Metalfab, Inc.

Industrial Electric Vibrators

Operator's Manual

M3258

Important

Metalfab, Inc. hereby disclaims any liability for injuries or damage resulting from use or application of this product contrary to instructions and specifications contained herein. Metalfab's liability shall be limited to repair or replacement of product shown to be defective.

Observe all safety rules given herein along with owner and Government standards and regulations. Know and understand lockout/tagout procedures as defined by American National Standards Institute (ANSI) z244.1-1982, *American National Standard for Personnel Protection - Lockout/Tagout of Energy Sources - Minimum Safety Requirements* and Occupational Safety and Health Administration (OSHA) Federal Register, Part IV, 29 CFR Part 1910, *Control of Hazardous Energy Source (Lockout/Tagout); Final Rule*.

The following symbols may be used in this manual:

⚠ DANGER

Danger: Immediate hazards that will result in severe personal injury or death.

⚠ WARNING

Warning: Hazards or unsafe practices that could result in personal injury.

⚠ CAUTION

Caution: Hazards or unsafe practices that could result in product or property damages.

IMPORTANT

Important: Instructions that must be followed to ensure proper installation/operation of equipment.

NOTE

Note: General statements to assist the reader.

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Introduction

The Metalfab, Inc. Electric Vibratory Motor you have purchased is of special manufacture. It has been designed and manufactured solely for use as a vibratory motor, to ensure the best possible performance and reliability under severe duty applications.

Installation

The mounting bolts used must be of grade 8 material. When installing the motor, it is necessary to use locking nuts (do not use split lock washers) and tighten the bolts evenly to the recommended torque ratings. Never reinstall used fasteners as they may fail under load. Check the bolts for security after a few hours of operation.

It is imperative that the eccentric weights at both ends of the shaft are adjusted identically: "mirror images of each other." When adjusting the eccentric weights, use the least amount of amplitude and force to move your material. This will provide longer motor life. See the "Eccentric Weight Adjustment" section.

The motors are supplied with a terminal block to provide safe and secure lead attachment. Wiring of these motors must be done in accordance with the National Electric Code. See Figures 2 through 6 for wiring diagrams. Each motor is supplied with a wiring diagram inside the terminal box.

Always use closed loop wire connectors only with crimped or soldered terminal ends on cable leads. See Figure 1 for the correct technique for assembling the wire connectors. Reinstall the foam rubber blocks supplied in the junction box on top of the cable leads.

When wiring the motor, always use the ground connection.

⚠ CAUTION

Never weld on the bin or structure without first disconnecting the motor leads. Failure to do so may cause damage to the motor windings and bearings by grounding through the motor.

IMPORTANT

Overload Protection Required!

This vibrator carries the best guarantee offered by any vibrator manufacturer. To assure extended life, maintain the warranty, and comply with the National Electric Code, this unit must be wired with the proper size overload protection.

Install overload protection in the vibrator circuit in accordance with Article 430, Part III of the National Electrical Code. If the vibrator cannot be operated in your application at this amperage level, consult Metalfab, Inc. or your local distributor. Do not increase the overload protection rating. This may destroy the vibrator and will void the warranty.

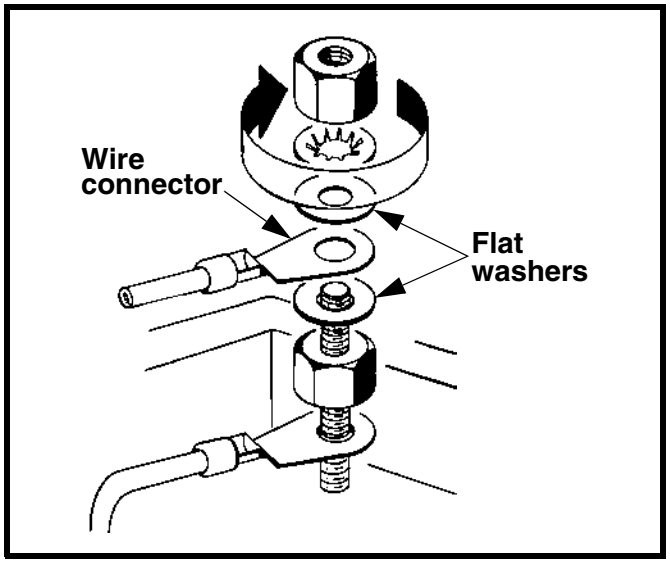

Figure 1. Installing Wire Connector

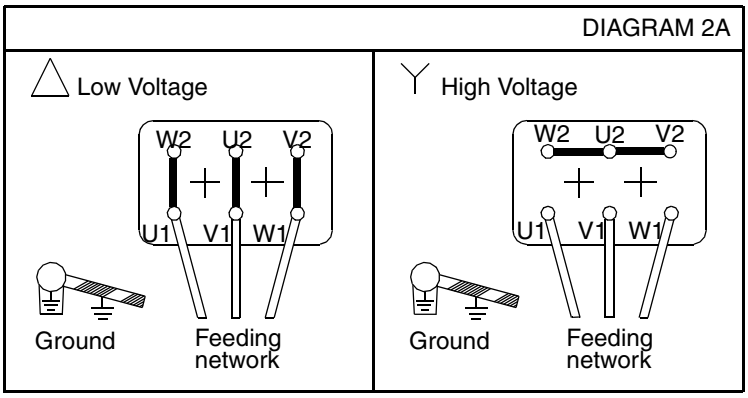

Figure 2. Six-Post Terminal Block Connection, 3 Phase

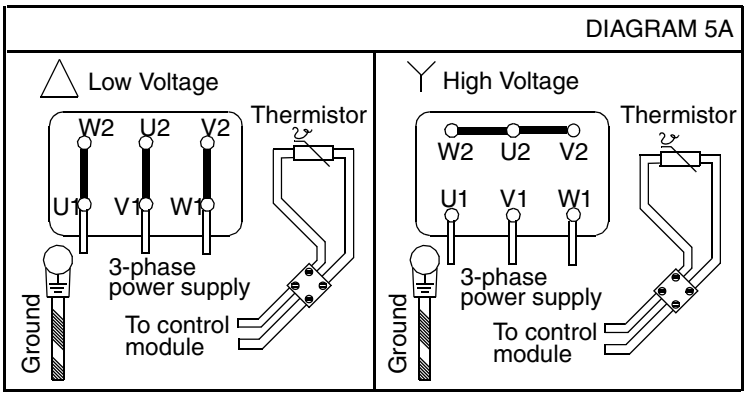

Figure 3. Six-Post Terminal Block Connection With Thermistor Circuit, 3 Phase (For Models CD18-10900 and CD18-14500)

