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# USER INSTRUCTION

for High Vacuum Rotary Vane Pump

## W2V40



WOOSUNG AUTOMA CO., LTD.

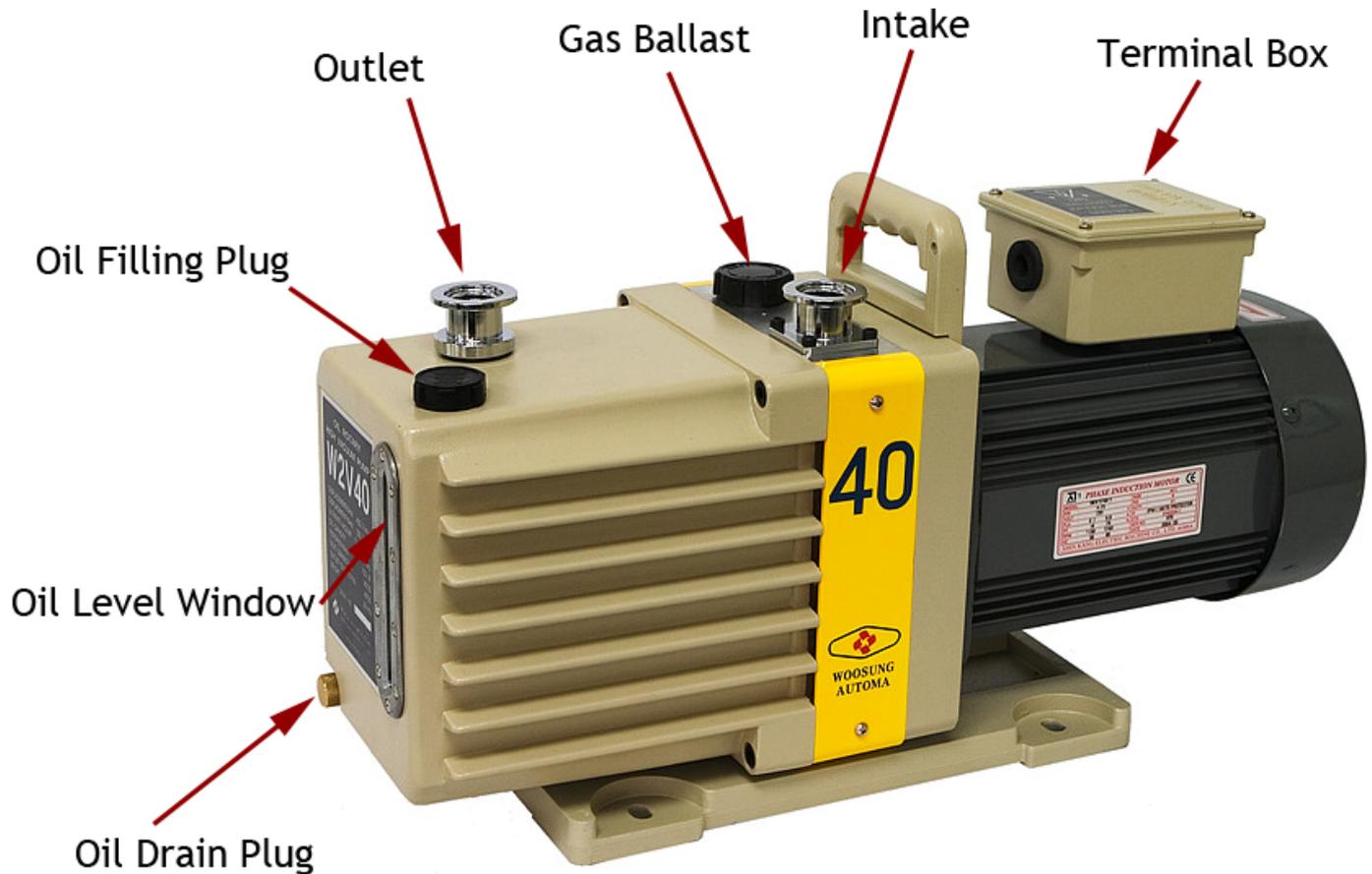


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## 1. Utility of Basic Parts and Specification



