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BONDIOLI & PAVESI

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Catalog Global 017

BONDIOLI & PAVESI

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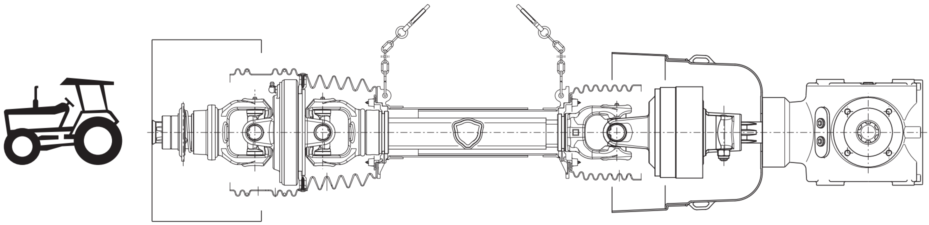
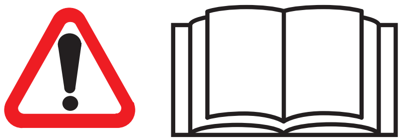


All rotating parts must be guarded.
The tractor master shield, the driveline guards, and the implement input connection shields form an interactive guarding system.

Proper use and maintenance of the driveline and shielding is of primary importance for operator safety.
A high percentage of driveline accidents occur when safety shielding is missing or does not function properly.
Bondioli & Pavesi recommends the use of proper shields and guards for the driveline, tractor, and implement. Damaged or missing components must be replaced with original equipment spare parts, correctly installed, before using the driveline.
Use the implement only with the original driveline. The implement input connection shield must be compatible with the driveline and the application.
To comply with international safety standards, the implement manufacturer shall provide safety sign(s) and instructions stating that guards must be kept in place and the machine should not be operated with guards open or removed. These sign(s) should be used to draw attention to the possible risks when the guard is unlocked, opened, or removed.

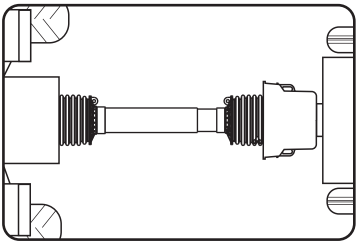
In addition it is recommended that the implement manufacturer provide a list of the guards, their corresponding warnings, their positions, and spare parts codes in the instruction manual.
Basic information for safe and correct use of the driveline and shielding are shown in our catalogs and in the instruction sheet provided with Bondioli & Pavesi drivelines.
Safety labels and user's manuals in alternative languages are available to meet local requirements.



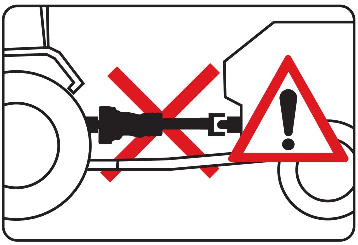
THE ABOVE INFORMATION CONCERNS YOUR SAFETY.

Safety and working conditions

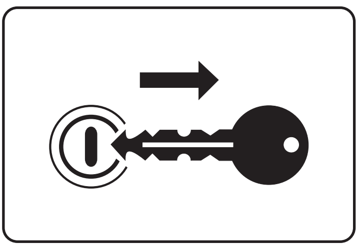
Use the implement only with the original driveline, which is compatible in length, power capacity, torque limiters, overrunning clutches, and shielding. The driveline and safety devices are designed specifically for the implement, and should be used exclusively for this purpose.
Do not exceed the speed and power limits given by the operator's manual. Drivelines, torque limiters, and overrunning clutches in this catalog are designed to be used at speeds that do not exceed 1000 min^{-1}.
Do not overload the implement or suddenly engage the PTO clutch. Any torque limiter or clutch should be installed on the implement end of the driveline. Use the driveline, torque limiters, and overrunning clutches only for their intended purpose.



All rotating parts must be guarded. Contact with a rotating driveline can cause death or serious injury. The tractor master shield, the driveline guards, and the implement input connection shield form an interactive guarding system.

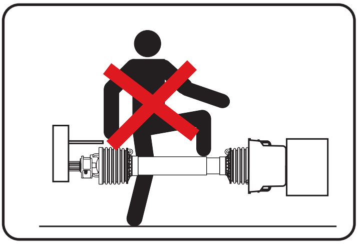


Ensure that all driveline, tractor, and implement shields are functional and in place before operation. Damaged or missing parts must be replaced with the original equipment spare parts, correctly installed, before using the driveline.

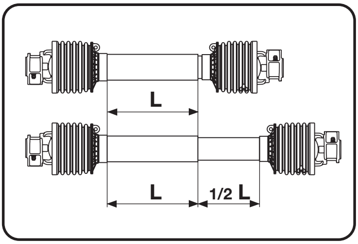


Disengage the PTO, turn off the tractor engine, remove the key, and check that all rotating parts have come to a standstill before approaching the implement or performing maintenance work.

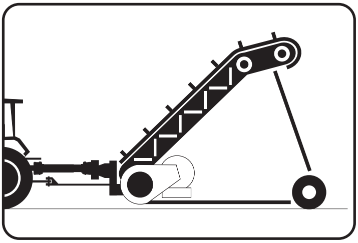
Do not approach, nor allow bystanders to come near the work zone or rotating parts. Do not wear loose clothing, jewelry, hair, or anything which could get caught in the machine.
Contact with rotating parts could cause serious injury or death.



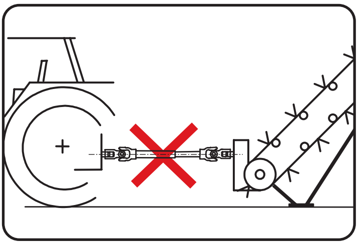
Do not stand, lean, or otherwise come in contact with the driveline. Do not step over or go under the driveline.



Keep the profile tubes overlapped as much as possible during transport and operation or rotation. Do not exceed the values given in this catalog for permissible length extension. If greater telescoping ability is required, contact Bondioli & Pavesi engineering.

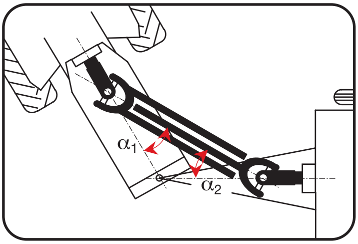


Always hitch the tractor to STATIONARY MACHINERY (pumps, hoists, generators, dryers, etc.). Chock the tractor wheels to prevent rolling and check that joint angles are small and as equal as possible.

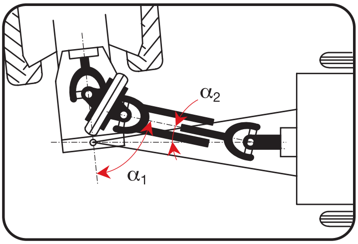


Always hitch the tractor to STATIONARY MACHINERY (pumps, hoists, generators, dryers, etc.) so that the profile tubes are not overextended.
Under all working conditions, extension of the driveline should not exceed the values reported in this catalog. All rotating parts must be guarded.

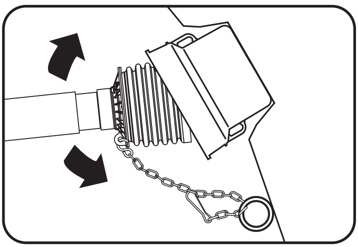
Safety and working conditions



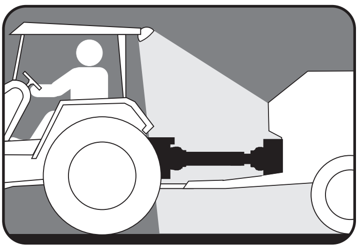
SINGLE CARDAN J0INTS
When operating, ensure that angles α1 = α2 are small and as equal as possible. The joint angles may vary widely during turns, but must never exceed 35° under power or 45° while rotating.
Disengage the PTO when the joint angles become excessive or too unequal. See “Driveline applications” for more information.



CONSTANT VELOCITY JOINTS
Constant velocity joint can allow large joint angles -up to 50° or 80° depending upon the type. These joint angles should only be allowed for brief periods, for example during turning.
For drivelines with a constant velocity joint on the tractor side and a single cardan joint on the implement side, the maximum recommended angles of the single joint are 16° at 540 min^{-1} and 9° at 1000 min^{-1} to prevent irregular motion.
See “Driveline Applications” for more information.

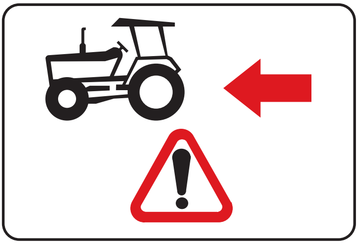


Attach the shield restraint chains, allowing sufficient slack for the driveline to move during turns and operation.
Best results are achieved when the chains are attached nearly perpendicular to the driveline guard. Adjust the length to allow articulation of the driveline in working or transport positions, but avoid excessive slack that may wrap around the driveline.

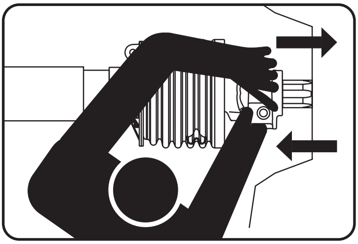


When used at night or in poor visibility, illuminate the driveline operating area.

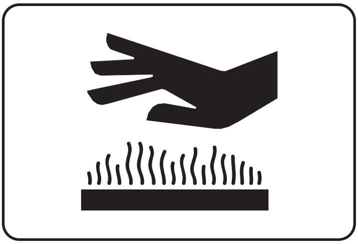
Safety and working conditions



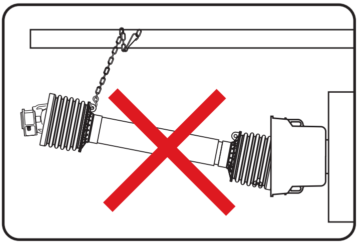
The tractor printed on the shield indicates the tractor end of the driveline.
Any torque limiter or overrunning clutch must be installed on the implement end of the driveline.



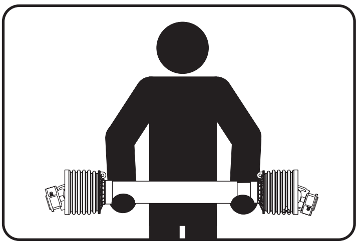
Ensure that the driveline is securely attached to the tractor and the implement before operating.
Check that all bolts or nuts are properly torqued.



Friction clutches may become hot during use.
Do not touch !
Keep the area around the friction clutch clear of any material which could catch fire and avoid prolonged slipping.

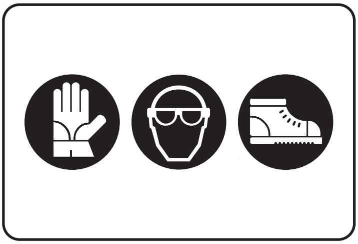


Never use the shield restraint chains to support the driveline for storage. Always use the support on the implement.



Keep the driveline horizontal during handling to prevent the halves from sliding apart, which could cause injury or damage the shielding. Use suitable means to transport the driveline, depending on the weight.

Safety and working conditions



Always wear adequate safety equipment when performing any maintenance or repair work.
Replace worn or damaged components with the original Bondioli & Pavesi spare parts. Do not alter or tamper with any driveline component. Contact an authorized Bondioli & Pavesi dealer concerning any operations not described in the instruction manual.

GLOBAL Drivelines and accessories

Farming is undergoing a period of tremendous change: market globalization has intensified competition demanding higher and higher levels of productivity, which in turn require more powerful, efficient and reliable machinery.

Improvements in farm productivity have occurred with the application of appropriate technologies.
The traditional farmer is also changing, assuming the role of a business manager, leaving the machines to be operated by employees or hired hands. For these reasons, machines must be inherently safe and easy to use, and they must require little maintenance.

International safety standards and regulations provide important guidelines and are continually updated. The wealth of expertise accumulated by Bondioli & Pavesi in regards to driveline safety is at the basis of Global drivelines and accessories.
Global drivelines comply with existing standards and regulations, as well as those under development.

Global drivelines are designed to respond to the user's needs: reliability, low weight (with equal performance), easy installation and simplified, long-lasting lubrication.

Global drivelines are based on the experience Bondioli & Pavesi has gained in the design and manufacture of drivelines and accessories since 1950.

Constant research and exclusive production techniques, combined with stringent testing and quality control, have enabled Bondioli & Pavesi to obtain high levels of performance in a compact driveline.

GLOBAL Drivelines and accessories

Cross kits: designed and built for farming applications

Global drivelines are born of the expertise Bondioli & Pavesi has acquired through years of designing, testing and manufacturing cross kits and needle bearings in its own factories.

This expertise has allowed us to create technically advanced cross kits that are perfectly suited for their intended use on agricultural equipment.

Most of the cross kits available today are designed for industrial applications where the volume is much larger than the farming sector. Both utilize universal joints but industrial applications are quite different. Agricultural drivelines are subjected to high and fluctuating torque loads and require heavy-duty components. Working angles tend to be large and variable, unlike industrial settings where joint angles are generally small and almost never change.

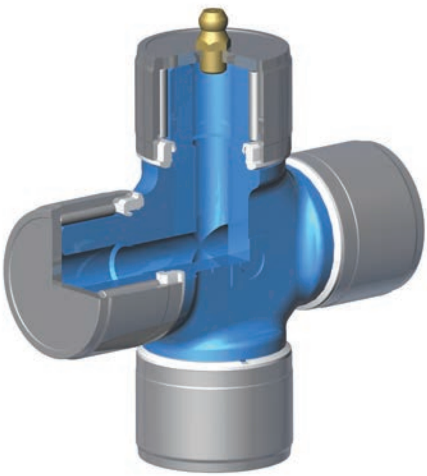
Different working conditions produce different stresses on the cross kit; that's why components specifically designed for farming applications achieve the best results.

The chief design objectives for cross kits are: higher strength trunnions on the cross, increased needle bearing life, and longer lubrication intervals.

Bondioli & Pavesi's experience provided the technical background for the design of the cross kit and how to test them properly.

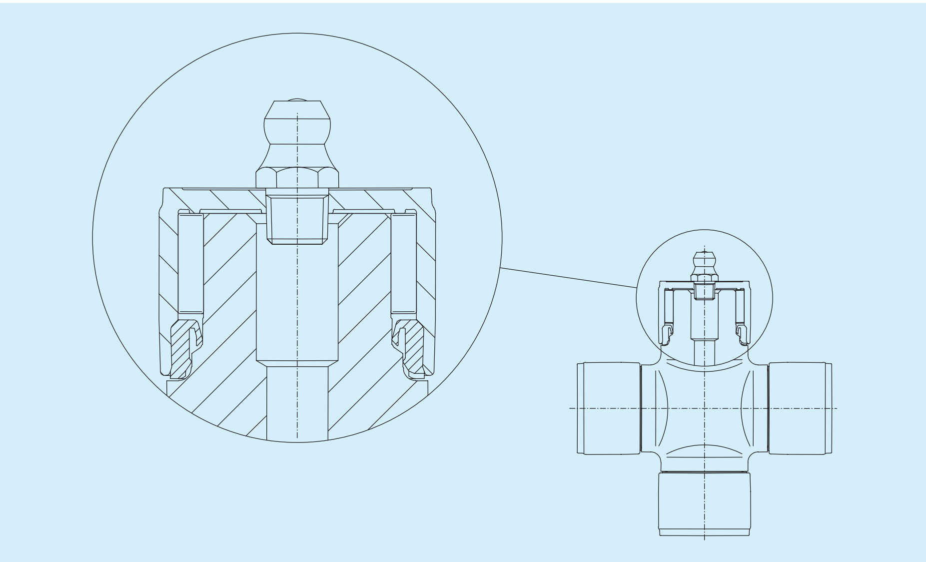
Production quality is constantly monitored and maintained with state-of-the-art manufacturing processes and heat treatment methods.

Maintaining direct control in every stage of production, from design to finished cross kit, ensures products that provide extraordinary performance in a compact size, thereby improving driveline function.



Agricultural machines are often employed in harsh working environments - dust, dirt, and dampness can shorten a driveline's life. Effective sealing is essential: to retain lubricants and protect from contamination by foreign elements.
Cross kits have needle bearings with double-lip seals designed to prevent contamination of the lubricant in severe working conditions, typical of farming applications. The seals allow excess grease to purge without damage during re-lubrication.
Bondioli & Pavesi analyzes cross kits using specially designed test fixtures. Data provided by these tests is used to optimize the shape, material, and heat treatment used for all the components of a cross kit - needles, cups, seals, and crosses.

Designed and manufactured in this manner, cross kits may allow extended lubrication intervals of 8 to 50 working hours, for most applications.
Lubrication can be done on a weekly basis instead of every day, thereby resolving one of the most demanding user requirements.



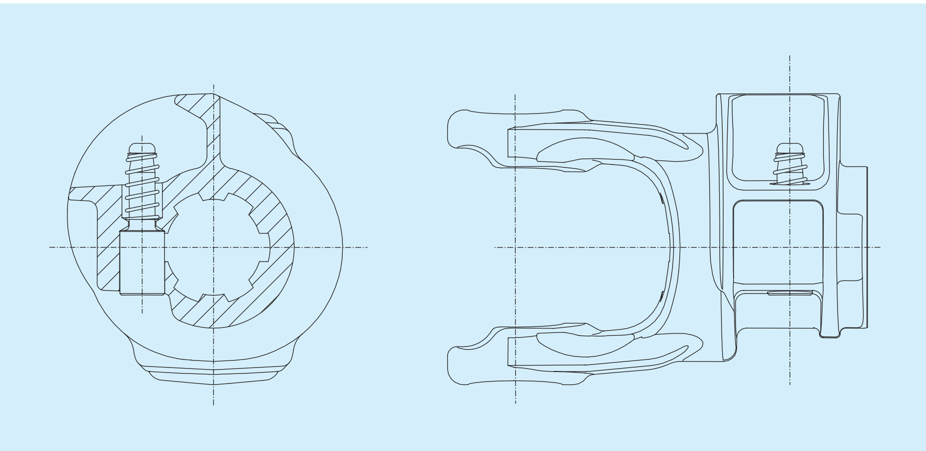
End yokes

Safety and practicality were main objectives in designing SFT end yokes and the means to couple them to power take-off (PTO) shafts – sturdy, user friendly, and consistent with international safety regulations.

Push-pin yokes

The push-pin yokes provide sturdy and reliable coupling to PTO or implement shafts. The push-pin mechanism is easy to understand, easy to use and no tools are necessary.

The pin is encircled by the hub's rounded profile, eliminating protrusions as recommended by international safety standards, but remains easy to access.



