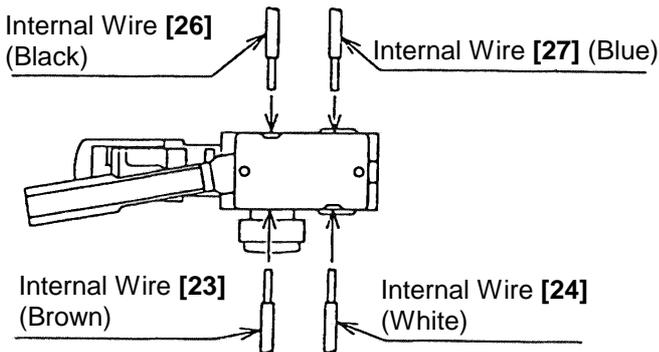
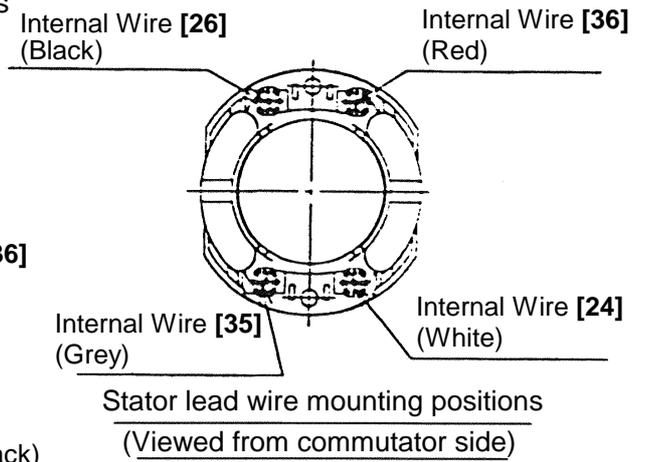
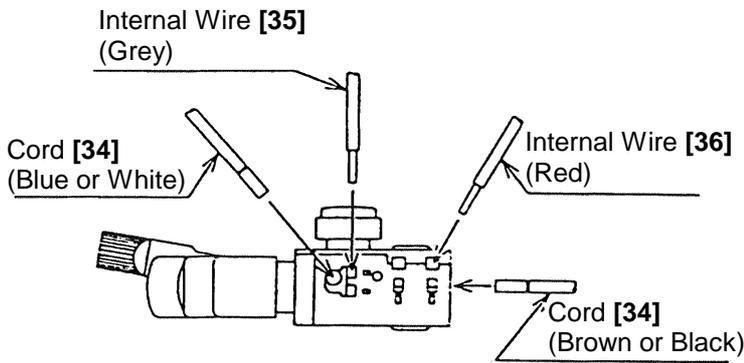


