



# CLUTCHES FROM WALTERSCHEID

*... that you can rely on!*



# PROFESSIONALS TRUST WALTERSCHEID

Your brand for professional agricultural drivetrain technology



## The Walterscheid brand stands for development and innovation of powertrain systems in agricultural technology.

For more than 100 years, our technologies have set the standard, especially when it comes to PTO drive shafts, overload and overrunning clutches, and modern tractor attachment systems. Producing PTO drive shafts and providing a range of associated services have been core competences of Walterscheid from the beginning.

Leading agricultural technology manufacturers place their trust in Walterscheid's proven products and expertise. Increasingly, our products are being individually developed and produced to meet the actual requirements upon tractors and agricultural machines. This is why all of our PTO drive shafts comply with the DIN EN 12965 standard, for example. Our PTO drive shafts ensure the reliability and – above all – the operational safety of agricultural machines. This includes a long service life with little maintenance required.

With this in mind, we recommend using original spare parts from Walterscheid more than ever. We are represented by specialized dealers throughout Germany, so we're never far away and can respond quickly to service requests.

You can recognise our products by the Walterscheid diamond, which appears not only on our PTO drive shafts but also on all spare parts and components. This logo is an exclusive guarantee of top reliability and Walterscheid quality!



Walterscheid –  
The original

## INTRODUCTION

### INNOVATION FOR INCREASED SAFETY

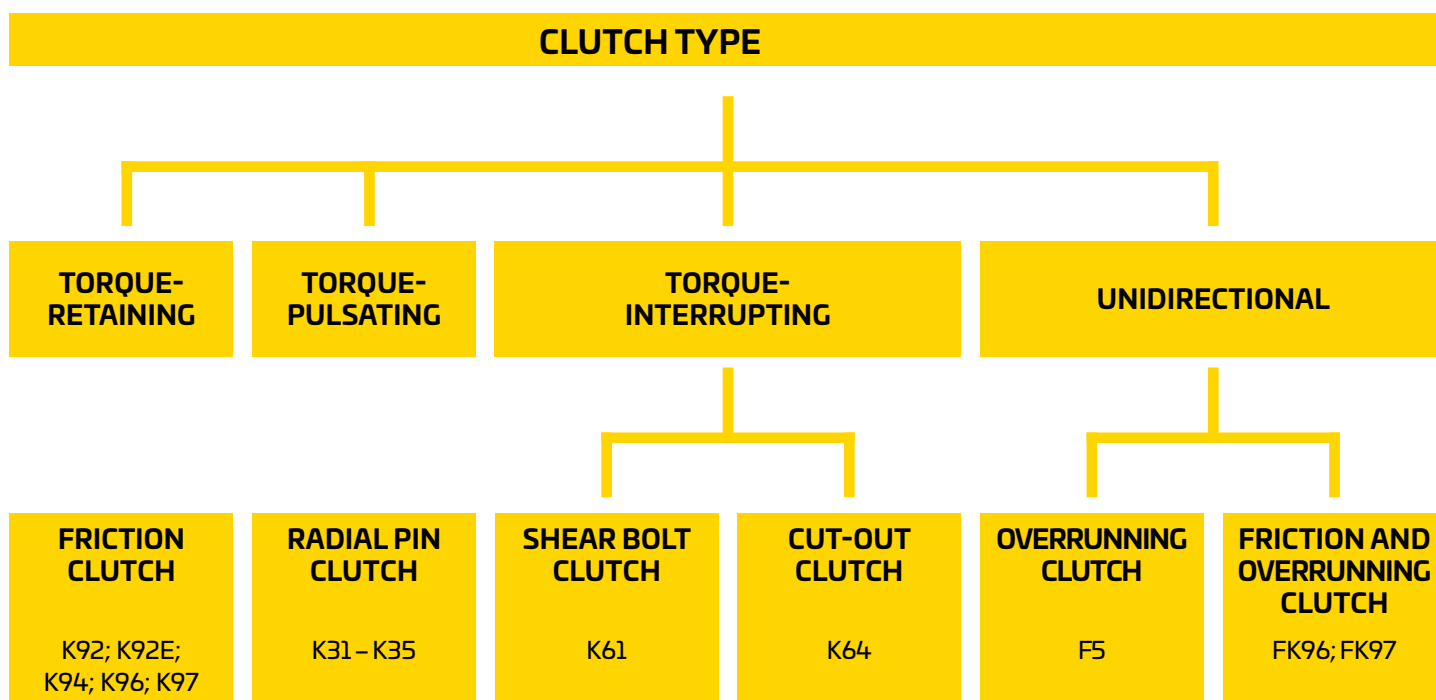
*The powertrain systems of agricultural machines are subjected to high load. Proper functioning must be guaranteed even under extreme conditions.*

Overload clutches are used to protect drives from excessive torque. They afford protection against damage caused by shock loads, starting torque peaks and blockages, for example.