Ball collar yokes

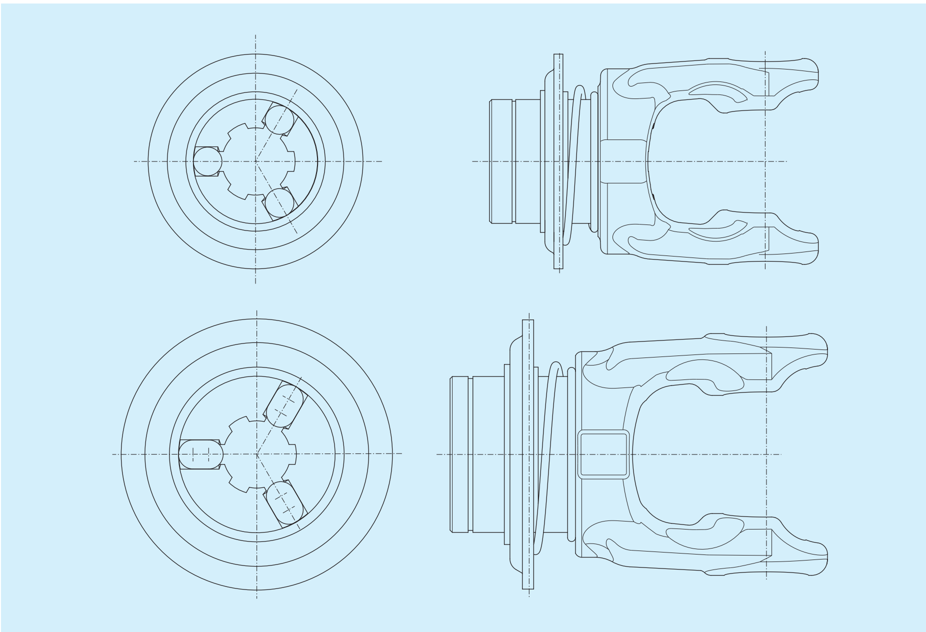
Ball collar yokes make it easy to connect (or disconnect) the yoke to the PTO or implement, quickly and without the use of tools.

Coupling is secured by hardened balls or spherical pins that engage the annular groove in the splined shaft. A spring-loaded collar controls the radial movement of the balls or pins.

The coupling elements are arranged symmetrically to uniformly distribute thrust forces generated by a telescoping driveline.

Yokes can be converted from conventional (RT) to automatic (RTA) ball collar connections with the appropriate kit.

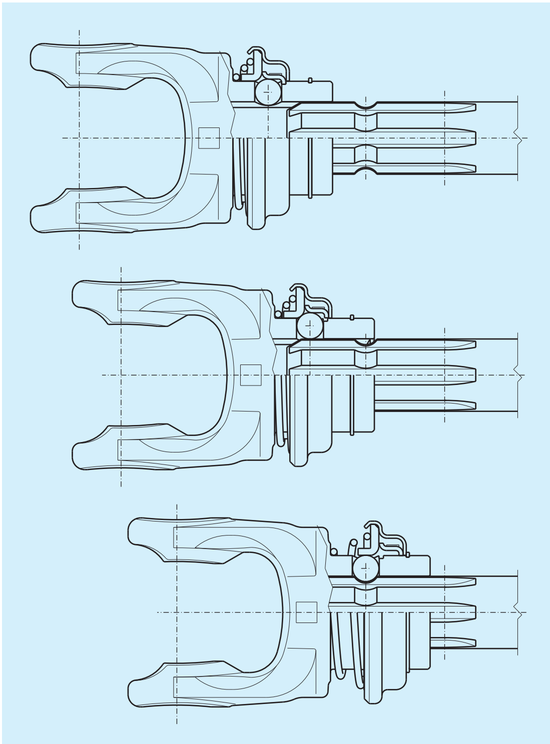
RT



RTA

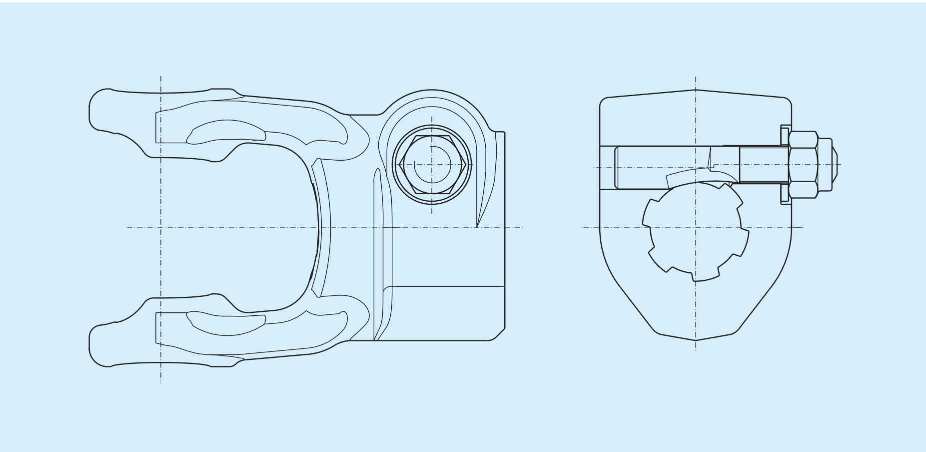
Automatic ball collar yokes
A special device in the collar makes it easy to connect and disconnect the yokes, automatically retaining or releasing the collar when the balls are in the correct position.
This leaves both hands free to hold the driveline and align the yoke to the splines when connecting or disconnecting the driveline to the PTO.
Standard RT ball collar yokes may be converted to automatic RTA yokes by replacing the collar kit.

Before slipping the yoke onto the implement shaft, the collar is pulled into the open position until it engages and is held in position by the automatic mechanism.
Now both hands are free to maneuver the yoke into position on the PTO and support the driveline.
Once the balls contact the splines of the PTO, the mechanism is released and the collar will return to its locked position when the balls engage the annular groove.
The automatic mechanism also holds the collar open when disconnecting the driveline from the PTO, again enabling use of both hands to hold the driveline when uncoupling.



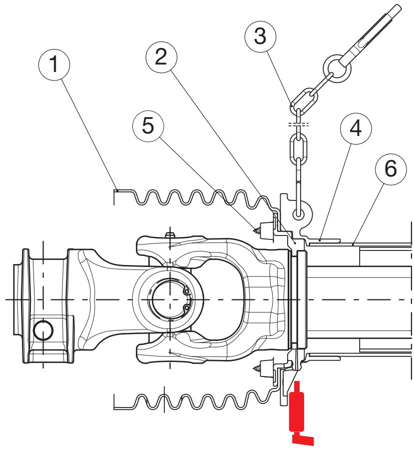
Taper pin yokes

Farm implements are supplied with a driveline designed and built for the specific application. For this reason, yokes are commonly coupled to the implement shaft with a semi-permanent type of connection. These types of connections usually require the use of tools to install or disconnect.
Tapered pins provide a fixed coupling between yoke and PTO.
Tapered pin yokes are intended for use on the implement end of primary drivelines (those that connect the tractor PTO to the first implement input shaft), or may be used on either, or both ends of drivelines internal to the machine.
The tapered shape of the pin fits snugly into the annular groove of a splined shaft, reducing play between the splines to a minimum.

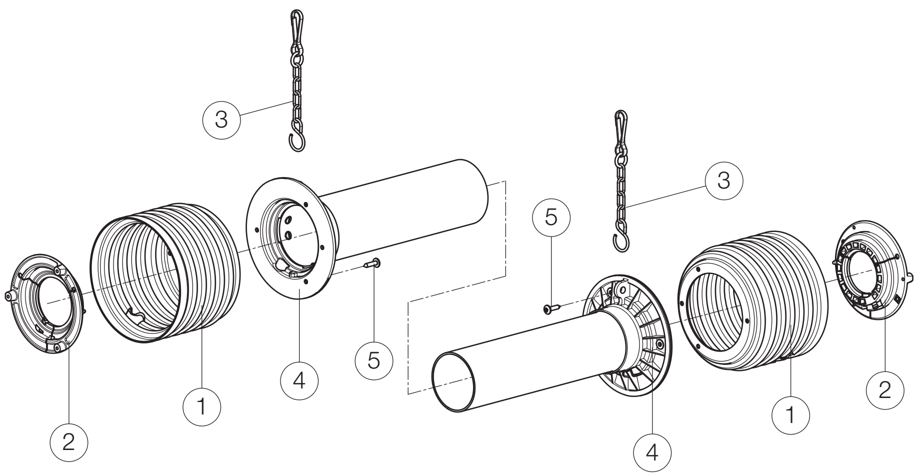


Safety equipment

Operator safety is a fundamental aspect of all Bondioli & Pavesi designs.
Global transmissions are compliant with international safety regulations. Their simple construction with robust components makes them particularly reliable in operation.
The corrugated outer cone (1) is robust and elastic, and features a hole for greasing the cross.
The support ring (2) is fitted to the internal yoke and serves to allow the mechanical assembly to rotate around the shield secured by the chains (3). The base cone (4) connects rigidly to the other parts of the shield.
The outer cone (1) and support ring (2) are rigidly secured to the base cone by self-tapping screws (5).
The tube (6) locks into the base cone so that the entire assembly forms a single unit.
The support ring and cross grease fittings are located to facilitate maintenance.



The shields are easy to remove and refit with normal tools.
The outer cones cover the internal yokes (as required by Machinery Directive 2006/42/EC) for all ends except for the FFV and FFNV clutches which are available for shafts without CE Mark.
Global transmissions are designed to allow for ample joint working angles before the shield itself obstructs the mechanism.



Restraint standards and regulations
UNI EN ISO 5674 and ANSI/ASABE AD5674 standards state that restraints must withstand a load of 400 N, and must detach at the end attached to the shield at loads of under 800 N.
Bondioli & pavesi driveline chains meet these detachment requirements.
Chains are attached to shields by S-hooks.

If the chain length has not been properly adjusted and is too tight, during turning maneuvers the S-hook opens and the chain disconnects from the shield. If this happens, the chain has to be replaced. The S-hook of the new chain is fastened to an eyelet on the cone and must be closed and round to prevent unintended detachment.

Spring link: easy repair of improperly attached shield restraint chains
Restraint chains can be supplied on request with the Spring Link device. This device includes a clip which can be opened and closed by screwdriver, and a spring hook which detaches from the shield when subjected to the loads described in the standards.
Both S-hook and Spring Link connections separate the chain from the shield in compliance with UNI EN ISO 5674.
If a shield chain with S-hook pulls free, the chain needs to be replaced. The Spring Link can be re-attached using a screwdriver.

See the section "Safety Shields" for more informations.
To request the chain with Spring Link, add the letter "Z" to the optional position in the driveline code as shown in chapter 2 "Codes and Dimensions".

GLOBAL Drivelines and accessories

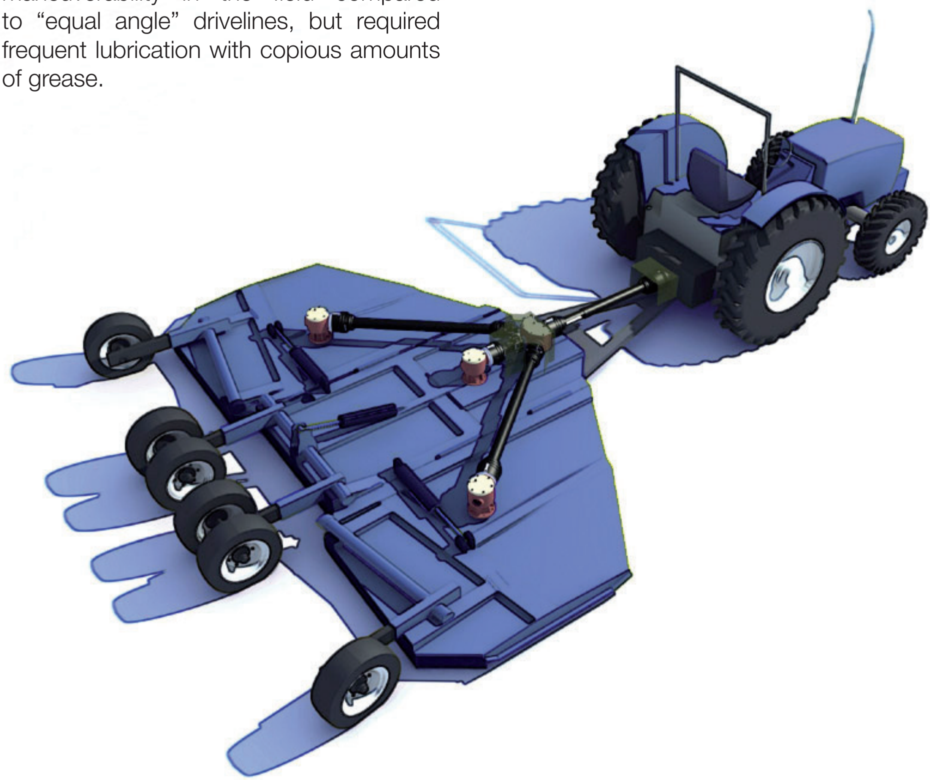
Constant velocity joints:
high efficiency, low maintenance

Constant Velocity (CV) joints were first widely used for agricultural applications during the 70's. CV joints increased the efficiency of towed implements by reducing or eliminating the problems associated with high and/or unequal joint angles during turns.

The requirement for tight turns with the implement has dictated a wide range of motion for the centering disc inside the CV joint. This required large apertures in the CV joint body, which risks contamination of the lubricating grease.

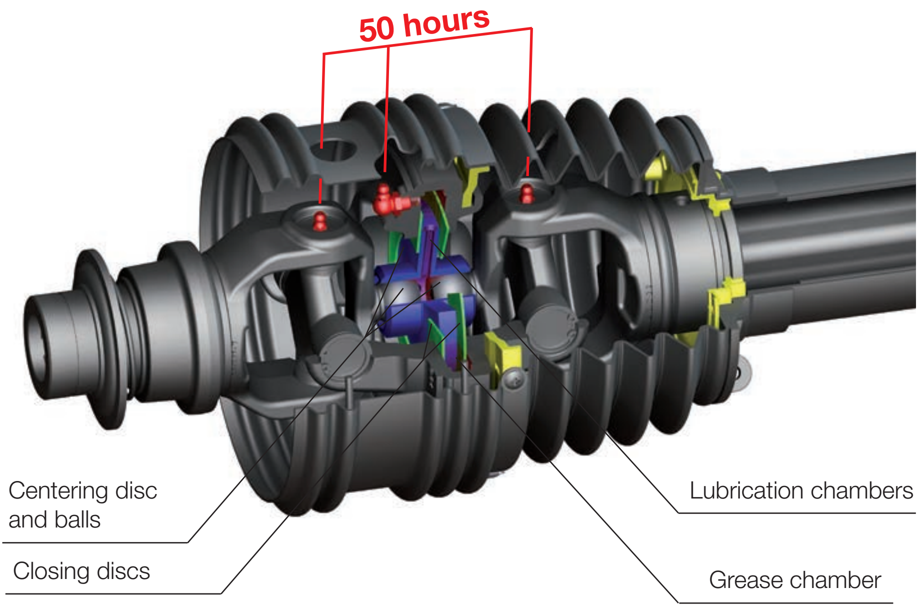
Until now, CV joints have allowed better maneuverability in the field compared to "equal angle" drivelines, but required frequent lubrication with copious amounts of grease.

The CV's used on Global drivelines overcome these problems and require **regreasing only once a week** (see the section on "Lubrication"). In addition, Global drivelines 80° CV joints do not require nearly as much grease as conventional CV joints. Cross kits for Global constant velocity joints also feature the double-lip seal caps, and have the same lubrication interval of 50 hours.



The 80° CV joints achieve this by introducing two closing discs which follow the movement of the centering disc.
These discs are not simple floating discs but are specifically designed springs which press against the sides of the housing and the centering disc in order to retain grease and limit contamination.
When the CV joint changes angle, the centering disc moves inside the housing. This movement displaces the grease inside the housing. Due to the sealing action of the closing discs against the centering disc and housing, the displaced grease is pushed through radial ducts in the disc to the centering ball and socket area.
Grease is therefore distributed to the centering members of the 80° CV joint by the angular motion of the joint itself.

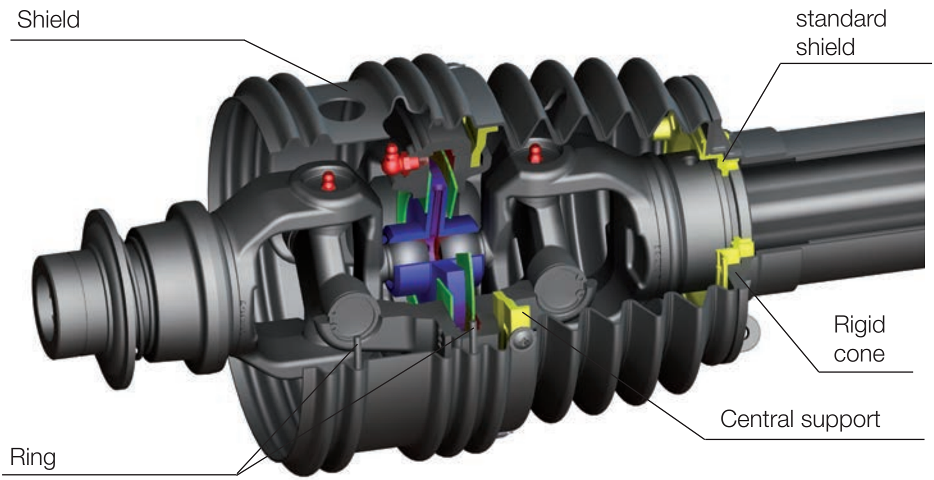
80° CV joint drivelines function properly when they work mainly in the straight position, but frequently make sharp turns, as illustrated in the section on “Driveline Applications”.
The motion of the centering disc also pushes grease into a hole directed toward the shield bearing groove. The movements of the 80° CV therefore automatically lubricates its own shield bearing.

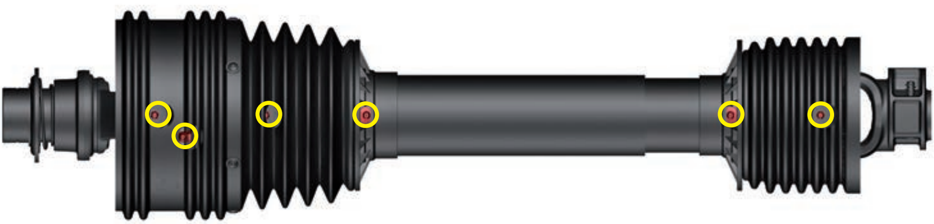


GLOBAL Drivelines and accessories

Global CV joints are guarded in compliance with recent developments in international safety standards and are designed o integrate with the tractor's master shield, as required by Directive 86/297/CEE, international standard ISO 500 and US standard ANSI/ASABE AD500.

The shield over the CV is connected to the rigid base cone and standard shield bearing. A second shield bearing supports the shield over the central housing of the CV joint.
A metal ring helps stiffen the end of the shield cone of the 80° CV joints.





