

MODEL

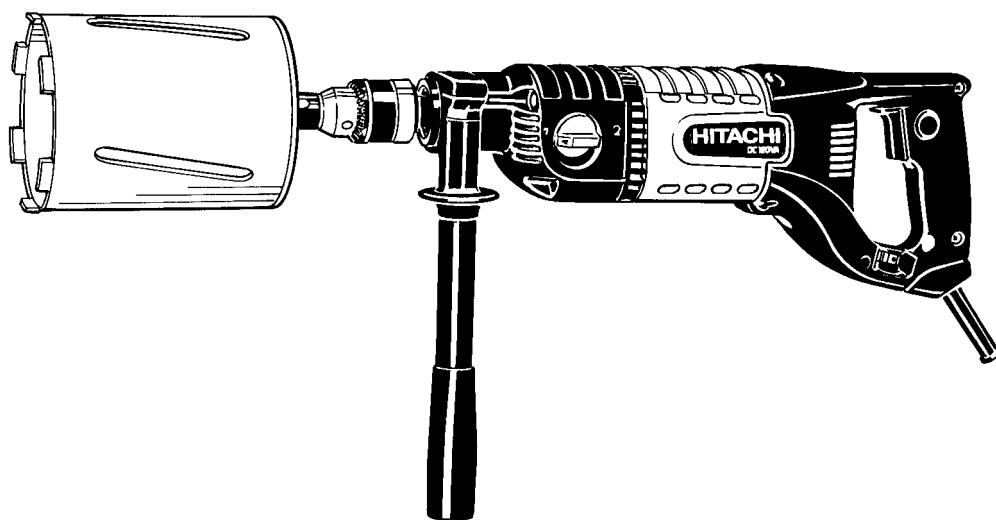
DC 120VA

HITACHI
POWER TOOLS

DIAMOND CORE DRILL
DC 120VA

TECHNICAL DATA
AND
SERVICE MANUAL

D



LIST No. 0192

Jun. 2000

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

Notice for use

Specifications and parts are subject to change for improvement.
Refer to Hitachi Power Tool Technical News for further information.

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1. PRODUCT NAME

Hitachi Diamond Core Drill (with slip clutch function), Model DC 120VA

2. MARKETING OBJECTIVE

The diamond core drill market is showing growth due to increase of demands for reform applications and comfortable operation (low noise and vibration). Especially, a core drill capable of drilling various types of materials efficiently is demanded.

To meet such demand, the Model DC 120VA was developed as an advanced version of the current dry-type Model DC 120V in efficiency and operability. The key features are as follows:

- (1) 1400 W high-power motor for fast drilling (110 V product: 1250 W)
- (2) Various drilling applications thanks to the speed control system with 2-speed transmission, dial-type stepless variable speed control and constant speed control
- (3) High slip torque mechanism for powerful drilling
- (4) Synchronized gear shift mechanism for easy speed switching
- (5) Easy-to-use rotary type side handle
- (6) Vibration-isolating handle for reduced operator fatigue

3. APPLICATIONS

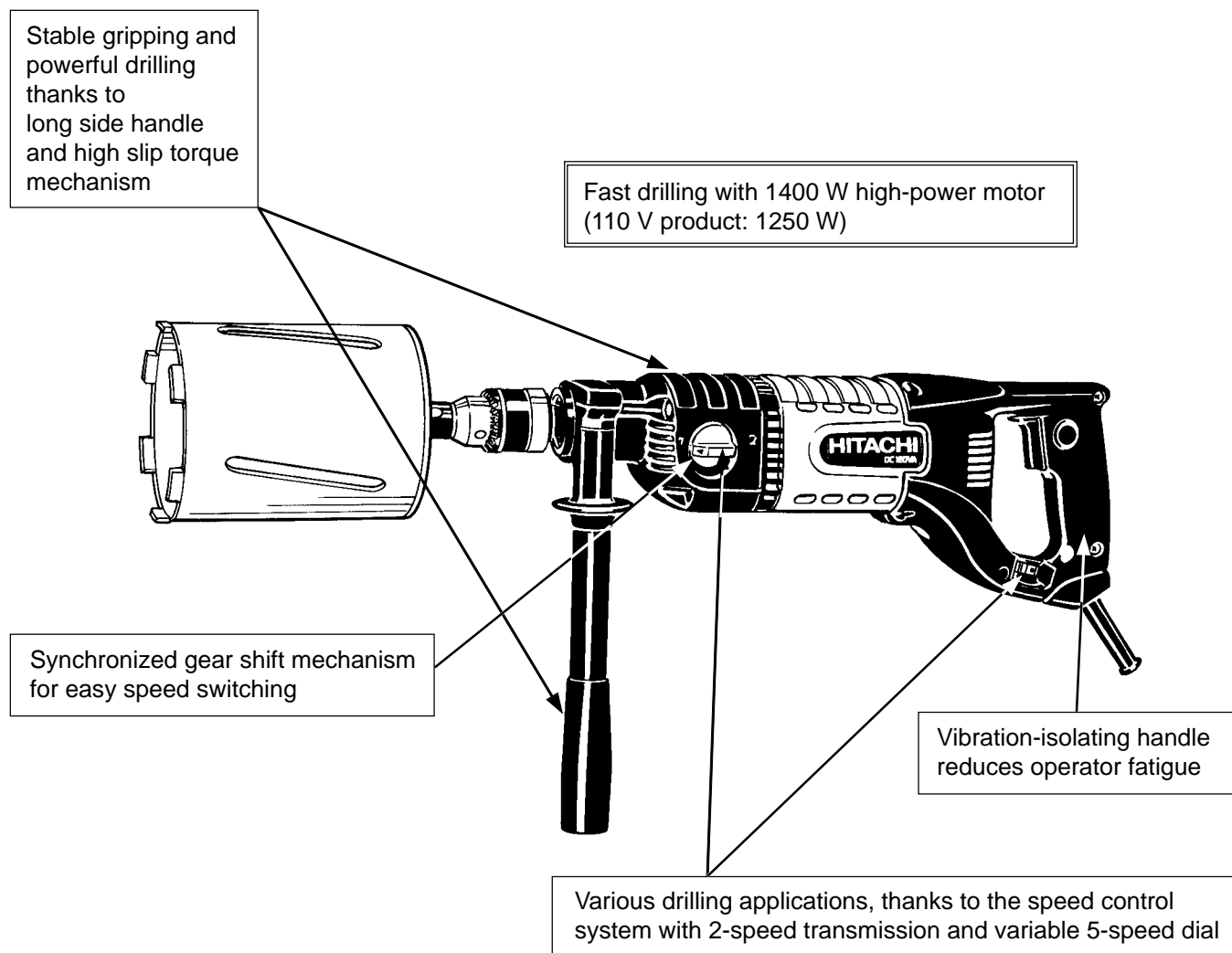
The Model DC 120VA can drill various workpieces using the appropriate bit or accessory tool.