### Specification

|                               |   |   |
|-------------------------------|---|---|
| Pumping Speed                 | 400 ℓ/min   |   |
| Ultimate Pressure             | Gas Ballast Closed                                | 5X10 <sup>-4</sup> torr ( 6.7 X 10 <sup>-2</sup> Pa ) |
|                               | Gas Ballast Open                                  | 5X10 <sup>-2</sup> torr ( 6.7 Pa )                    |
| Power Input                   | Standard  | 220VAC 1Φ 50/60Hz                                     |
|                               | Option  | 220VAC/380VAC 3Φ 50/60Hz                              |
|                               | Customer's Request (Voltage, Frequency and Phase) |   |
| Full Load Power               | 0.75 kW ( 1 HP )                                  |   |
| Motor Speed                   | 1700 rpm  |   |
| Inlet and Outlet              | Standard  | NW25  |
|                               | Option I  | Hose Nipple(Φ12 OD, Φ16 OD, or Φ26 OD)                |
|                               | Option II   | Screw Nipple (3/8" Female)                            |
| Oil Capacity                  | 1500 cc ( 1.5ℓ )                                  |   |
| Weight                        | 29 Kg   |   |
| Ambient Operation Temp. Range | 7~40 °C   |   |
| Overall Dimension (mm)        | 170(W) X 490(L) X 293(H)                          |   |



## 2. Inspection

When you receive a pump, you need to check the pump is the same type you ordered.

Please check there is any sign of loose bolts, spilt oil, and broken/loose Parts.

If you ordered accessories for vacuum system please check them in the box.

## 3. Installation

### 1) Preparation

Select a well ventilated area, free of dust.

The pump should be placed conveniently to monitor the oil level of the pump.

We recommend the pump is operated in the temperature over 7 °C.

(We use vacuum oil named 'MR-200' as our default vacuum oil and it is best performance over 7 °C.)

### 2) Fastening

The pump should be tightly fastened to the ground or to a secure object so as not to be moved by the vibration of the pump. The pump should be installed and maintained horizontally all the time.

### 3) Connection by using Terminal box

- ① Open the Cover of Terminal box. You can see there is 6 cords connected.
- ② W2V40's motor is 3 phase one. You need to connect 3 external cords to the pump.
- ③ By referencing the Terminal box cover, you can connect the pump to power.
- ④ After finishing connection please do not connect the pump to the system and check the electronic connection is proper or not. ( If the connection is wrong motor will operate opposite and you need to change the connection)

## 4. Operation

### 1) Start up

Prior to start up, make sure that the line voltage and type of connections are appropriate.

( For all 200V motors, a "Delta" connection is applied initially)

Make sure that the oil level should be within the region between "LO" and "HI" marks.

( Ideally, 3/4 toward "High from "LO")

Never operate the pump in the condition which vacuum oil is below "LO"

In case of 3 phase line operation, make sure that the direction of motor rotation is the same as indicated on the body of the pump.

### 2) Emergency Stop and Power Failure

There is no need of a particular procedure to prevent from losing vacuum in case of an emergency stop or power failure.

The oil regulator build inside pump prevents Back-Flow of oil when the pump stops.



## 5. MAINTENANCE

### 1) Random inspection

Check vacuum oil frequently. You need to check whether the oil is brownish, dirty, or contains moisture.

Also you need to check the oil level always you start up the pump.

If oil level is lowered you can add oil to proper level. (Near "HI")

If oil has poisoned by any dust or water, you need to change the entire oil.

Procedure of Oil change is like below.

- ① To change oil, let the pump cool for about 5 minutes.
- ② Drain the contaminated oil completely through the drain plug ( backside of pump ).
- ③ Close the drain plug.
- ④ Fill the new vacuum oil (MR-200) through the oil filling plug and check the oil level.

\* The pump oil temperature should be typically less than 65 °C when operating.

### 2) Periodic Serviceable Items

#### - Vacuum Oil

Usually the circumstances are very important key of oil's life so there is no exact solution when you change the oil but usually we recommend you need to change the pump's oil like below.

| Application   | Chang oil within (Hours) |
|---|--------------------------|
| High Vacuum in Lab environment, or system seldom exposed to the air           | 2,500                    |
| High Vacuum in manufacturing environment, often exposed to the air            | 1,200                    |
| Vacuum furnace, large gas-exhaust diffusion system, system with booster pump. | 600                      |
| Vacuum drier, vacuum molding, vacuum packing                                  | 200                      |
| Vacuum distillation, low vacuum tank  | 120                      |

Again, we need to mention each system has differences so it is better for user to make own oil change plan.

#### - Oil Seal and other items

WSA supports 2 kinds of repair kits for maintain W2V40.