Overload clutches are used both in the main drive, between the tractor and the machine, and inside the machine itself. There, they serve to ensure the proper functioning of individual units and assemblies with different power

requirements. According to international regulations, clutches used in the main drive must always be located on the machine side.

Walterscheid GmbH offers a range of clutches capable of covering a wide variety of applications. The different requirements are met by four basic clutch types:



### TORQUE-MAINTAINING CLUTCHES

Friction clutches count among the torque-maintaining clutches and limit short-term torque peaks. Power transmission in the powertrain is not interrupted.

The clutch torque is dependent on the spring forces, the mean friction radius, the coefficient of friction and the num-

ber of friction linings. Friction clutches are particularly suitable for limiting loads during start-up processes, e.g. the acceleration of large masses.

## OUR RANGE OF CLUTCHES

Our range of clutches can cover a wide variety of applications. The different requirements are met by four basic clutch types: torque-maintaining, torque-pulsating, torque-interrupting and unidirectional.

### Friction clutches

Torque-maintaining



**Application:**

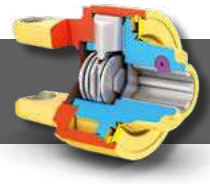
Start-up clutch for accelerating large masses, limiting short-term torque peaks without interrupting work

**Machine types:**

Mowers, rotary tillers, pick-ups, large balers, blowers, forage harvesters

### Cut-out clutches

Torque-interrupting



**Application:**

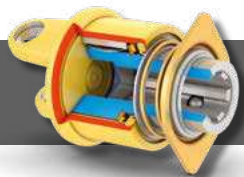
Interruption of force upon overload, automatic re-engagement at a defined speed

**Machine types:**

Large balers, forage wagons, manure spreaders, rotary harrows, feeders on harvesters

### Overrunning clutches

Unidirectional



**Application:**

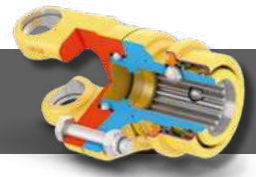
Overrunning clutch to protect the drive from rotating masses, no overload protection

**Machine types:**

Mowers, blowers, schredders, balers

### Shear bolt clutches

Torque-interrupting



**Application:**

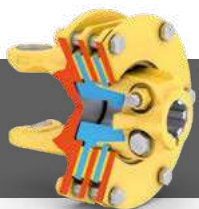
Complete interruption of force, the shear bolt must be replaced each time

**Machine types:**

Slurry pumps, mixers, economy-Balers

### Friction and overrunning clutches

Torque-maintaining, unidirectional



**Application:**

Friction / overrunning clutch to protect the drive from rotating masses

**Machine types:**

Mowers, blowers, schredders, balers

### Radial pin clutch

Torque-pulsating



**Application:**

Interruption of force upon overload with pulsating torque that can be used for freewheeling the machine

**Machine types:**

Rotary tedders and hay rakes, pick-ups, individual protection in corn headers, protection of conveying elements in cutting units

## TORQUE RETAINING CLUTCHES

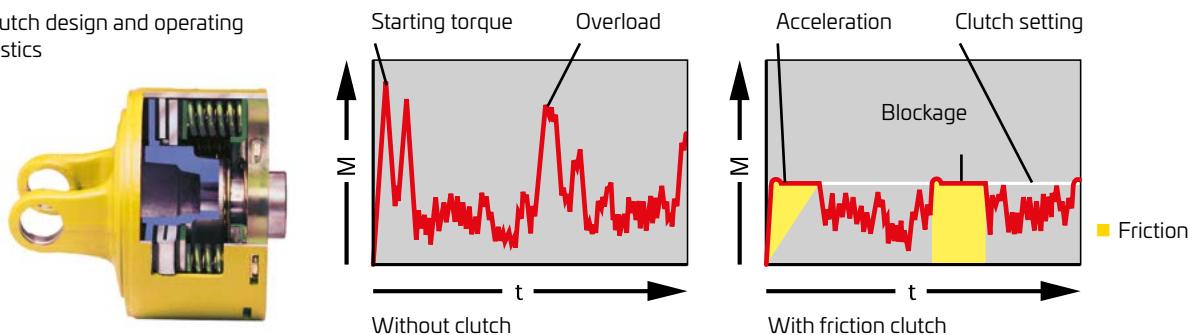
Friction clutches belong to the group of the torque-retaining clutches and limit short-term torque peaks. Power transmission in the powertrain is not interrupted.

