Instruction Manual for FLEXIDYNE® Couplings

Sizes 9C and 11C

These instructions must be read thoroughly before installation or operation. This instruction manual was accurate at the time of printing. Please see **baldor.com** for updated instruction manuals.

Note! The manufacturer of these products, Baldor Electric Company, became ABB Motors and Mechanical Inc. on March 1, 2018. Nameplates, Declaration of Conformity and other collateral material may contain the company name of Baldor Electric Company and the brand names of Baldor-Dodge and Baldor-Reliance until such time as all materials have been updated to reflect our new corporate identity.

WARNING: To ensure the drive is not unexpectedly started, turn off and lock-out or tag power source before proceeding. Failure to observe these precautions could result in bodily injury.

WARNING: All products over 25 kg (55 lbs) are noted on the shipping package. Proper lifting practices are required for these products.

DESCRIPTION

FLEXIDYNE dry fluid couplings are a unique concept to provide soft start and momentary overload protection for all types of driven equipment. Standard NEMA-B motors with RPM base speeds of 1750, 1160 or 860 are commonly used with a FLEXIDYNE, yet other available power sources may be used with the FLEXIDYNE.

The dry “fluid” in the FLEXIDYNE is heat treated steel shot. A measured amount, referred to as flow charge, is added into a housing which has been keyed to the motor shaft. When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packs it between the housing and the rotor, which in turn, transmits power to the load.

After the starting period of slippage between housing and rotor, the two become locked together and achieve full load speed, operating without slip and with 100% efficiency.

WARNING: Because of the possible danger to person(s) or property from accidents which may result from the improper use of products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified in the catalog. Proper installation, maintenance and operation procedures must be observed. The instructions in the instruction manuals must be followed. Inspections should be made as necessary to assure safe operation under prevailing conditions. Proper guards and other suitable safety devices or procedures as may be desirable or as may be specified in safety codes should be provided, and are neither provided by ABB nor are the responsibility of ABB. This unit and its associated equipment must be installed, adjusted and maintained by qualified personnel who are familiar with the construction and operation of all equipment in the system and the potential hazards involved. When risk to persons or property may be involved, a holding device must be an integral part of the driven equipment beyond the speed reducer output shaft.

Consequently, the motor accelerates instantly to base speed, while the load starts gradually and smoothly.

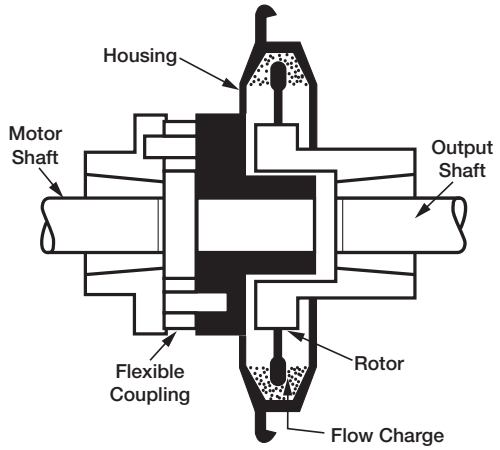

Figure 1 - Housing Cross Section

INSTALLATION

Method 1

Install coupling flange on motor shaft and drive housing mechanism on driven shaft in accordance with the instructions packaged with the TAPER-LOCK® bushings.
Note: The coupling flange must be mounted on motor shaft (not driven shaft) to allow proper operation of the FLEXIDYNE.

Shaft ends must not protrude beyond bushing ends. Install coupling disc over pins on drive housing mechanism. Position motor and driven unit so that spacer buttons on coupling flange just contact the drive housing and coupling flange (Reference dimension “A”, illustrated in Figure 3).