Tool	Capacity	Workpiece												
		Reinforced concrete	Brick	Mortar	Slate	Autoclaved lightweight concrete	External wall material	Gypsum board	Wood	Chloroethylene material	Fiber reinforced plastic		Steel	Stainless
Diamond core bit (Hitachi)	27 mm to 120 mm (available in 10 sizes)	●	●	●	●	●	●							
Hole saw for metal (Commercial)	Up to 60 mm										●		●	●
Hole saw for wood (Commercial)	Up to 120 mm								●	●				
Drill bit for steel (Hitachi)	Up to 13 mm					●	●	●			●		●	●
Drill bit for wood (Hitachi)	Up to 30 mm						●	●	●	●				

<Typical applications>

- Air conditioning Installation of air conditioners and water coolers
- Piping and wiring Electric, gas and water supply work
- Electrical fixtures Installation of electrical fixtures
- Reinforcing Anchoring
- Residential facilities Construction of terrace, garage, etc.

4. SELLING POINTS



* Shown with an optional core bit.

4-1. Selling Point Descriptions

4-1-1. Powerful motor with a power input of 1400 W

Although the motor has the same dimensions as the Model DC 120V, the motor of the Model DC 120VA is more powerful thanks to the larger-diameter motor coil.

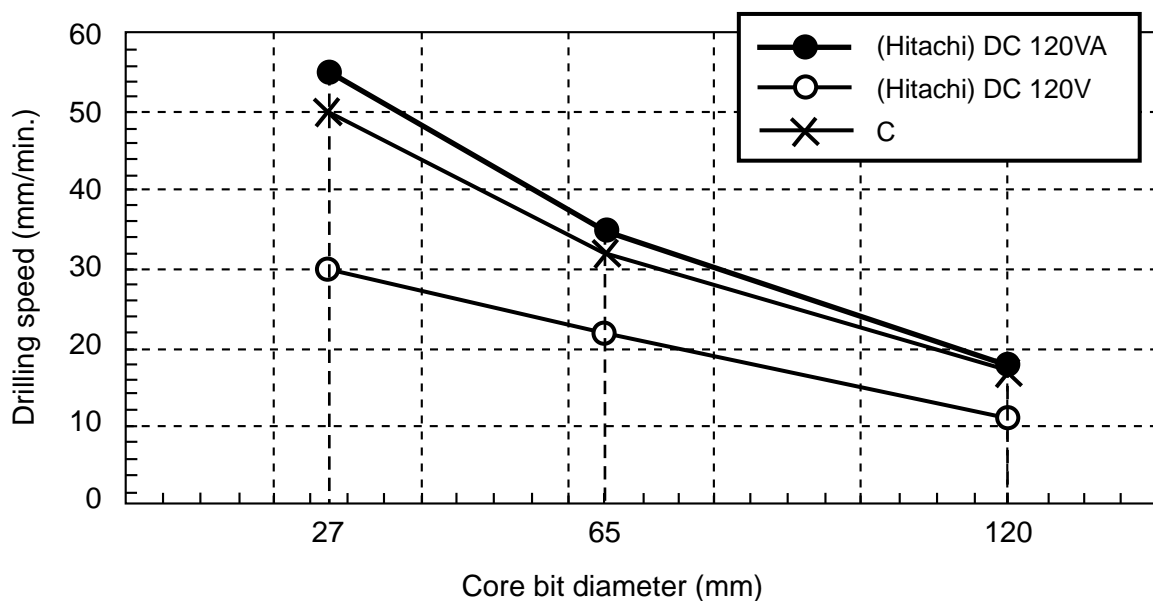
4-1-2. Faster drilling speed

The Model DC 120VA can drill holes in various materials using diamond core bits of up to 120 mm in diameter which are generally used for hand-held drills, or tools (hole saws) corresponding to specific materials, thanks to the optimum design. The drilling speed is about 30 % faster than the Model DC 120V and equivalent to C.

Drilling speed comparison of dry-type drills

(Test conditions)

- Power requirements: 230 V, 50 Hz
- Concrete compression strength: 2.5×10^5 MPa
- Test material: Concrete reinforced with 10-mm diameter bars (drilling depth 150 mm)
- Orientation: Horizontal drilling



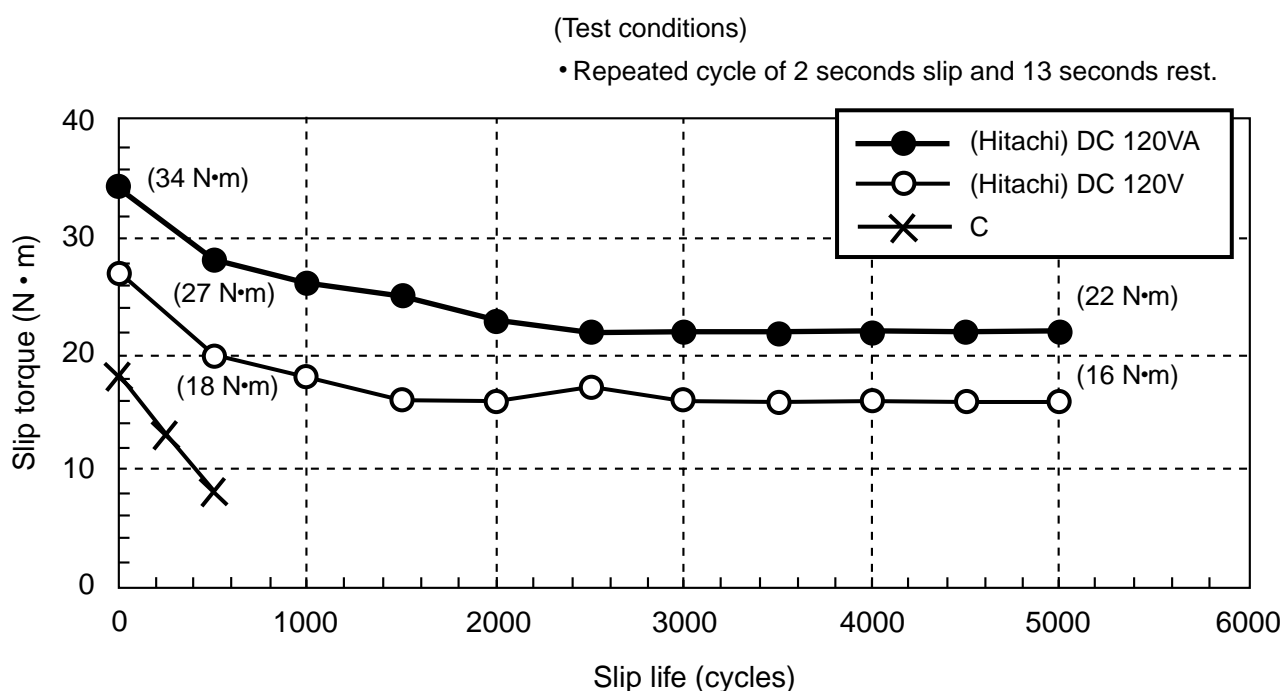
* Drilling performance varies depending on the operating conditions such as strength of concrete, diameter and number of reinforcing bars. The test results shown above should be used as a reference only.

4-1-3. High slip torque mechanism for powerful drilling

The table below shows the factory test results on slip-mechanism life cycles. The Model DC 120VA is superior to the Model DC 120V and C.