Schematic diagram

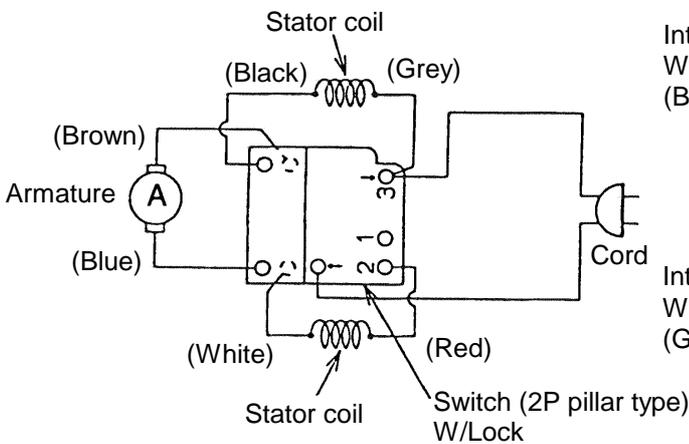
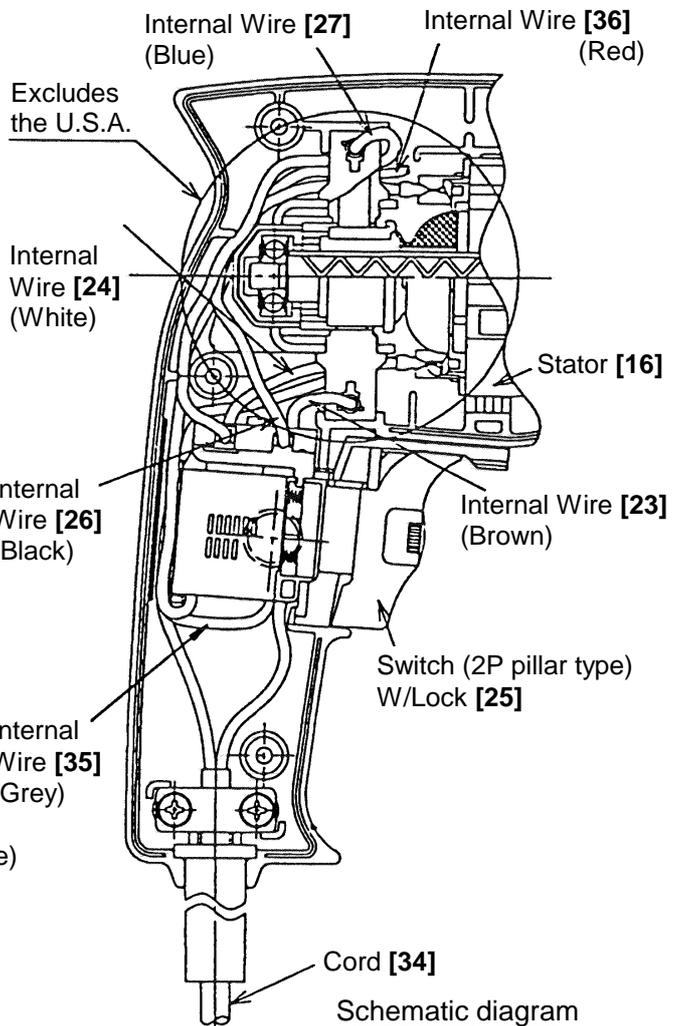
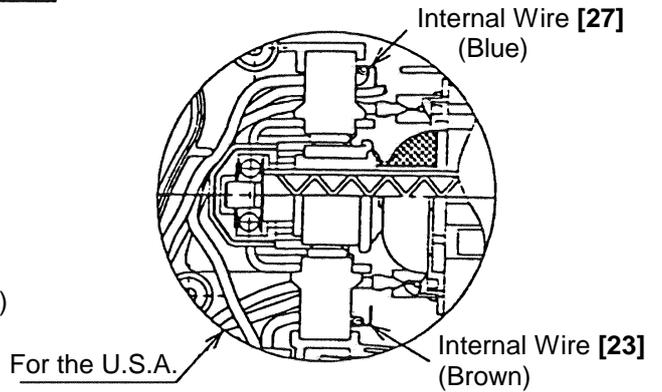


