# Instruction Manual for No. 55C & 55D FLEXIDYNE® Couplings and Drive

These instructions must be read thoroughly before installing or operating this product.

**WARNING: To ensure that 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.**

## DESCRIPTION:

Flexidyne dry fluid couplings and drives are unique concepts 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 mechanism, yet other available power sources may be used with the Flexidyne mechanism.

The dry "Fluid" in the Flexidyne housing 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.

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

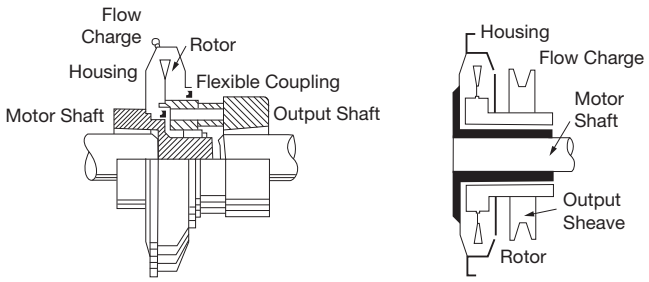


**Figure 1 - Housing cross section**

**WARNING: Because of the possible danger to persons(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 Baldor Electric Company nor are the responsibility of Baldor Electric Company. 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.**

## INSTALLATION:

**55C Coupling:** Install coupling flange on drive shaft and drive housing mechanisms on motor shaft in accordance with the instruction manual for the Taper-Lock® bushings found at ***www.baldor.com***. Note: The coupling flange must be mounted on driven shaft (not motor shaft) to allow proper operation of the Flexidyne coupling. Shaft ends must not protrude beyond bushing ends. Install coupling disc over pins on drive housing mechanism. Position the motor and the driven unit so that the spacer buttons on the coupling disc slightly contact the coupling flange.

Parallel misalignment should not exceed 1/64" maximum. (See Fig. 2) For longest Flexidyne coupling life, it is always desirable to align coupling as accurately as possible at initial installation.

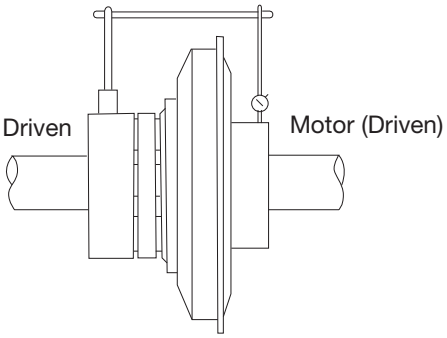


**Figure 2 - Parallel Misalignment**

**55D Drive:** Install sheave on driven hub. When using a Taper-Lock sheave with #1610 bushing, do not exceed 175 inch-pounds of wrench torque. When using a QD sheave with SH bushing, do not exceed 108 inch-pounds of wrench torque. Excessive tightening may distort the sleeve of the driven hub due to the wedging action of the bushing.

**Note: Special "overbore" keyless bushings are used. Due to the cushioning effect of the Flexidyne drive, a key is not required on the sheave.**

Do not use sheaves with set screws. These will exert pressure on the sleeve of the driven hub. Also, they tend to distort the driven hub and may cause damage to the bronze bushing.

**NOTE: Do not remove mounting collar.**

Stake motor shaft key in place and slide Flexidyne drive onto the motor shaft with the collar as close to the motor as possible. Tighten key set screw securely against motor shaft key, then, tighten shaft set screw securely against motor shaft.

Do not input power to the Flexidyne drive thru the sheave. The sheave is the output of the Flexidyne drive.

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## START-UP

1. Remove the filler plug and install the proper amount of flow charge specified in Table 1. Replace and tighten filler plug, making sure that no flow charge is trapped in threads. Torque filler plug to 35 inch-pounds.
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 couplings and drives as stated in Table 1. Note: Table 2 lists starting time capacity for various starting cycles.
4. Push start button. Observe motor current during load acceleration and number of seconds required to reach full speed (Fig. 3).