Test conditions: Repeated cycle of 2 seconds slip and 13 seconds rest.

Model	Slip torque after testing	Influence on operation
Hitachi DC 120VA	2.2 kgf-m after 5000 cycles	No problem
Hitachi DC 120V	1.6 kgf-m after 5000 cycles	No problem but slipped frequently
C	0.8 kgf-m after 500 cycles	Drilling impossible



<Slip clutch mechanism>

DC 120VA: A claw clutch, which is the same as that of the Model DC 120V, is provided to increase the service life.

C: A friction-plate clutch with a belleville spring, which is the same as that of 6300T, is provided.

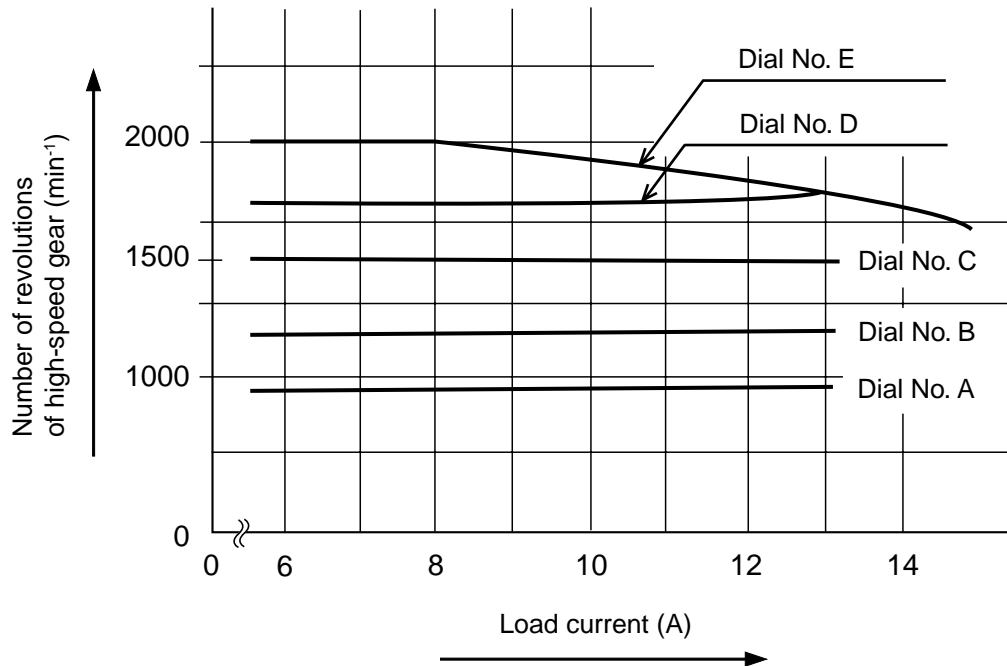
4-1-4. Synchronized gear shift mechanism for easy speed switching

A synchronized gear shift mechanism is provided to permit automatic shifting between the low- and high-speed ranges just by turning the shift lever. This eliminates the need to turn the drill chuck by hand while making the changeover.

Model	Synchronized gear shift mechanism
Hitachi DC 120VA	Provided
Hitachi DC 120V	2-speed transmission is not provided
C	Not provided

4-1-5. Constant speed electronic control with stepless variable speed for stable drilling efficiency

The Model DC 120VA contains an electronic control circuit which allows the number of revolutions to be steplessly adjustable on the dial. The number of revolutions in the low-speed range is from 400 min^{-1} to 1,000 min^{-1} , and the high-speed range from 800 min^{-1} to 2,000 min^{-1} . The constant speed control minimizes the change in the number of revolutions even if the load fluctuates, thus providing ease of use and increased service life of drill bits. The graph below shows the relationship between load and speed.



4-1-6. Easy-to-use rotary type side handle

For ease of operation, the side handle can be secured in any position over 360° in increments of 45° to suit the operating position.

4-1-7. Vibration-isolating handle reduces operator fatigue

For safety, the handle and the housing are rubber-isolated to reduce vibrations transmitted to the operator's hand.

4-1-8. Unique body design

The ergonomically designed, unique styling ensures excellent operability.

5. SPECIFICATIONS

5-1. Main Specifications

Capacity (with dry-type diamond core bit)	Brick, block *	152 mm (5 – 63/64")
	Mild steel	13 mm (1/2")
	Wood	30 mm (1 – 1/8")
Drill chuck	Capacity 1.2 mm (0.047") – 13 mm (1/2")	
Power source	100 V 12 A 230 V 6.4 A 240 V 6.2 A	
Type of motor	Single-phase series commutator motor	
Enclosure	Housing, handle Nylon resin Inner cover, gear cover Aluminum alloy die casting	
Type of switch	Trigger switch with stopper	
Type of handle	D-type handle	
Full-load current	100 V 12 A 230 V 6.4 A 240 V 6.2 A	
Power consumption	100 V 1250 W 230 V 1400 W 240 V 1400 W	
Rotation speed	No-load: Low speed gear 400 – 1000 /min. No-load: High speed gear 800 – 2000 /min. Full-load: Low speed gear 400 – 860 /min. Full-load: High speed gear 800 – 1920 /min.	
Full-load output	380 W	
Weight	4.0 kg (without cord and side handle) (8.8 lbs.)	
Packaging	Corrugated cardboard box	
Weight after packaging	5.2 kg (11.4 lbs.)	
Cord	Type: 2-core cabtire cord Nominal sectional area: 0.75 mm ² Length: 2.5 m (8.3 ft.)	
Standard accessories	Chuck wrench 1 Side handle 1	

* Drilling may not be possible with some very hard brick and block materials.

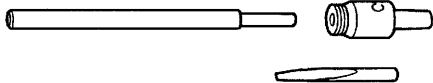
5-2. Optional Accessories

(1) Diamond core bits



Dia. bit	Length
22 mm (7/8")	300 mm (11 – 11/16")
28 mm (1-7/64")	
38 mm (1-1/2")	150 mm (5 – 29/32")
48 mm (1-57/64")	
52 mm (2-3/64")	
65 mm (2-9/16")	
78 mm (2-1/16")	
91 mm (3-37/64")	
107 mm (4-7/32")	
117 mm (4-39/64")	
127 mm (5")	
152 mm (64/64")	

(2) Adapter packs & extension rods

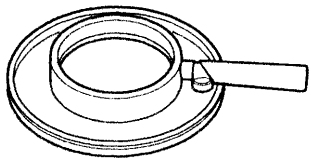


- Adapter pack Adapter for dia. 38 – 152 mm (1-1/2 " – 6 ")
core bits
Pilot spigot
Ejector drift



- Extension rod (length 250 mm (9-27/32 "))