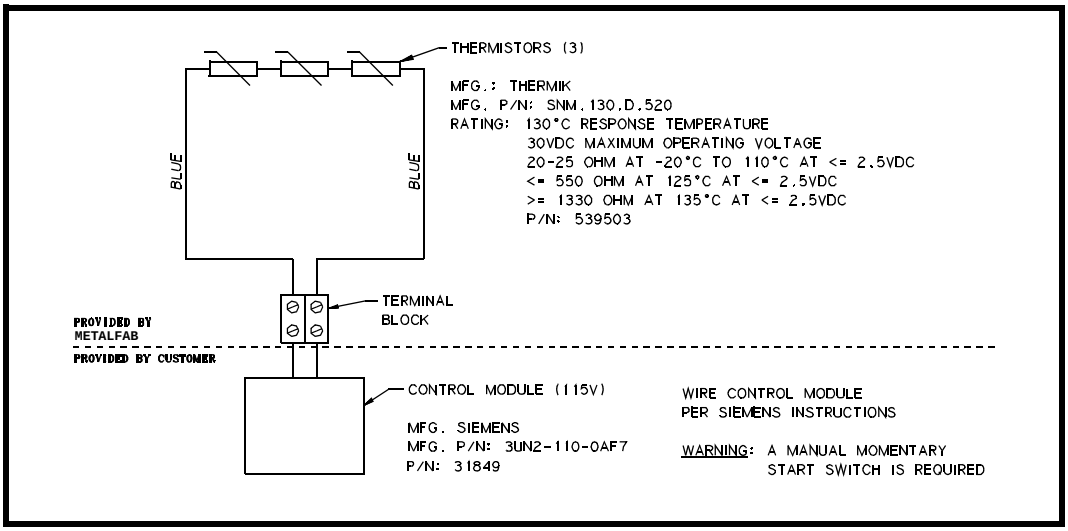

Figure 4. Thermistor Wiring Diagram (For Models CD18-10900 and CD18-14500)

Table I. Motor Technical Specification*

Model	230/460 V, 60 Hz			220/380 V, 50 Hz		
	Nominal Amps	Starting Amps	HP	Nominal Amps	Starting Amps	HP
CD18-920	1.2/0.6	4.1/2.1	0.5	1.04/2.0	3.5/2.0	0.5
CD18-2000	3.0/1.5	12.6/6.3	1.5	2.5/1.5	10.3/6.0	1.5
CD18-3190	3.0/1.5	12.6/6.3	1.5	2.5/1.5	10.3/6.0	1.5
CD18-3870	3.8/1.9	18.6/9.3	1.5	3.5/2.0	14.8/8.6	1.5
CD18-5380	6/3	43.4/21.7	3	5.5/3.2	33.5/19.5	2.4
CD18-10900	10/5	80/40	4	10.4/6.0	73/42	4
CD18-14500	18/9	138/69	7	18.1/10.5	118/68	6.7
CDX18-910	1.2/0.6	4.2/2.1	0.37	0.35/0.6	1.15/2.0	0.29
CDX18-2150	1.76/0.88	8.5/4.3	0.6	1.46/0.85	6.5/3.8	0.5
CDX18-3190	3.0/1.5	16.8/8.4	1	2.5/1.5	13.1/7.6	0.75
CDX18-4400-D	3.8/1.9	20.7/10.4	1.5	3.3/1.9	15.9/9.2	1.2
CDX18-5900-D	5.8/2.9	45.0/22.5	2	5.4/3.1	40/23	1.75

*For 575 V current, multiply 460 V currents by 0.8 to obtain amp draw.