'Minor Repair Kit for W2V40' is for normal overhaul. Pump consists of various metal and rubber component and some component need to change periodically. Please check the list of Repair kit.

'Major Repair Kit of W2V40' contains vane and other important parts of the pump. Please check the list.

Overhaul is very important for improve pump's performance and pump's life time. We recommend user need to overhaul once a year.



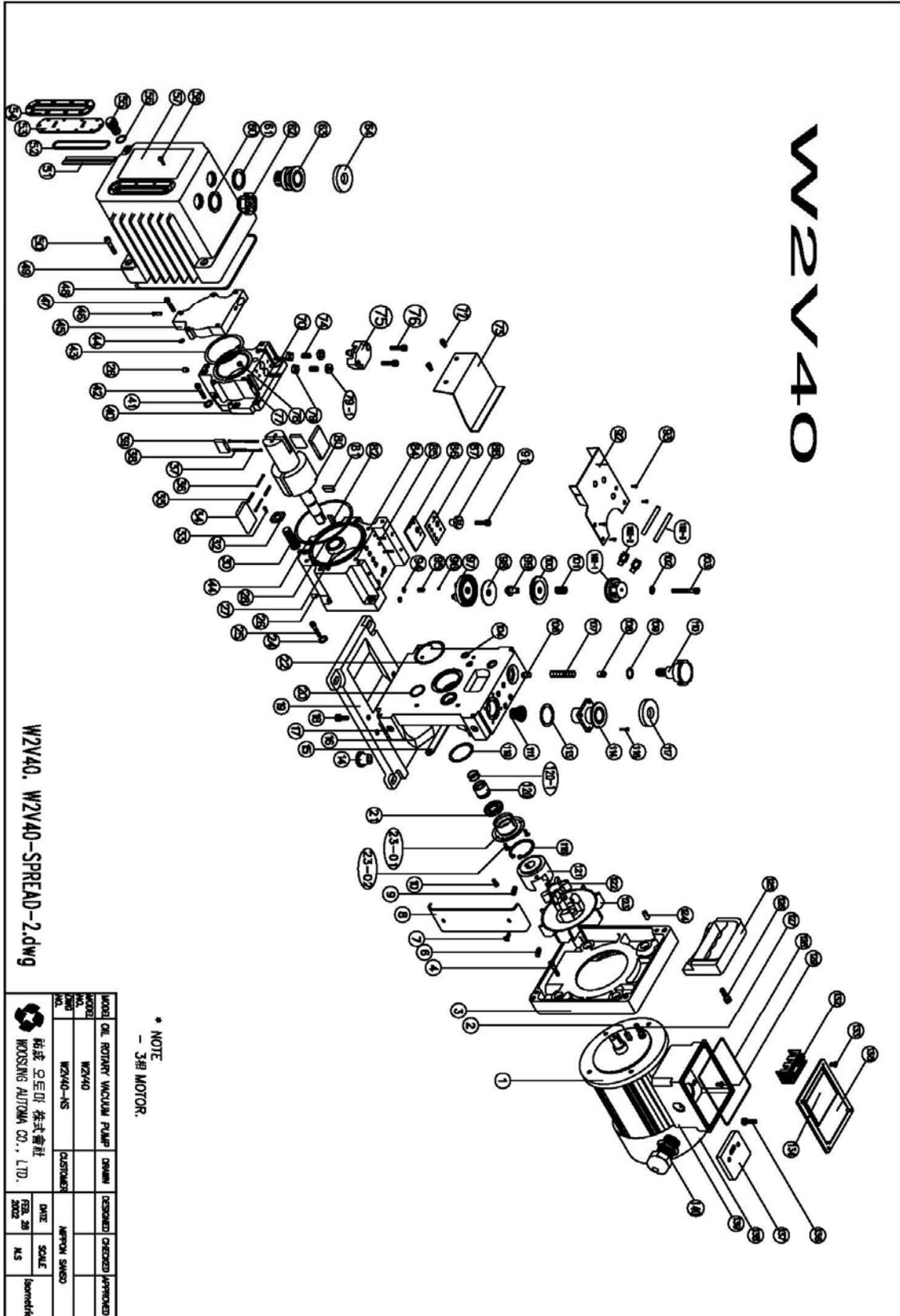
## 5. TROUBLE SHOOTING

| SYMPTOM                     | CHECK  | STEM TO TAKE   |
|-----------------------------|--|--|
| Noisy motor would not turn  | Power line voltage and connections.<br>Any foreign materials inside the pump.<br>Motor ( Open internal circuit).                             | Correct voltage or connections.<br>Remove the foreign materials, If problem with oil, change it.<br>Replace open windings. |
| Noise and hot pump          | Any Foreign materials inside the exhaust valve.<br>Leakage in the system.<br>If leakage valve is open.<br>All the valves in the vacuum line. | Remove the foreign materials<br>Fix the leakage.<br>Close the valve.<br>Close if found open.                               |
| Vacuum Drops<br>(get worse) | Low oil level.<br>Leakage on the device connection.<br>Moisture content of oil.<br>Oil regulator.<br>If Gas Ballast is open.                 | Add Oil.<br>Close the intake and recheck.<br>Change Oil.<br>Replace the Oil Regulator.<br>Close the gas ballst.            |
| Motor runs but Pump not.    | Worn out coupling mechanism.<br>Worn out key between motor and pump.   | Replace coupling.<br>Replace the key and the set screws.   |





### 8. Development Figure





9. Bill of Material

**BOM of W2V40**

2007/02/09

(Standard Type : W2V40)

| NO | SPEC NO    | DESCRIPTION                              | STANDARD                | Q`T |
|----|------------|--|-------------------------|-----|
| 1  | W4V0001    | MOTOR                                    | 3ΦX 200/380V X750X50/60 | 1   |
| 2  | W4V0002    | KEY                                      | 5X5X15R                 | 1   |
| 3  | W4V0003    | MOTOR PLATE                              | DIECAST                 | 1   |
| 4  | W4V0004    | MOTOR MOUNTING BOLT                      | M6X15                   | 4   |
| 5  | W4V0006    | COUPLING FAN FIXING BOLT                 | M5X10(SET SCREW)        | 1   |
| 6  | W4V0007    | SIDE COVER FIXING BOLT                   | M4X8 (OVAL HEAD)        | 4   |
