

**WP0056**

**Dodge® Flexidyne mechanical soft starts: basic information**

Dodge Customer/Order Engineering

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Many applications; such as blowers, fans, pumps, compressors, etc. with high attached inertial loads, require a large amount of torque at start-up. These applications can require motors to produce torque spikes up to two hundred percent or more of the nominal running torque. A sharp increase in electrical power usage accompanies these torque spikes, increasing operating costs and reducing the service life of the equipment. Several options exist to lower the starting loads required, allowing the motor to come up to speed more slowly with lower electricity consumption. Such devices are often referred to as 'soft-starts' and include AC and DC drives, fluid couplings, etc. ABB offers a low cost soft-start device in the Flexidyne.

A Flexidyne unit is similar in operation to a fluid coupling. It differs in one primary way. The Flexidyne uses steel shot, called flow charge, rather than oil, as the working media. The Flexidyne also runs as a housing drive, so that the motor shaft turns the housing to rotate the flow charge. The basic design and operation of a Flexidyne is simple, yet effective.

The three basic parts of a Flexidyne unit include a Driver, Driven, and the flow charge. The motor shaft attaches to the Driver, which consists of the drive hub and the housing. The Driven consists of the rotor and the driven hub, which is attached to the load. When the Driver begins to rotate, centrifugal force moves the flow charge to the inside perimeter of the housing. The flow charge initially slips past the rotor, but as the housing comes up to motor speed, the centrifugal force on the flow charge provides sufficient force to move the rotor. At full speed, the Flexidyne has generated enough centrifugal force to no longer slip, and is 100% efficient.

The amount of flow charge determines the start-up load on the motor and the time required to bring the load up to speed. As more flow charge is added, the starting load on the motor increases and the time to accelerate the load decreases. Too much flow charge, and the motor can start under near full load. Too little flow charge, and the unit can slip excessively at start-up, generating significant heat and leading to premature wear of the rotor and flow charge.

The device was first offered by Dodge in 1955 and is available in three styles: a coupling style, a drive style, and a C-Flex Module.

Flexidyne coupling units, as the name implies, are used to directly couple two shafts and are available in twelve sizes. On the smallest size, the 5C, a tubular flexible element connects the drive hub to the housing. On the next sizes: the 55C, 70C, 75C, 9C, and 11C, a Dodge Poly-Disc flange and element are used. The largest sizes: 987, 1196, 15116, D15116, D15131, 18172, and D18172, utilize a Dodge High-Speed Para-Flex Taper-Lock flange and element. Examples of each type are shown below.

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**Figure 1.** From left to right: 5C, 11C, 15116

The coupling units are capable of handling horsepower requirements of ½ HP up to 250 HP, depending on motor speed, and shaft sizes from ½” to 3 15/16”. The 5C uses a clearance fit, keyway, and setscrews to attach to the shaft. All other sizes utilize Taper-Lock bushings.

The drive style Flexidyne unit is used for belted applications with V-belt sheaves or synchronous sprockets and is available in 8 sizes. The 5D Flexidyne comes with an integral sheave attached to the rotor. With the 55D, the sheave is attached to the unit using either a Taper-Lock or QD bushing. All other sizes are bolted on to the unit. Examples of both types are shown below.



**Figure 2.** From left to right: 5D, all other size

A wide variety of sheaves for Flexidyne drives are available from stock. For special applications, Made-To-Order sheaves are available. Synchronous sprockets are available solely as Made-To-Order parts. The drive units are capable of handling horsepower requirements from ½ HP up to 250 HP, depending on motor speed, and shaft sizes from 5/8” to 3 3/8”. All sizes use a clearance fit, keyway, and setscrews to mount to the motor shaft.

A C-Flex Module is used to easily attach a Flexidyne coupling between a C-face motor / gear reducer combination. Four C-Flex Modules are available to attach to any 56, 140TC, 180TC, and 210TC reducer frames to 1750 RPM AC motors.

C-Flex modules can accommodate horsepower requirements from ½ HP to 10 HP and shaft sizes from 5/8” to 1 3/8”.

Standard flow charge included with Flexidyne units is a cast steel shot. For applications exposed to excessive moisture or wide temperature variations, stainless steel flow charge is available. Replacement flow charge is available for all sizes of Flexidyne unit in cast or stainless steel.

There are many benefits to using Flexidyne units. Some of these benefits include: lower current draw by the motor at start-up, 100% running efficiency at rated speed due to no slip, torque capacity can be varied by adding or removing flow charge, simple, compact design, motor can be sized for running load rather than start-up load, long life of unit with minimal maintenance, suitable for a variety of applications, easy installation, and low cost. These are just some of the many benefits offered by Flexidyne units.

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Note: Flexidyne units are not intended for use on variable speed applications, engines, or speeds below 700 RPM.

Flexidyne drives and couplings are a simple, low-cost soft-start option. They offer many of the same benefits as fluid couplings, while operating at 100% efficiency. Many different sizes and styles of Flexidyne are available to accommodate a wide variety of applications. If you have additional questions, or to see if a Flexidyne unit is right for your application, contact PT Components Customer Order Engineering at (864) 284-5700.