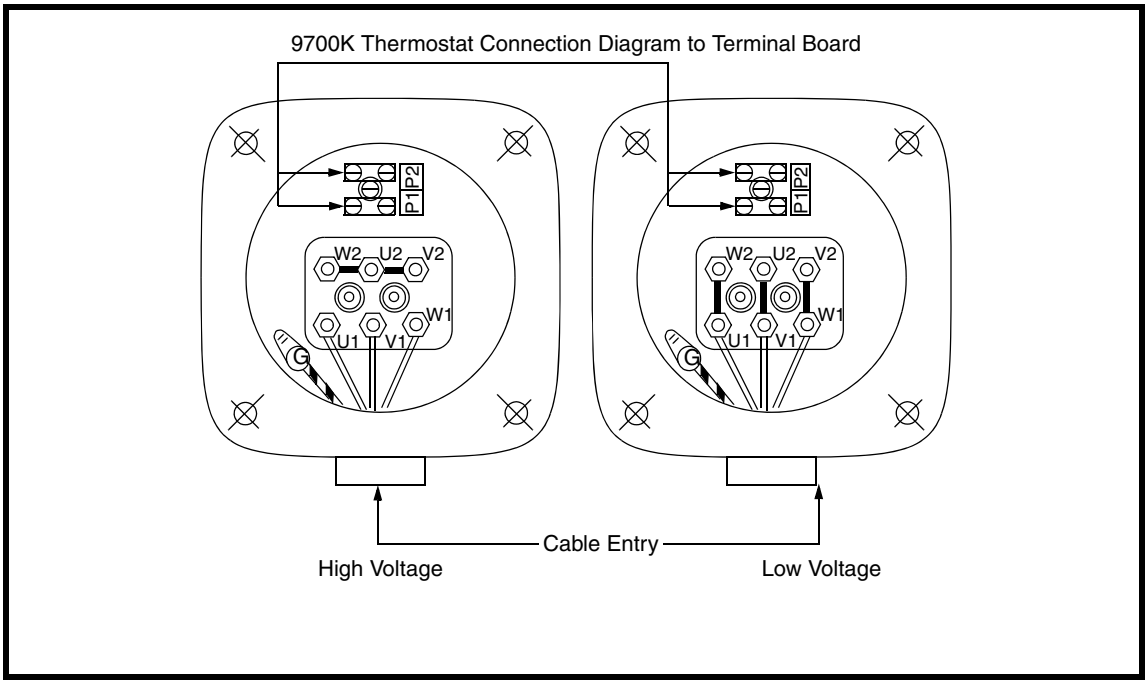

Figure 5. Wiring Connection Diagrams: UL/cUL/ATEX Approved CDX Series Division 1 Class I Groups C and D, Class II Groups E, F, and G; EExd IIB T4

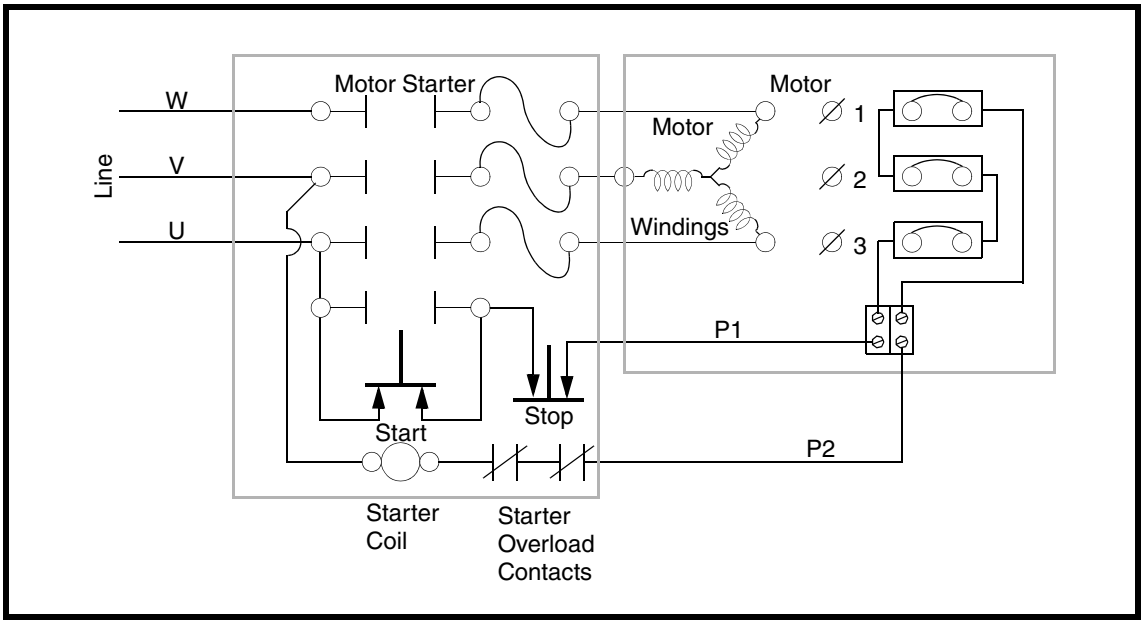

Figure 6. Manual Reset Connections

Table II. Thermostat Contact Ratings for Control Circuits P1 and P2

Volts	AC Amperes	
	Break not make	Break and make
110	6.0	3.1
220	3.0	1.6
380	1.7	0.9

Table III. Overload Protection Chart (Heater Selection)

Motor size	Heater brand			
	Allen Bradley 230/460 V	Westinghouse 230/460 V	Square D 230/460 V	Cutler Hammer 230/460 V
CD18-910	WL29/WL22	FH18/FH11	A1.5/A.71	H1117/H1112
CD18-2000	WL39/WL31	FH28/FH21	A4.32/A1.86	H1026/H1019
CD18-3870	WL41/WL34	FH29/FH22	A4.79/A1.99	H1027/H1021
CD18-5380	WL46/WL39	FH34/FH27	*B9.10/B4.15	*H1031/H1025
CD18-10900	*WL52/WL45	*FH41/FH33	**B17.5/B8.20	**H1036/H1030
CD18-14500	**WL59/WL52	**FH49/FH40	**B36/B15.5	**H1042/H1036
CDX18-2150	WL34/WL26	FH23/FH15	A2.31/A1.16	H1021/H1115
CDX18-3190	WL39/WL31	FH28/FH21	A4.32/A1.86	H1026/H1019
CDX18-4400-D	WL41/WL34	FH30/FH22	A4.79/A1.99	H1027/H1021
CDX18-5380-D	WL46/WL39	FH34/FH27	*B9.1/B4.15	H1031/H1025

Starter size is NEMA 00 unless otherwise specified.

*Use NEMA 0 starter.

**Use NEMA 1 starter.

Eccentric Weight Adjustment

All Metalfab, Inc.Vibratory Motors feature eccentric weights to change the amplitude and centrifugal force. The following procedure should be adhered to whenever the eccentric weights are adjusted.

1. Remove weight covers on both ends of motor.
2. Note present eccentric weight setting.
3. Loosen bolts on the outer adjustable eccentric weights only.
4. Rotate outer eccentric weights on shaft and line up the outer eccentric with the desired percentage setting on the inside eccentric. (See Figure 8 for examples of force settings.)
5. Retighten eccentric bolts and reinstall weight covers.

NOTE

The upper weight and lower weight must be set at same position.