Table 1 - Dimension “A” and “B” sizes

FLEXIDYNE Size	9C	11C
Dimension “A”	7/8	1-1/8
Dimension “B”	5-1/8	6-1/8

Method 2

If motor and driven unit are to be positioned before mounting FLEXIDYNE, shaft ends should be spaced apart by dimension "B", illustrated in Figure 3 and Table 1. Slide bushing and coupling flange onto motor shaft. Install coupling disc over pins on drive housing mechanism. Install drive housing mechanism on driven shaft and coupling flange on motor shaft per instructions packed with the TAPER-LOCK bushings, so that the spacer buttons on the coupling disc just contact the drive housing and coupling flange (Reference dimension "A", illustrated in Figure 3 and Table 1). Make certain that shaft ends do not protrude beyond bushing ends.

For longest FLEXIDYNE coupling life, it is always desirable to align coupling as accurately as possible at initial installation. Check alignment by laying a straight edge across the coupling flange and drive housing at several points around the circumference.

START-UP

1. Remove one of the filler plugs and install one half the proper amount of flow charge specified in Table 2. Replace and tighten filler plug, making sure that no flow charge is trapped in the threads. Remove other filler plug and install the remaining half of specified amount of flow charge repeating the same procedure. Tighten filler plug to 200 in.-lbs. torque.
2. Attach AC ammeter (conventional clamp-on or equivalent) to one line of the AC motor. Set range to cover 200% of motor nameplate current.
3. Note maximum allowable acceleration time for FLEXIDYNE as stated in Tables 2 and 3. Table 3 lists starting time capacity for starting cycles occurring more than once every 2 hours.
4. Push start button. Observe motor current during load acceleration and number of seconds required to reach full speed (Fig. 2).

Increase amount of flow charge if:

A. Acceleration time reaches maximum allowable before load is up to speed. Turn off power immediately if this time is reached.
B. Acceleration amperage is below motor nameplate.

Decrease amount of flow charge if:

A. Acceleration time is less than 1-1/2 seconds.
B. Acceleration amperage is above 200% of motor nameplate.

CAUTION: The rotor of the FLEXIDYNE must slip during acceleration to allow flow charge to become evenly distributed in the FLEXIDYNE housing. Therefore, DO NOT ALLOW FLEXIDYNE TO RUN "FREE" (that is, without a load on the driven end), otherwise a dangerous out-of-balance condition may result.

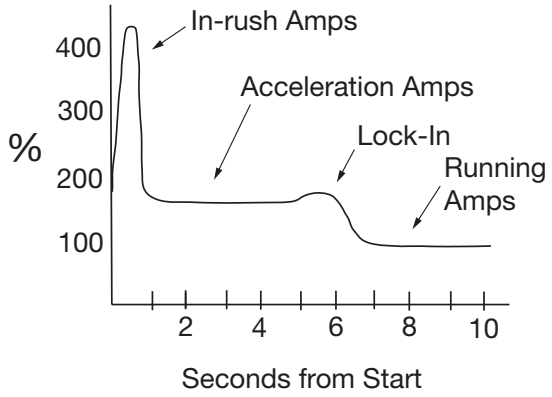

Figure 2 - Flow Charge Graph

The amount of flow charge in the FLEXIDYNE determines the acceleration time for a given load. Longer acceleration times will occur when less flow charge is used and faster acceleration, from stop to full speed, will be observed with greater amounts of flow charge.

OPERATION

The FLEXIDYNE should start the load smoothly and without delay provided the proper amount of flow charge has been used. Should the acceleration time exceed the maximum allowable in Table 1, shut off power to the FLEXIDYNE immediately. Allow the FLEXIDYNE to cool, then add small amounts of flow charge until proper acceleration is observed.

Vibration is an indication of accelerating too rapidly and not allowing flow charge to become evenly distributed in the FLEXIDYNE housing. This can be corrected by removing small amounts of flow charge until vibration subsides. Other causes of vibration are, undersize shafting, unit not installed far enough on shaft, worn bore in the unit, or misalignment.

Slippage – The FLEXIDYNE can, without slipping, transmit overloads up to 130% of its preset starting torque. Should this breakaway torque be exceeded, the FLEXIDYNE will slip and generate heat (see Overload Protection). Although slippage usually indicates increased loads, it can also be caused by worn flow charge or a worn rotor, especially if the FLEXIDYNE has been in operation for some time. The necessity to replace either a rotor or flow charge will be made evident by a loss in power transmitting capacity of the FLEXIDYNE.