(3) Dust extraction range



- Dust sucker - Large



- Dust sucker - Small

6. COMPARISONS WITH SIMILAR PRODUCTS

6-1. Specification Comparisons

Maker, Model					HITACHI DC 120VA	C	HITACHI DC 120
Item							
Values listed on catalogs	Capacity	Brick, block	Diameter	mm	152 (5-63/64")	152 (5-63/64")	152 (5-63/64")
		Mild steel	Diameter	mm	13 (1/2")	13 (1/2")	13 (1/2")
		Wood	Diameter	mm	30 (1-1/2")	30 (1-1/2")	30 (1-1/2")
	Voltage			V	230/50 Hz	230/50 Hz	230/50 Hz
	Current			A	6.4	6.4	4.0
	Power consumption			W	1400	1400	900
	No-load rotation speed			min ⁻¹	Low-speed) 400 – 1000 High-speed) 800 – 2000	Low-speed) 900 – 2000 High-speed) 1800 – 4000	600 – 1400
	Weight (without cord)			kg	4.0 (8.8 lbs.)	4.2 (9.2 lbs.)	3.1 (6.8 lbs.)
	Characteristics of motor (measured values)	No-load rotation speed		min ⁻¹	Low-speed) 450 – 1050 High-speed) 850 – 2000	Low-speed) 900 – 2000 High-speed) 1800 – 4000	580 – 1410
Full-load current		A	6.4		4.0		
Full-load rotation speed		min ⁻¹	Low-speed) 400 – 1020 High-speed) 760 – 1920	Low-speed) 900 – 1600 High-speed) 1700 – 3200	890		
Full-load torque		kg-m	(Low-speed) 4 (High-speed) 2	(Low-speed) 3 (High-speed) 1.5	5.3		
Maximum output		W	1560	1560	1090		
Locked torque		kg-m	(Low-speed) 70 (High-speed) 35	(Low-speed) 46 (High-speed) 23	60		
Slip torque			kg-m	34	18	27	
Insulation structure				Double insulation	Double insulation	Double insulation	
Full-load noise level			dB	86	88	88	
Standard accessories				Chuck wrench 1 Side handle 1	Chuck wrench 1 Side handle 1 Rubber gloves 1 pair	Chuck wrench 1 Side handle 1 Plastic case 1	

7. PRECAUTIONS IN SALES PROMOTION

7-1. Safety Precautions

In the interest of promoting the safest and most efficient use of the Models DC 120VA Diamond Core Drill by all of our customers, it is very important that at the time of sale the salesperson carefully ensures that the buyer seriously recognizes the importance of the contents of the Handling Instructions, and fully understands the meaning of the precautions listed on the caution plate attached to each tool.

(1) Handling Instructions:

Although every effort is made in each step of design, manufacture and inspection to provide protection against safety hazards, the dangers inherent in the use of any electric power tool cannot be completely eliminated. Accordingly, general precautions and suggestions for the use of electric power tools, and specific precautions and suggestions for the use of the Diamond Core Drill are listed in the Handling Instructions to enhance the safe, efficient use of the tool by the customer. Salespersons should ensure that the customer thoroughly reads and understands these precautions, with particular attention to the following.

① Check the power source voltage:

Ensure that the power source voltage conforms with the power specifications listed on the nameplate.

(2) Cautions on nameplate:

① Each tool is provided with a nameplate which lists the following basic safety precautions in the use of the tool.

For Europe

CAUTION

- Read thoroughly **HANDLING INSTRUCTIONS** before use.

For Germany

ACHTUNG

- Bedienungsanleitung vor Inbetriebnahme lesen.

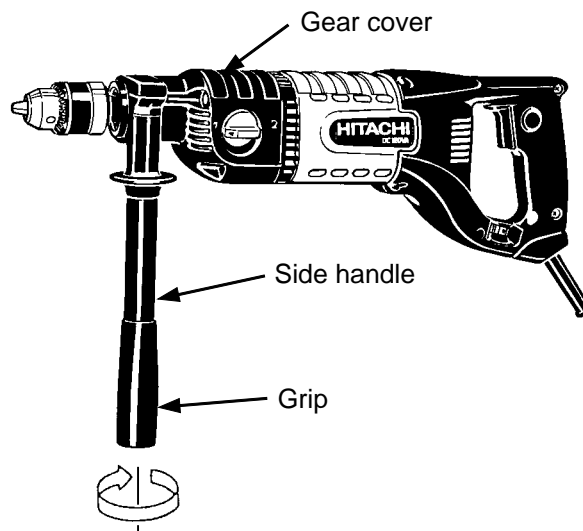
For France

- **TRES IMPORTANT:** Lire avec attention la notice d'utilisation.

8. PRECAUTIONS IN USAGE

8-1. Drilling with Diamond Core Bits

- (1) Ensure that the Side Handle is firmly secured before attempting to operate the tool. The side handle is separated from the main body of the tool when it is shipped from the factory. Carefully instruct the customer to loosen the grip portion of the side handle by turning it as shown in the right figure, install it on the gear cover portion, and fix it securely in the desired position before operating the tool.



- (2) Diamond core bits:

Diamond core bits applicable to the Model DC 120VA and DC 120V are dry-type diamond core bits for drilling brick, concrete block and similar materials. Instruct the customer not to apply water during the drilling operation. In addition, the customer should be advised that drilling may not be possible in bricks and blocks which are particularly high in hardness and density.

- (3) Rotation speed during drilling:

If you exceed the standard values (optimum speed of rotation) given in Table 1 in the Handling Instructions or engage in continued work for an extended period of time or perform a drilling job on soft materials, the motor may be subjected to an unreasonable load and may result in burnout. Especially, avoid any abnormal use where the drill stops during the drilling work. Adjust the number of rotations so that a smooth drilling job can be done at all times. Make absolutely certain that you never use any tool or bit beyond its maximum capacity as otherwise the service life of the main unit may be extremely shortened.

Table 1

Shift lever indication			1 [Low speed gear]					2 [High speed gear]				
			Dial									
Materials to be drilled	Types of drills	Drill diameters No load speed (min ⁻¹)	A	B	C	D	E	A	B	C	D	E
			450	600	770	940	1050	850	1100	1400	1700	2000
Brick, block	Diamond core bit	φ27										
		φ65										
		φ152										
Autoclaved lightweight concrete t3.0	Hole saw	φ27										
		φ65										
		φ120										
Steel SPCC t3.0	Hole saw	φ15										
		φ55										
Stainless steel t1.6	Hole saw	φ15										
		φ55										
Wood t50	Hole saw	φ27										
		φ65										
		φ120										
Steel SPCC t3.0	Drill	φ13										
Wood t50	Drill	φ30										

■ : Standard values (optimum speed of rotation)

(4) Pressure:

Drilling will NOT be accelerated by placing heavy pressure on the drill. Such action will only result in a damaged drill bit, decreased drilling efficiency, and/or shortened service life of the drill.

(5) When drilling completely through the material:

When the drill bit bores completely through the material, careless handling often results in broken drill bit or damage to the drill body itself due to the sudden movement of the drill.

Always be alert and ready to release pushing force when drilling through the material.

9. PRECAUTIONS IN DISASSEMBLY AND REASSEMBLY

The **[Bold]** numbers in the descriptions below correspond to the item numbers in the Parts List and exploded assembly diagram.