The clutch torque is dependent on the spring forces, the mean friction radius, the coefficient of friction and the number of friction linings. Friction clutches are particularly suitable for limiting loads during start-up processes, e.g. the acceleration of large masses. If the drive system is blocked, all the energy to be transmitted is converted into heat.

Overheating of the friction clutch can result in temporary reduction of the clutch torque or destroy the friction lining. The thermal loading capacity of friction clutches depends on the design type, the friction linings and the installation conditions.

Walterscheid GmbH only uses thermal heavy-duty friction linings.

Friction clutch design and operating characteristics



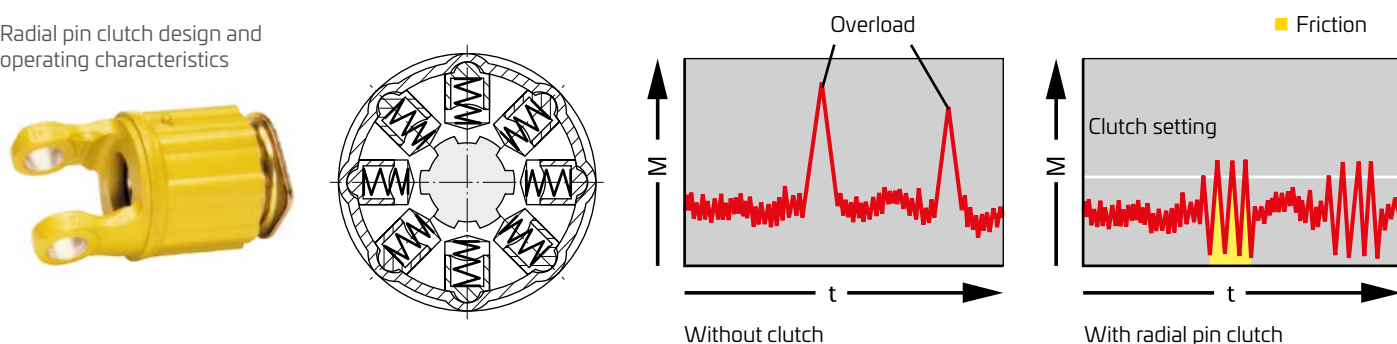
## TORQUE-PULSATING CLUTCHES

Radial pin clutches belong to the group of torque-pulsating clutches. Spring-loaded cams, acting as locking elements, radially engage with special grooves in the housing. If the clutch torque is exceeded, the locking elements are pressed against the springs as a result of vectorial force resolution, until the positive connection to the housing is released. During the slipping phase, the cams repeatedly engage with the grooves in the housing, thereby generating pulsating torques.

The mechanical energy to be transmitted is primarily converted into elastic spring deformation energy.

The clutch torque is dependent on the clutch design, the type of spring and the number of springs. Axially acting cams are rarely used as locking elements in practice, owing to their axially acting, pulsating forces.