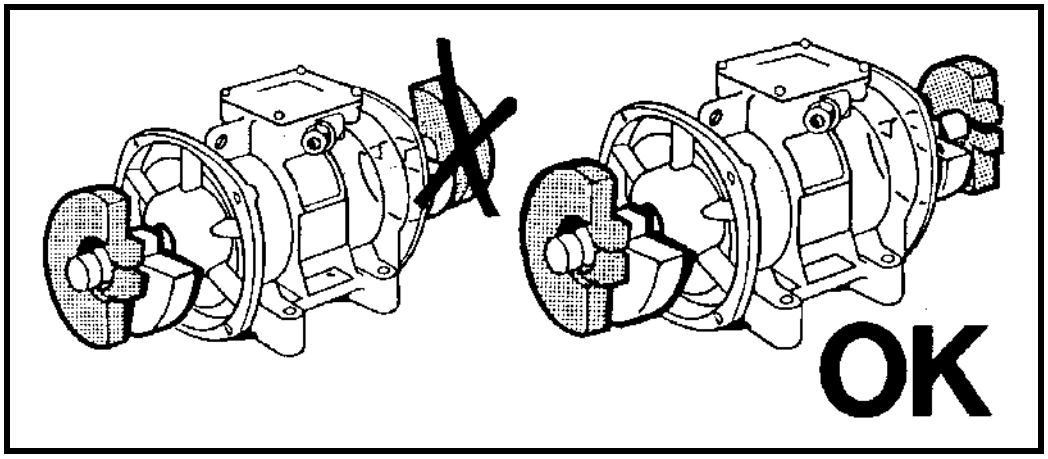

Figure 7. Setting Sets of Eccentric Weights to Mirror Images

⚠WARNING

Before any adjustments vibrator should be electrically "locked out."

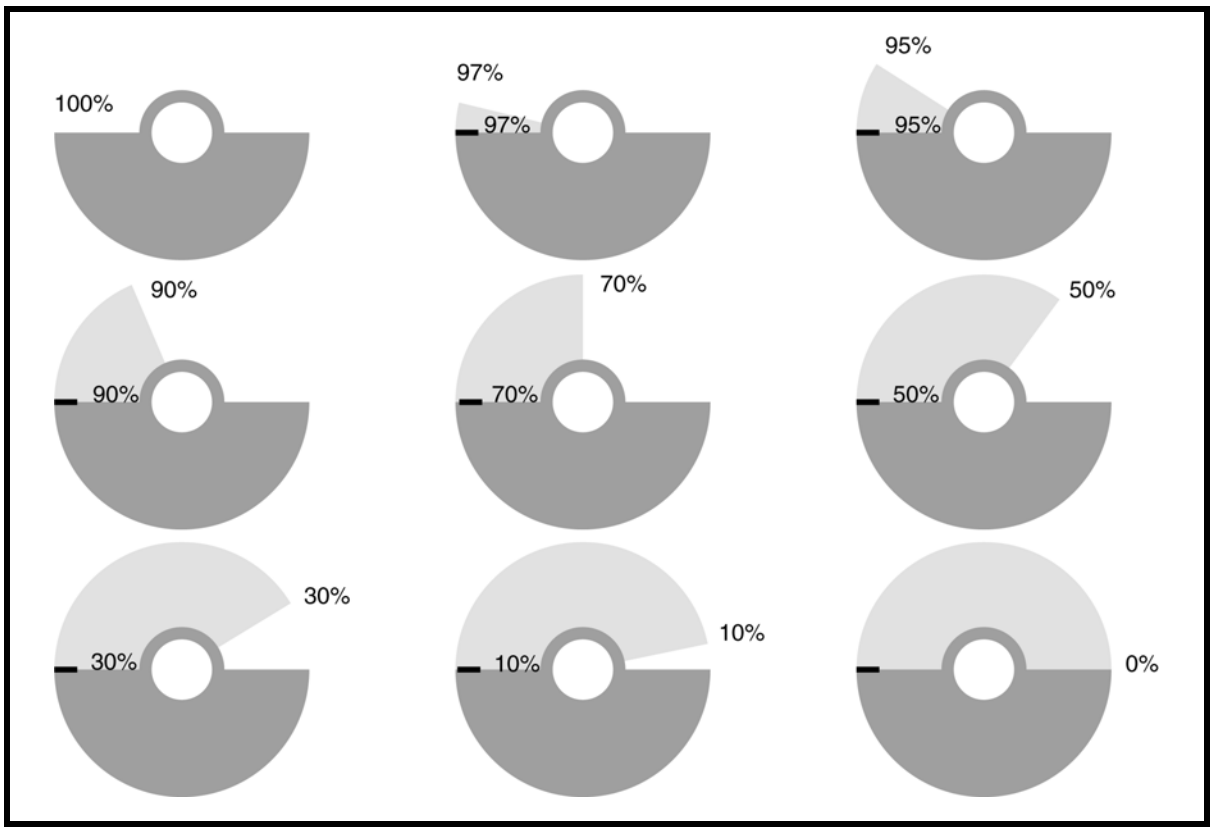

Figure 8. Eccentric Weight Adjustment

Lubrication

Each Metalfab, Inc.Vibratory Motor has been lubricated from the factory and requires no further lubrication for 2000 hours of operation. Exceptions to this lubrication schedule are only to be made if surface temperatures exceed 194°F (90°C). In this case, the lubrication time should be halved for every 18°F (10°C) increment above 194°F (90°C). The lubrication quantity should also be halved accordingly.

The grease lubrication installed in the CD Series motors is Kluber Staburags NBU 8 EP. The CDX series explosion proof motors use Kluber Isoflex Topas NB 52.

Never mix greases of different types or manufacturers as this may cause premature bearing failure. Kluber grease may be purchased from:

Kluber Lubrication Corporation
54 Wentworth Ave.
Londonderry, NH 03053
(603) 434-7704

Refer to the chart below for the proper lubrication quantities for each motor.

Table IV. Vibrator Lubrication

Motor size	Bearing number (FAG TVP2C4 QP51 or SKF ECP-C4)	Grease per bearing	
		oz.	g
*CD18-920	6305.2ZR.C3	---	---
CD18-2000	NJ2208E	0.3	9
CD18-3870	NJ2308E	0.6	16
CD18-5380	NJ2309E	0.7	19
CD18-10900	NJ2313E	1.4	40
CD18-14500	NJ2315E	2.1	60**
*CDX18-910	6306.2ZR.C3	---	---
*CDX18-2100	NJ2206E	---	---
CDX18-3500	NJ308E	0.4	12
CDX18-4400	NJ2308E	0.6	16
CDX18-5380-D	NJ2310E	1.0	25***

All motors must be lubricated every 2000 working hours unless otherwise specified.
*This motor has bearings sealed for life.
**Lubricate every 1000 working hours.
***Lubricate every 3000 working hours.