| 7  | W4V0008    | SIDE COVER                               | ABS                     | 2   |
| 8  | W4V0009    | COUPLING FIXING BOLT                     | M5X10(SET SCREW)        | 1   |
| 9  | W4V0010    | SUCTION PAD FIXING BOLT                  | M4X8                    | 2   |
| 10 | W4V0014    | BASE RUBBER                              | NBR                     | 4   |
| 11 | W4V0015    | OIL PAD STRAP                            | PRESS                   | 1   |
| 12 | W4V0016    | OIL SUCTION PAD                          | FELT                    | 1   |
| 13 | W4V0017    | MAIN PLATE(BADY)                         | DIECAST                 | 1   |
| 14 | W4V0018    | BASE PLAT MOUNTING BOLT                  | M6X20                   | 4   |
| 15 | W4V0019    | BASE PLATE                               | DIECAST                 | 1   |
| 16 | W4V0020    | O-RING                                   | P-22                    | 1   |
| 17 | W4V0021    | OIL SEAL(VITON)                          | 18X40X7                 | 1   |
| 18 | W4V0022    | O-RING                                   | G-45                    | 1   |
| 19 | W4V0023-01 | OIL SEAL HOUSING                         | DIECAST                 | 1   |
| 20 | W4V0023-02 | HOUSING FIXING BOLT                      | M4X10(PLATE)            | 3   |
| 21 | W4V0024    | SPRING WASHER                            | Φ6                      | 4   |
| 22 | W4V0025    | 1 <sup>ST</sup> STATOR FIXING BOLT       | M6X25                   | 4   |
| 23 | W4V0026    | COCKING PIN                              | Φ6.1X7.4                | 3   |
| 24 | W4V0027    | OIL SEAL(VITON)                          | 25X35X7                 | 1   |
| 25 | W4V0028    | O-RING                                   | S-95                    | 1   |
| 26 | W4V0030    | OIL STRAINER                             | Φ18X65                  | 1   |
| 27 | W4V0032    | OIL FILTER FIXTURE                       | PRESS                   | 1   |
| 28 | W4V0033    | OIL STRAINER FIX. BOLT                   | M4X8                    | 2   |
| 29 | W4V0034    | 1 <sup>ST</sup> STAGE BLADE              | 40X55X6T                | 2   |
| 30 | W4V0035    | 1 <sup>ST</sup> STAGE BLADE SPRING       | Φ1.8X33X0.5             | 2   |
| 31 | W4V0036    | 1 <sup>ST</sup> STAGE BLADE SPRING GUIDE | Φ1.8X26                 | 2   |
| 32 | W4V0037    | 2 <sup>ND</sup> STAGE BLADE SPRING GUIDE | Φ1.8X26                 | 2   |
| 33 | W4V0038    | 2 <sup>ND</sup> STAGE BLADE SPRING       | Φ1.8X30X0.5             | 2   |