   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.
5. Once satisfactory operation has been obtained record the following for future reference:

   A. The amount of flow charge.
   B. Starting current.
   C. Acceleration time

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

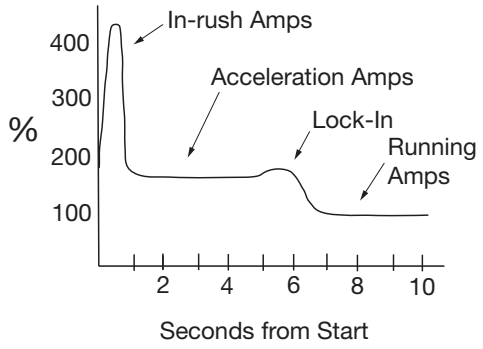


**Figure 3 - Flow Charge Ratio**

The amount of flow charge in the Flexidyne housing determines the acceleration time for a given load. Slower 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. It is recommended to keep the acceleration time as fast as the system will permit.

## OPERATION

The Flexidyne mechanism 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 on page 3, shut off power to the Flexidyne mechanism immediately. Allow the Flexidyne mechanism to cool, then add small amounts of flow charge until proper acceleration is observed.

**Vibration** — 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 or worn bore in the unit.

**Slippage** — The Flexidyne mechanism can, without slipping, transmit overloads 30% above pre-set starting torque. Should this breakaway torque be exceeded the Flexidyne mechanism 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 mechanism 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 mechanism.

## MAINTENANCE

For average industrial applications involving 3 or 4 starts a day and 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. See page 4 for flow charge analysis. Visual inspections should continue until enough flow charge changes have been made to adequately establish a schedule for renewing Flexidyne flow charge.

The Flexidyne mechanism 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 mechanism 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 in Table 2)

Acceleration times shown in Table 1 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 2.

Acceleration times listed in Tables 1 and 2 are the MAXIMUM permissible for the various starting frequencies listed. The MINIMUM acceleration time required for proper Flexidyne mechanism operation is 1 to 1½ 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 mechanism 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 1.

**Starting Cycle** is the time from the beginning of one acceleration to the beginning of the next. Allowable acceleration times in Table 2 are based on the assumption that the Flexidyne mechanism 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 2; 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 2.

**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.

## OVERLOAD PROTECTION

**WARNING: The user is responsible for conforming with the National Electrical Code and all other applicable codes. Wiring Practices, grounding , disconnects and overcurrent protection are of particular importance. Failure to observe these precautions could result in severe bodily injury or loss of life.**

**Table 1 - Flow Charge Recommendations**

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

| Rated Motor HP | Flexidyne Mechanism Size | 100% @ 1760 RPM | | | | 125% @ 1750 RPM | | | | 150% @ 1740 RPM | | | | 175% @ 1700 RPM | | | | 200% @ 1650 RPM | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Starting HP | Flow Charge | | Max Time in Sec. ① | Starting HP | Flow Charge | | Max Time in Sec. ① | Starting HP | Flow Charge | | Max Time in Sec. ① | Starting HP | Flow Charge | | Max Time in Sec. ① | Starting HP | Flow Charge | | Max Time in Sec. ① |
| | | | Lbs. | Oz. | | | Lbs. | Oz. | | | Lbs. | Oz. | | | Lbs. | Oz. | | | Lbs. | Oz. | |
| 1 | 55 | 1.0 | 0 | 9 | 125 | 1.2 | 0 | 10 | 110 | 1.5 | 0 | 11 | 92 | 1.7 | 0 | 12 | 84 | 1.9 | 0 | 13 | 78 |
| 1-1/2 | 55 | 1.5 | 0 | 10 | 92 | 1.9 | 0 | 12 | 78 | 2.2 | 0 | 13.5 | 72 | 2.5 | 0 | 14 | 67 | 2.8 | 0 | 16 | 63 |
| 2 | 55 | 2.0 | 0 | 12 | 76 | 2.5 | 0 | 13.5 | 67 | 3.0 | 0 | 15 | 60 | 3.4 | 1 | 1 | 56 | 3.8 | 1 | 2 | 53 |