Wiring diagram

(2) For Models without Noise Suppressor and Choke Coils



Switch lead wire mounting positions

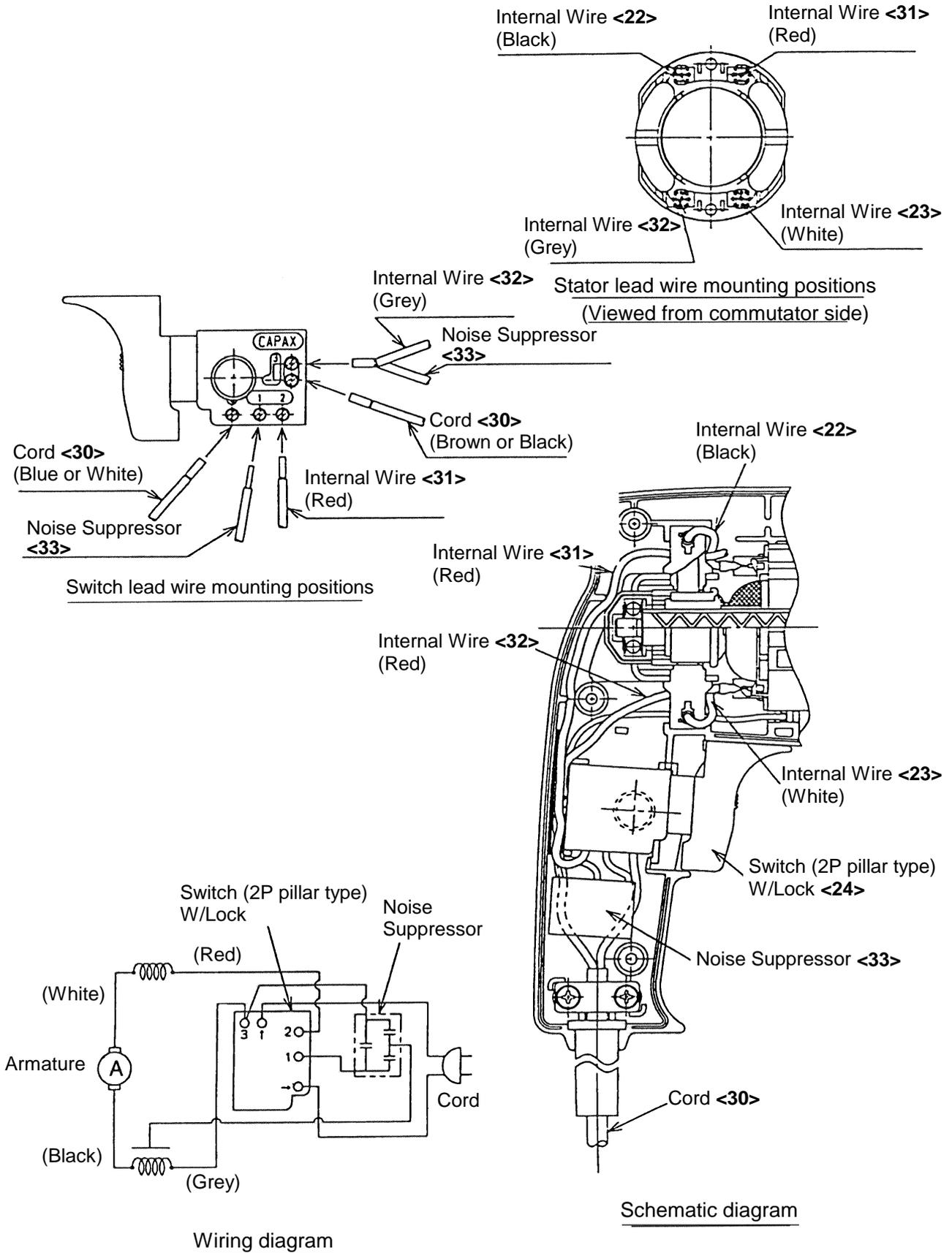


Wiring diagram

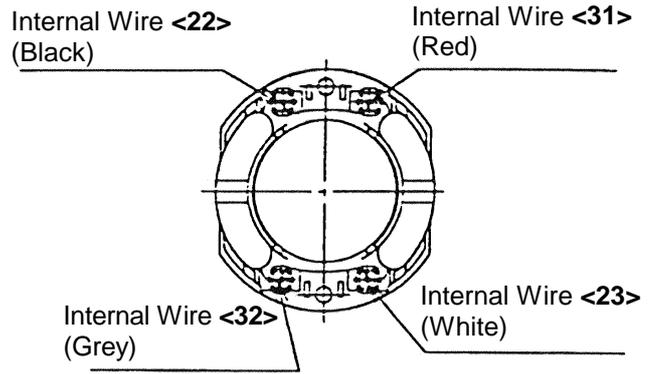
1-5-2. Model FDV 16T Wiring and Schematic Diagrams