9-1. Disassembly

9-1-1. Handle cover section and carbon brush

- (1) Loosen the Tapping Screw (W/Flange) D4 x 20 **[48]** and remove Handle (B) **[49]**.
- (2) Remove the Tapping Screw (W/Flange) D4 x 20 **[48]** from the Cord Clip **[56]** and remove the Cord **[59]** together with the Cord Armor **[57]**.
- (3) Loosen the Machine Screw (W/Washer) M3.5 x 6 **[52]** on the Switch **[53]** and remove the Noise Suppressor **[54]**.
- (4) Loosen the Machine Screw (W/Washer) M3.5 x 6 **[52]** on the Switch **[53]** and remove the internal wire with terminal. Remove the Switch **[53]**.
- (5) Remove the Carbon Caps **[36]** with a flat-blade screwdriver to remove the Carbon Brushes **[37]**.

9-1-2. Armature and stator ass'y

- (1) Loosen the Tapping Screw (W/SP. Washer) D5 x 55 **[8]** on the Gear Cover **[9]** and remove the gear cover section from the Inner Cover Ass'y **[13]**. Remove the Armature **[28]** together with the Inner Cover Ass'y **[13]** from the Housing Ass'y **[35]**.
- (2) Remove the Armature **[28]** from the Inner Cover Ass'y **[13]**. Place the Inner Cover Ass'y **[13]** on a cylindrical jig and press down on the pinion of the Armature **[28]** as shown in Fig. 1.
- (3) Loosen the Machine Screw (W/Washer) M3.5 x 6 **[52]** on the trigger switch and the Tapping Screw (W/SP. Washer) D5 x 55 **[8]**. Disconnect the internal wire from the Brush Terminal **[32]** and the Controller **[51]**. Tap the end surface of the housing with a wooden or plastic hammer lightly to remove the Stator Ass'y **[31]**.

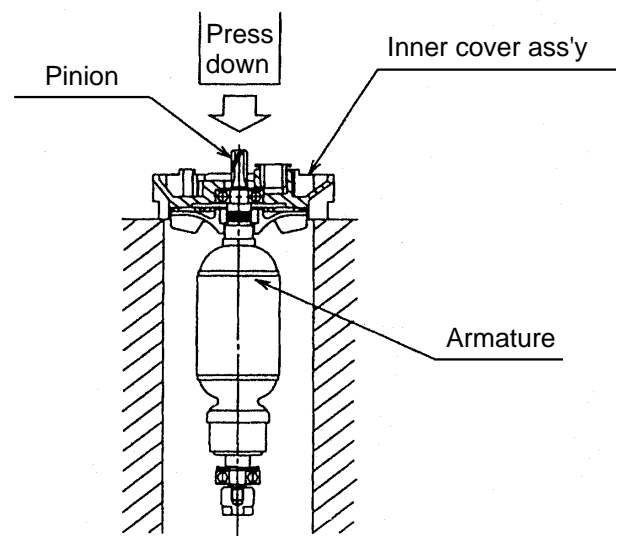


Fig. 1

9-1-3. Drill chuck

The Drill Chuck 13WLR (W/Screw) **[3]** contacts the Nut **[4]** fixed on the spindle and is secured with a UN5/8-16 right-handed screw. Put a 17-mm wrench on the Nut **[4]** and insert the chuck wrench in the wrench hole of the Drill Chuck 13WLR (W/Screw) **[3]** as shown in Fig. 2. Lightly tap the tip of the chuck wrench with a wooden or plastic hammer so that it turns counterclockwise viewing from the drill chuck side. Turn the loose Drill Chuck 13WLR (W/Screw) **[3]** and remove it.

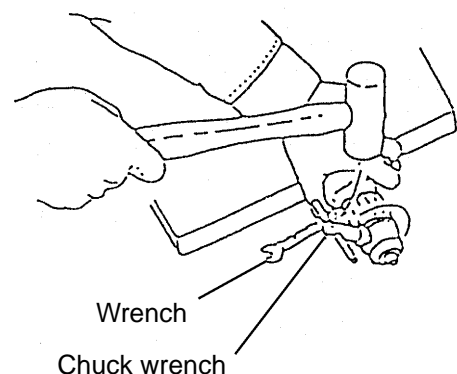
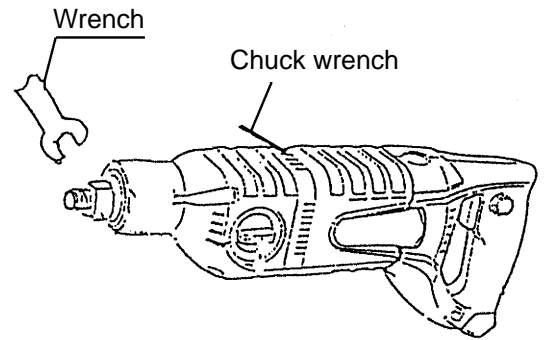


Fig. 2

9-1-4. Nut

The Nut [4] is secured to Spindle (B) Ass'y [20] with a UN5/8-16 right-handed screw. Insert a metal bar of 3 mm or less diameter in the air vent and fix it. Put a 21-mm wrench on the Nut [4] and turn it to remove the Nut [4].



9-1-5. Spindle (B) ass'y and others

- (1) After removal of the Nut [4], press down on the tip of Spindle (B) Ass'y [20] with a hand press as shown in Fig. 4. Then Spindle (B) Ass'y [20] can be removed from the Gear Cover [9].
- (2) Remove the Retaining Ring for D35 Hole [5]. Then the Dust Seal [6] can be removed. Lightly tap the tip of the Gear Cover [9] with a wooden hammer to remove the Ball Bearing 6003VVCMP2L [7].
- (3) Support the Clutch [19] on a cylindrical jig and press down on the end surface of the Spindle (B) Ass'y [20] with a hand press as shown in Fig. 5. Then Sleeve [17] can be removed from Spindle (B) Ass'y [20] together with the Spring [18].