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

| Rated Motor HP | Flexidyne Mechanism Size | 100% @ 1175 RPM | | | | 125% @ 1160 RPM | | | | 150% @ 1150 RPM | | | | 175% @ 1130 RPM | | | | 200% @ 1100 RPM | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Starting HP | Flow Charge | | Max Time in Sec. ① | Starting HP | Flow Charge | | Max Time in Sec. ① | Starting HP | Flow Charge | | Max Time in Sec. ① | Starting HP | Flow Charge | | Max Time in Sec. ① | Starting HP | Flow Charge | | Max Time in Sec. ① |
| | | | Lbs. | Oz. | | | Lbs. | Oz. | | | Lbs. | Oz. | | | Lbs. | Oz. | | | Lbs. | Oz. | |
| 1/2 | 55 | .50 | 0 | 11 | 250 | .60 | 0 | 12 | 200 | .75 | 0 | 13 | 175 | .80 | 0 | 15 | 160 | .90 | 1 | 0 | 148 |
| 3/4 | 55 | .75 | 0 | 12 | 175 | .90 | 0 | 15 | 148 | 1.1 | 1 | 0 | 130 | 1.3 | 1 | 1 | 115 | 1.4 | 1 | 2 | 110 |

① Maximum Allowable Acceleration Time for one start per hour, or less. Proper application of the Flexidyne mechanism requires that the load be connected. Without connected load acceleration time may be too fast to allow change to be distributed for proper balance.

**Table 2 - Thermal Capacity for No. 55C & 55D Flexidyne Mechanisms**

| Starting HP ① | Maximum Allowable Acceleration Time in Seconds for Standard Motor Speeds at Various Starting Cycles | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2 Hours | | 1 Hour | | 30 Minutes | | 15 Minutes | | 10 Minutes | | 5 Minutes | | 2 Minutes | | 1 Minute | |
| | 1160 | 1750 | 1160 | 1750 | 1160 | 1750 | 1160 | 1750 | 1160 | 1750 | 1160 | 1750 | 1160 | 1750 | 1160 | 1750 |
| .50 | 250 | ... | 250 | ... | 250 | ... | 250 | ... | 190 | ... | 110 | ... | 60 | ... | 33 | ... |
| .75 | 175 | ... | 175 | ... | 175 | ... | 175 | ... | 130 | ... | 80 | ... | 40 | ... | 26 | ... |
| 1.0 | 148 | 125 | 148 | 125 | 148 | 125 | 148 | 125 | 110 | 96 | 68 | 58 | 35 | 30 | 22 | 19 |
| 1.5 | 110 | 92 | 110 | 92 | 110 | 92 | 110 | 92 | 82 | 67 | 50 | 41 | 28 | 23 | 18 | 15 |
| 2.0 | ... | 76 | ... | 76 | ... | 76 | ... | 76 | ... | 60 | ... | 37 | ... | 20 | ... | 13 |
| 2.5 | ... | 67 | ... | 67 | ... | 67 | ... | 67 | ... | 52 | ... | 32 | ... | 17 | ... | 11 |
| 3.0 | ... | 60 | ... | 60 | ... | 60 | ... | 60 | ... | 47 | ... | 29 | ... | 15 | ... | 9 |
| 3.5 | ... | 55 | ... | 55 | ... | 55 | ... | 55 | ... | 43 | ... | 25 | ... | 13 | ... | 8 |
| 4.0 | ... | 50 | ... | 50 | ... | 50 | ... | 50 | ... | 40 | ... | 20 | ... | 10 | ... | 6 |

① Starting HP is determined by amount of flow charge installed, see Table 1.

## PARTS REPLACEMENT

The 55C and 55D FLEXIDYNE mechanisms were not designed to be repaired. Normal care in installation and operation will yield long, dependable life of the unit.

Miscellaneous accessory parts are available and should be ordered with complete description of part and 6 digit part number.

**Table 3 - Parts Replacement**

| Name of Part | No. Required | Part Numbers | |
|---|---|---|---|
| | Per Unit | 55C | 55D |
| Flexidyne Coupling Mechanism (complete) | - | 305019 | ..... |
| Flexidyne Drive Mechanism (5/8" Bore) (complete) | - | ..... | 305015 |
| Flexidyne Drive Mechanism (7/8" Bore) (complete) | - | ..... | 305016 |
| Filler Plug | 1 | 305018 | 305018 |
| Filler Plug Lockwasher | 1 | 419190 | 419190 |
| Coupling Element | 1 | 008030 | ..... |
| Coupling Flange { Type 'H | 1 | 008057 | ..... |
| Coupling Flange { Type 'F' | | 008058 | ..... |
| Collar | 1 | ..... | 305134 |
| Collar Set screw | 1 | ..... | 400022 |
| Collar Set Screw | 1 | ..... | 400030 |

**Flexidyne Mechanism Trouble Analysis**

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