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|    |           |  |                  |    |
|----|-----------|--|------------------|----|
| 34 | W4V0039   | 2 <sup>ND</sup> STAGE BLADE              | 40*30.5*6        | 2  |
| 35 | W4V0040   | 2 <sup>ND</sup> STAGE STATOR             | FC-25            | 1  |
| 36 | W4V0041   | 2 <sup>ND</sup> SPRING WASHER            | Ø6               | 1  |
| 37 | W4V0042   | 2 <sup>ND</sup> STAGE STATOR FIXING BOLT | M6X30            | 6  |
| 38 | W4V0043   | O-RING                                   | G-70             | 1  |
| 39 | W4V0044   | O-RING                                   | P-6              | 2  |
| 40 | W4V0045   | END PLATE                                | FC-25            | 1  |
| 41 | W4V0046   | COCKING PIN                              | M6X6             | 1  |
| 42 | W4V0047   | END PLATE FIXING BOLT                    | M6X30            | 3  |
| 43 | W4V0048   | O-RING                                   | AN-170           | 1  |
| 44 | W4V0049   | OIL BOX                                  | DIECAST          | 1  |
| 45 | W4V0050   | OIL BOX ASSEMBLY FIXING BOLT             | M6X35            | 4  |
| 46 | W4V0051   | OIL LEVEL PLATE                          | 10X95X0.2T       | 1  |
| 47 | W4V0052   | O-RING                                   | S-75             | 1  |
| 48 | W4V0053   | OIL LEVEL WINDOW                         | 34X122X3         | 1  |
| 49 | W4V0054   | OIL LEVEL BACK PLATE                     | DIECAST          | 1  |
| 50 | W4V0055   | OIL DRAIN PLUG                           | M-10             | 1  |
| 51 | W4V0056   | O-RING                                   | AM-109           | 1  |
| 52 | W4V0057   | NAME PLATE                               | STICKER          | 1  |
| 53 | W4V0058   | LEVEL BACK PLATE FIXING BOLT             | M3.5X11(+)       | 10 |
| 54 | W4V0060   | O-RING                                   | Ø20XØ30X2.5T     | 1  |
| 55 | W4V0061   | O-RING                                   | Ø20XØ30X2.6T     | 1  |
| 56 | W4V0062   | OIL FILLING PLUG                         | M-24             | 1  |
| 57 | W4V0063   | EXHAUST ASSEMBLY                         | NW25             | 1  |
| 58 | W4V0064   | EXHAUST ASSEMBLY CAP                     | NW25(CAP)        | 1  |
| 59 | W4V0070   | VALVE GUIDE PIN (ROLL PIN)               | Ø3X20            | 2  |
| 60 | W4V0072   | DISCHARGE BAFFLE FIXING BOLT             | M6X30            | 2  |
| 61 | W4V0073   | DISCHARGE BAFFLE                         | 100X156X1        | 1  |
| 62 | W4V0074   | 2 <sup>ND</sup> VALVE SPRING             | Ø0.5X7.3X8.3X17  | 2  |
| 63 | W4V0075   | SPRING SUPPORT                           | DIECAST          | 1  |
| 64 | W4V0076   | SPRING SUPPORT FIXING BOLT               | M5X20            | 2  |
| 65 | W4V0077   | TAPPER PIN                               | Ø7X40            | 2  |
| 66 | W4V0078   | NUT                                      | M6               | 2  |
| 67 | W4V0079   | 2 <sup>ND</sup> STAGE VALVE              | Ø14.5*7          | 1  |
| 68 | W4V0079-1 | VALVE SPRING NEST                        | Ø13.5XØ10.5X4.8T | 2  |
| 69 | W4V0080   | ROTOR ASSEMBLY                           | FCD-64           | 1  |
| 70 | W4V0081   | OIL PUMP BLADE                           | 6X8X21           | 1  |
| 71 | W4V0082   | KEY                                      | 5X5X18           | 1  |