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

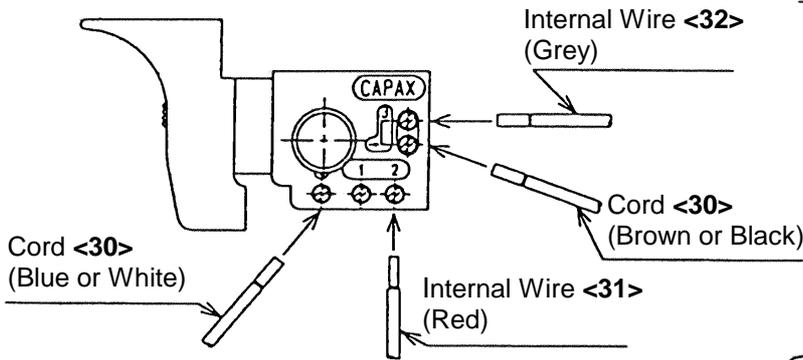
(1) For Models with a Noise Suppressor



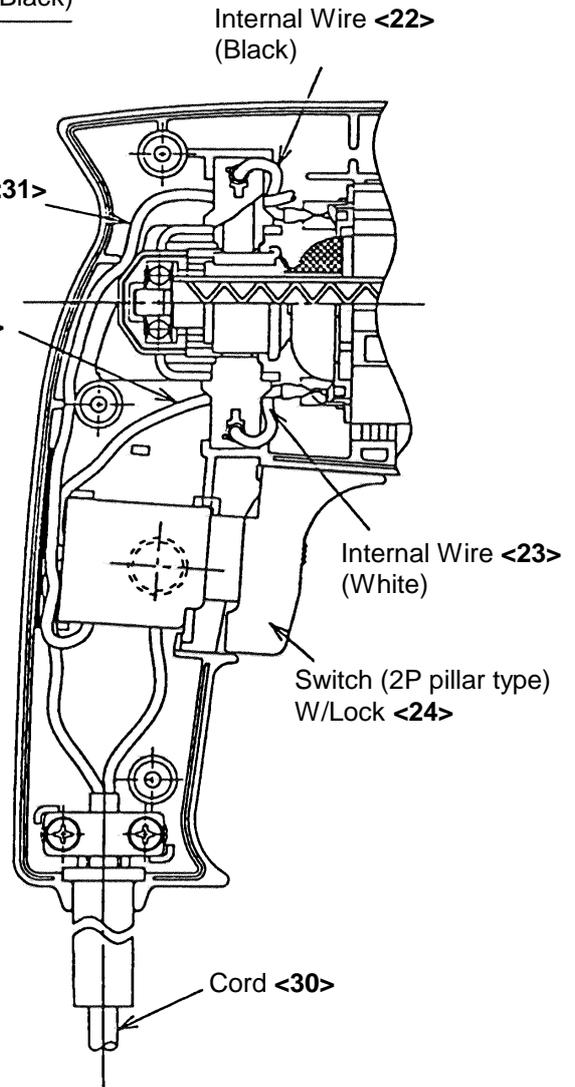
(2) For Models without Noise Suppressor



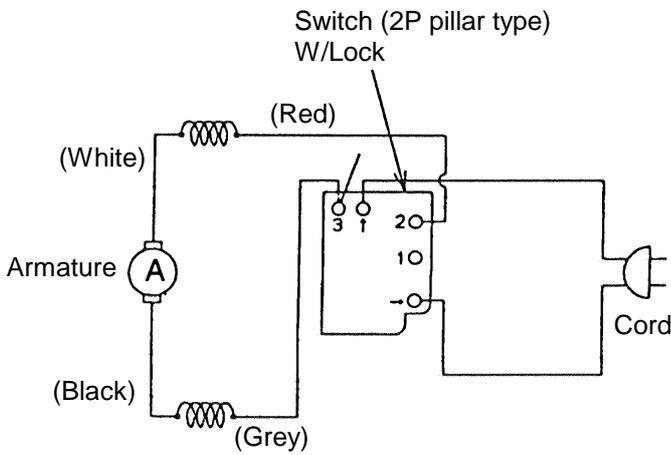
Stator lead wire mounting positions
(Viewed from commutator side)