Fifteen pumps of a standard grease gun equals approximately 1 oz. (28 g) of grease. Too much grease may cause the bearings to overheat and result in premature bearing failure.

When installing new bearings, lubricate by hand-packing the bearings. The quantity of grease for new bearings should be doubled that of the above lubrication table.

Bearing Replacement and Tear Down

⚠WARNING

Before any adjustments vibrator should be electrically "locked out."

All assembly/disassembly work must take place in a very clean environment to avoid any contamination to the bearings. Always replace the grease seals when bearings are replaced. Use only the recommended bearings and grease as described in the "Lubrication" section of this manual.

NOTE

These motors will produce bearing noise when they are run without the eccentric weights. Please do not misconstrue this bearing noise as necessarily meaning the bearings are bad. It is simply due to the "loose" fit bearings used. However, when the eccentric weights are attached and even a minimum of centrifugal force is created, the bearings should quiet down. If the bearings still make noise under load, it is evident there is a damaged bearing.

Do not simply request a bearing by using its first few call numbers, but use the complete call numbers. To be sure you receive the correct bearing, order it from Metalfab, Inc. Use only FAG or SKF bearings.

Disassembly of motor and bearings

You must first remove the weight covers and weights. Next, remove the four bolts holding the bearing flange to the stator housing. Then introduce two weight cover bolts into the small tapped holes just next to the four bearing flange bolts. By tightening these two screws into the bearing flange, you will press out the bearing flange from the stator housing.

NOTE

These small screws should be tightened evenly so as not to bind the bearings on the shaft.

After the bearing flanges have been removed from the motor housing, you may then remove the two aforementioned small screws from each bearing flange and introduce them into the two small threaded holes that exist in the bearing flange next to the bearing. Again, screw the two screws into the bearing housing with even pressure to prevent binding of the bearing in the bearing flange. If the bearing requires additional thread engagement for removal, use a spacer or stack of washers for this purpose.

Next, it is necessary to remove the inner races of the bearing from the shaft. A bearing puller will be required for this operation. Heat may be applied to the inner race of the bearing to facilitate its removal from the shaft. If heat is applied to the inner race, the bearing must be discarded.

Reassembly of new bearings

Before proceeding with bearing replacement it is necessary to:

1. Completely clean the bearing flange bore.
2. Check the bearing flange bore dimensions and compare with the outer diameter of the outer race of the bearing. The bearing must have an interference fit with the bearing flange seat. In other words, the outer diameter of the bearing must be slightly larger than the inside diameter of the bearing flange seat. Do not assemble the bearing into the flange if an interference fit does not exist.
3. Be sure you keep the bearings together as a set, so the removable inner races are not switched.

For reassembly of the new bearings, you must have a press of at least two tons force that is adjustable from zero to two tons.

In order to press the bearings into the bearing flange seat, it is necessary to machine a bearing pressing tube having slightly less diameter than the outer diameter of the outer race of the bearing.

NOTE

The inner side of this bearing pressing tube must be relieved in order to avoid pressing on the bearing rollers, inner race, or cage.

When inserting the bearing, lay the bearing flange on a flat ring with machined surfaces and insert the bearings by means of the bearing pressing tool. Use the least amount of pressure required for introducing the bearing into the bearing flange seat. Make sure the bearing reaches the bottom ledge of the seat.

Then lubricate the bearing by hand-packing with the appropriate grease (see the "Lubrication" section of this manual. It is then necessary to replace the bearing seal using the same pressing tool as was used for the bearing. For inserting the bearing seal into the flange, carefully tap the seal in place with a plastic hammer.

Reassembly of the inner race of the bearing onto the shaft should be done in adherence with the above mentioned bearing pressing operation and without the use of direct heat.

Reassembly of motor

When reassembling the motor, be sure to tighten all bolts securely and use the compression washers.

For reassembly of the motor, care should be taken when reinstalling the second bearing flange into the motor housing. This second bearing flange should be slowly and—most important—evenly introduced into the stator housing to prevent binding the bearing onto the shaft and damaging the bearing.

After assembling both bearing flanges, it is necessary to check the shaft for axial movement. The axial clearance should be from 0.010 to 0.060 inch.

When the shaft keys and weights are reassembled, avoid pounding onto the shaft. Doing so may mark the bearing surfaces and reduce the bearing's life.

Make sure to test the motor for amp draw and any excessive heat rise at the bearing flanges after reassembly. Note any unusual noises that may be present while the motor is running under loaded conditions.

Part Numbers

When ordering, please specify:

- Model and serial numbers
- Voltage and phase
- Spare part description
- Quantity required