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|-----|-----------|--|------------------|---|
| 72  | W4V0084   | 1 <sup>ST</sup> STAGE STATOR                 | FC-25            | 1 |
| 73  | W4V0085   | 1 <sup>ST</sup> VALVE GUIDE PIN (ROLL PIN)   | Ø3X20            | 2 |
| 74  | W4V0086   | 1 <sup>ST</sup> VALVE                        | 50X53X3T         | 1 |
| 75  | W4V0087   | 1 <sup>ST</sup> VALVE BACK PLATE             | 49X54X1.8T       | 1 |
| 76  | W4V0088   | 1 <sup>ST</sup> VALVE SPACER                 | Ø8X Ø15X9        | 1 |
| 77  | W4V0091   | 1 <sup>ST</sup> VALVE FIXING BOLT            | M5X20            | 1 |
| 78  | W4V0092   | 1 <sup>ST</sup> VALVE OIL BAFFLE             | 147X127X1.2T     | 1 |
| 79  | W4V0093   | 1 <sup>ST</sup> VALVE OIL BAFFLE FIXING BOLT | M5X8             | 4 |
| 80  | W4V0094   | O-RING                                       | P-6              | 2 |
| 81  | W4V0095   | DISTRIBUTER CHECK VALVE NEST                 | Ø5.7X10          | 1 |
| 82  | W4V0096   | DISTRIBUTER CHECK VALVE BALL                 | Ø4               | 1 |
| 83  | W4V0097   | DISTRIBUTER BODY                             | DLECAST          | 1 |
| 84  | W4V0098   | DISTRIBUTER VALVE                            | Ø45              | 1 |
| 85  | W4V0099   | DISTRIBUTER SPACER                           | DICAST           | 1 |
| 86  | W4V0100   | DISTRIBUTER WEIGHT                           | Ø44X4.7T         | 1 |
| 87  | W4V0101   | DISTRIBUTER WEIGHT SPRING                    | Ø0.6X9.5X10X17   | 1 |
| 88  | W4V0102   | WASHER                                       | Ø5               | 1 |
| 89  | W4V0102-1 | DISTRIBUTER CAP                              | AL               | 1 |
| 90  | W4V0102-2 | NIPPLE                                       | BRASS            | 2 |
| 91  | W4V0102-3 | OIL HOSE                                     | Ø8               | 2 |
| 92  | W4V0103   | DISTRIBUTER FIXING BOLT                      | M5X50            | 1 |
| 93  | W4V0104   | O-RING                                       | AN-109           | 1 |
| 94  | W4V0106   | GAS BALLAST PIN                              | 4.2X6.2X11.5     | 1 |
| 95  | W4V0107   | GAS BALLAST SPRING                           | Ø4.5XØ6.3X33X0.9 | 1 |
| 96  | W4V0108   | GAS BALLAST SPRING PIN                       | 4.5X6.2X11.5     | 1 |
| 97  | W4V0109   | O-RING                                       | P-10A            | 1 |
| 98  | W4V0110   | GAS BALLAST KNOB                             | Ø40              | 1 |
| 99  | W4V0111   | STRAINER                                     | 0.2X32#X23       | 1 |
| 100 | W4V0113   | O-RING                                       | P-30             | 1 |
| 101 | W4V0114   | INTAKE FLANGE                                | NW25             | 1 |
| 102 | W4V0116   | INTAKE FLANGE FIXING BOLT                    | M4X12            | 4 |
| 103 | W4V0117   | INTAKE FLANGE CAP                            | NW25             | 1 |
| 104 | W4V0118   | SNAP RING                                    | R-40             | 1 |
| 105 | W4V0119   | O-RING                                       | G-35             | 1 |
| 106 | W4V0120   | SEAL BUSHING                                 | Ø20 ?            | 1 |
| 107 | W4V0120-1 | O-RING                                       | S-18             | 2 |
| 108 | W4V0121   | COUPLING                                     | DIECAST          | 1 |
| 109 | W4V0122   | COUPLING JOINT                               | NBR              | 1 |