The greasing of Global shafts is designed to be as simple and quick as possible. Grease fittings are aligned and easily accessible so the user can line up the shield holes with the grease fitting to grease all components without fuss.

Extended lubrication intervals or permanently lubricated torque limiters and overrunning clutches: less maintenance for higher efficiency

Global drivelines are designed to respond to the user's needs: reliability, high performance, low weight, easy installation, and less maintenance.

These same goals were met with the design of the devices that control torque.

The extended 50-hour lubrication interval represents a significant step forward in reduced maintenance requirements.

In addition, LB shear bolt torque limiters require lubrication only once a season.

All torque limiters and overrunning clutches, either standard 50 hour interval or seasonal lubrication frequency, may be lubricated with NLGI 2 grease.

The Global range includes permanently lubricated LR automatic torque limiters.

During assembly, these devices are lubricated with NLGI 2 molybdenum disulphide grease ("moly grease") and sealed. No further lubrication is required for their entire service life - they are not provided with grease fittings.

Torque limiters are normally mounted on the implement end of the driveline, where they are protected by the driveline guard and an overlapping shield. UNI EN ISO 4254-1 and ANSI/ASABE S604.1 standards specify at least a 50 mm overlap.

RA2 Torque Limiters
Extended lubrication: 50 hours

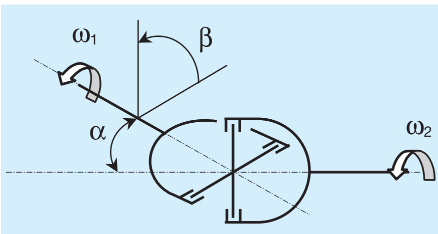
SA Torque Limiters
Extended lubrication: 50 hours

LB Torque Limiters
Seasonal Lubrication

LR Torque Limiters
Permanently lubricated

The cardan joint

The cardan joint is an ancient mechanism. In the 16th century, Gerolamo Cardano, an Italian mathematician, described this mechanism, used to hold a compass so that it was no longer affected by the rolling motion of a ship.
Robert Hooke was the next to undertake research into the specifics of universal joint motion and discovered that two joints operating in series with the same joint angle eliminated the uneven motion generated by a single joint.
A cardan joint consists of two yokes connected to a cross by four bearings.
A cardan joint transmits motion in an uneven manner when operated at an angle. If the rotational speed of the driving yoke is constant, the speed of the driven yoke varies with the angle of rotation.

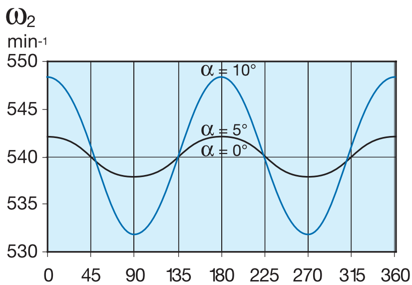


α: joint angle
β: rotation angle of driving yoke
$\boldsymbol{\omega_1}$: driving yoke speed
$\boldsymbol{\omega_2}$: driven yoke speed

The output speed is a function of the input speed and joint angle, and varies as the joint rotates.

$$\omega_2 = \frac{\omega_1 \cdot \cos\alpha}{1 - \sin^2\alpha \cdot \cos^2\beta}$$

The following diagram illustrates the variation in driven yoke speed during a complete revolution of the joint when the driving yoke speed is constant $\boldsymbol{\omega_1}$ = 540 min^{-1} and joint angle is 5° or 10°.



For **α** = 0°, the instantaneous speed of the driven yoke remains constant so $\boldsymbol{\omega_2} = \boldsymbol{\omega_1}$ = 540 min^{-1}.
When the joint works at an angle, the instantaneous speed of the driven yoke varies continuously, undergoing two complete cycles for each revolution of the joint. For example, for **α** = 5°, the instantaneous speed of the driven yoke varies between $\boldsymbol{\omega_2}$ = 538 min^{-1} and $\boldsymbol{\omega_2}$ = 542 min^{-1}. For **α** = 10°, the instantaneous speed of the driven yoke varies between $\boldsymbol{\omega_2}$ = 532 min^{-1} and $\boldsymbol{\omega_2}$ = 548 min^{-1}.

Driveline applications

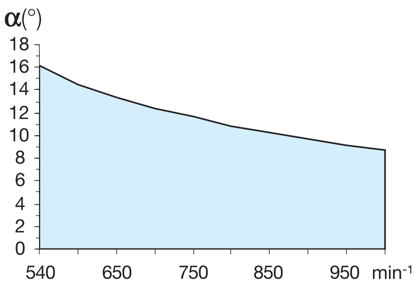
The angle of the cardan joint generates variations in speed; consequently producing accelerations and oscillating torque depending upon the inertia of the driveline and the torque transmitted. These stresses act on the driveline and are transmitted to its supports.
In normal working conditions, the angle of the cardan joint must be limited to prevent excessive vibration and stress that can reduce component life. Through experience, we can determine practical limits to the angular acceleration of the driven yoke and from this we can determine the recommended maximum joint angle.
We can use one of Hooke's equations to approximate the maximum angular acceleration of the driven yoke, which is generally acceptable for any practical problems concerning cardan joints. According to this equation, the maximum angular acceleration A_{max} depends upon the speed of the driving yoke ω_1 and the angle of the joint α.

After estimating the largest acceptable angular acceleration, the maximum joint angle can be calculated as a function of the rotation speed.

The recommended maximum joint angles, based on Bondioli & Pavesi's experience, are listed in the table and diagram below.
These values are generally acceptable for agricultural implements, but the final determination of allowable torsional oscillation and accompanying vibration depends upon the specific construction of the implement and its intended use.

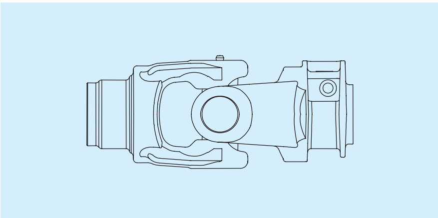
The angular acceleration generated by a single cardan joint or by more than one joint with different joint angles requires special attention and must be verified for each specific case.

$$A_{max} = \alpha^2 \cdot \omega_1^2$$



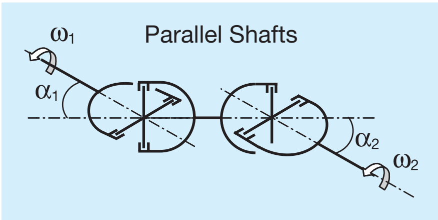
α_{max} (°)	n min^{-1}
16.1	540
14.5	600
13.4	650
12.4	700
11.6	750
10.9	800
10.2	850
9.7	900
9.2	950
8.7	1000

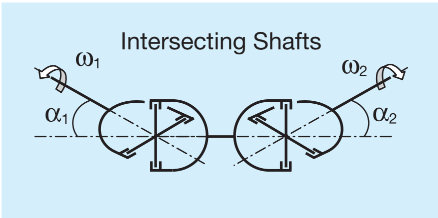
A single cardan joint is suitable for transmitting power between two shafts with axes that intersect in the center of the joint. They are often used to connect internal shafts within an implement. More often, a cardan joint is used as part of a double joint or driveline.
Installation of a single cardan joint is normally made by locking one of the yokes onto the shaft, and allowing the other yoke to move freely in the axial direction to compensate for small amounts of movement between the shafts or deflection of the structure.



A double cardan joint must be used when the axes of the connected shafts do not intersect with the center of the joint.

Double cardan joint
The variations in speed generated by a cardan joint operated at an angle can be eliminated by using a second joint, with the condition that the inner yokes are parallel and that the joint angles are equal and in the same plane. This is the situation found with parallel or intersecting shafts.





In both cases, the output shaft speed is the same as that of the input shaft at all times. Therefore, motion is transmitted at a constant velocity.
The central double yoke is subject to stresses generated by the cardan joints operating at an angle.
When the connected shafts and the central double yoke of the double joint are in the same plane, but the joint angles are different, there is a variation in output speed.

Driveline applications

In this condition it is possible to define the equivalent joint angle α_{eq} as the joint angle that generates a variation in speed equal to that generated by two or more joints connected in phase.
In the normal arrangement of double joints and cardan shafts, the driving yoke of the second joint is in the same plane as the driven yoke of the first joint. The equivalent joint angle may be calculated as:

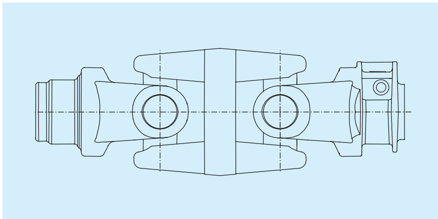
$$\alpha_{eq} = \sqrt{\alpha_1^2 - \alpha_2^2}$$

Example: $\alpha_{eq} = 10°$, $\alpha_2 = 6°$

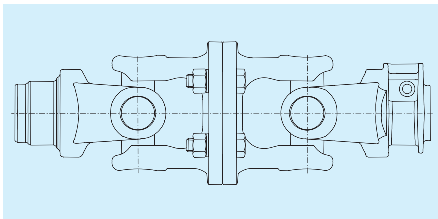
$$\alpha_{eq} = \sqrt{10^2 - 6^2} = 8°$$

If the driven yoke of the first joint is in the same plane as the driven yoke of the second joint, the joint angles must be squared and added together to calculate the equivalent angle.
Naturally when the joint angles are equal and the driving yoke of the second joint is in the same plane as the driven yoke of the first joint, $\alpha_{eq} = 0°$.
The recommended limits on page 3.2 apply for the equivalent angle α_{eq} as a function of the rotational speed.

The double cardan joint is normally used for connecting internal shafts on agricultural implements.
Installation of a double cardan joint is normally made by locking one of the yokes onto the shaft, and allowing the other yoke to move freely in the axial direction to compensate for small amounts of movement between the shafts or deflection of the structure. The central part of a double joint can be a one-piece double yoke:



or two flange yokes:



The flanged double joint is easier to install than a one-piece double joint. The selection of a one-piece or flanged double joint depends upon the particulars of the application and the installation requirements.

Cardan joint driveline

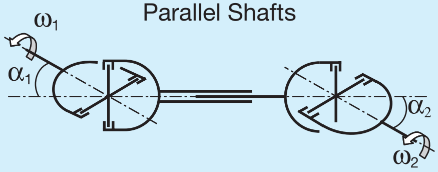
The cardan joint driveline consists of two cardan joints connected by telescoping members.

Variations in speed generated by the joint angle of the first cardan joint can be eliminated by the second cardan joint on condition that the inner yokes are parallel and the joint angles are equal and in the same plane. These conditions are satisfied in the arrangement of parallel shafts or intersecting shafts.

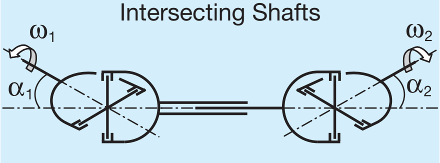
In each of these situations, the output speed is transmitted at a constant velocity.

The telescoping members are still subject to stress generated by the cardan joints working at an angle. For this reason, we recommend using drivelines with joint angles as small as possible.

Parallel Shafts



Intersecting Shafts



The previous definition of equivalent joint angle $\boldsymbol{\alpha}_{eq}$ is also valid for cardan joint drivelines.

The following tables give the values for the joint angle of the second joint, $\boldsymbol{\alpha}_2$ max and $\boldsymbol{\alpha}_2$ min, which would generate acceptable total speed variation as a function of the joint angle of the first joint $\boldsymbol{\alpha}_1$ and the rotational speed.

For example, considering a rotational speed of 750 min^{-1} and the first joint angle $\boldsymbol{\alpha}_1$ = 12°, the second joint angle should be between $\boldsymbol{\alpha}_2$ = 3° e $\boldsymbol{\alpha}_2$ = 16°.

$\boldsymbol{\alpha}_2$ max acceptable

$\boldsymbol{\alpha}_1$ (°)	540 min^{-1}	650 min^{-1}	750 min^{-1}	850 min^{-1}	1000 min^{-1}
5°	16°	14°	12°	11°	10°
7°	17°	15°	13°	12°	11°
10°	19°	16°	15°	14°	13°
12°	20°	18°	16°	15°	14°
15°	22°	20°	19°	18°	17°
17°	23°	21°	20°	19°	19°
20°	25°	24°	23°	22°	21°
22°	25°	25°	24°	24°	23°
25°	25°	25°	25°	25°	25°

$\boldsymbol{\alpha}_2$ min acceptable

$\boldsymbol{\alpha}_1$ (°)	540 min^{-1}	650 min^{-1}	750 min^{-1}	850 min^{-1}	1000 min^{-1}
5°	0°	0°	0°	0°	0°
7°	0°	0°	0°	0°	0°
10°	0°	0°	0°	1°	5°
12°	0°	0°	3°	7°	9°
15°	0°	7°	10°	11°	13°
17°	6°	11°	13°	14°	15°
20°	12°	15°	16°	17°	18°
22°	15°	18°	19°	20°	21°
25°	20°	21°	22°	23°	24°

Driveline applications

The cardan joint driveline is the most commonly used method for transmitting power from a tractor PTO (Power Take Off) to agricultural implement PIC (Power Input Connection). Cardan joint drivelines carry out a very complex function: efficient transmission of power between two shafts that are continually changing their relative positions.

PTO's have standardized dimensions:

- Type 1: 1 3/8”-Z6 (540 min^{-1})
- Type 2: 1 3/8”-Z21 (1000 min^{-1})
- Type 3: 1 3/4”-Z20 (1000 min^{-1})

in compliance with ISO 500, DIN 9611 and ANSI/ASABE AD500 standards.

Specifications for the driveline are based on the requirements of the implement to which it is connected.

Since the driveline normally stays connected to the implement, the implement connection is often semi-permanent, requiring tools for assembly or disassembly.

The taper pin is the most stable connection for implement yokes and torque limiters.

Torque limiters or overrunning clutches should be installed on the implement end of a primary driveline (i.e. the driveline that connects the tractor PTO to the PIC).

Suitable torque limiters protect the implement, the driveline, and the tractor from torque overloads, and allows balanced sizing of driveline components.

Connection of the driveline to the tractor PTO must be done quickly and easily, since tractors are normally used with more than one implement. The tractor end of the driveline is usually supplied with a “quick coupling” which can be a pushpin, ball collar, or an automatic ball collar connection.

The mechanism of the automatic ball collar holds the collar open and automatically releases it when the balls are in the proper position on the PTO. Both hands can be used to hold the driveline making installation much easier.

The driveline must be selected according to the requirements of each specific implement. However, it is possible to define some basic types of implements:

- mounted implements
- towed implements
- stationary implements

Mounted implements

Mounted implements are connected to the three- point hitch of the tractor. The three point hitch supports the weight of the implement., and allows adjustment of the vertical position of the implement to suit working conditions. The three- point hitch also permits the implement to be raised for turning and transport.

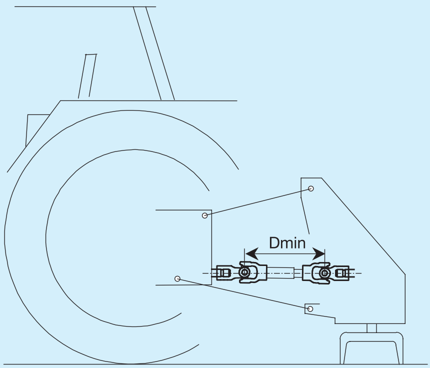
In working conditions, the PTO shaft and implement PIC should be parallel and aligned so joint angles are minimized and equal. If this cannot be achieved, joint angles should not exceed the values given in the table on page 3.5 to prevent vibrations and undue stress.

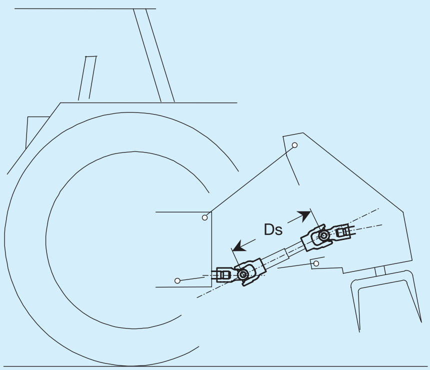
The magnitude of the joint angles influences the life of the cardan joint. As the joint angle increases, the life of the cardan joint is reduced, as explained in chapter 5 -“Size, Torque and Power”. Sometimes larger than normal drivelines are specified to compensate for large joint angles.

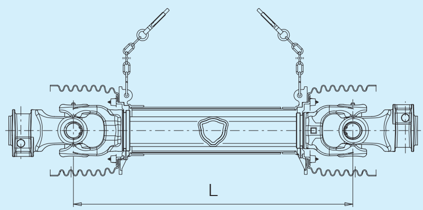
Raising the implement during maneuvers can lead to large unequal joint angles, and cause vibrations and noise. In extreme situations, it may be necessary to reduce speed or interrupt tractor PTO rotation.

Three-point mounted implements are hooked up close to the tractor, to reduce cantilevered weight, therefore requiring short drivelines. The telescoping members and the length of the driveline must be selected according to the distance between the PTO and PIC in the working and transport positions.

Length **L** of the driveline is defined as the distance between the centers of the joints with the driveline fully collapsed.







Driveline applications

Length L of the driveline must be selected so that the telescoping members never close completely, or "bottom out", and maintain proper overlap while in use.
For mounted implements, the driveline will reach its minimum length Dmin at some point between the fully raised or lowered position. The driveline length L must be less than Dmin:

$$L < Dmin$$

The driveline will telescope as the hitch is raised or lowered. While the implement is under power, the working length Lw of the driveline must provide for sufficient overlap of the telescoping members.
If the implement is raised for transport, and the driveline is not rotating, the stationary length Ds of the driveline must be less than the maximum permitted length Ls.

$$Ds < Ls$$

Splined telescoping members are available if triangular profile tubes do not allow sufficient Ls extensions.
See sections entitled "Telescoping members" and "Length".
Lubrication of the telescoping members is essential to limit wear and reduce axial thrust loads, which also reduce the life of cardan joints and PTO or PIC bearings.
Users sometimes skip this important maintenance step, especially if the driveline must be removed from the PTO and partially disassembled to lubricate the telescoping members.

Lubrication of telescoping tubes can be facilitated by installing the Direct Greasing system. This system is available on request, and includes a grease fitting installed on the outer telescoping tube easily accessible through the safety shield.
The Direct Greasing system is described and illustrated in the "Lubrication" section.
Correct use of the driveline and the integrity of the safety shield are essential for the user's safety. One of the main causes of damage to driveline shielding is incorrect attachment of the retaining chain.
When fixing the chain to the implement (in compliance with EN standard 1553), ensure that the chain:

- is positioned perpendicular to the driveline in the working position.
- permits articulation of the shaft while working, transporting, or turning.
- does not wrap excessively around the shield.

In compliance with the UNI EN ISO 4254-1, shield chains cannot be used to support the driveline when the implement is not connected to the tractor. The implement must provide a proper support for the driveline when it is not in use.
To avoid damaging the shield, it is important to check that other implement or tractor components do not interfere during turns or maneuvers.