MAINTENANCE

For average industrial applications involving 3 or 4 starts per day of not more than 6 seconds acceleration time each, the flow charge should be changed every 10,000 hours of operation. For more severe conditions, visually inspect flow charge at more frequent intervals; it should be changed when it has deteriorated to a half powder, half granular condition. Visual inspections should continue until enough flow charge changes have been made to adequately establish a schedule for renewing FLEXIDYNE flow charge.

The FLEXIDYNE has been lubricated at the factory and no further lubrication is required. Never apply grease, oil or any other foreign material to the flow charge.

THERMAL CAPACITY

Since there is slippage within the flow charge during acceleration, heat is generated from friction. The thermal capacity of the FLEXIDYNE is based on balancing this heat generated during acceleration against the cooling time between accelerations. The amount of heat generated is determined by the amount of horsepower dissipated by slipping and the duration of each acceleration. If the flow charge weight is light, the heat generated will not be as great as that which would be generated with a heavier flow charge, when compared at the same acceleration time. A longer time between starts will dissipate more heat; therefore, higher starting horsepowers may be transmitted, or longer acceleration times may be allowable. (See Starting Cycle)

Acceleration times shown in Table 2 are for starting frequencies of one start per hour or less. If starting frequency is more than once per hour, use acceleration time for actual starting cycle shown in Table 3.

Acceleration times listed in Tables 2 & 3 are the MAXIMUM permissible for the various starting frequencies listed. The MINIMUM acceleration time required for proper FLEXIDYNE operation is 1 to 1-1/2 seconds. This is the time required for the flow charge to be uniformly distributed around the housing cavity before the unit “locks in”. Any acceleration time between the minimum and maximum listed is acceptable, although a shorter acceleration time will generally provide longer wear life. For applications requiring a specific acceleration time (within these limits) flow charge may be added or removed to produce the required results.

Stalled – If a jam-up stalls the drive, the motor continues to run and the FLEXIDYNE slips. This causes heat to be generated at twice the rate of normal acceleration. Therefore, the allowable slipping time, when stalled, is half the allowable acceleration time given in Table 2.

Starting Cycle is the time from the beginning of one acceleration to the beginning of the next. Allowable acceleration times in Table 3 are based on the assumption that the FLEXIDYNE will be running continuously except for a momentary stop before the next start. If the stop is more than momentary, decrease the actual starting cycle by one-half the stopped time before using Table 3; for example, with a 50 minute actual starting cycle of which 20 minutes is stopped time, decrease 50 by half of 20 to give 40 minutes as the starting cycle time to use for Table 3.

Grouped Starts –For several starts grouped together followed by uninterrupted running, add the acceleration times of all starts and consider it as the time for one start. The starting cycle would be the time from the beginning of one group of starts to the beginning of the next group.

Table 2 - Flow Charge Recommendations

Based on % of Starting Torque for 1760 RPM NEMA Design B Motors

Rated Motor HP	FLEXIDYNE Size	100% @ 1760 RPM				125% @ 1750 RPM				150% @ 1740 RPM			
		Starting HP	Flow Charge		Max. Time in Sec.	Starting HP	Flow Charge		Max. Time In Sec.	Starting HP	Flow Charge		Max. Time In Sec.
			Lbs.	Oz.			Lbs.	Oz.			Lbs.	Oz.	
15	9C	15	2	9	76	18.8	3	0	58	22.3	3	7	58
20	9C	20	3	2	52	25	3	10	40	30	4	0	26
25	11C	25	4	3	98	31	4	12	76	37	5	0	55
30	11C	30	4	10	80	37	5	0	55	45	5	12	39
40	11C	40	5	5	44	50	6	0	34	60	6	8	24
50	11C	50	5	13	34	62	6	10	24	74	7	6	20