Switch lead wire mounting positions



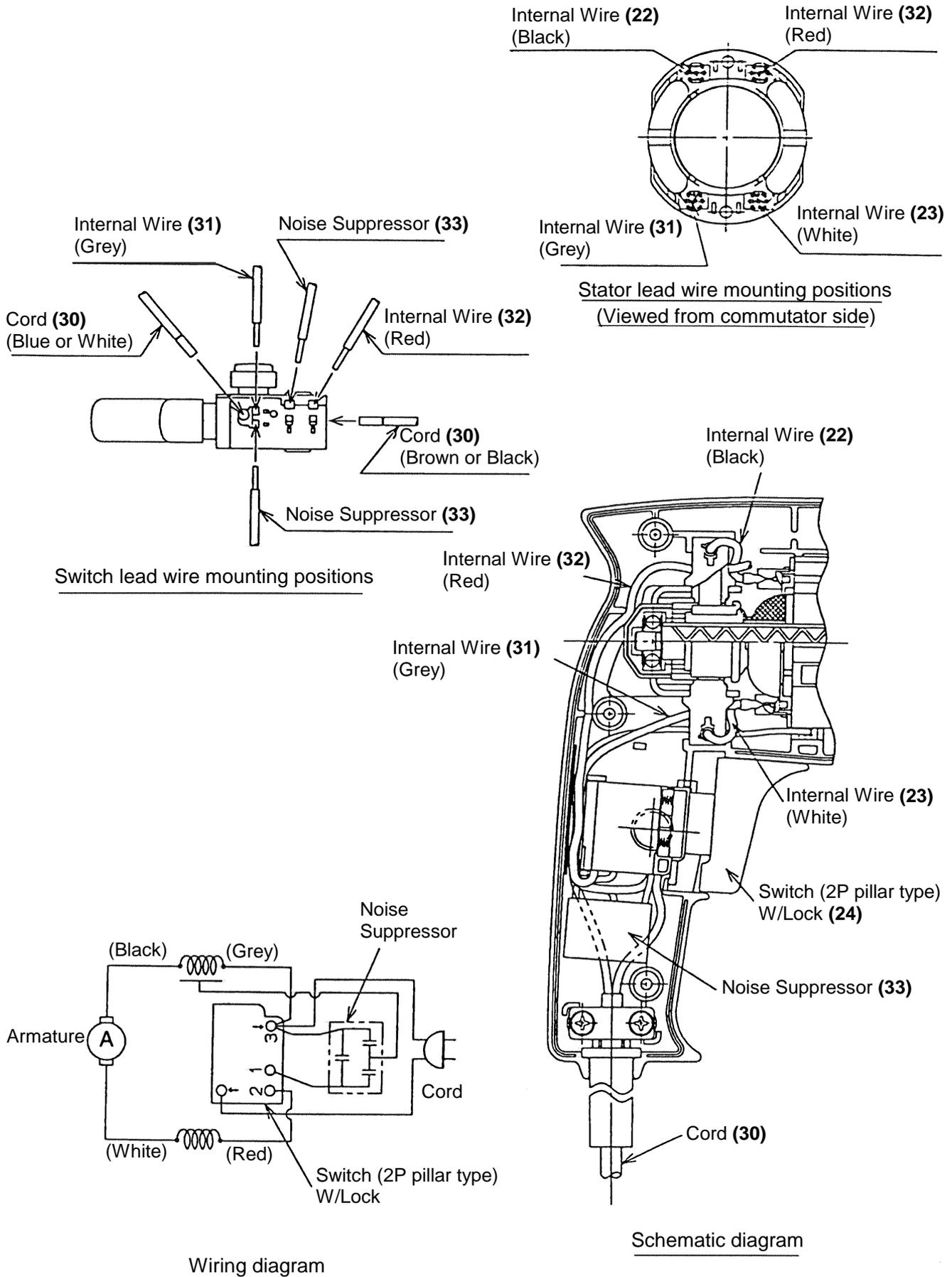
Schematic diagram



Wiring diagram

1-5-3. Model FDV 16 Wiring and Schematic Diagrams

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



1-6. Insulation Tests

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

Insulation Resistance: $7M\Omega$ or more with DC 500 V Megohm Tester

Dielectric Strength:

AC 4,000 V/1 minute, with no abnormalities220 V - 240 V (and 110 V for U.K. products)

AC 2,500 V/1 minute, with no abnormalities 110 V - 115 V (except U.K. products)

1-7. No-Load Current Values

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

100 V	} Less than 2 A
115 V		
220 V	}Less than 1 A
230 V		
240 V		

2. STANDARD REPAIR TIME (UNIT) SCHEDULES

MODEL	Variable		10	20	30	40	50	60 min.
	Fixed							
			Work Flow					
FDV 16VB	General Assembly							
FDV 16T								
FDV 16								
				Housing (A) Housing (B) Spindle BB(6201VVCN) Gear Stator Armature Holder BB(608VVMC)				
				Carbon Brush Switch Cord				