Radial pin clutch design and operating characteristics



## TORQUE-INTERRUPTING CLUTCHES

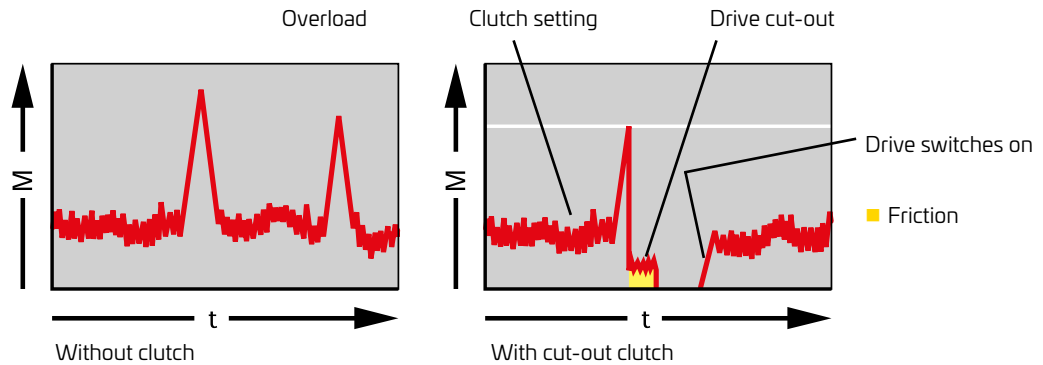
### Clutches with one-time cut-out function

The shear bolt clutch is the simplest form of torque-interrupting clutch. If the permissible clutch torque is exceeded, a bolt is sheared off and power transmission thus interrupted. The energy to be transmitted is converted into plastic deformation energy. The transmissible clutch torque is dependent on the effective radius of the cross-sectional area of the bolt and its shear strength.

### Clutches with automatic reengagement function

The flow of energy through the powertrain is interrupted if the clutch torque is exceeded. The rpm speed must drop below the limit speed in order to achieve automatic reengagement of the clutch. The energy to be transmitted is converted once into elastic spring deformation energy. The clutch torque is dependent on the clutch design and the spring force.

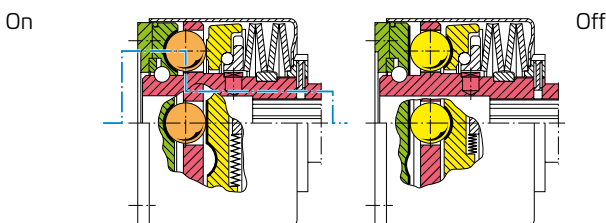
Operating characteristics of reengaging clutches



This type of clutch is frequently used in forage harvesters, square balers and snow blowers. In a special design, the receiving recesses are controlled externally, so that a clutch shift is possible regardless of the torque being exceeded. In combination with metal detectors, clutches with this quick-stop function have proven successful in forage harvesters. This clutch is a nonstandard design, and is only available per request.

In the cam-type cut-out clutch, spring-loaded cams radially engage with special grooves in the housing. When the clutch

Schematic diagram of the cut-out function of a K62 ball-type cut-out clutch

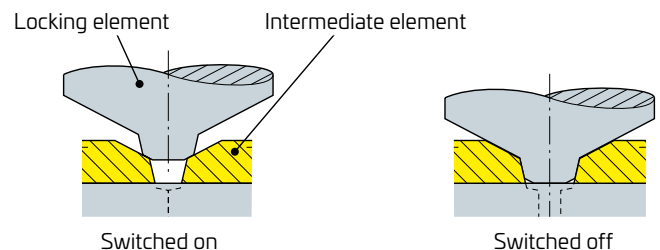


In the ball-type cut-out clutch, spring-loaded balls axially engage with special dome-shaped recesses. When the clutch torque is exceeded, the balls are pressed out of the recesses as a result of vectorial force resolution and pushed into special receiving recesses against the force of Belleville springs. This interrupts power transmission through the drivetrain. After reaching the limit speed of 80 rpm one or more shift springs return the receiving recesses to their starting position. This clutch type operates in both directions.

torque is exceeded, the cams are pressed into a pair of spring-loaded shift rings as a result of vectorial force resolution and lock with them. When the reengaging speed of 180 to 300 rpm is reached, the cams slide back into their starting position.

The clutches only operate in one direction. Owing to the central spring arrangement, the clutch is not suitable for a through-mounted shaft. This design offers a low-cost alternative to the ball-type clutches.