Towed implements

Towed implements have wheels to support all or part of the weight of the implement (some of the weight may be supported by the tractor drawbar hitch).

The implement is hooked to the tractor by a pin that provides articulating movements.

The position of the pin with respect to the PTO is standardized in compliance with ISO 5673 and ANSI/ASABE AD5673 standards.

It is recommend to use the drawbar hitch as intended by the manufacturer of the implement (per labels, instruction manuals, or other documents). The use of inappropriate extensions or hitch hooks may damage the driveline and create hazards to the operator.

Towed implements change position with respect to the tractor during turning or when traveling over bumps and holes.

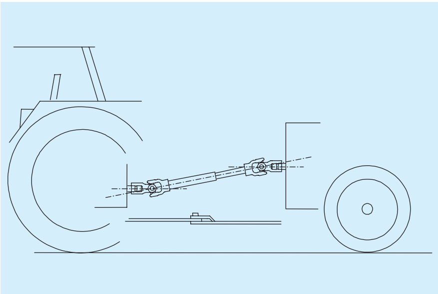
In the working position, the implement proceeds in alignment with the tractor and the joint angles depend on the relative position of the PTO and PIC.

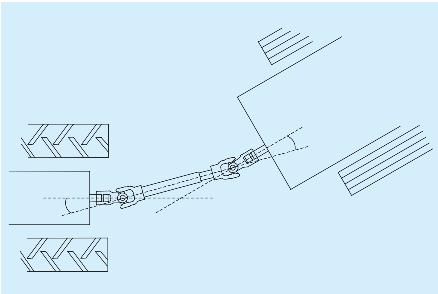
We recommend limiting differences between the joints angles to the values given in the tables on page 3.5.

When turning, the joint angles also depend upon the turning angle and the position of the hitch pin with respect to the PIC and PTO.

The PTO and PIC are often both horizontal and located in-line with the hitch pin. If the hitch pin is at the same distance from the PTO as it is from the PIC, the turning angle is divided into equal parts between the two joints. This is called an “Equal Angle” hitch, the cardan joint angles are equal, and the total speed variation generated by the driveline is negligible both in the working position and during turns. The joint angles during turning but should not exceed 45° even when both joint angles are equal.

When the PTO and PIC are at unequal distances from the hitch pin, turns will produce different cardan joint angles in each end of the driveline. The cardan joint nearest the hitch pin will be allotted the larger joint angle.





Driveline applications

In situations where the difference between the joint angles generates excessive vibrations and noise, it may be necessary to reduce speed or interrupt rotation of the PTO before turning.
In towed implements, the telescoping members of the driveline may retract or extend under load during turns or when the tractor and implement cross over rough terrain. Telescoping while transmitting torque generates axial thrust forces, which act upon joints, PTO's, and PIC's. These forces can reduce the life of these components.
The ratio of thrust **T** generated for a given torque **M** (**T/M**) is an important factor that must be considered when selecting telescoping members. The values of **T/M** (N/Nm) are approximate and refer to properly greased telescoping members (lower values are better):

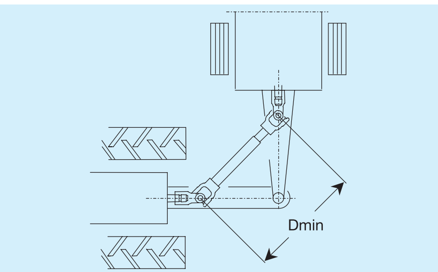
	T/M
Triangle profile tubes	6 - 8
Triangle profile Rilsan coated tubes	3 - 5
Triangle profile heat-treated tubes	9 - 10
Splined telescoping members	7 - 9

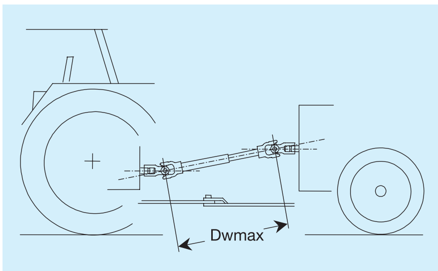
The telescoping members and the shaft length must be selected based on the distance between the PTO and PIC during working and transport maneuvers.
In towed implements, the cardan shaft is at its minimum length when turning.
Length **L** of the driveline must be selected so that the telescoping members never close completely, or “bottom out” when at the maximum turning angle and the tractor is pitched upwards (an inclination of 20° is considered as the maximum for most implements):

$$L < Dmin$$

The driveline is at its maximum working length when the tractor is aligned with the implement. The telescoping members must be selected so that the maximum length of the shaft at work **Dwmax** is less than the permissible maximum working length **Lw**:

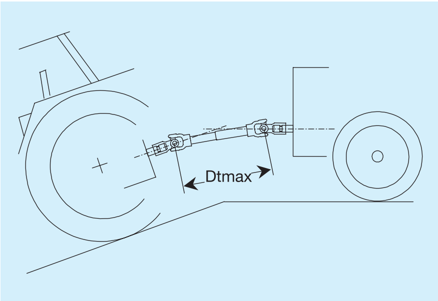
$$Dwmax < Lw$$





Maximum extension of the driveline is obtained when the tractor is pitched downwards, such as when entering a hole or climbing over a bump. The driveline length in this condition **Dtmax** must be less than the length **Lt** allowed for temporary use:

Dtmax < Lt



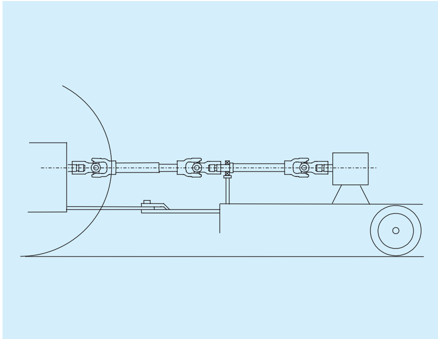
If triangular tubes do not allow for sufficient extension **Lw** and **Lt**, splined telescoping members may be used.
The values for **L**, **Lw** and **Lt** are indicated in the length tables in the “Length” section.
Lubrication of the telescoping members is essential to limit wear and reduce axial thrust loads, which also reduce the life of cardan joints and PTO or PIC bearings.
Users sometimes skip this important maintenance step, especially when the driveline must be removed from the PTO or partially disassembled to lubricate the telescoping members.

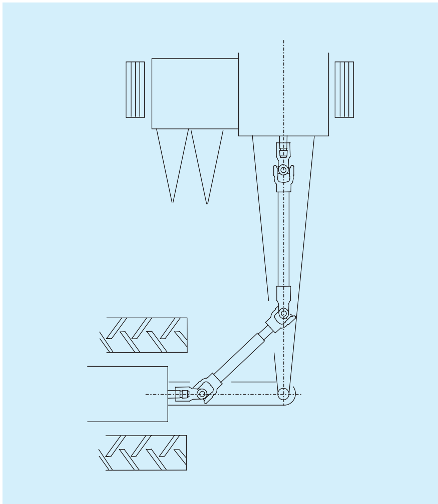
Lubrication of telescoping tubes can be facilitated by installing the Direct Greasing system. This system is available on request, and includes a grease fitting installed on the outer telescoping tube and easily accessible through the safety shield.
The Direct Greasing system is described and illustrated in the “Lubrication” section.
Correct use of the driveline and the integrity of the safety shield are essential for the user’s safety. One of the main causes of damage to driveline shielding is incorrect attachment of the retaining chain.
When fixing the chain to the implement (in compliance with UNI EN ISO 4254-1), ensure that the chain:
- is positioned perpendicular to the driveline in the working position
- permits articulation of the shaft while working, transporting, or turning
- does not wrap excessively around the shield.

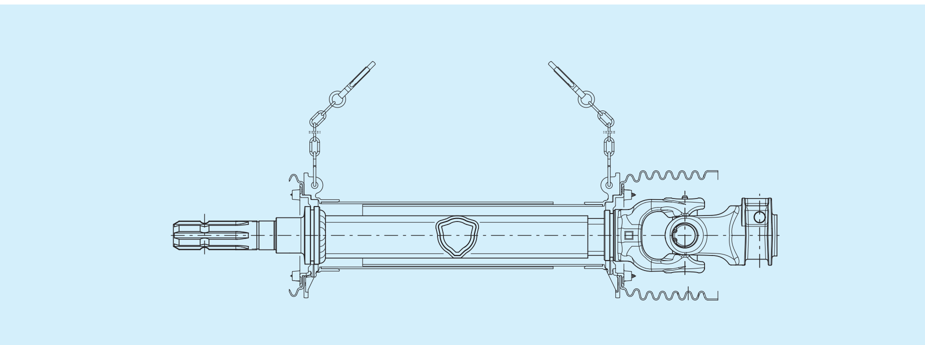
In compliance with the UNI EN ISO 4254-1, shield chains cannot be used to support the driveline when the implement is not connected to the tractor. The implement must provide a proper support for the driveline when it is not in use.
To avoid damaging the shield, it is important to check that other implement or tractor components do not interfere during turns or maneuvers.

Driveline with three cardan joints

On towed implements with a long hitch, the hitch pin is much closer to the tractor PTO than the implement PIC. To prevent excessive difference between the joint angles, towed implements with long hitches may be driven by drivelines composed of three joints in series.
The first two joints (primary driveline) may operate as an Equal Angle driveline, or operate with joint angles that are nearly equal.
The secondary driveline has a single cardan joint, and a splined stub shaft supported by an intermediate bearing attached to the implement hitch. The intermediate bearing may move back and forth, with a fixed length primary driveline and a telescoping secondary driveline.
More common is a fixed intermediate bearing, so the primary driveline telescopes and the secondary driveline is of a fixed length.
In either case, to facilitate installation and to compensate for structural flexing, telescoping tubes may be supplied for the secondary driveline.





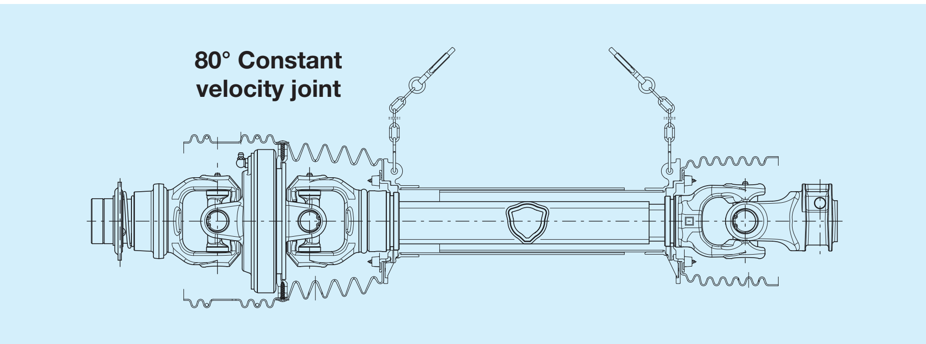


The tractor end of the secondary driveline has a splined shaft that is fixed to the implement yoke of the primary driveline.
The dimensions of the splined shaft are illustrated in specifications for each size of driveline.
By calculating the equivalent angle of the three cardan joints one can determine the correct phasing to produce minimal variation of total speed. If the third joint is in the same plane as the first two, the equation for calculating the equivalent angle can be extended to cover all three joints:

$$\alpha_{eq} = \sqrt{\alpha_1^2 \pm \alpha_2^2 \pm \alpha_3^2}$$

The angles of the second and/or third joint are added if their driven yokes are parallel to the first joint. The angles of the second and/or third joint are subtracted if their driven yokes are at right angles to the first joint.
The recommended maximum values for the equivalent angle are given in the table and the diagram on page 3.2.

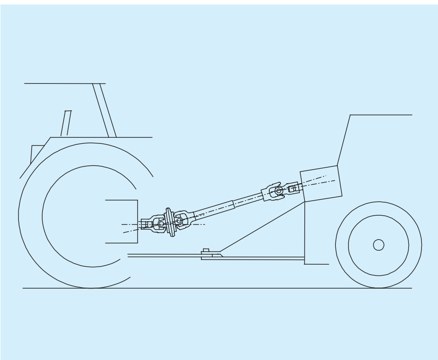
Driveline with 80° constant velocity joint
Drivelines with constant velocity (CV) joints are normally used as primary drivelines for implements with long drawbar hitches.
Use of an 80° CV joint simplifies hitch construction and often eliminates the need for an intermediate bearing and secondary driveline.
An 80° CV joint can accommodate wide joint angles for shorts periods (for example during turning) without generating variations in velocity.
GLOBAL constant velocity joints require relubrication every 50 hours. (see Chapter 29 - Lubrication).
Movement of the 80° CV joint improves lubrication as grease is distributed over the surfaces of the centering components and the shield bearing surface. For this reason, it is recommended to use 80° CV joints for applications with frequent turning, and where the normal working position of the CV does not exceed 25°. 80° CV joints are not recommended for stationary or three point hitch applications.

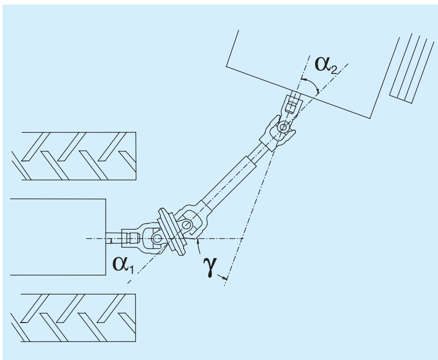


Driveline applications

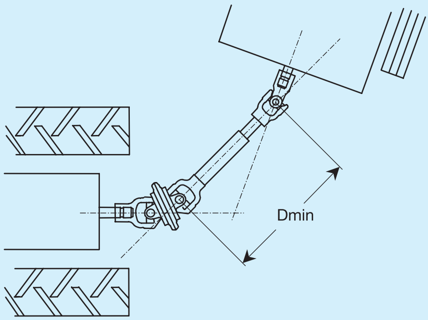
The most common configuration for CV drivelines is an 80° CV joint on one end (nearest the hitch pin) and a single cardan joint on the other end. Transmission of power through the driveline is influenced by the angle of the cardan joint and speed.
The angle of the single cardan joint depends, in the vertical plane, on the height and inclination of the implement input shaft.
The working angle of the cardan joint should be limited to the recommended values shown on page 3.2 (16° at 540 min^{-1} and 9° at 1000 min^{-1}) as it generates a speed variation not compensated for by other joints. To reduce the angle of the single cardan joint, the implement input shaft is often tilted toward the tractor PTO.
The hitch pin of a towed implement with long hitch is nearer the tractor PTO than the implement PIC. The turning angle $\boldsymbol{\gamma}$ is therefore mainly allotted to the constant velocity joint (joint angle $\boldsymbol{\alpha}_1$) with respect to the cardan joint (joint angle $\boldsymbol{\alpha}_2$).
The angle of the CV joint must be less than 80°, including both the horizontal and vertical planes. Therefore, turning angles under 70° are generally recommended.

The angle is largest during turning when the tractor is pitched upwards. A pitch of 20° is normally considered as the maximum value.
When the hitch pin is located on a common axis with the center of the constant velocity joint, the turning angle is seen only by the constant velocity joint, and the angle of the single cardan joint does not change during turning.
If the hitch pin is in an intermediate position between the two joints, the single cardan joint is at an angle during turning and thus generates speed variations and vibrations depending upon the angle (see page 3.2).
The telescoping members of drivelines with 80° constant velocity joints must slide under load due to irregular terrain or during turns.
The thrust generated during these movements is transferred to the joints and bearings, reducing their working life.
During turns, the direction of thrust also generates an oscillating bending stress on the tractor PTO and implement PIC.



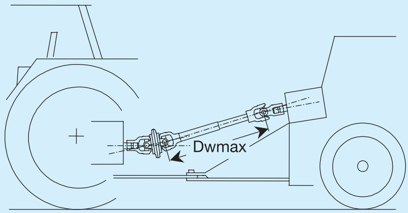


To minimize thrust forces, drivelines with 80° constant velocity joints are supplied with Rilsan tubes as standard.
Length **L** of the driveline must be selected so that the telescoping members never close completely, or "bottom out" when the driveline is at its minimum length **Dmin**. This occurs when the turning angle is at a maximum and the tractor is pitched upwards (an inclination of 20° is considered as the maximum for most implements



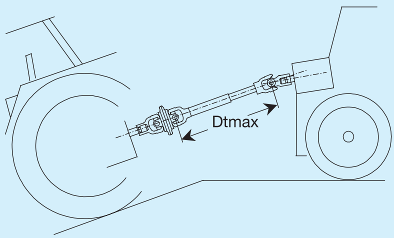
L < Dmin

The driveline is at its maximum working length when the tractor is aligned with the implement. The telescoping members must have adequate overlap while transmitting power. The maximum length of the shaft at work **Dwmax** must be less than the permissible maximum working length **Lw**:



Dwmax < Lw

Maximum extension of the driveline is obtained when the tractor is pitched downwards, such as when entering a ditch or cresting a hill. Normally a tilt of 20° is considered. The driveline length in this condition **Dtmax** must be less than the length allowed in temporary working conditions **Lt**:



Dtmax < Lt

The values for **L**, **Lw**, and **Lt** may by found in the specifications for each size of CV driveline.

Driveline applications

Connection of the driveline to the tractor PTO must be done quickly and easily, since tractors are normally used with more than one implement. The yoke on the tractor end of the driveline is usually supplied with a "quick coupling" which may be a pushpin, ball collar, or an automatic ball collar connection.
The mechanism of the automatic ball collar holds the collar open and automatically releases it when the balls are in the proper position on the PTO. Both hands can be used to hold the driveline making installation much easier.
Lubrication of the telescoping members is essential to limit wear and reduce axial thrust loads, which also reduce the life of cardan joints and PTO or PIC bearings.
Users sometimes skip this important maintenance step, especially when the driveline must be removed from the PTO or partially disassembled to lubricate the telescoping members.
Lubrication of telescoping tubes can be facilitated by installing the Direct Greasing system. This system is available on request, and includes a grease fitting installed on the outer profile tube and easily accessible through the safety shield.
The Direct Greasing system is described and illustrated in the "Lubrication" section.

Correct use of the driveline and the integrity of the safety shield are essential for the user's safety. One of the main causes of damage to driveline shielding is incorrect attachment of the retaining chain.
When attaching the chain to the implement (in compliance with UNI EN ISO 4254-1), ensure that the chain:
- is positioned perpendicular to the driveline in the working position
- permits articulation of the shaft while working, transporting, or turning
- does not wrap excessively around the shield.

In compliance with the UNI EN ISO 4254-1, shield chains cannot be used to support the driveline when the implement is not connected to the tractor. The implement must provide a proper support for the driveline when it is not in use.
To avoid damaging the shield, it is important to check that other implement or tractor components do not interfere during turns or maneuvers.