Rated Motor HP	FLEXIDYNE Size	175% @ 1700 RPM				200% @ 1650 RPM			
		Starting HP	Flow Charge		Max. Time In Sec.	Starting HP	Flow Charge		Max. Time in Sec.
			Lbs.	Oz.			Lbs	Oz	
15	9C	25.5	3	13	39	28.3	4	2	28
20	9C	34	4	8	22	38	5	3	16
25	11C	42	5	8	42	47	6	2	37
30	11C	51	6	3	33	57	6	12	27
40	11C	68	7	3	22	75	8	0	19
50	11C	85	8	2	17	94	8	11	15

Based on % of Starting Torque for 1175 RPM NEMA Design B Motors

Rated Motor HP	FLEXIDYNE Size	100% @ 1175 RPM				125% @ 1160 RPM				150% @ 1150 RPM			
		Starting HP	Flow Charge		Max. Time in Sec.	Starting HP	Flow Charge		Max. Time In Sec.	Starting HP	Flow Charge		Max. Time In Sec.
			Lbs	Oz			Lbs.	Oz.			Lbs.	Oz.	
5	9C	5	2	4	230	6.2	2	11	212	7.4	3	1	193
7½	9C	7.5	3	0	191	9.3	3	9	163	11.1	3	14	144
10	11C	10	5	0	480	12.4	5	5	439	14.8	5	10	398
15	11C	15	5	14	394	18.0	6	5	343	22.0	7	0	274
20	11C	20	6	8	308	25.0	7	14	222	30.0	8	4	136

Rated Motor HP	FLEXIDYNE Size	175% @ 1130 RPM				200% @ 1100 RPM			
		Starting HP	Flow Charge		Max. Time in Sec.	Starting HP	Flow Charge		Max. Time In Sec.
			Lbs	Oz			Lbs.	Oz.	
5	9C	8.5	3	8	176	9.4	3	12	161
7½	9C	12.7	4	4	134	14.1	4	12	126
10	11C	17	6	3	360	19.0	7	0	325
15	11C	25	7	14	222	28.0	9	0	171
20	11C	34	8	13	125	38.0	9	10	113

Based on % of Starting Torque for 875 RPM NEMA Design B Motors

Rated Motor HP	FLEXIDYNE Size	100% @875 RPM				125% @ 870 RPM				150% @ 850 RPM			
		Starting HP	Flow Charge		Max. Time in Sec.	Starting HP	Flow Charge		Max. Time In Sec.	Starting HP	Flow Charge		Max. Time In Sec.
			Lbs	Oz			Lbs.	Oz.			Lbs.	Oz.	
2	9C	2	2	6	1000	2.5	2	2	1000	2.9	3	0	890
3	9C	3	3	0	862	3.7	3	8	669	4.4	4	0	475
5	11C	5	5	6	1000	6.2	5	14	904	7.3	6	10	816
7½	11C	7.5	6	8	800	9.3	7	2	656	10.9	8	0	572

Rated Motor HP	FLEXIDYNE Size	175% @ 840 RPM				200% @ 820 RPM			
		Starting HP	Flow Charge		Max. Time in Sec.	Starting HP	Flow Charge		Max. Time In Sec.
			Lbs	Oz			Lbs.	Oz.	
2	9C	3.4	3	8	750	3.7	3	12	669
3	9C	5	4	6	310	5.6	4	14	297
5	11C	8.4	7	0	728	9.4	7	8	648
7½	11C	12.6	8	8	527	14.0	9	5	488

Table 3 – FLEXIDYNE Thermal Capacity

FLEXIDYNE Size	Starting HP	Maximum Allowable Acceleration Time in Seconds for Standard Motor Speeds at Various Starting Cycles											
		2 Hours			1 Hour			30 Min.			15 Min.		
		870	1160	1750	870	1160	1750	870	1160	1750	870	1160	1750
9C	2.5	1000	....	....	1000	....	....	820	....	....	600	....	....
	5.0	310	230	....	310	230	....	260	230	....	180	190	....
	9.1	220	166	....	220	166	....	180	166	....	130	135	....
	10.0	....	150	135	....	150	135	....	150	135	....	120	118
	15.0	....	120	76	....	120	76	....	120	76	....	100	66
	17.5	....	110	64	....	110	64	....	110	64	....	92	55
	20	....	....	52	....	....	52	....	....	52	....	....	45
	25	....	....	40	....	....	40	....	....	40	....	....	35
	30	....	....	26	....	....	26	....	....	26	....	....	22
	35	....	....	21	....	....	21	....	....	21	....	....	18
	38	....	....	16	....	....	16	....	....	16	....	....	15