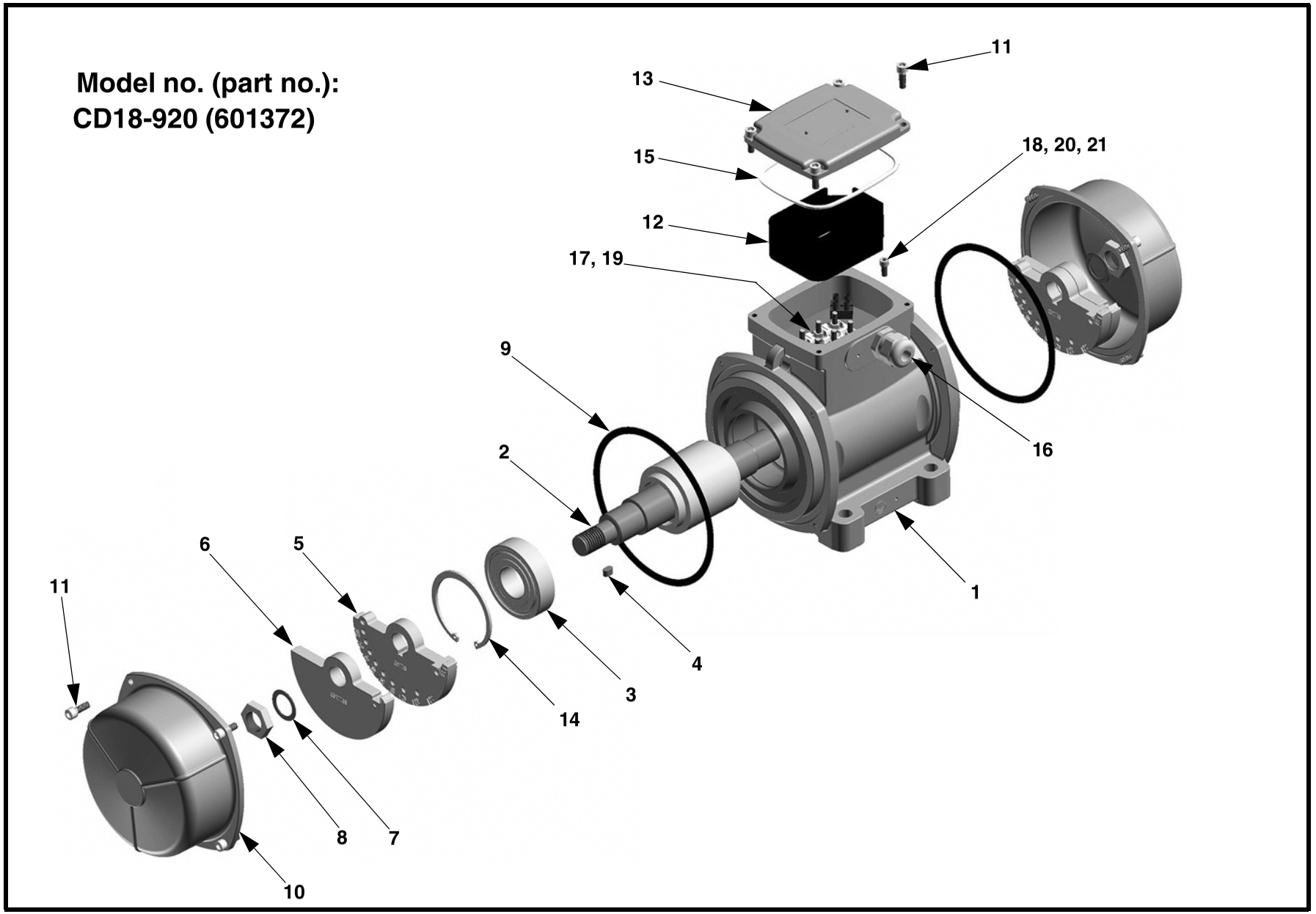

Figure 9. Frame Size 20 Vibrator Parts Drawing

Figure 9. Frame Size 20 Vibrator Parts Drawing

Vibrator		Part Number (Model Number)
Description	**Item**	**601372 (CD18-920)**
Case	1	421173
Shaft ASM	2	400394
Ball Bearing	3	507048
Key	4	506028
Weight Fixed 60 Hz	5	517652
Weight Adj. 60 Hz	6	517653
O-Ring	9	508667
Weight Cover	10	517398
Screw SHC	11	515644
Cushion, Foam	12	514041
Terminal Box Cover w/ O-Ring	13	309044
Ring, Internal	14	500010
O-Ring	15	508693
Fitting, Cord	16	511579
Terminal Block	17	510501
Washer Schnorr D5	18	513002
Screw SHC	19	515502
Washer Ground D5	20	518025
Screw SHC	21	515533
Washer Schnorr D8*	22	513004
Drive Screw*	23	32873
Diagram Wiring*	24	518213
Screw HHC*	25	515509
Hex Nut*	26	509069
Washer Schnorr*	27	513004
Ring Snap External*	28	500056