Stationary Implements

Stationary implements are operated from a fixed position. Stationary implements include pumps, hoists, generators, dryers, etc. Stationary implements should only be used when directly coupled to the tractor by a three point or drawbar hitch.

If necessary, prevent the tractor from moving by placing chocks on the wheels.

The position of the implement with respect to the tractor is essential for safe and efficient operation of the driveline.

The tractor must be coupled to the implement and positioned so the joint angles are small and equal. Any difference between the joint angles creates vibrations and stress that can compromise implement performance. See page 3.5. Joint life is also influenced by the joint angle, in particular in applications where the joint angle is fixed.

Telescoping members must be adequately overlapped for the power transmitted. The distance between the centers of the joints during work must be less than the recommended maximum length Lw, listed in the specifications for each size of driveline.

Correct use of the driveline and the integrity of the safety shield are essential for user safety.

Agriculture implements are often operated by tractors with more power than required by the implement, so it is a good idea to outfit the driveline with a torque limiter to prevent damage caused by overloading.

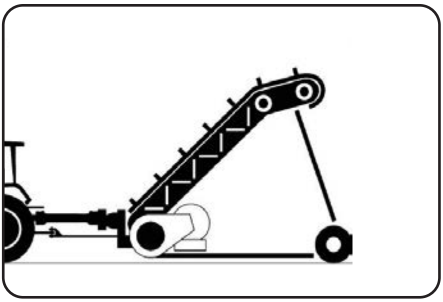
⚠ If necessary, prevent the tractor from moving by placing chocks on the wheels.

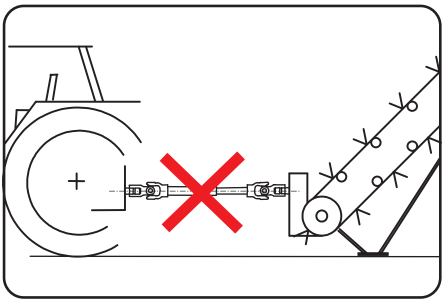
⚠ Only use the implement with its original driveline that is specifically designed for the required length, size, torque limiters or clutches, and shield.

⚠ When using the implement and its driveline, do not exceed the speed and power requirements stated in the implement manual.

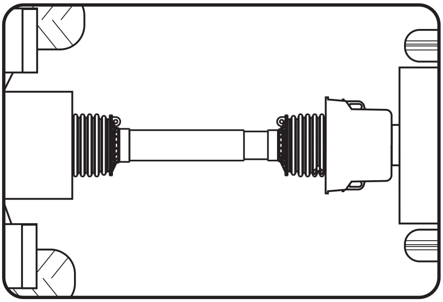
⚠ Standard catalog drivelines, torque limiters, and overrunning clutches are designed for speeds not to exceed 1000 min^{-1}.

⚠ All rotating parts must be guarded.





Driveline applications



The tractor master shield, the driveline guard(s), and the implement input connection shield form an integrated guarding system.
One of the main causes of damage to driveline shielding is incorrect attachment of restraint chains, and interference with tractor and/or other implement components.
When attaching the chain to the implement (in complaince with UNI EN ISO 4254-1), ensure that the chain:
- is positioned perpendicular to the driveline in the working position
- permits articulation of the shaft while working, trasporting, or turning
- does not wrap excessively around the shield

In compliance with the EN standard 1553, shield chains cannot be used to support the driveline when the implement is not connected to the tractor. The implement must provide a proper support for the driveline when it is not in use.
To avoid damaging the shield, it is important to check that other implement or tractor components do not interfere during turns or maneuvers.

Codes and dimensions

A basic Bondioli & Pavesi driveline is specified by a fifteen position alphanumeric code.
The fifteen essential positions of the code are used to list the following specifications:

- Standard Shaft (position 1)
- Size (positions 2 and 3)
- Telescoping members (position 4)
- Length (positions 5-6-7)
- Labels, instruction manuals and retaining chains (pos. 8-9)
- Tractor end yokes (pos.10-11-12)
- Implement end yokes (pos 13-14-15).

The three additional positions make it possible to select optional safety cones and Spring Link chains (see chapter -"Safety Shields").
Drive shafts running at 1000 min^{-1} are identified by an "X" letter in a final additional position.
Charts for the main types of drivelines and their codes are given on the following pages.
Each end of the driveline is defined by three-digit codes that identify the yoke or torque limiter.
For example, code R07 identifies a yoke with ball collar for a single cardan joint . The code WR7 identifies 80° CV joint with ball collar yoke.
It is important to enter the three digit codes for the yokes and torque limiters in the correct positions in the shaft code. These positions specify whether the yokes and joints are to be fitted on the tractor or implement end.

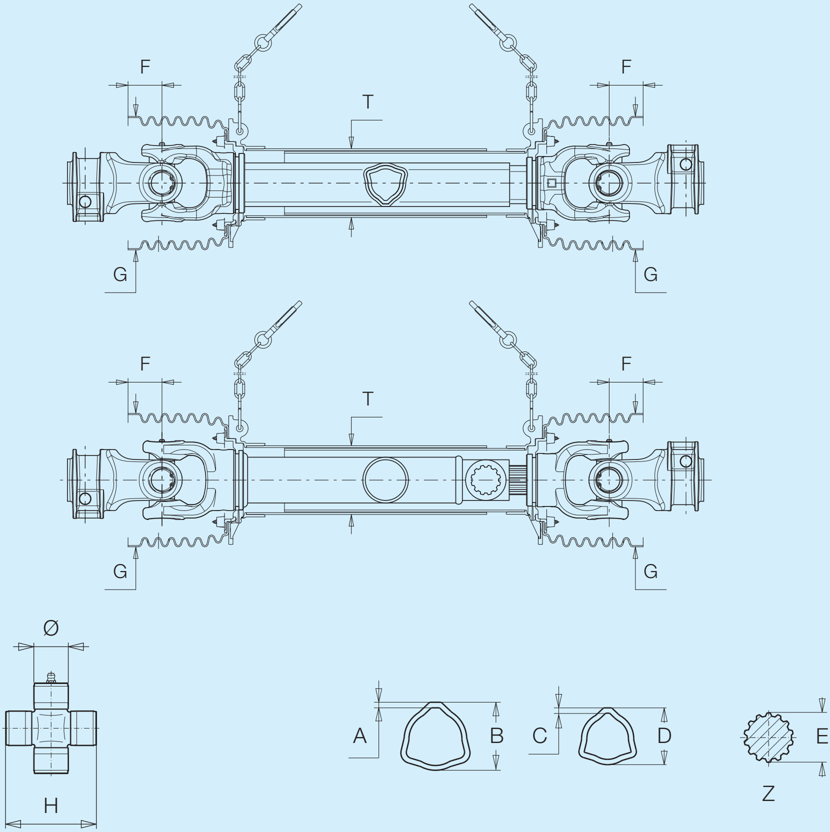
Positions 10-11-12 of the code are used for the tractor end of primary drivelines. Positions 13-14-15 are used for the implement end of primary drivelines.
For example, if an 80° constant velocity joint is required with a ball collar on the tractor end, enter code WR7 in positions 10-11-12 of the shaft code. If an RA2 (1 3/8" Z6) overrunning clutch is required on the implement end, enter code A50 in positions 13-14-15 of the shaft code.

⚠ For primary shafts, any torque limiter or overrunning clutch must be fitted on the implement side. All rotating parts must be guarded.

The three-digit codes for yokes and torque limiters are shown in chapters 10-27 of this catalog.

Codes and dimensions

Global Cardan joint driveline



	Ø mm	H mm	G mm	T mm	F mm	A mm	B mm	C mm	D mm	E mm	Z
G1	22.0	54.0	127	60.8	27	2.6	32.5	4.0	26.5	- -	- -
G2	23.8	61.3	127	60.8	23	3.2	36.0	4.0	29.0	- -	- -
G3	27.0	74.6	137	66.6	32	3.4	43.5	3.2	36.0	- -	- -
G4	27.0	74.6	137	66.6	32	3.4	43.5	4.0	36.0	30	10
G5	30.2	79.4	158	81.2	40	3.0	51.5	3.8	45.0	35	12
G7	30.2	91.4	158	81.2	33	4.0	54.0	4.2	45.0	35	12
G8	34.9	93.5	158	81.2	31	4.0	54.0	5.5	45.0	40	14
G9	34.9	106.0	160	96.0	30	4.0	63.0	4.0	54.0	40	14

Codes for Global Cardan joint driveline

1

7

7: standard cardan joint driveline.

2 3

Size.

G1 - G2 - G3 - G4 - G5 - G7 - G8 - G9.
See chapter “Size, torque and power”.

4

Telescoping members.

N - Regular triangle profile tubes.
R - Rilsan® coated profile tubes (not available for size G1).
T - Heat treated triangle profile tube.
S - Splined telescoping members (exclusively for size G4 - G5 - G7 - G8 - G9).
See chapter “Telescopic members”.

5 6 7

Length.

Triangle profile tubes:
041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.
Splined telescoping members:
041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081.
See chapter “Length”.

8 9

Warning labels, instruction manuals and shield restraint chains.

CE - CEE-EFTA countries bearing CE mark.
US - USA and Canada without restraint chains.
U2 - USA and Canada with restraint chains.
JP - Japan.
FX - Other countries and CEE-EFTA countries not bearing CE mark.
See chapter “Safety shields”.

10 11 12

Tractor (or driver) end yoke.

Specify the three-digit code for the yoke, which will also denote the type of joint.

13 14 15

Implement (or driven) end yoke.

Specify the three-digit code for the yoke, which will also denote the type of joint, torque limiter or overrunning clutch.

16 17 18

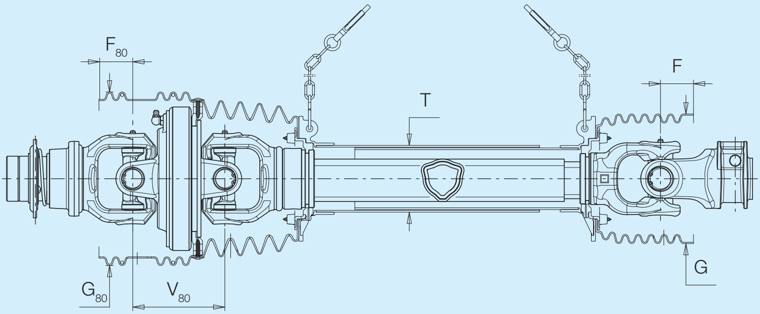
Addditional positions

Use these positions only if requesting optional outer cones or Spring Link System.
See chapter "Safety Shields".
If both options are requested, select the outer cones before and "**Z**" letter for Spring Link in position 18.
Add an “X“ letter at the end of the code for drive shaft running at 1000 min^{-1}.

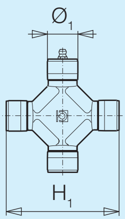
All rotating parts must be guarded. The shields on the tractor and on the implement machine work with the integral driveline guard to form an interactive guarding system.
For primary drivelines (i.e. the driveline connecting the tractor PTO to the initial power input connection on the implement), torque limiters or overrunning clutches must be fitted on the implement end of the driveline.

Codes and dimensions

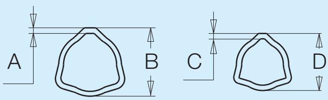
Global driveline with 80° constant velocity joint



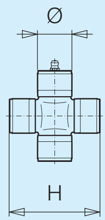
Cross kit for CV joint



Rilsan®-coated triangle profile tubes



Cross kit for single cardan joint



	$Ø_1$ mm	H_1 mm	G_{80} mm	F_{80} mm	V_{80} mm	T mm	G mm	F mm	A mm	B mm	C mm	D mm	Ø mm	H mm
G1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G2	22.0	76.0	181	36	85	60.8	127	23	2.9	36.0	4.3	29.6	23.8	61.3
G3	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G4	22.0	86.0	181	31	93	66.6	137	32	3.1	43.5	4.3	36.6	27.0	74.6
G5	27.0	100.0	211	41	112	81.2	158	40	2.7	51.5	4.1	45.6	30.2	79.4
G7	27.0	100.0	211	41	112	81.2	158	33	3.7	54.0	4.5	45.6	30.2	91.4
G8	30.2	106.0	233	52	119	81.2	158	31	3.7	54.0	5.8	45.6	34.9	93.5
G9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

BONDIOLI & PAVESI

Codes for Global driveline with 80°constant velocity joint

1

7

7: standard cardan joint driveline.

2 3

Size.

G2 - G4 - G5 - G7 - G8.
See chapter “Size, torque and power”.

4

R

Telescoping members.

R - Rilsan®-coated triangle profile tubes.
See chapter “Telescopic members”.

5 6 7

Length.

Tubi triangolari Rilsan®:
041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.
See chapter “Length”.

8 9

Warning labels, instruction manuals and shield restraint chains.

CE - CEE-EFTA countries bearing CE mark.
US - USA and Canada without restraint chains.
U2 - USA and Canada with restraint chains.
JP - Japan.
FX - Other countries and CEE-EFTA countries not bearing CE mark.
See chapter “Safety shields”.

10 11 12

Tractor (or driver) end yoke.

Specify the three-digit code for the yoke, which will also denote the type of joint.

13 14 15

Implement (or driven) end yoke.

Specify the three-digit code for the yoke, which will also denote the type of joint, torque limiter or overrunning clutch.

16 17

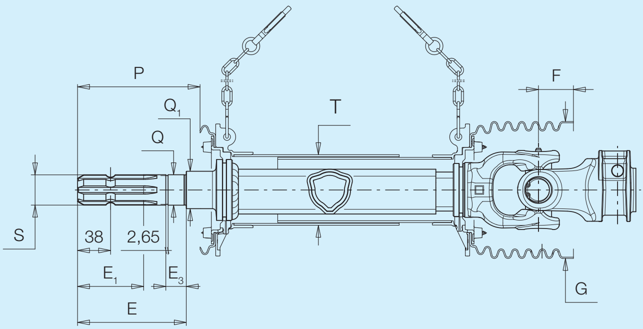
Addditional positions

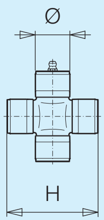
Use these positions only if requesting optional outer cones or Spring Link System.
See chapter "Safety Shields".
If both options are requested, select the outer cones before and "Z" letter for Spring Link in position 17.
Add an “X“ letter at the end of the code for drive shaft running at 1000 min^{-1}.

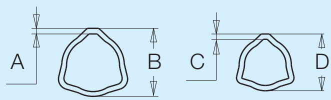
All rotating parts must be guarded. The shields on the tractor and on the implement machine work with the integral driveline guard to form an interactive guarding system.
For primary drivelines (i.e. the driveline connecting the tractor PTO to the initial power input connection on the implement), torque limiters or overrunning clutches must be fitted on the implement end of the driveline.

Codes and dimensions

Global Cardan joint drivelines with splined stub shaft







	Ø mm	H mm	S	E mm	E_1 mm	E_3 mm	Q^{j6} mm	Q_1 mm	P mm	T mm	G mm	F mm	A mm	B mm	C mm	D mm
G1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G3	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G4	27.0	74.6	1 3/8" Z6	125	76	23.5	35	43	141	66.6	137	32	3.4	43.5	4.0	36.0
			1 3/8" Z21	125	76	23.5	35	43	141							
G5	30.2	79.4	1 3/8" Z6	125	76	23.5	35	43	141	81.2	158	40	3.0	51.5	3.8	45.0
			1 3/8" Z21	125	76	23.5	35	43	141							
			1 3/4" Z20	135	89	21.5	45	53	151							
G7	30.2	91.4	1 3/8" Z6	125	76	23.5	35	43	141	81.2	158	33	4.0	54.0	4.2	45.0
			1 3/8" Z21	125	76	23.5	35	43	141							
			1 3/4" Z20	135	89	21.5	45	53	151							
G8	34.9	93.5	1 3/8" Z6	125	76	23.5	35	43	141	81.2	158	31	4.0	54.0	5.5	45.0
			1 3/8" Z21	125	76	23.5	35	43	141							
			1 3/4" Z20	135	89	21.5	45	53	151							
G9	34.9	106.0	1 3/8" Z6	125	76	23.5	35	43	141	96.0	160	30	4.0	63.0	4.0	54.0
			1 3/8" Z21	125	76	23.5	35	43	141							
			1 3/4" Z20	135	89	21.5	45	53	151							

Codes for Global Cardan joint driveline wth splinded stub shaft

1	7	**7:** standard cardan joint driveline.
2 3		Size. **G4 - G5 - G7 - G8 - G9.** See chapter "Size, torque and power".
4	N	Telescoping members. **N** - Regular triangle profile tube See chapter "Telescopic members".
5 6 7		Length. Triangle profile tube: **041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.** See chapter "Length".
8 9		Warning labels, instruction manuals and shield restraint chains. **US** - USA and Canada without restraint chains. **U2** - USA and Canada with restraint chains. **JP** - Japan. **FX** - Other countries and CEE-EFTA countries not bearing CE mark. See chapter "Safety shields".
10 11 12		Tractor (or driver) end yoke. Specify the three-digit code for the splined stub shaft member required. **0P1** - 1 3/8" Z6 **0P2** - 1 3/8" Z21 **0P4** - 1 3/4" Z20
13 14 15		Implement (or driven) end yoke. Specify the three-digit code for the yoke, which will also denote the type of joint, torque limiter or overrunning clutch.
16 17		Addditional positions Use these positions only if requesting optional outer cones or Spring Link System. See chapter "Safety Shields". If both options are requested, select the outer cones before and "Z" letter for Spring Link in position 17. Add an "**X**" letter at the end of the code for drive shaft running at 1000 min^{-1}.

All rotating parts must be guarded. The shields on the tractor and on the implement machine work with the integral driveline guard to form an interactive guarding system.
For primary drivelines (i.e. the driveline connecting the tractor PTO to the initial power input connection on the implement), torque limiters or overrunning clutches must be fitted on the implement end of the driveline.

The size of the driveline must be selected according to the functional requirements of the application.
The needle bearings of the cross kit must operate for the desired lifetime, according to the dictates of torque, speed and joint angle.
The strength must be sufficient to transmit the required torque under all working conditions.
Agricultural implements are often subject to overloads and torque peaks that are difficult to quantify. Torque limiters are available to help prevent possible failure of the driveline or other components. The setting of the torque limiter may also be used as a reference in proper sizing of the driveline.
A suitable type of torque limiter must be selected according to the duty cycle; the setting must be selected according to the median torque transmitted M and the peak torque (Mmax for the driveline).
Briefly, the following conditions apply for the different types of torque limiters.
Ratchet torque limiters, shear bolt torque limiters and automatic torque limiters are used on implements whose duty cycle is constant or alternating with possible overloads or torque peaks. The setting of these torque limiters is generally 2 to 3 times the median torque M.
Friction torque limiters are used on implements whose duty cycle is alternating with frequent overloads. A friction torque limiter allows these frequent overloads to be surmounted without stopping the driveline.
Combination friction clutch torque limiters with incorporated overrunning clutches are used on implements with high inertial loads (e.g. rotors or flywheels). These types of implements are subject to torque peaks during start up. Overloads during operation can be overcome without interrupting the transmission. The setting of friction clutch torque limiters is normally about twice the median torque M.
When setting torque limiters it is recommended to define proper safety parameters with respect to the strength limit of the entire driveline.