FLEXIDYNE Size	Starting HP	10 Min.			5 Min.			2 Min.			1 Min.		
		870	1160	1750	870	1160	1750	870	1160	1750	870	1160	1750
9C	2.5	425	....	....	225	....	....	90	....	....	45	....	....
	5.0	140	160	....	70	100	....	27	42	....	13	22	....
	9.1	100	110	....	50	72	....	20	29	....	10	15	....
	10.0	100	100	....	65	70	....	26	28	....	13	14	....
	15.0	....	85	58	....	50	38	....	21	15	....	11	7
	17.5	....	78	48	....	47	31	....	19	12	....	9	6
	20	....	....	38	....	....	25	....	....	10	....	....	5
	25	....	....	30	....	....	20	....	....	8	....	....	4
	30	....	....	18	....	....	12	....	....	5	....	....	....
	35	....	....	15	....	....	10	....	....	4	....	....	....
	38	....	....	13	....	....	9	....	....	3	....	....	....

FLEXIDYNE Size	Starting HP	Maximum Allowable Acceleration Time in Seconds for Standard Motor Speeds at Various Starting Cycles											
		2 Hours			1 Hour			30 Min.			15 Min.		
		870	1160	1750	870	1160	1750	870	1160	1750	870	1160	1750
11C	5	1000	....	....	950	....	....	700	....	....	450	....	....
	10	600	480	....	560	480	....	440	400	....	280	270	....
	20	320	308	116	300	308	116	230	257	116	150	175	96
	30	....	136	80	....	136	80	....	115	80	....	80	67
	40	....	107	44	....	107	44	....	89	44	....	63	37
	50	....	78	34	....	78	34	....	64	34	....	46	28
	60	....	....	24	....	....	24	....	....	24	....	....	20
	70	....	....	21	....	....	21	....	....	21	....	....	17
	80	....	....	18	....	....	18	....	....	18	....	....	15
	90	....	....	16	....	....	16	....	....	16	....	....	13
	100	....	....	14	....	....	14	....	....	14	....	....	12

FLEXIDYNE Size	Starting HP	10 Min.			5 Min.			2 Min.			1 Min.		
		870	1160	1750	870	1160	1750	870	1160	1750	870	1160	1750
11C	5	290	....	....	130	....	....	46	....	....	21	....	....
	10	180	200	....	80	100	....	30	40	....	13	20	....
	20	90	130	80	42	65	50	15	26	21	6	13	11
	30	....	60	56	....	30	35	....	12	14	....	6	7
	40	....	47	32	....	30	20	....	9	8	....	4	4
	50	....	35	24	....	17	15	....	6	6	....	3	3
	60	....	....	17	....	....	10	....	....	4	....	....	....
	70	....	....	14	....	....	9	....	....	3	....	....	....
	80	....	....	12	....	....	8	....	....	....	....	....	....
	90	....	....	11	....	....	7	....	....	....	....	....	....
	100	....	....	10	....	....	6	....	....	....	....	....	....

REPLACEMENT OF PARTS

Disassembly

1. Remove drive housing mechanism from driven shaft.
2. Remove filler plug and flow charge from FLEXIDYNE.
3. Remove housing screws and housing cover. Remove cover seal retainer by inserting a small pin in holes for the drive screws and tapping on rod to remove drive screws. Remove cover seal.
4. Remove screws that attach driven hub to rotor retainer. Remove driven hub and rotor.
5. Remove bronze bushing retainer ring and slip bronze bushing off drive housing.
6. Remove ball bearing snap ring and remove ball bearing. To remove ball bearing, place 3 equal length pins in the 3 holes thru the end of the drive housing and press against the pins. For sizes 9 & 11 use 11/64" to 3/16" diameter pins.
7. Remove rotor retainer and seal shield.