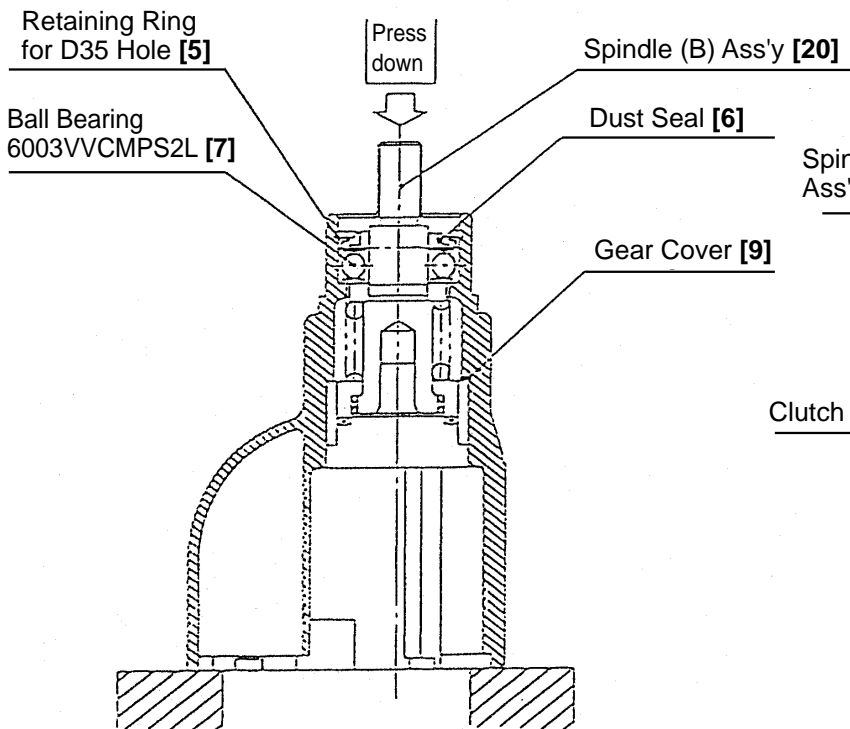


Fig. 4

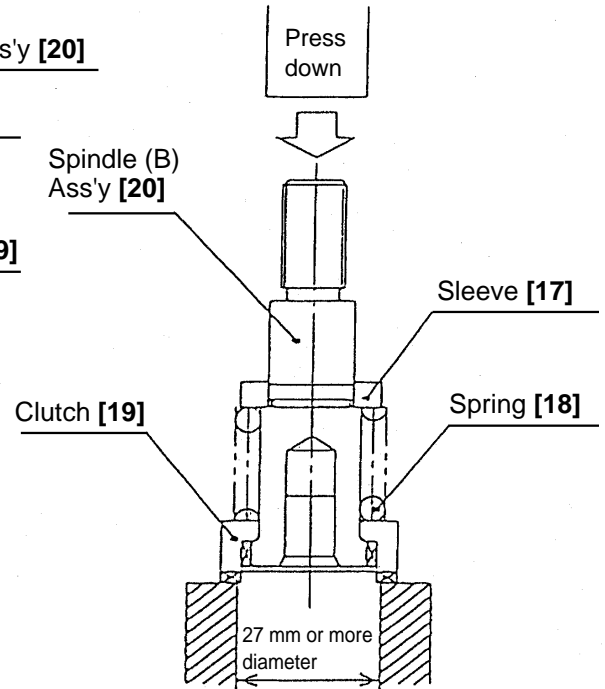


Fig. 5

9-2. Reassembly

Perform reassembly in the reverse order of disassembly while observing the given precautions and taking care of the following points.

9-2-1. Internal wire arrangement

Arrange the internal wires as shown in Fig. 6. Be careful not to catch the internal wires when mounting the handle.

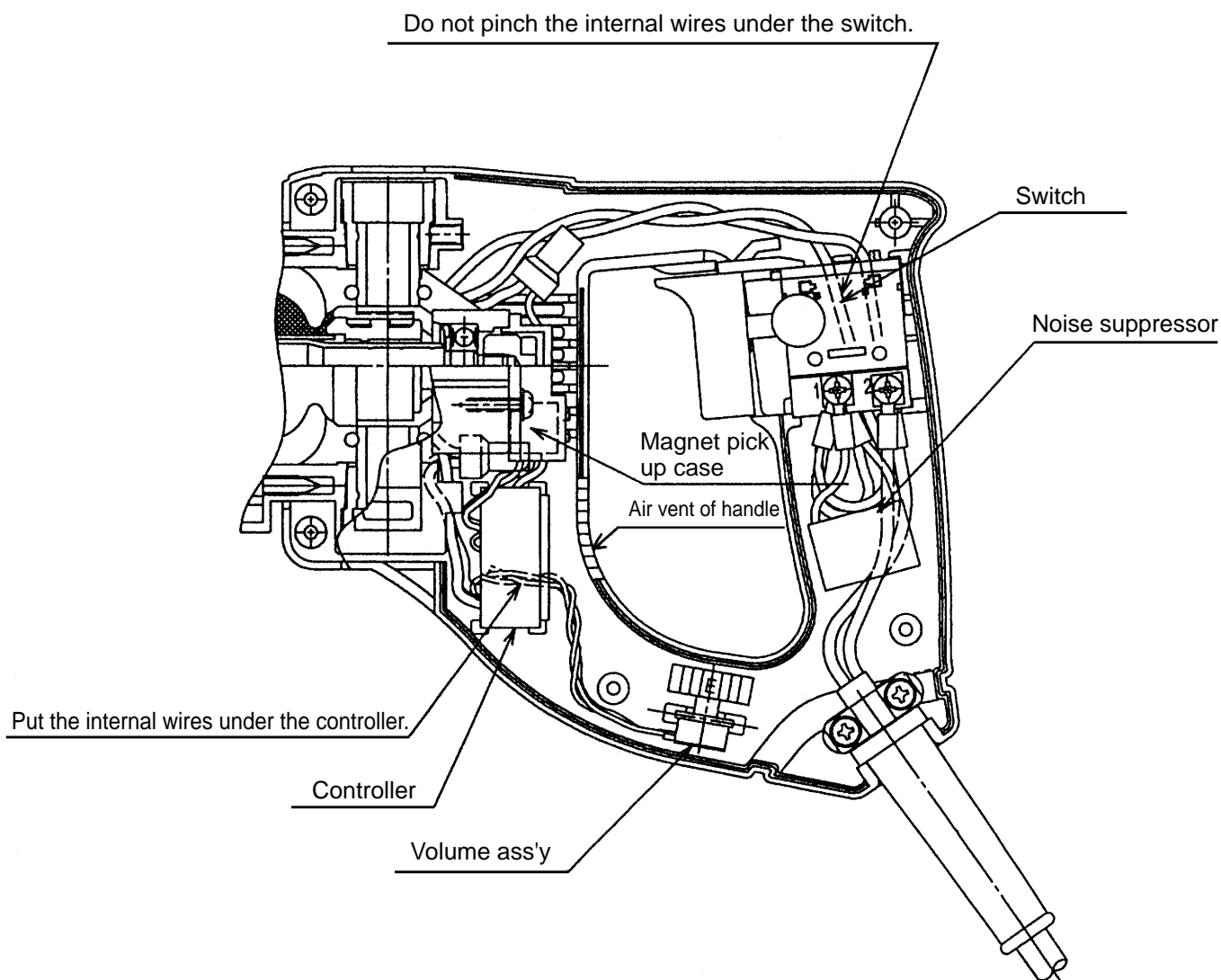


Fig. 6

<CAUTION>

- Insert the Controller [51] so that its uneven surface faces toward the air vent of the handle.
- Do not apply excessive force when closing the cover of the handle. Otherwise, the "volume" (variable-speed dial) can be damaged.

9-2-2. Reassembly of the gear cover section

Fig. 7 shows the assembly drawing. Reassemble the gear cover section according to the following figure.