Maximum torque Mmax

The driveline strength must be sufficient to transmit the desired torque under all foreseeable working conditions.
Therefore the driveline must be sized so the maximum torque required by the application will always be lower than the maximum torque of the driveline Mmax, even in case of accidental torque peaks.

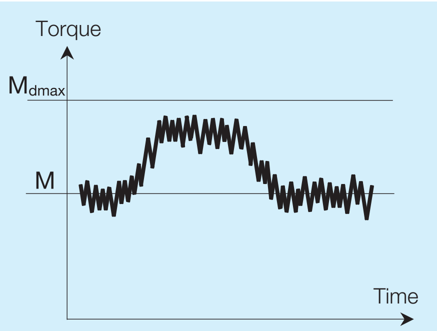
Maximum torque Mmax

	Nm	in.lb
G1	750	6640
G2	1050	9290
G3	1700	15050
G4	2000	17700
G5	2500	22130
G7	2900	25670
G8	3500	30980
G9	3900	34520

Size, torque and power

Maximum dynamic torque Mdmax

Cardan joints must operate for the desired lifetime under normal working conditions. For this to occur, the transmitted torque must be lower than the maximum dynamic torque Mdmax.



The maximum dynamic torque Mdmax is defined as the maximum working torque for the joint, and it is considered as the upper limit when determining the lifetime of a cardan joint. Each torque value considered in a load cycle and used to calculate working life must be less than the maximum dynamic torque Mdmax for the given size.

	Maximum dynamic torque **Mmax**	
	Nm	in.lb
G1	320	2830
G2	450	3980
G3	780	6900
G4	780	6900
G5	1050	9290
G7	1450	12830
G8	2000	17690
G9	2250	19910

Lifetime of single cardan joints

The lifetime of a single cardan joint **Lh** usually corresponds to the life of the needle bearings. It can be determined by the following parameters:

- **M** Transmitted torque (Nm) or **P** Transmitted power (kW).
- Velocity of rotation **n**.
- Joint angle α.

Example: **Lh** = 700 hours is the theoretical life for a cardan joint size **G4**, torque 500 Nm, velocity 540 min^{-1} and joint angle = 5°.
The nomogram for the lifetime can also be used to determine the proper joint size for a required lifetime.
Example: for a life of 1000 hours, joint angle 10°, velocity = 1000 min^{-1} and torque M = 500 Nm, a size **G7** cardan joint must be used.

Torque and power are related by the following formula:

$$\mathbf{P}\ [kW]\ \ \mathbf{9553} = M\ [Nm] \cdot n\ [min^{-1}]$$

$$\mathbf{P}\ [hp]\ \ \mathbf{63025} = M\ [in\text{-}lb] \cdot n\ [min^{-1}]$$

Power can be expressed in (HP) by the formula:

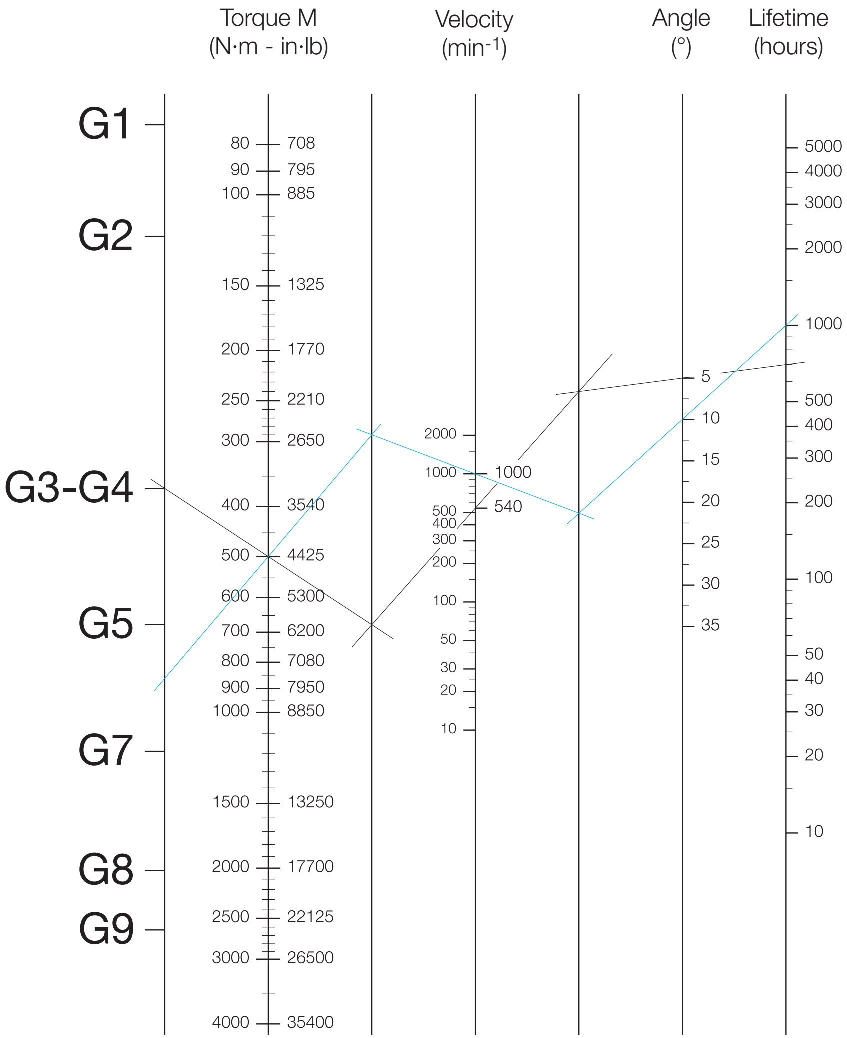
$$\mathbf{P}\ [kW] \cdot 1{,}36 = \mathbf{P}\ (HP)$$

The torque is expressed in (kpm) or (in.lb.) by the formula:

$$\mathbf{M}\ [Nm] \cdot 0{,}102 = \mathbf{M}\ (kpm)$$

$$\mathbf{M}\ [Nm] \cdot 8{,}85 = \mathbf{M}\ (in.lb.)$$

Nomogram to calculate single cardan joint lifetime



Size, torque and power

Duty cycles

The lifetime can be calculated with more accuracy by examination of a duty cycle that represents the various operating conditions.

For a given duty cycle, joint lifetime is divided into percentages of use for each condition. Specific working conditions (torque, rotational velocity, and joint angle) are set for each segment of the duty cycle Together, these percentages form the total life.

The total lifetime of can be calculated as follows:

$$\mathbf{L_{tot}} = \frac{\mathbf{1}}{\sum\limits_{i=1}^{m} \frac{\mathbf{X_i}}{\mathbf{L_i}}}$$

where:

X_i = percentage of total lifetime corresponding to segment i of duty cycle

L_i = lifetime defined according to the working conditions of segment i of duty cycle.

m = total number of segments

Example: determine the lifetime Lh_i of a size G7 driveline with the duty cycle shown in the table below:

	Torque	Speed	Angle	%	Lh_i
	Nm	min^{-1}	(°)		hours
1	500	540	15	30	1500
2	700	540	10	50	900
3	900	540	5	15	680
4	1000	540	5	5	450

The resulting lifetime is 920 hours:

$$Lh_{tot} = \frac{1}{\frac{0.30}{1500} + \frac{0.50}{900} + \frac{0.15}{680} + \frac{0.05}{450}} = 920$$

Nominal Power and Torque

The nominal torque Mn of a driveline can be defined as the torque associated with a 1000 hour lifetime of a joint operating with joint angle α = 5°, rotational velocity n = 540 min^{-1} (or 1000 min^{-1}), and a 50 hour lubrication frequency.

The nominal power Pn is the power corresponding to the nominal torque Mn.

Following charts report technical data and values for nominal power Pn and nominal torque Mn for each type and driveline size.

Categories ASAE

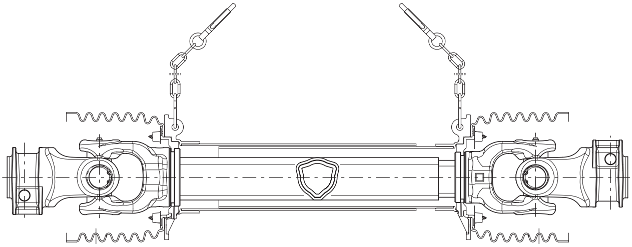
In the U.S., drivelines are often bracketed into one of the categories defined by ANSI/ASAE S331.5. This standard classifies drivelines on the basis of dynamic and static strength.

The standard also recognizes two duty levels: Regular Duty and Heavy Duty. These duty levels pertain to the static strength of the telescoping members.

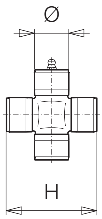
Drivelines can be classified in compliance with ASAE standard according to the chart below, for each size.

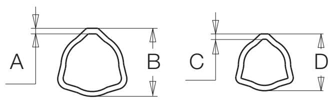
Categories ASAE		
	Regular Duty	Heavy Duty
G1	1	1
G2	2	1
G3	3	2
G4	3	3
G5	4	3
G7	4	4
G8	5	5
G9	6	5

Global Cardan joint drivelines



	540 min^{-1}				1000 min^{-1}						Categories ASAE	
	Pn		Mn		Pn		Mn		Mdmax			
	kW	CV	Nm	in·lb	kW	CV	Nm	in·lb	Nm	in·lb	RD	HD
G1	12	16	210	1850	18	25	172	1500	320	2830	1	1
G2	15	21	270	2400	23	31	220	1950	450	3980	2	1
G3	26	35	460	4050	40	55	380	3350	780	6900	2	2
G4	26	35	460	4050	40	55	380	3350	780	6900	3	3
G5	35	47	620	5500	54	74	520	4600	1050	9290	4	3
G7	47	64	830	7350	74	100	710	6250	1450	12830	4	4
G8	61	83	1080	9560	96	130	913	8050	2000	17690	5	5
G9	70	95	1240	10950	110	150	1050	9300	2250	19910	6	5





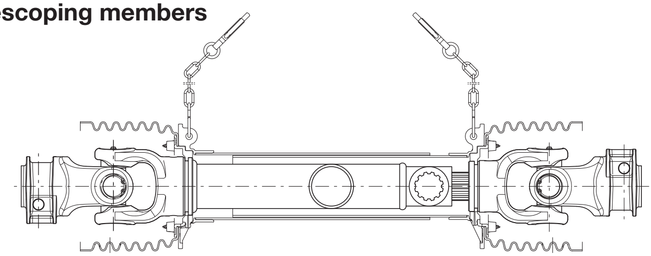
Regular and heat treated tubes

Rilsan® coated tubes

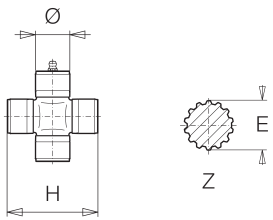
	Ø	H	A	B	C	D	A	B	C	D	Mmax	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm	in·lb
G1	22.0	54.0	2.6	32.5	4.0	26.5	- -	- -	- -	- -	750	6640
G2	23.8	61.3	3.2	36.0	4.0	29.0	2.9	36.0	4.3	29.6	1050	9290
G3	27.0	74.6	3.4	43.5	3.2	36.0	3.1	43.5	3.5	36.6	1700	15050
G4	27.0	74.6	3.4	43.5	4.0	36.0	3.1	43.5	4.3	36.6	2000	17700
G5	30.2	79.4	3.0	51.5	3.8	45.0	2.7	51.5	4.1	45.6	2500	22130
G7	30.2	91.4	4.0	54.0	4.2	45.0	3.7	54.0	4.5	45.6	2900	25670
G8	34.9	93.5	4.0	54.0	5.5	45.0	3.7	54.0	5.8	45.6	3500	30980
G9	34.9	106.0	4.0	63.0	4.0	54.0	3.7	63.0	4.3	54.6	3900	34520

Size, torque and power

Global Cardan joint driveline with splined telescoping members

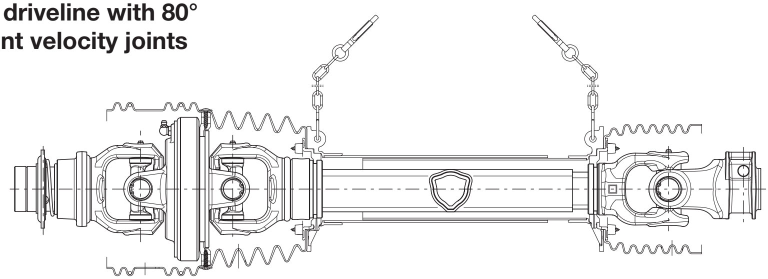


	540 min^{-1}				1000 min^{-1}						Categories	
	Pn		Mn		Pn		Mn		Mdmax		ASAE	
	kW	CV	Nm	in·lb	kW	CV	Nm	in·lb	Nm	in·lb	RD	HD
G1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G3	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G4	26	35	460	4050	40	55	380	3350	780	6900	3	3
G5	35	47	620	5500	54	74	520	4600	1050	9290	4	3
G7	47	64	830	7350	74	100	710	6250	1450	12830	4	4
G8	61	83	1080	9560	96	130	913	8050	2000	17690	5	5
G9	70	95	1240	10950	110	150	1050	9300	2250	19910	6	5

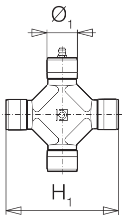


	Ø	H	E	Z	Mmax	
	mm	mm	mm	mm	Nm	in·lb
G1	- -	- -	- -	- -	- - -	- - -
G2	- -	- -	- -	- -	- - -	- - -
G3	- -	- -	- -	- -	- - -	- - -
G4	27.0	74.6	30	10	2000	17700
G5	30.2	79.4	35	12	2500	22130
G7	30.2	91.4	35	12	2900	25670
G8	34.9	93.5	40	14	3500	30980
G9	34.9	106.0	40	14	3900	34520

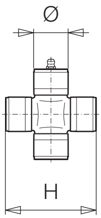
Global driveline with 80° constant velocity joints



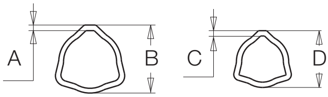
	540 min^{-1}				1000 min^{-1}				Categories ASAE	
	Pn		Mn		Pn		Mn			
	kW	CV	Nm	in·lb	kW	CV	Nm	in·lb	RD	HD
G1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G2	15	21	270	2400	23	31	220	1950	2	1
G3	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G4	26	35	460	4050	40	55	380	3350	3	3
G5	35	47	620	5500	54	74	520	4600	4	3
G7	47	64	830	7350	74	100	710	6250	4	4
G8	61	83	1080	9560	96	130	913	8050	5	5
G9	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -



Cross kit for CV joint



Cross kit for single cardan joint

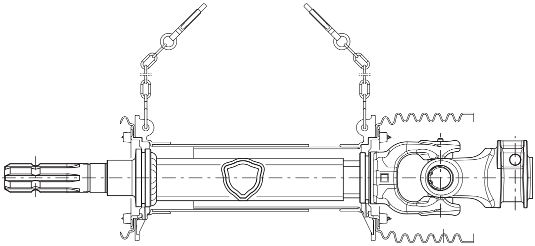


Rilsan® coated tubes

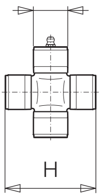
	Ø$_1$ mm	H$_1$ mm	Ø mm	H mm	A mm	B mm	C mm	D mm	Mmax Nm	Mmax in·lb
G1	- -	- -	- -	- -	- -	- -	- -	- -	- - -	- - -
G2	22.0	76.0	23.8	61.3	2.9	36.0	4.3	29.6	1050	9290
G3	- -	- -	- -	- -	- -	- -	- -	- -	- - -	- - -
G4	22.0	86.0	27.0	74.6	3.1	43.5	4.3	36.6	2000	17700
G5	27.0	100.0	30.2	79.4	2.7	51.5	4.1	45.6	2500	22130
G7	27.0	100.0	30.2	91.4	3.7	54.0	4.5	45.6	2900	25670
G8	30.2	106.0	34.9	93.5	3.7	54.0	5.8	45.6	3500	30980
G9	- -	- -	- -	- -	- -	- -	- -	- -	- - -	- - -

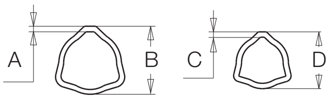
Size, torque and power

Global driveline with splined stub shaft



	540 min^{-1}				1000 min^{-1}						Categories ASAE	
	Pn		Mn		Pn		Mn		Mdmax			
	kW	CV	Nm	in·lb	kW	CV	Nm	in·lb	Nm	in·lb	RD	HD
G1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G3	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G4	26	35	460	4050	40	55	380	3350	780	6900	3	3
G5	35	47	620	5500	54	74	520	4600	1050	9290	4	3
G7	47	64	830	7350	74	100	710	6250	1450	12830	4	4
G8	61	83	1080	9560	96	130	913	8050	2000	17690	5	5
G9	70	95	1240	10950	110	150	1050	9300	2250	19910	6	5

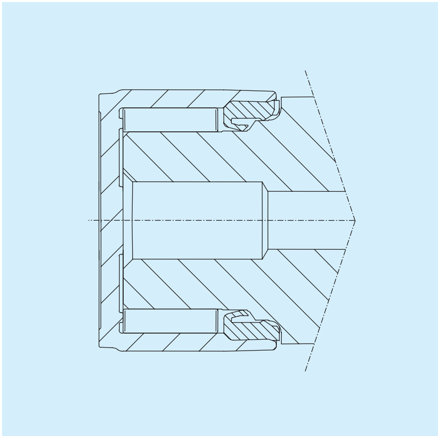


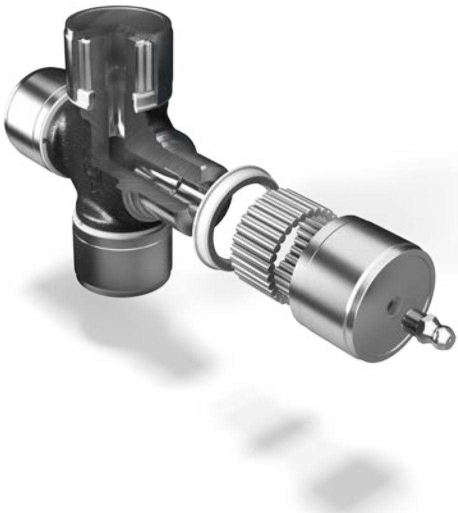


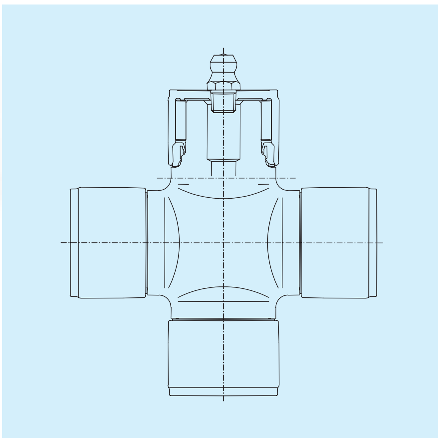
	Ø	H	A	B	C	D	Mmax	
	mm	mm	mm	mm	mm	mm	Nm	in·lb
G1	- -	- -	- -	- -	- -	- -	- -	- -
G2	- -	- -	- -	- -	- -	- -	- -	- -
G3	- -	- -	- -	- -	- -	- -	- -	- -
G4	27.0	74.6	3.4	43.5	4.0	36.0	2000	17700
G5	30.2	79.4	3.0	51.5	3.8	45.0	2500	22130
G7	30.2	91.4	4.0	54.0	4.2	45.0	2900	25670
G8	34.9	93.5	4.0	54.0	5.5	45.0	3500	30980
G9	34.9	106.0	4.0	63.0	4.0	54.0	3900	34520

Agricultural machines are often employed in harsh working environments – dust and dampness can shorten a driveline's life span. Sealing elements of the cross kits are very important: they retain lubricants, protect the needles and lubricants from contamination by foreign substances, and allow excess grease to purge without damage.
The needle bearings in Bondioli & Pavesi cross kits are equipped with double-lip seals designed to prevent contamination of the lubricant in the severe working conditions typical of farming applications.
Trials carried out on specially designed test fixtures provided data for optimizing the shape, materials, and the required heat treatment for all components – needles, caps, seals, and crosses.