*Parts Not Shown in Drawing

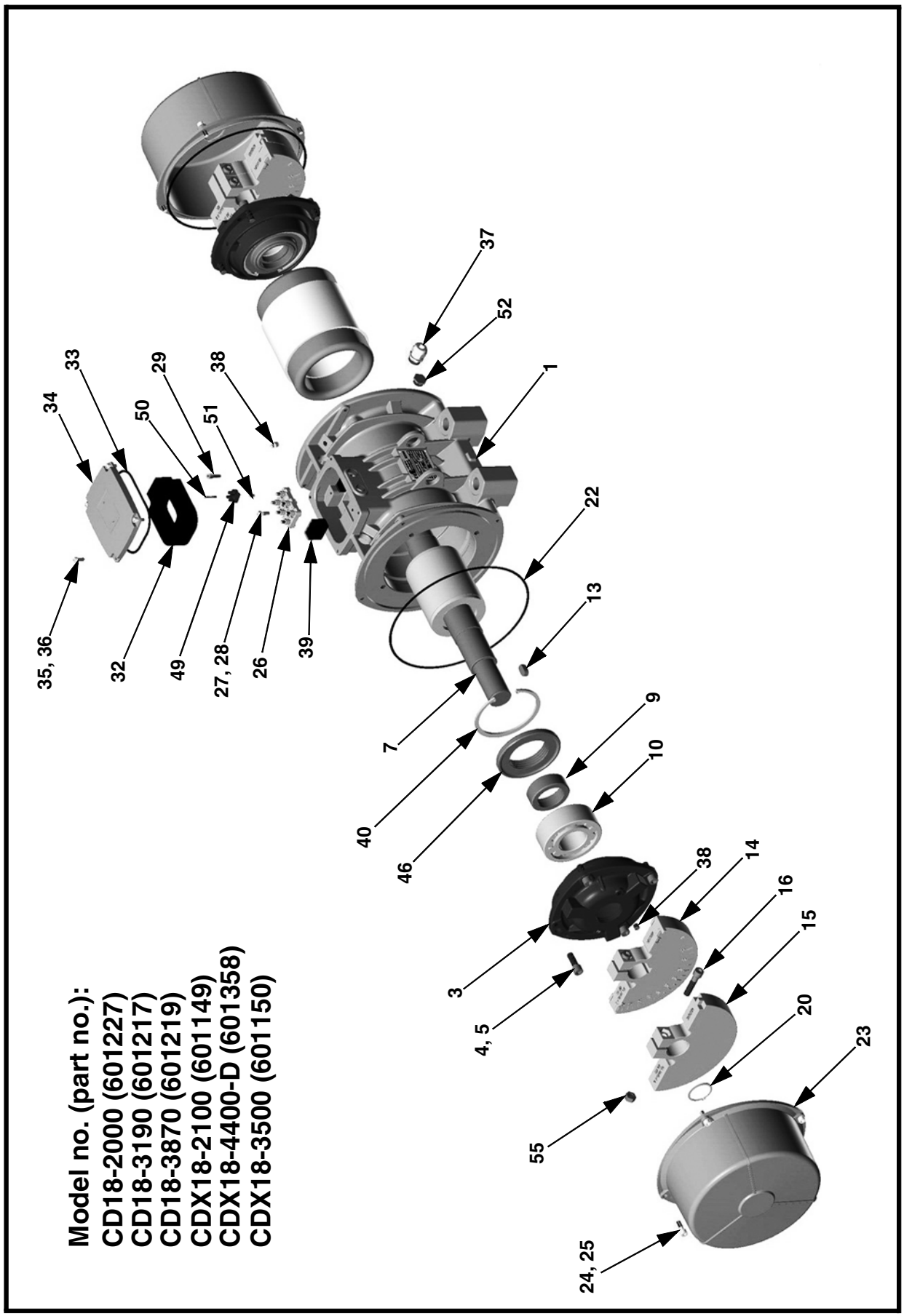

Figure 10. Frame Sizes 30, 40, 50 Vibrator Parts Drawing

Figure 10. Frame Sizes 30, 40, 50 Vibrator Parts Drawing

Vibrator		Frame Size and Part Number (Model Number)					
		30	40			50	
Description	Item	601149 (CDX18-2100)	601150 (CDX18-3500)	601217 (CD18-3190)	601227 (CD18-2000)	601219 (CD18-3870)	601358 (CDX18-4400-D)
Case	1	300177	300178	300236	300236	300236	300436
Flange	3	301148	301149	301196	301196	301197	301254
Screw	4	515507	515593	515508	515508	515508	515508
Washer, Schnorr	5	513004	513004	513004	513004	513004	513004
O-Ring	6	508560	508588				
Shaft	7	400214	400215	400286	400286	400287	400367
Bushing, Shaft	9			508049	508049	508049	
Bearing	10	506531	506547	506535	506535	506538	506538
Key	13	506029	506044	506044	506044	506044	506044
Weight, Fixed 50 Hz	14	304246	304250	517658	517660	517665	
Weight, Fixed 60 Hz	14	304247	304251	517660	517663	517667	517658
Weight, Adj 50 Hz	15	305167	305171	517659	517661	517666	
Weight, Adj 60 Hz	15	305168	305172	517661	517664	517668	517659
Screw	16	516556	516544	515559	515559	515559	515559
Washer, Schnorr	17	513004	513004	513005	513005	513005	513005
Washer, Brass*	18	513514	513514				
Disc, Weight Adj 50 Hz	19	518156/7	518174/5				
Disc, Weight Adj 60 Hz	19	518156/7	518174/5				
Ring, Snap	20	500041	500058	500055	500055	500055	500055
Nut, Hex	21			509070	509070	509070	509070
O-Ring	22	508576	508621	508621	508621	508621	508601
Cover, Weight	23	306076	306077	517076	517076	517055	306129
Screw	24	515505	515506	515508	515508	515508	515508
Washer, Schnorr	25	513003	513003	513004	513004	513004	513004
Terminal Block	26	510501	510501	510501	510501	510501	510501
Terminal Block U.S.	26	510501	510501	510501	510501	510501	510501
Screw	27	515501	515501	515502	515502	515502	515501
Washer, Schnorr	28	513002	513002	513002	513002	513002	513002
Screw, Ground	29	516555	516555	515533	515533	515533	516555
Washer, Schnorr	30	513003	513003	513002	513002	513002	513003
Tag, Ground	31	518407	518407	518025	518025	518025	518407
Block, Rubber	32	514021	514021	514041	514041	514041	514039
O-Ring	33	508620	508620	508612	508612	508612	508671
Cover, Wiring Box	34	309031	309031	502500	502500	502500	309037
Screw	35	515509	515509	515611	515611	515611	515538
Washer, Schnorr	36	513004	513004	513003	513003	513003	513005
Fitting, Cord	37			511579	511579	511579	
Fitting, Grease	38		509050	510000	510000	510000	
Protector, Lead	39	514022	514022	514023	514023	514023	514031
Ring, Snap	40			500015	500015	500015	
Cover, Bearing	46		303048	502801	502801	502801	303080
Screw/Ring Snap*	47		515505				500076
Washer Schnorr*	48		513003				
Thermostat Term. Block	49	510510	510510				510510
Screw, Terminal Block	50	515605	515605				515605
Screw Insert	51	509056	509056				509056