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|     |         |                            |          |   |
|-----|---------|----------------------------|----------|---|
| 110 | W4V0123 | FAN                        | DIECAST  | 1 |
| 111 | W4V0124 | MOTOR PLATE GUIDE PIN      | Ø6X13    | 2 |
| 112 | W4V0125 | HANDLE                     | DIECAST  | 1 |
| 113 | W4V0126 | HANDLE FIXING BOLT         | M6X20    | 2 |
| 114 | W4V0127 | MOTOR BODY FIXING BOLT     | M6X35    | 4 |
| 115 | W4V0128 | O-RING                     | AN-048   | 1 |
| 116 | W4V0129 | TERMINAL BOX FIXING BOLT   | M5X20(+) | 2 |
| 117 | W4V0132 | 3P TERMINAL                | 3P/20A   | 1 |
| 118 | W4V0133 | COVER FIXING BOLT          | M4*8(+)  | 4 |
| 119 | W4V0134 | NAME PLATE                 | STICKER  | 1 |
| 120 | W4V0135 | TERMINAL BOX COVER         | DIECAST  | 1 |
| 121 | W4V0136 | 3P TERMINAL FIXING BOLT    | M4X12(+) | 2 |
| 122 | W4V0136 | TERMINAL BOX BOTTOM RUBBER | RUBBER   | 1 |
| 123 | W4V0138 | ROTATION MARK              | STICKER  | 1 |
| 124 | W4V0139 | TERMINAL BOX               | DIECAST  | 1 |
| 125 | W4V0140 | POWER CORD PROTECTOR       | NBR      | 1 |



10. Service Kits

W2V40 Service KIT

| Code #                          | Description                        | Q'ty | Standard        | Remarks         |
|---------------------------------|------------------------------------|------|-----------------|-----------------|
| W4V0016                         | OIL SUCTION FELT                   | 1    | FELT            | Minor and Major |
| W4V0020                         | O-RING                             | 1    | P-22            | Minor and Major |
| W4V0021                         | OIL SEAL(Viton)                    | 1    | 22X32X7         | Minor and Major |
| W4V0022                         | O-RING                             | 1    | G-45            | Minor and Major |
| W4V0027                         | OIL SEAL(Viton)                    | 1    | 25X35X7         | Minor and Major |
| W4V0028                         | O-RING                             | 1    | S-95            | Minor and Major |
| W4V0043                         | O-RING                             | 1    | G-70            | Minor and Major |
| W4V0044                         | O-RING                             | 1    | P-6             | Minor and Major |
| W4V0048                         | O-RING                             | 1    | AN-170          | Minor and Major |
| W4V0052                         | O-RING                             | 1    | S-75            | Minor and Major |
| W4V0079                         | 2 <sup>ND</sup> STAGE VALVE        | 1    | Φ14.5X7         | Minor and Major |
| W4V0086                         | 1 <sup>ST</sup> VALVE              | 1    | 50X53X3T        | Minor and Major |
| W4V0094                         | O-RING                             | 2    | P-6             | Minor and Major |
| W4V0098                         | DISTRIBUTOR VALVE                  | 1    | Φ45             | Minor and Major |
| W4V0104                         | O-RING                             | 1    | AN-109          | Minor and Major |
| W4V0113                         | O-RING                             | 1    | P-30            | Minor and Major |
| W4V0119                         | O-RING                             | 1    | G-35            | Minor and Major |
| W4V0120-1                       | O-RING                             | 2    | S-18            | Minor and Major |
| <i>Until Here for Minor Kit</i> |                                    |      |                 |                 |
| W4V0034                         | 1 <sup>ST</sup> STAGE BLADE        | 2    | 40X55X6T        | Major Only      |
| W4V0035                         | 1 <sup>ST</sup> STAGE BLADE SPRING | 2    | Φ1.8X33X0.5     | Major Only      |
| W4V0036                         | 1 <sup>ST</sup> STAGE SPRING GUIDE | 2    | Φ1.8x26         | Major Only      |
| W4V0037                         | 2 <sup>ND</sup> STAGE BLADE GUIDE  | 2    | Φ1.8x26         | Major Only      |
| W4V0038                         | 2 <sup>ND</sup> STAGE BLADE SPRING | 2    | Φ1.8X30X0.5     | Major Only      |
| W4V0039                         | 2 <sup>ND</sup> STAGE BLADE        | 2    | 29X40X6T        | Major Only      |
| W4V0074                         | 2 <sup>ND</sup> VALVE SPRING       | 2    | Φ0.5X7.3X8.3X17 | Major Only      |
| W4V0081                         | OIL PUMP BLADE                     | 1    | 6X8X21          | Major Only      |
| W4V0120                         | SEAL BUSHING                       | 1    | Φ22X20          | Major Only      |
| <i>Total for Major Kit</i>      |                                    |      |                 |                 |



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