Proper design and manufacturing allow universal joints to be lubricated at extended intervals of 50 working hours, for most applications.
Lubrication can be done on a weekly basis instead of every day, reducing one of the most burdensome maintenance requirements. Under certain working conditions, drivelines may be lubricated only once for an entire season.



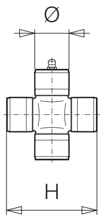




Cross kits

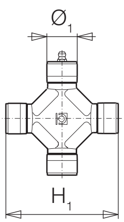
Cross kits for single cardan joints

The codes below refer to the cross kit as a spare part – complete with the four snap rings required for assembly. They are supplied in single-item or multiple-item packs. The pack quantity is indicate by the numbers following the “R” in the code.



	Ø mm	H mm	Cross kit code	Multiple-item pack code
G1	22.0	54.0	4120B0012	4120B0012R50
G2	23.8	61.3	4120C0012	4120C0012R30
G3	27.0	74.6	4120E0012	4120E0012R25
G4	27.0	74.6	4120E0012	4120E0012R25
G5	30.2	79.4	4120G0012	4120G0012R40
G7	30.2	91.4	4120H0012	4120H0012R30
G8	34.9	93.5	4120L0012	4120L0012R24
G9	34.9	106.0	4120M0012	4120M0012R20

Cross kits for constant velocity joints



	$Ø_1$ mm	H_1 mm	Cross kit code	Multiple-item pack code
G2	22.0	76.0	4120C0051	4120C0051R25
G4	22.0	86.0	4120E0051	4120E0051R40
G5	27.0	100.0	4120G0051	4120G0051R24
G7	27.0	100.0	4120G0051	4120G0051R24
G8	30.2	106.0	4120L0051	4120L0051R20

Telescoping members of Bondioli & Pavesi drivelines allow power transmission from the power take off (PTO) to the power input connection (PIC); they also compensate for the length variation occurring during operation or transport.
Among the chief characteristics of a shaft is its torsional strength, i.e. its resistance to twisting forces. The torsional strength should be large enough to withstand the torque transmitted under all predictable operating conditions.
A driveline's torsional strength is expressed by the maximum torque Mmax determined by the properties of the telescoping profile tubes.
The size of driveline must be chosen so the maximum torque exerted during all predicted operations is less than the telescoping member's torsional strength Mmax. The following tables give the torsional strength Mmax of each size of telescoping profile member.
Machines used in agriculture are often subjected to loads and torque peaks that are not easy to quantify.
Torque limiters are useful in many applications. Torque limiters help prevent damage, as well as provide a benchmark for choosing the proper size of driveline.
The setting of the torque limiter Mt must be less than the maximum torque Mmax, and is determined by the type of torque limiter and the requirements of the application.
Another important consideration is the telescoping capability of the drive tubes. Drivelines must vary their length to satisfy the application. If regular telescoping members can't satisfy the length requirement of the application, splined profile members can may be used instead.

Another important property of telescoping members is their capacity to slide under load while producing low telescopic thrust forces. Thrust forces create axial and bending loads that are transmitted to the universal joints, the power take off (PTO) and the power input connection (PIC) shafts and their bearings, reducing their life.
The capacity to slide under load while producing low thrust force is expressed by the ratio thrust (T) over torque (M); an important factor to consider when choosing telescoping members. The following indicative values of the T/M ratio refer to adequately lubricated telescoping members. The smaller the T/M ratio, the lower the thrust forces acting on the joints, shafts, and bearings.

Ratio thrust **T** / Torque **M**	N/Nm
Triangle profile tubes	
Regular	6 - 8
Rilsan®-coated inner tube	3 - 5
Heat-treated inner tube	9 - 10
Splined profile tubes	7 - 9

Lubrication of telescoping members is an extremely important factor to reduce thrust forces and help prevent wear.

Telescoping members

Triangle profile tubes

Triangle profile tubes are designed to provide maximum resistance and optimal telescoping. The profile will only couple so the joints are properly in phase with respect to each other.

Rilsan®-coated triangle profile tubes

The Rilsan® coating on the inner tube helps reduce telescopic thrust.

These tubes are recommended for shafts that have to slide for long lengths under loads, e.g. primary drivelines of towed implements when going around turns.

Rilsan® coated triangle profile tubes are standard on drivelines fitted with constant velocity (CV) joints. The thickness of the Rilsan® coating is compensated for by a thinner outer tube, that is different from a regular tube.

Triangle profile tube with heat-treated inner tube

Applying heat treatment to the inner profile tube increases the surface hardness.

Heat treated tubes are usually chosen for short drivelines that work in aggressive environments (abrasive particles) and are subject to frequent short sliding, e.g. the primary driveline of towed implements.

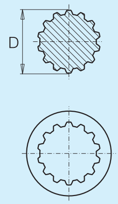
Heat treatment does not effect the thickness of the tubes, so a regular outer tube is used.

Splined telescoping members

Splined telescoping members can satisfy the requirements of applications with high torques, frequent sliding under load and extensions longer than those permitted by regular telescoping tubes or maximum extension tubes. See chapter *Lengths*.

Splined telescoping members have a CUNA involute profile. Thrust forces generated by the transmitted torque is divided among the spline teeth.

Splined members CUNA involute profile



	D mm	N° of teeth z
G1	- -	- -
G2	- -	- -
G3	- -	- -
G4	30	10
G5	35	12
G7	35	12
G8	40	14
G9	40	14

How to select telescoping member

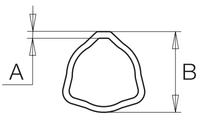
The telescoping member required is indicated by the fourth letter in the driveshaft code. The table below lists the various telescoping members available and the code with which they are identified in the driveshaft code.

Drivelines with 80° constant velocity joints have Rilsan® telescoping tubes.

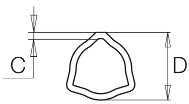
Telescoping member type	
Triangle profile tubes	**N**
Rilsan®-coated triangle tubes	**R**
Heat-treated triangle tubes	**T**
Splined telescoping members	**S**

Triangle profile tube
Add the letter **"N"** in the fourth positionof the shaft code to select regular trianglepro-file tubes.
Tubes as spare part are supplied either in3-meter lengths, 1-meter lengths or 1-meter lengths drilled for roll pin. Add "3000" or"1000" to the selected profile code to order 3-meter or 1-meter tubes respectively.

Drilled tube codes are shown on the table.



Outer tube



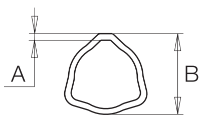
Inner tube

	A mm	B mm	Profile code	Drilled tube code	C mm	D mm	Profile code	Drilled tube code	Mmax mm
G1	2.6	32.5	12503	225021000R	4.0	26.5	12502	225011000R	750
G2	3.2	36.0	12505	225051000R	4.0	29.0	12504	225041000R	1050
G3	3.4	43.5	12508	225121000R	3.2	36.0	12505	225051000R	1700
G4	3.4	43.5	12508	225121000R	4.0	36.0	12507	225101000R	2000
G5	3.0	51.5	12510	225701000R	3.8	45.0	12597	225111000R	2500
G7	4.0	54.0	12512	225211000R	4.2	45.0	12509	225161000R	2900
G8	4.0	54.0	12512	225211000R	5.5	45.0	12511	225181000R	3500
G9	4.0	63.0	12522	225721000R	4.0	54.0	12512	225711000R	3900

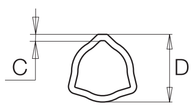
Telescoping members

Rilsan®-coated triangle profile tubes
Add **“R”** to position 4 in the shaft code to select Rilsan®-coated triangle profile tubes.
Outer tubes for spare parts are supplied either in 3-meter lengths, 1-meter lengths or 1-meter lengths drilled for roll pin. Add “3000” or “1000” to the selected profile code to order 3-meter or 1-meter tubes respectively.
Drilled tube codes are shown on the table.

For the inner Rilsan® coated tubes, add “1500” or “1000” to the code of drilled for roll pin tube to have a 1,5-meter lengths or 1-meter lengths respectively.



Outer tube



Inner tube

	A mm	B mm	Profile code	Drilled tube code	C mm	D mm	Profile code	Drilled tube code	Mmax mm
G1	- -	- -	- -	- -	- -	- -	- -	- -	750
G2	2.9	36.0	12518	225341000R	4.3	29.6	- -	24504....R	1050
G3	3.1	43.5	12516	225311000R	3.5	36.6	- -	24505....R	1700
G4	3.1	43.5	12516	225311000R	4.3	36.6	- -	24510....R	2000
G5	2.7	51.5	12520	225371000R	4.1	45.6	- -	24511....R	2500
G7	3.7	54.0	12517	225271000R	4.5	45.6	- -	24516....R	2900
G8	3.7	54.0	12517	225271000R	5.8	45.6	- -	24518....R	3500
G9	3.7	63.0	12521	225751000R	4.3	54.6	- -	24571....R	3900

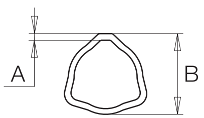
Triangle profile tubes with heat-treated inner tube

Add **"T"** to position 4 in the shaft code to select triangle profile tube with heat-treated inner tube.

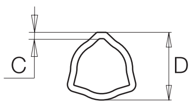
Outer tubes for spare parts are supplied either in 3-meter lengths, 1-meter lengths or 1-meter lengths drilled for roll pin. Add "3000" or "1000" to the selected profile code to order 3-meter or 1-meter tubes respectively.

Drilled tube codes are shows on the table.

Heat-treated inner tubes are supplied for spare parts only inner drilled tube codes are shown on the table and drilled to accept the roll pin.



Outer tube



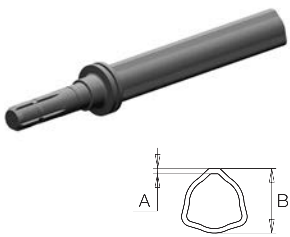
Inner tube

	A mm	B mm	Profile code	Drilled tube code	C mm	D mm	Profile code	Drilled tube code	Mmax mm
G1	2.6	32.5	12503	225021000R	4.0	26.5	- -	270011000R	750
G2	3.2	36.0	12505	225051000R	4.0	29.0	- -	270041000R	1050
G3	3.4	43.5	12508	225121000R	3.2	36.0	- -	270051000R	1700
G4	3.4	43.5	12508	225121000R	4.0	36.0	- -	270101000R	2000
G5	3.0	51.5	12510	225701000R	3.8	45.0	- -	270111000R	2500
G7	4.0	54.0	12512	225211000R	4.2	45.0	- -	270161000R	2900
G8	4.0	54.0	12512	225211000R	5.5	45.0	- -	270181000R	3500
G9	4.0	63.0	12522	225721000R	4.0	54.0	- -	270711000R	3900

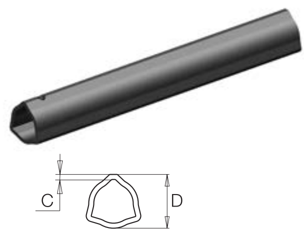
Telescoping members

Triangle profile tubes with splined stub shaft
Shafts with external tube welded to the stub shaft are used in transmissions with three joints. See “Driveline applications”.
A splined stub shaft is identified as the end of the cardan shaft with the three digit code given in “Codes and dimensions”.
Normal triangle profile tubes are identified with the letter **“N”** in the fourth position of the cardan shaft code.
The spare part codes for the tube welded to the spline are shown on the table.

Internal tubes as spare parts are supplied either in three meter lengths, one meter lenghts or one meter lengths drilled for roll pin. The codes for the 3-metre and 1-metre bars consists of the profile code given in the table plus “3000” or “1000” respectively.
Drilled tube codes are shown on the table.



Outer tube

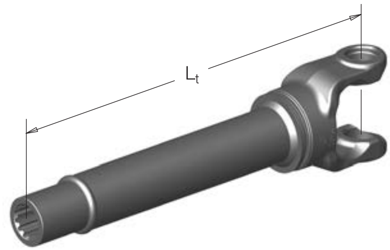


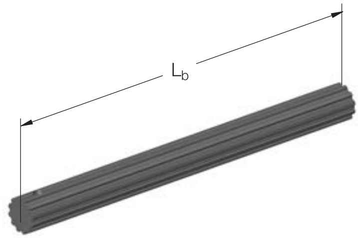
Inner tube

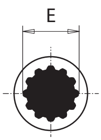
		A mm	B mm	Profile code	Outer tube + Stub Shaft code	C mm	D mm	Profile code	Drilled tube code	Mmax mm
G4	1 3/8" Z6	3.4	43.5	12508	53A081000R	4.0	36.0	12507	225101000R	2000
	1 3/8" Z21				53C081000R					
G5	1 3/8" Z6	3.0	51.5	12510	53A101000R	3.8	45.0	12597	225111000R	2500
	1 3/8" Z21				53C101000R					
	1 3/4" Z20				53E101000R					
G7	1 3/8" Z6	4.0	54.0	12512	53A121000R	4.2	45.0	12509	225161000R	2900
	1 3/8" Z21				53C121000R					
	1 3/4" Z20				53E121000R					
G8	1 3/8" Z6	4.0	54.0	12512	53A121000R	5.5	45.0	12511	225181000R	3500
	1 3/8" Z21				53C121000R					
	1 3/4" Z20				53E121000R					
G9	1 3/8" Z6	4.0	63.0	12522	53A221000R	4.0	54.0	12512	225711000R	3900
	1 3/8" Z21				53C221000R					
	1 3/4" Z20				53E221000R					

Splined telescoping members
Add letter **"S"** to position 4 in the shaft code to select splined telescoping tube.
Splined bars and outer tube welded and sleeve assemblies for spare parts are supplied to the requested length L_t in mm.

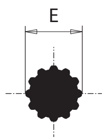
Splined bars are supplied for spare parts cut-to-length (up to 700 mm length) and drilled for the roll pin.
To select cut-to-length members add the required length L_b in mm to the codes listed below.
Example:
Splined bar, G5, L_b = 390 mm.
Code of spare bar = 249110390R







Outer splined sleeve

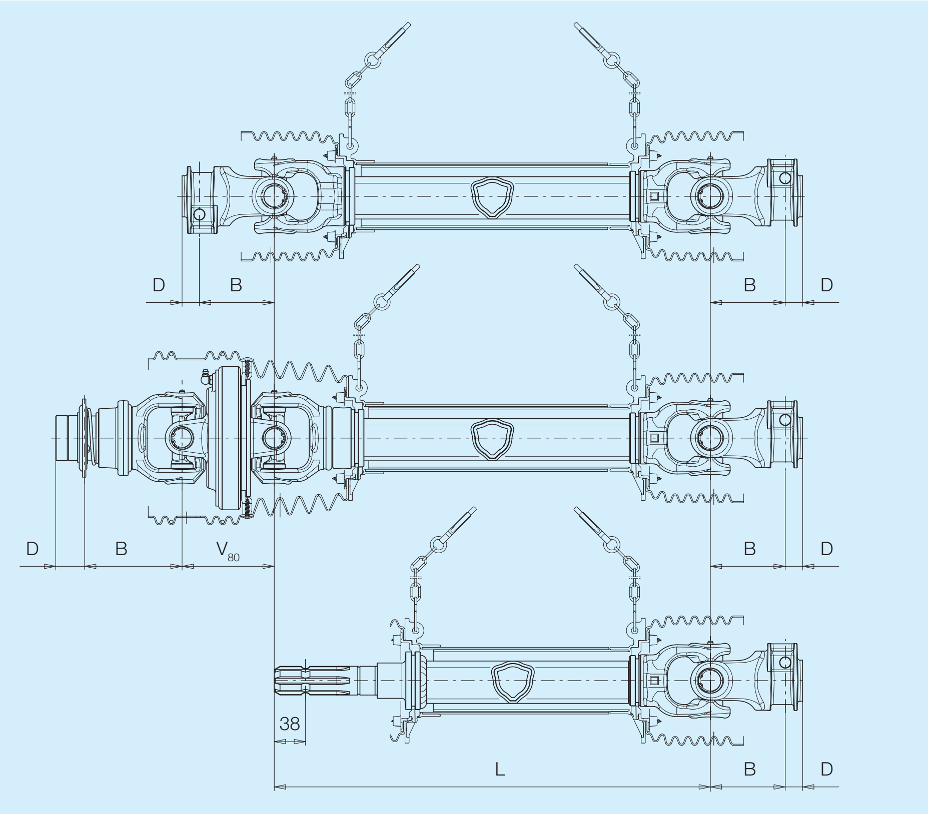


Splined bar

	E mm	z	Outer tube and sleeve assembly	Splined bar code	Mmax mm
G1	- -	- -	- -	- -	- -
G2	- -	- -	- -	- -	- -
G3	- -	- -	- -	- -	- -
G4	30	10	52AG4....R	24917....R	2000
G5	35	12	52AG5....R	24911....R	2500
G7	35	12	52AG6....R	24911....R	2900
G8	40	14	52AG7....R	24921....R	3500
G9	40	14	52AG9....R	24929....R	3900

The cardan joint driveline is the most commonly used method for transmitting power from a tractor PTO (power take off) to the PIC (power input connection) of an agricultural implement. The distance and angle between the PTO and PIC are constantly changing as the implement moves through the field. The variable extension of drivelines makes them easy to install and compensates for this relative motion between shafts, both in working conditions and when transporting the implement.