Reassembly

1. Install new seal felt and replace seal shield in drive housing.
2. Install housing seal (red in color) on rotor retainer and set rotor retainer in place in drive housing. Make certain housing seal does not twist and that it is properly seated in the drive housing.
3. Press ball bearings onto drive housing.

   Note: Press against inner (not outer) race of bearing.

   Make certain rotor retainer is not cocked when bearing enters it. Check to see that rotor retainer rotates freely in housing seal.
4. Install ball bearing retaining ring.
5. Install rotor and driven hub. Install and tighten screws.
6. Install cover seal (gray in color) in housing cover. Line up holes in cover seal retainer with holes in cover and install drive screws.
7. Place cover in position on drive housing so that filler plugs are diametrically opposed. Install and tighten housing screws.
8. Replace filler plug in housing cover. Tighten to recommended torque of 200 in.-lbs.

Table 4 - Manufacturer's Part Numbers for Replacement Bearings

FLEXIDYNE Size	DODGE Part Number
9C	399210
11C	399219

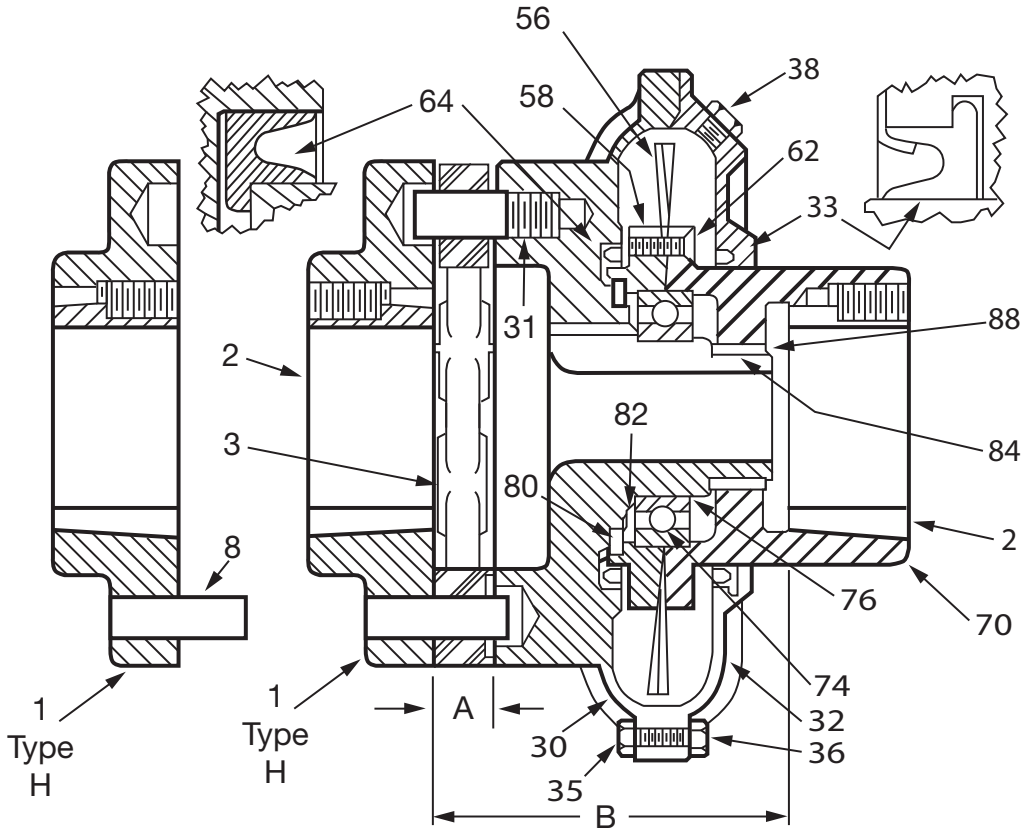

Figure 3 - Parts Diagram

Replacement Parts

Reference	Name of Part		No. Required	9C Coupling Part Number	11C Coupling Part Number
1	Coupling Flange ①	Type H Type F	1	008045 008044	008047 008046
2	TAPER-LOCK Bushing with Screws ②		2	#2517	#2517
3	Coupling POLY-DISC ①		1	008034	008035
8	Coupling Flange Pin ①		⑤	409124	409125
30	Drive Housing		1	391554	391559
31	Drive Housing Stud		⑤	309243	311243
	HOUSING COVER and SEAL ASSEMBLY ③		1	391457	391464
32	Housing Cover ④		1	309080	311081
33	Cover Seal (Gray Color) with Retainer and Drive Screws ④		1	391254	391255
35	Hex Nut		6	407083	407085
36	Housing Screw		6	411045	411063
37	Lockwasher		6	419009	419010
38	Filler Plug		2	308021	308021
39	Filler Plug Lockwasher		2	419121	419121
56	Rotor		1	309006	311006
58	Rotor Retainer		1	309207	311207
62	Rotor Retainer Screw		6	415056	415058
64	Housing Seal (Red Color)		1	309036	311038
70	Driven Hub		1	309205	311205
74	Ball Bearing ⑥		1	391210	391219
76	Ball Bearing Snap Ring		1	421013	421019
80	Seal Felt		1	309024	311024
82	Seal Shield		1	309027	311027
84	Bronze Bushing		1	309212	311212