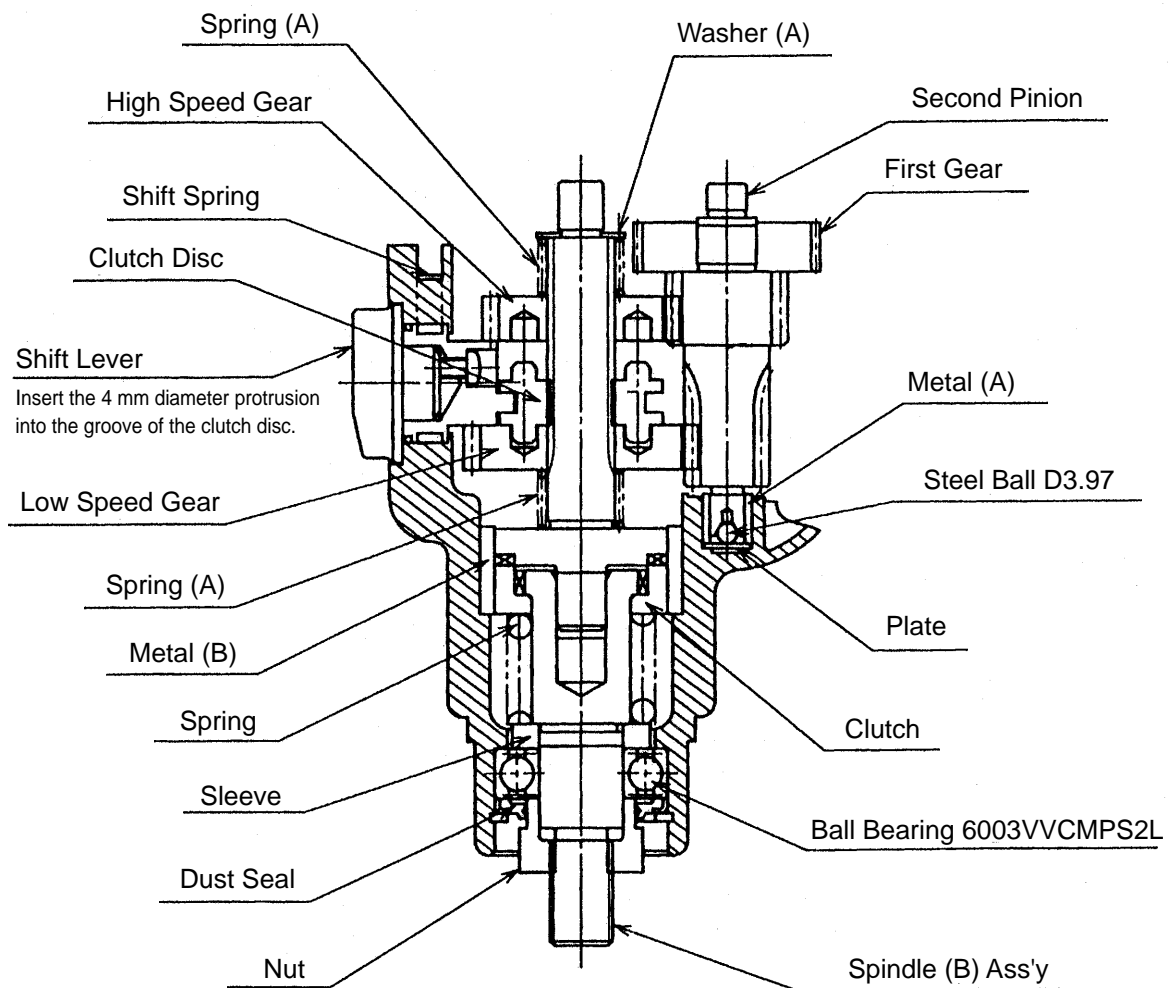


Fig. 7

<CAUTION>

Mounting directions of the High Speed Gear [25] and the Low Speed Gear [23] are specified. Mount these parts in the specified direction as shown in the above figure.

9-3. Lubrication

(1) Apply DOUBREX 251 grease to the following parts.

- Each gear: tooth portion
- Spindle (B) Ass'y [20] (including [17], [18] and [19])
- Clutch Disc [24]: entirely
- Shift Lever [15]: 19 mm dia. outer circumference portion and 4 mm dia. convex portion
- Spindle (A) [21]: claw portion and 10 mm dia. convex portion
- Second Pinion [11] and first gear: tooth portion
- Inner Cover Ass'y [13] and Gear Cover [9]: metal portion
- Inside the Gear Cover [9]: 70 g

<CAUTION>

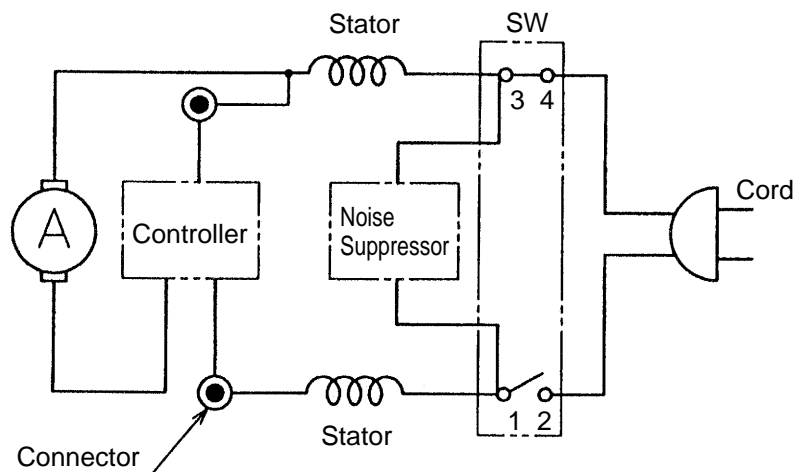
Be sure to use only DOUBREX 251 grease for the gear cover and the components in the gear cover. Use of other grease may cause grease leakage from the tip of the gear cover and the shift lever.

9-4. Tightening Torque

- | | |
|--|--------------------------------|
| (1) Nut [4] | 20 – 30 N•m {200 – 300 kgf•cm} |
| (2) Tapping Screw (W/SP. Washer) D5 x 55 (Black) [8] | 2.5 – 3.5 N•m {25 – 35 kgf•cm} |
| (3) Tapping Screw (W/Flange) D4 [47] [48] | 1.5 – 2.5 N•m {15 – 25 kgf•cm} |

9-5. Internal Wiring

- Wiring diagram



10. CONFIRMATION AFTER REASSEMBLY

10-1. Insulation Tests

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

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

Dielectric strength: AC 4000V/1 minute,

with no abnormalities 220 V – 240 V

(and 110V for U.K. products)

AC 2500V/1 minute,

with no abnormalities 110 V – 127 V

(except U.K. products)

