Crossgard Overload Couplings

The Crossgard series of overload protection clutches all use sprung loaded balls locked in detents to provide drive and overload control. The balls are random positioned in the clutch so drive can only be engaged in one relative angular position between driver and driven shafts, so ensuring full synchronisation of the drive at all times. In the event of an overload the balls are driven out of their detents to release the torque, and cause axial movement of the pressure plate which can be used to actuate a limit switch or proximity sensor to isolate the drive. All units are fitted with a torque indicator to enable simple setting of the desired torque rating. There are three basic types of Crossgard Clutches all of which are available as flexible shaft couplings, types CG, CGX and CGZ.

Crossgard Principles of Operation

During normal operation torque is transmitted between hub and driving flange by a number of balls located in the flange engaged in detents in the hub under load applied by disc springs. The balls are arranged in irregular angular positions to ensure re-engagement can only occur at one angular position between hub and flange. When an overload occurs the balls are driven out of their detents and then roll between the hub and pressure plate. The pressure plate moves axially a sensor plate which can be used to activate a proximity or limit switch. Torque is varied by adjusting the spring load on the pressure plate by tightening or loosening adjusting nuts.

Design Features

Crossgard clutches have been designed to provide the customer with a reliable, simple to operate clutch, all three types incorporating the following design features.

Drive Synchronisation
Non symmetrical arrangement of the drive balls and pockets allows only one angular position of engagement of drive, ensuring input and output are always synchronised.

Bi-directional drive
The clutches function equally in either direction of rotation, and are suitable for reversing drives.

Visual Torque Meter
All units have a scale on the adjusting nut to enable the set torque to be determined by reference to torque charts. Setting can also be verified at any time by visual check.

Simple Torque setting and adjustment
Required torque is set by turning the adjusting nut, and setting off torque scale.

Overload Monitoring
All units incorporate a sensor plate which moves axially when overload occurs to trigger a proximity or limit switch to isolate power to motor and activate failure indicators.

Stock availability
All standard Crossgard clutches are carried in stock with pilot bore. Units can be supplied with finished bore, keyseat and setscrews, fitted with platewheels; or complete with flexible coupling on 72 hours lead time.

Type CG Crossgard Clutch Pages 15-17

CG Crossgard Clutches are a low cost, simple design suitable for general purpose applications. The clutches provide full overload protection of drives which require synchronisation to be maintained at all times. Following overload the clutches are automatically reset by slow rotation of input drive once the overload cause is cleared. Seven sizes of clutch provide a torque range 10Nm to 7150Nm with operating speeds to 700rpm. Torque settings are accurate to ±10% even after repeated tripping. Also can be supplied with roller chain or elastomeric coupling.

Use CG Clutch:

- For general purpose applications.
- Where drives are inaccessible.
- For chain and low speed belt drives.
- In wrapping and packaging machines.
- On bakery and bottling machines.
- For conveyors and on sliding door drives.

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Crossgard Overload Clutches and Selection Procedure

Type CGX Crossgard Clutch Pages 18/19

High technology and precision is demanded in indexing and the position of equipment in modern machinery. The CCX Crossgard satisfies the demands for precision and performance and provides overload protection for modern machinery. CGX Clutches through their unique design provide backlash free, fail-safe, overload protection. High precision of trip torque is obtained with settings within ±3% accuracy, and very little motion is lost during tripping. An innovative ball and wedge mechanism is used to prevent backlash, and this is further employed in the coupling version to compensate for angular or parallel error or axial displacement with no loss in torsional rigidity. Five sizes of clutches and couplings have range 1.7 Nm to 785 Nm with maximum shaft speeds of 1400rpm. Units automatically reset after overload by slow shaft rotation.

Use CGX Clutch:

- For precision positioning indexing drives.
- For accurate mechanical overload protection.
- For zero backlash drives.
- On output shafts on cam boxes and Geneva mechanisms.
- On servo motor drives and robotics.
- In printing machinery.
- On N.C. machine tools and machining centres.

Type CGZ Crossgard Clutch Pages 20/21

The CGX Clutches incorporate a locking mechanism which restrains spring pressure being applied to the driving balls following an overload. Following an overload the input drive can continue to rotate freely enabling the clutch to be used for shaft speeds up to 1800 rpm. After the machine has been stopped following an overload the CGZ can only be reset by applying an axial load on the pressure plate. The clutch can also be used as an on-off clutch. Four sizes have torque range 2.4 Nm to 450 Nm, with accuracy ±10%. An elastomeric coupling is also available.

Use CGZ Clutch:

- For high speed drives - direct motor shaft.
- Where manual re-engagement preferred.
- As ON-OFF clutch.
- For machine tool drives.
- On textile and paper making machinery.

Crossgard Selection

Like other overload devices,it is best to position the Crossgard nearest the driven equipment where the overload is most likely to occur. Tripping torque should be at least 25% greater than the operating torque to compensate for motor starting torque and intermittent, shock and reversing loads.

Selection Method

1. Selecting the trip torque.
Trip torque should be set equal to the maximum amount of torque which can be applied based on such conditions as the strength of the machine and load. When it is not clear what the maximum amount of torque is, calculate the rated torque from the rated output and the rpm of the shaft onto which the Crossgard is to installed, and multiply this figure by the service factor. The result may be taken as the trip torque.

Tripping Torque = Operating x SF

$$\text{Torque Nm} = \frac{\text{Power kW} \times 9550}{\text{RPM}}$$

2. Select Clutch or Coupling where torque is mid range of rating to allow maximum on-site adjustment.

3. Check shaft diameters can be accommodated, if not a larger unit will be required.

4. Ensure shaft speeds are within limits of unit selected.

5. For coupling check alignment requirements.

6. Select proximity sensor switch, see page 29.

Determination of Service Factor

SF	Operating Conditions
1.25	Normal starting and stopping, intermittent motion
1.50	Load with light shocks, forward and reverse motion
1.70	Load with heavy shocks,frequent torque reversals

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