* Part Not Shown in Drawing

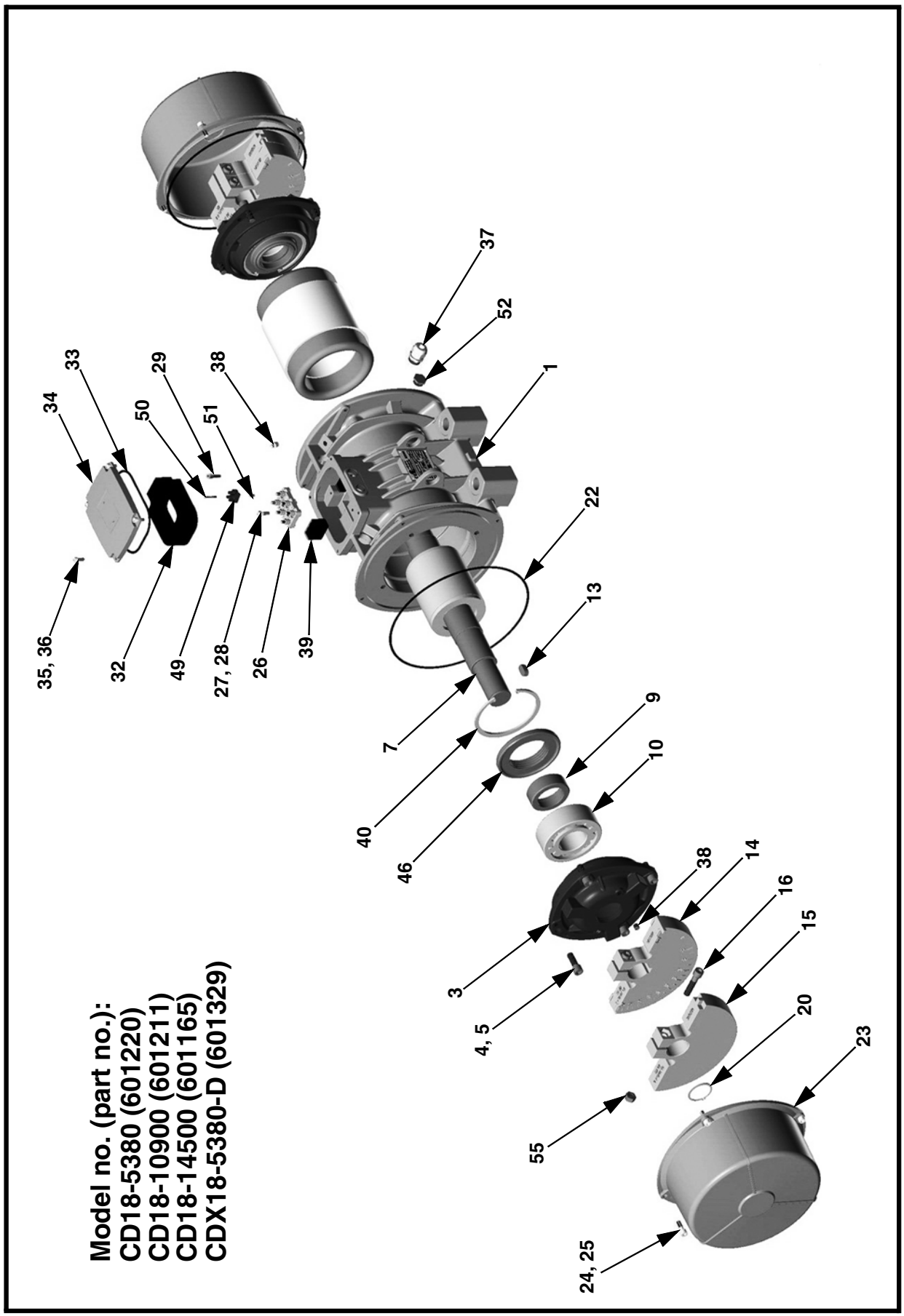

Figure 11. Frame Sizes 60, 80, 90 Vibrator Parts Drawing

Figure 11. Frame Size 60, 80, 90 Vibrator Parts Drawing

Vibrator		Frame Size and Part Number (Model Number)			
		60		80	90
Description	Item	601220 (CD18-5380)	601329 (CDX18-5380-D)	601211 (CD18-10900)	601165 (CD18-14500)
Case	1	300443	300437	300511	300516
Flange	3	301263	301255	301289	301291
Screw	4	515538	515538	515517	515518
Washer, Schnorr	5	513005	513005	513006	513007
O-Ring	6				
Shaft	7	400295	400368	400273	400305
Bushing, Shaft	9	508050			
Bearing	10	506553	506563	506551	506556
Key	13	506044	506044	506046	506032
Weight, Fixed 50 Hz	14	517674	517674	517822	304315
Weight, Fixed 60 Hz	14	517676	517676	517824	304316
Weight, Adj 50 Hz	15	517675	517675	517823	305240
Weight, Adj 60 Hz	15	517677	517677	517825	305241
Screw	16	515612	515616	515602	515614
Washer, Schnorr	17	513006	513006		513007
Washer, Brass*	18				
Disc, Weight Adj 50 Hz	19				518207/8
Disc, Weight Adj 60 Hz	19				518207/8
Ring, Snap	20	500058	500058	500061	500022
Nut, Hex	21	509071			
O-Ring	22	508619	508622	508628	508632
Cover, Weight	23	517078	306128	517060	517063
Screw	24	515508	515508	515514	515514
Washer, Schnorr	25	513004	513004	513005	513005
Terminal Block 50 Hz	26	510501	510502	510502	510502
Terminal Block 60Hz	26	510501	510502	510502	510502
Screw	27	515502	515504	515664	515644
Washer, Schnorr	28	513002	513003	513003	513003
Screw, Ground	29	515533	516555	515652	515652
Washer, Schnorr	30	513002	513003	513003	513003
Tag, Ground	31	518025	518026	518026	518407
Rubber Block	32	514041	514036	514048	514048
O-Ring	33	508612	508548	508685	508685
Cover, Wiring Box	34	309044	309038	309050	309050
Screw	35	515644	515538	515508	515508
Washer, Schnorr	36	513003	513005	513004	513004
Fitting, Cord	37	511579		511580	511580
Fitting, Grease	38	510007	509059	510007	510007
Protector, Lead	39	514026	514031	514026	514026
Ring, Snap	40	500076		500009	500034
Cover, Bearing	46	502802	303081	502807	502809
Screw/Snap Ring*	47		500008		
Thermostat Term. Block	49		510510	510510	510510
Screw, Terminal Block	50		515609	515605	515605
Screw Insert	51		509056	509056	509056
Plug	52			514523	514523

*Parts Not Shown in Drawing

Notes

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Dry solids processing equipment

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