Schematic diagram of the cut-out function of a cam-type cut-out clutch

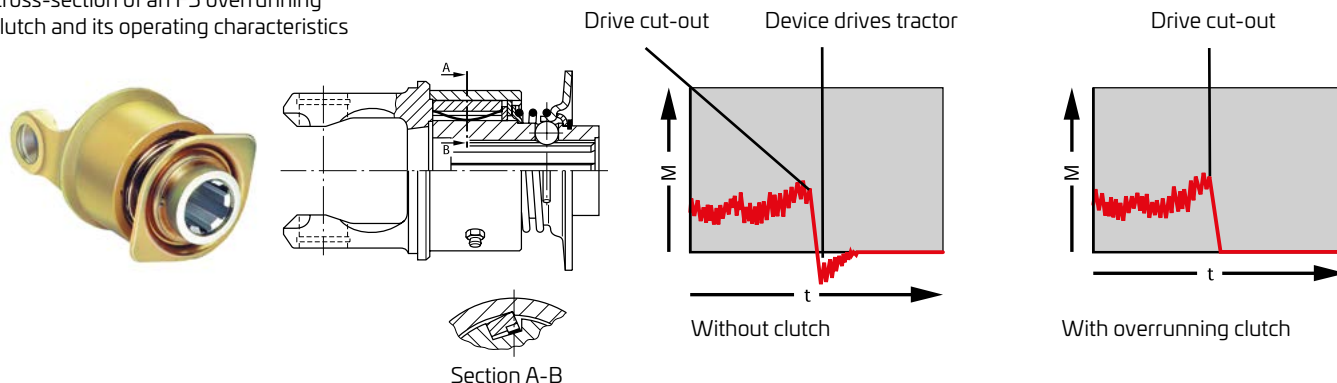


## UNIDIRECTIONAL CLUTCHES

Overrunning clutches transmit torque in only one direction. They are often used for reversing operations, in order to prevent loading by rotating masses.

Pivoting, spring-loaded wedges engage in grooves. The flanks of these grooves are designed in such a way that the locking wedges can only engage on one side.

Cross-section of an F5 overrunning clutch and its operating characteristics



Preferred applications include rotary mowers and flywheel drives; unidirectional clutches are often combined as friction and overrunning clutches.

This also applies to the overload clutch, since it is more heavily loaded due to more frequent activation. Therefore, the response characteristics and response torque of the clutch must be designed to match the strength and torque characteristics of the machine.

### Design notes

#### Protection from exceptional loads

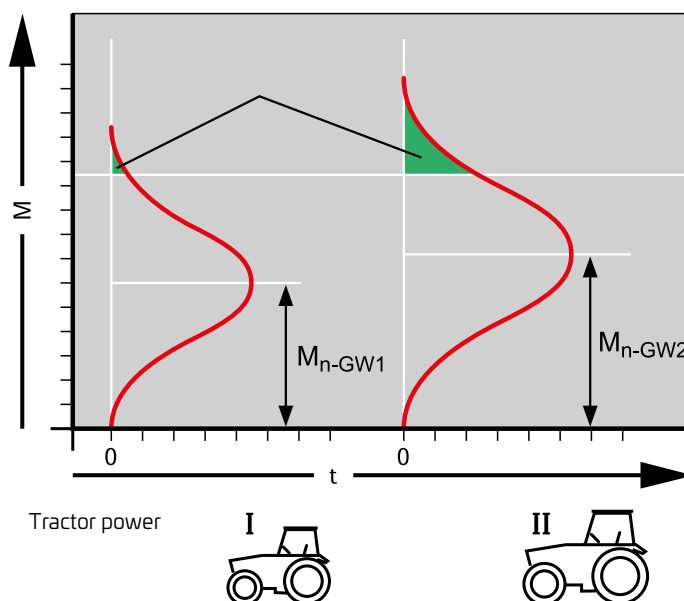
When designing and using mechanical drive systems with exceptional loads, the drive torque  $M_{n-GW}$  must be significantly lower than the clutch torque  $M_K$  in order to prevent recurring disruptions to the work process as a result of frequent cut-out of the clutches.

#### Protection from periodic load peaks

These drive systems are primarily protected from overload peaks. However, power transmission is usually not interrupted. Clutches of these drive systems must be designed to prevent overheating.

Machines that are insufficiently dimensioned, however, can also not be reliably protected from premature failure by overload clutches. This means that, even at the same response torque of the clutch  $M_K$ , the machine with the higher-powered tractor is on average subjected to much more loads.

Machine load by tractors with different hp range



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# WALTERSCHEID INSIDE –

Our drive, hitching and attachment systems increase the efficiency of agricultural machines.

- ▶ THINKING OF THE **FUTURE.**
- ▶ DEVELOPING **IDEAS.**
- ▶ LIVING **TECHNOLOGY.**
- ▶ MASTERING **CHALLENGES.**



Walterscheid –  
The original