10-2. No-Load Current Value

110 V 12 A

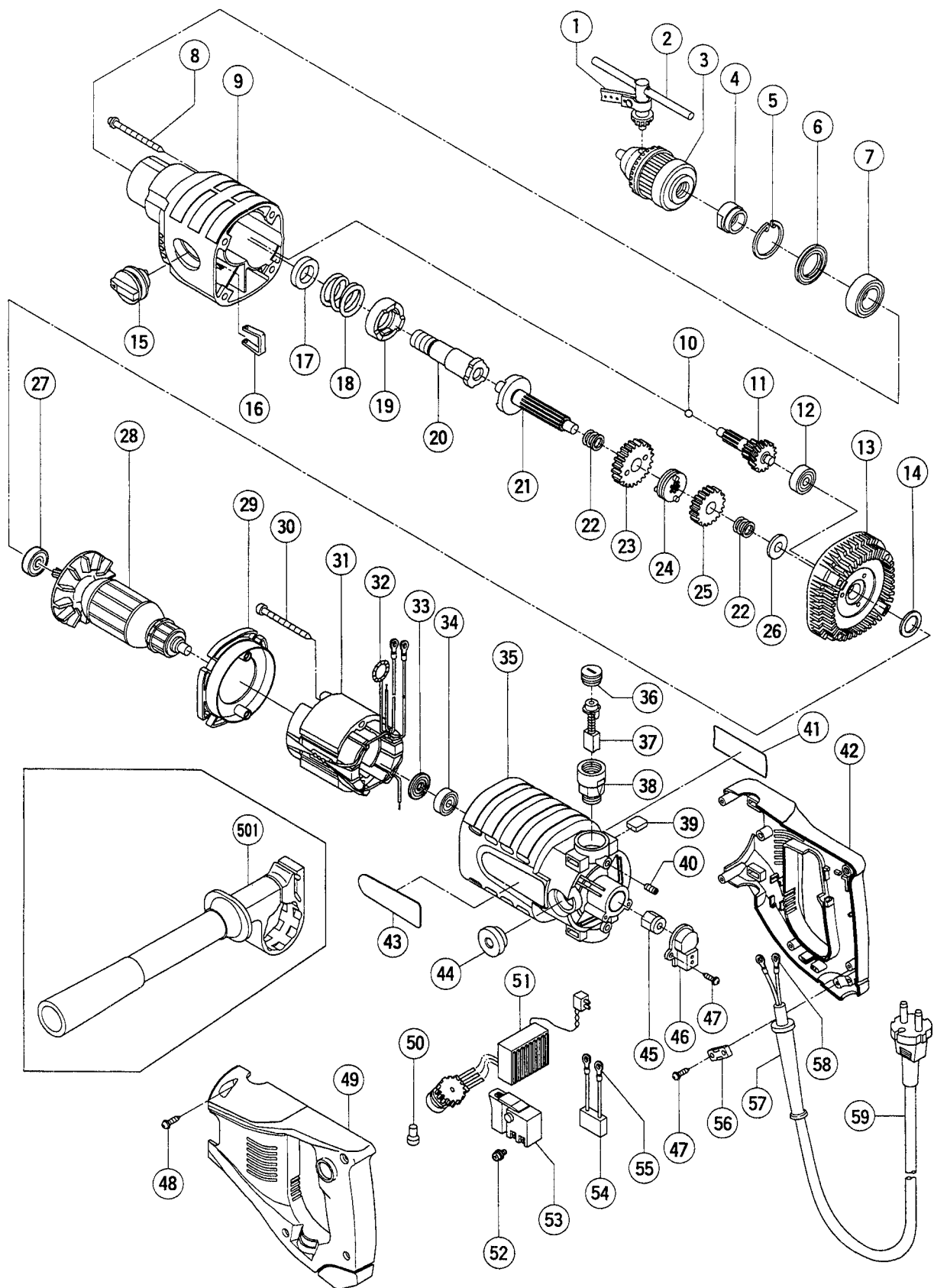
230 V 6.4 A

240 V 6.2 A

11. STANDARD REPAIR TIME (UNIT) SCHEDULES

MODEL	Variable		10	20	30	40	50	60 min.
	Fixed							
DC 120VA		Work Flow						
					Housing Ass'y Stator Ass'y			
		Cord Switch Controller Handle (A) Handle (B)			Gear Cover Nut Dust Seal Ball Bearing (6003VV) Sleeve Spring Clutch Spindle (B) Ass'y Spindle (A) Spring (A) x 2 Low Speed Gear Clutch Disc High Speed Gear			
		General Assembly			Second Pinion Steel Ball Ball Bearing (608VV) Inner Cover Ass'y Armature Ball Bearing (609VV) Dust Seal (A) Ball Bearing (608VV)			

Assembly Diagram for DC 120VA



PARTS

DC 120VA

ITEM NO.	CODE NO.	DESCRIPTION	NO. USED	REMARKS	
1	950-288	VINYL BAND	1		
2	930-515	CHUCK WRENCH 10G	1		
3	950-287	DRILL CHUCK 13WLR (W/SCREW)	1		
4	309-125	NUT	1		
5	939-556	RETAINING RING FOR D35 HOLE (10 PCS.)	1		
6	981-572	DUST SEAL	1		
7	600-3VV	BALL BEARING 6003VVCMP2L	1		
8	303-281	TAPPING SCREW (W/SP. WASHER) D5X55(BLACK)	4		
9	318-735	GEAR COVER	1		
10	959-155	STEEL BALL D3.97 (10 PCS.)	1		
11	318-728	SECOND PINION	1		
12	608-VVM	BALL BEARING 608VVC2PS2L	1		
13	318-729	INNER COVER ASS'Y	1	INCLUD.12,14,27	
14	984-357	WASHER	1		
15	318-726	SHIFT LEVER	1		
16	994-396	SHIFT SPRING	1		
17	309-128	SLEEVE	1		
18	309-167	SPRING	1		
19	318-737	CLUTCH	1		
20	318-736	SPINDLE (B) ASS'Y	1	INCLUD.17-19	
21	318-722	SPINDLE (A)	1		
22	318-723	SPRING (A)	2		
23	318-725	LOW SPEED GEAR	1		
24	319-115	CLUTCH DISC	1		
25	318-724	HIGH SPEED GEAR	1		
26	318-727	WASHER (A)	1		
27	609-VVM	BALL BEARING 609VVC2PS2L	1		
* 28	360-523	ARMATURE 100V-110V	1		
* 28	360-524E	ARMATURE 230V	1		
* 28	360-524F	ARMATURE 240V	1		
29	318-718	FAN GUIDE	1		
30	991-007	TAPPING SCREW D5X60	2		
* 31	340-465C	STATOR ASS'Y 110V	1	INCLUD.32	
* 31	340-465E	STATOR ASS'Y 230V	1	INCLUD.32	
* 31	340-465F	STATOR ASS'Y 240V	1	INCLUD.32	
32	930-703	BRUSH TERMINAL	1		
33	956-387	DUST SEAL (A)	1		
34	608-VVM	BALL BEARING 608VVC2PS2L	1		
35	318-739	HOUSING ASS'Y	1	INCLUD.38-40,44	
36	945-161	BRUSH CAP	2		
37	999-043	CARBON BRUSH (1 PAIR)	2		
38	958-900	BRUSH HOLDER	2		
39	318-734	RUBBER PIECE (B)	4		
40	938-477	HEX. SOCKET SET SCREW M5X8	2		
41		NAME PLATE	1		
42	318-719	HANDLE (A)	1		
43		HITACHI LABEL	1		
44	318-733	RUBBER PIECE (A)	2		
45	318-721	MAGNET	1		
46	995-887	MAGNET PICK UP CASE	1		
47	984-750	TAPPING SCREW (W/FLANGE) D4X16	4		

PARTS

DC 120VA

[illegible]

*** : ALTERNATIVE PARTS**

3 - 00

STANDARD ACCESSORIES

DC 120VA

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