88	Bushing Retaining Ring		1	421009	421014

① Standard Parts – used in Nos. 7 (9C) and 8 (11C) POLY-DISC Couplings. Use Loctite #242 on threads when replacing coupling flange pins.
② When ordering TAPER-LOCK Bushings – specify size number and bore.
③ Includes parts listed immediately below.
④ The parts marked, make up the assemblies under which they are listed.
⑤ 5 required for 9C; 6 required for 11C.
⑥ See Table 4 – Manufacturer's Part Numbers for Replacement Bearings.

Flexidyne Mechanism Trouble Analysis		
Symptom	**Cause**	**Cure**
Vibration	1. Misalignment 2. Bent shaft 3. Excess flow charge 4. Fused flow charge 5. Improper installation – Output shaft jammed against housing	1. Realign drive or coupling. 2. Replace or straighten. 3. Remove small amount of flow charge. 4. Correct the overload. 5. Readjust spacing between shafts and FLEXIDYNE housing.
Erratic Acceleration	1. Breakdown of flow charge 2. Caked flow charge 3. Below minimum amount of flow charge	1. Replace flow charge. 2. Moist environment – use stainless flow charge. 3. Add flow charge.
Flexidyne Mechanism Doesn't Slip	1. Improper installation – Output shaft jammed against housing 2. Flow charge in bearings – causing bearing seizure	1. Readjust spacing between shafts and Flexidyne housing. 2. Replace seals, bearings and flow charge or replace Flexidyne mechanism.
Excessive Slippage	1. Not enough flow charge 2. Overload 3. Worn flow charge 4. Worn rotor	1. Add flow charge. 2. Relieve overload 3. Replace flow charge. 4. Replace rotor.
Poor or short flow charge life	1. Excessive slip at start up 2. Excessive inching or jogging of machine	1. Add flow charge to reduce starting time. 2. Install time delay in motor control circuit.

Flexidyne Mechanism Flow Charge Analysis	
Condition	**Cause**
1. Red oxide color, granular consistency	1. Normal after some usage.
2. Red oxide color, powdery consistency, possibly with powdery flakes	2. Worn-out, can cause Flexidyne mechanism damage.
3. Black, powdery	3. Rotor worn, excessive slip and heat.
4. Red oxide, powdery and chunky	4. Worn-out and moisture present.
5. Clumping of flow charge	5. Moisture present, use stainless flow charge.

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