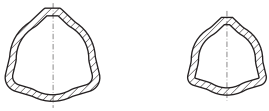
Driveline length **L** is defined as the distance between the centers of the crosses, with the driveline fully collapsed.
On drivelines fitted with constant velocity (CV) joints, the reference points are the centers of the inboard crosses.
Driveline length is represented in the code by the length L (3 digits) in centimeters.
Standard length and corresponding codes are shown below.
Other lengths are available on request (1 cm intervals).



Code	041	046	051	056	061	066	071	076	081	086	091	101	111	121
Lenght L (mm)	410	460	510	560	610	660	710	760	810	860	910	1010	1110	1210

Driveline length

Triangle profile tubes



Lw is defined as the maximum allowable working length, center to center. For brief periods, such as traversing over bumps, the driveline may extend to the maximum temporary length, Lt. The maximum allowable length for non-rotating shafts is Ls.

Lw: maximum working length.

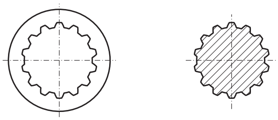
Lt: maximum temporary length.

Ls: maximum length for non-rotating shafts.

Lw and **Lt** refer to drivelines rotating at a maximum speed of 1000 min^{-1}, except for items marked * which refer to a maximum speed of 540 min^{-1}. For shaft lengths longer than those shown, or for speeds higher than 1000 min^{-1}, please contact Bondioli & Pavesi's Engineering Department.

	Code	**041**	**046**	**051**	**056**	**061**	**066**	**071**	**076**	**081**	**086**	**091**	**101**	**111**	**121**
	Lenght L (mm)	410	460	510	560	610	660	710	760	810	860	910	1010	1110	1210
G1	Lw	514	612	687	762	837	912	987	1062	1137	1212	1287	*1437	*1587	*1737
	Lt	564	662	746	829	912	996	1079	1162	1246	1329	1412	*1579	*1746	*1912
	Ls	593	688	775	863	950	1038	1125	1213	1300	1388	1475	1650	1825	2000
G2	Lw	506	606	683	758	833	908	983	1058	1133	1208	1283	1433	*1583	*1733
	Lt	556	656	740	824	907	990	1074	1157	1240	1324	1407	1574	*1740	*1907
	Ls	585	682	769	857	944	1032	1119	1207	1294	1382	1469	1644	1819	1994
G3-G4	Lw	490	590	675	750	825	900	975	1050	1125	1200	1275	1425	1575	*1725
	Lt	540	640	730	813	896	980	1063	1146	1230	1313	1396	1563	1730	*1896
	Ls	565	665	757	845	932	1020	1107	1195	1282	1370	1457	1632	1807	1982
G5	Lw	- -	499	599	699	799	892	967	1042	1117	1192	1267	1417	1567	1717
	Lt	- -	574	674	774	874	969	1052	1136	1219	1302	1386	1552	1719	1886
	Ls	- -	647	745	833	920	1008	1095	1183	1270	1358	1445	1620	1795	1970
G7	Lw	- -	485	585	685	785	885	960	1035	1110	1185	1260	1410	1560	1710
	Lt	- -	560	660	760	860	960	1043	1126	1210	1293	1376	1543	1710	1876
	Ls	- -	633	733	822	910	997	1085	1172	1260	1347	1435	1610	1785	1960
G8	Lw	- -	481	581	681	781	881	958	1033	1108	1183	1258	1408	1558	1708
	Lt	- -	556	656	756	856	956	1040	1124	1207	1290	1374	1540	1707	1874
	Ls	- -	629	729	819	907	994	1082	1169	1257	1344	1432	1607	1782	1957
G9	Lw	- -	- -	555	655	755	855	945	1020	1095	1170	1245	1395	1545	1695
	Lt	- -	- -	630	730	830	930	1023	1106	1190	1273	1356	1523	1690	1856
	Ls	- -	- -	695	795	887	975	1062	1150	1237	1325	1412	1587	1762	1937

Splined telescoping members



Lw: maximum working length.
Lt: maximum temporary length.
Ls: maximum length for non-rotating shafts.

Lw and **Lt** refer to drivelines rotating at a maximum speed of min^{-1}. For shaft lengths longer than those shown, or for speeds higher than min^{-1}, please contact Bondioli & Pavesi's Engineering Department.

	Code	**041**	**046**	**051**	**056**	**061**	**066**	**071**	**076**	**081**
	Lenght L (mm)	410	460	510	560	610	660	710	760	810
G1	Lw = Lt	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Ls	- -	- -	- -	- -	- -	- -	- -	- -	- -
G2	Lw = Lt	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Ls	- -	- -	- -	- -	- -	- -	- -	- -	- -
G3	Lw = Lt	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Ls	- -	- -	- -	- -	- -	- -	- -	- -	- -
G4	Lw = Lt	510	585	675	768	860	953	1045	1138	1230
	Ls	565	665	765	865	965	1065	1165	1265	1365
G5	Lw = Lt	501	576	657	750	842	935	1027	1120	1212
	Ls	547	647	747	847	947	1047	1147	1247	1347
G7	Lw = Lt	494	569	644	736	828	921	1013	1106	1198
	Ls	533	633	733	833	933	1033	1133	1233	1333
G8	Lw = Lt	492	567	642	732	824	917	1009	1102	1194
	Ls	529	629	729	829	929	1029	1129	1229	1329
G9	Lw = Lt	475	550	625	700	790	883	975	1068	1160
	Ls	495	595	695	795	895	995	1095	1195	1295

Global driveshafts are provided with safety labels and operator's manual as prescribed by international safety standards and regulations.

Outer labels

The outer label displays basic safety information for using the driveline, presented according to the rules existing in the country of destination.

In Europe, the Machinery Directive requires that information shown on the outer label must be understood in the language of the country of destination, which in practice means all EEC languages. For this reason, label no. 399CEE051 provides information by means of illustrations. This label is used for all CE marked drivelines, as well as other countries.

Outer label
399CEE051

In North America (United States, Canada, Mexico) standard ANSI/ASABE AD11684 details the requirements for labels and text. Drivelines for sale into North America are provided with the outer label no. 399141000.

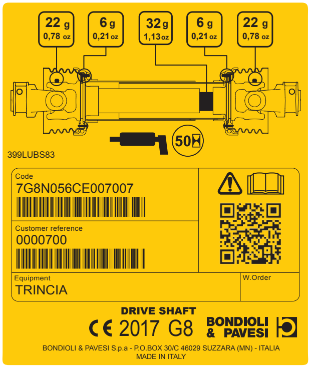
Outer label
399141000

Drivelines bound for Japan are provided with the outer label no. 399JAP001.

Outer label
399JAP001

Safety labels and operator's manual

The outer label 399LUB... displays the following information:
- The lubrication frequency;
- The driveshaft lubrication points;
- The grease quantity, in grams and ounce, to be applied to each component;
- Driveshaft code;
- Customer reference;
- Type of implement;
- Batch of prodaction;
- A QR code, that allows to access to the opearator's manuals on internet by a mobile device, containing explanations on the labels, information on safe and correct driveline use, and instructions for proper maintenance;
- Tractor side;
- CE mark when needed, year of production and driveshaft size;
- The mark and adress of the manufacturer.



Outer label 399LUB...

Inner label
This safety label draws the operators' attention to the fact that the protective guard is missing and therefore the driveline is hazardous to operate. This is shown by the pictorial of a person entangled by a rotating shaft.
In addition, the signal word "DANGER" is used, which is understood throughout the world.
Inner label no. 399143000 is applied on the outer profile tube, under the protective guard, and provided on drivelines for all countries.

Inner label 399143000

Safety labels and operator's manual

Operator's manual

Operator's manual contains explanations on the labels, information on safe and correct driveline use, and instructions for proper maintenance.

Machinery Directive 2006/42/CE specifies that drivelines between self-powered vehicles (or tractors) and implements, marketed in EU and EFTA countries, should be CE marked.

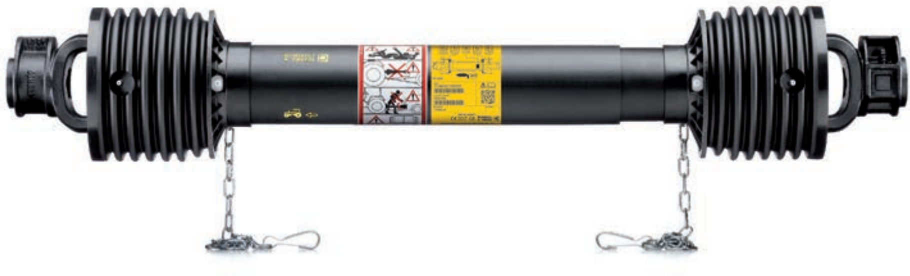
The manual 399UNI001 is provided with all drivelines and includes a Declaration of Compliance with Machinery Directive 2006/42/CE.

Operator's manual 399UNI001

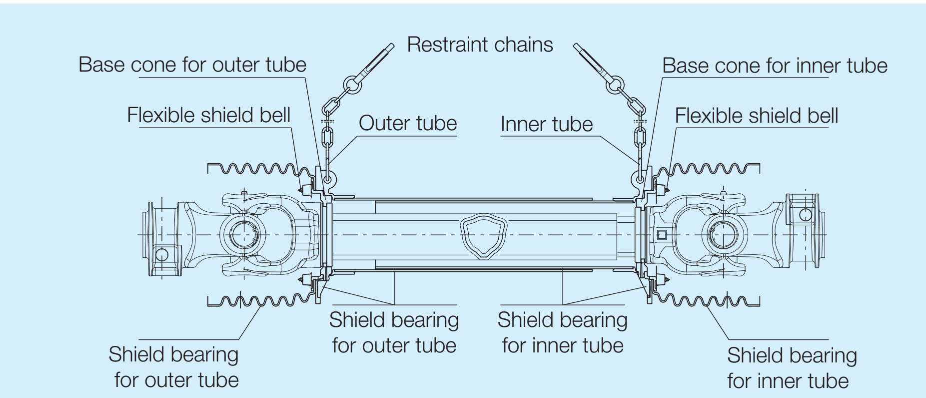
The destination of the driveline, and consequently its labels and operator's manual, is indicated by a destination code, i.e. the character in the eighth position in the driveline code number.

The table below shows the codes assigned to the labels and operator's manual provided with Series Global drivelines, according to their destination codes.

Country of destination	Destination code	Inner label	Outer label	Operator's manual
Drivelines bearing the CE mark	**C**	399143000	399CEE051 399LUB...	399UNI001
Drivelines made for USA and CANADA	**U**	399143000	399141000 399LUB...	399UNI001
Drivelines made for Japan	**J**	399143000	399JAP001 399LUB...	399UNI001
Drivelines made for other countries and for CEE – EFTA countries not bearing CE mark	**F**	399143000	399CEE051 399LUB...	399UNI001

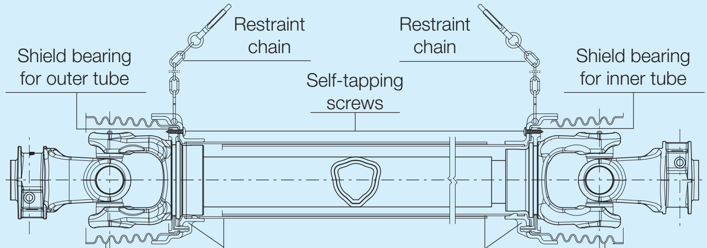


The safety features of Global drivelines meet the requirements of international safety standards. They are made of simple, sturdy components which make them both functional and reliable.
The outer shield cone is of rigid construction but the corrugated shape also gives it elasticity. It has a hole giving access to the cross kit lubricator fitting.
The shield bearing is fixed to the inner yoke and allows the mechanical part to rotate inside the shield restrained by the chains. The base cone acts as a sturdy connection for the other safety shield components.
The outer shield cone and the shield bearing are fixed to the base cone by means of self-tapping screws.
The shield tube slots into the base cone so that once assembled, the tube and base cone form a single component. The grease fittings for the shield bearing and cross kit easily accessible to make maintenance easier.
Installing and removing driveline shields is a simple operation that can be done with commonly available tools.



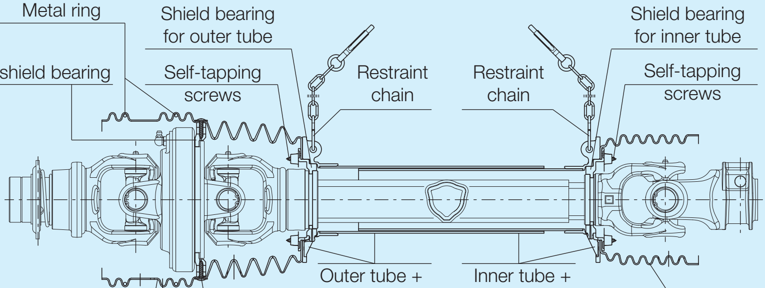
Safety shields

This size Global G9 is equipped with SFT shield so shield bearings, tube+cones and end cones are different than other sizes as shown on figure.



80° constant velocity joints in Global drivelines are protected by a single cone that reflects the very latest requirements of international safety standards and designed to integrate with the master shield of the tractor in accordance with standards ISO 500, 86/297/CEE and ANSI/ASABE AD500.

The shield around the 80° constant velocity joint is connected to the base cone and the standard shield bearing. Another bearing is fitted to the center housing on the CV joint. The metal ring stiffens the end of the shield.

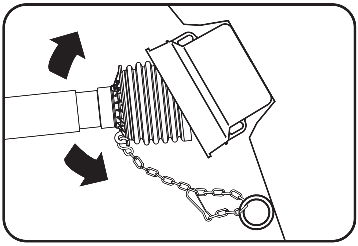


Restraint chains

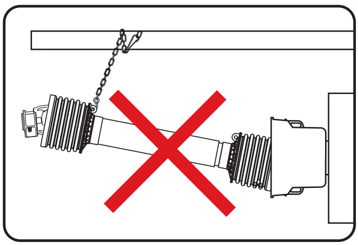
Section 3.4.7 of Annex 1 to the Machinery Directive (2006/42/CE) states for primary drivelines the outside parts of the shield must be so designed, constructed and arranged that they cannot turn with the transmission shaft.
UNI EN 12965 regulations specify that drivelines connecting tractors to implements (primary drivelines) must be fitted with a restraining system to prevent the shield from rotating with the driveline.
The most common way of restraining the shields is to use chains to fasten the two halves of the shield to the tractor and to the implement. Drivelines are normally supplied with the implement, which should provide a proper attachment point for the shield restraint chains.
Attaching the chain to the tractor can be more difficult, since tractors are normally used to drive more than one implement and driveline. Modern tractors are provided with a hole in the master shield for attaching the shield restraint chain. Incorrect attachment of shield restraint chains may cause damage to the shields.

A few simple recommendations can help avoid damaging the shields and exposing the user to potential hazards.
Bondioli & Pavesi recommends that implement manufacturers provide a suitable fastening point for the chain on the implement. In addition, the following recommendations should be included in the operator's manual:

- Attach the shield restraint chain properly. The best method is to attach the chain so that it is perpendicular with respect to the driveline.
- Adjust the length of the chain length so the driveline can move freely under any condition when working, traveling, or maneuvering.
- Adjust the length of the chains so they do not wrap excessively around the driveline.



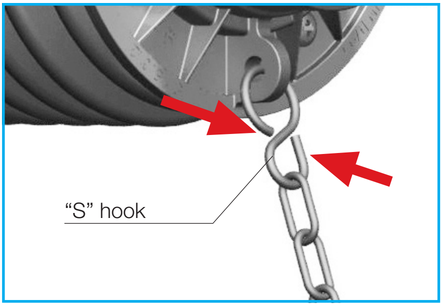
- Do not use the chains to support or suspend the driveline when the implement is not in use.



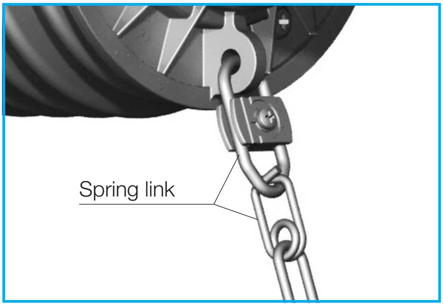
Safety shields

Restraint standards and regulations
UNI EN ISO 5674 and ANSI/ASABE AD5674 standards state that restraints must withstand a load of 400 N, and must detach at the end attached to the shield at loads of under 800 N.
Bondioli & Pavesi driveline chains meet these detachment requirements. Chains are attached to shields by S-hooks.

Spring Link
Restraint chains can be supplied on request with the Spring Link device. This device includes a clip which can be opened and closed by screwdriver, and a spring hook which detaches from the shield when subjected to the loads described in the standards.
Both S-hook and Spring Link connections separate the chain from the shield in compliance with UNI EN ISO 5674 and ANSI/ASABE AD5674.
If the chain detaches, a chain with S-hook needs to be replaced, while the Spring Link can be put back as shown below.



If the chain length has not been properly adjusted and is too tight, during turning maneuvers the S-hook opens and the chain falls from the shield. If this happens, the chain has to be replaced.
The S-hook of the new chain is fastened to an eyelet on the cone and must be closed and round to prevent unintended detachment.



To request the chain with Spring Link, add the letter **“Z”** to the optional position in the driveline code as shown in chapter “Codes and Dimensions”.

If the Spring Link chain length has not been properly adjusted and is too tight, during turning maneuvers.

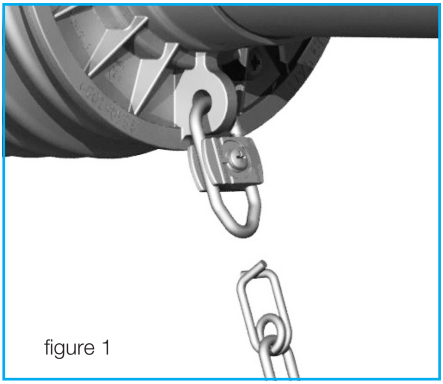


figure 1

The Spring Link will detach and the chain falls from the shield (as shown in figure 1). If this happens, the chain can be re-fitted as follows:

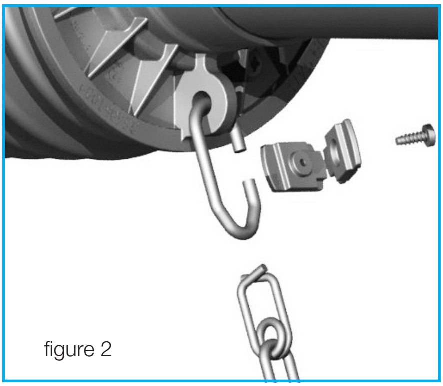


figure 2

Remove the screw and open the clip (figure 2).

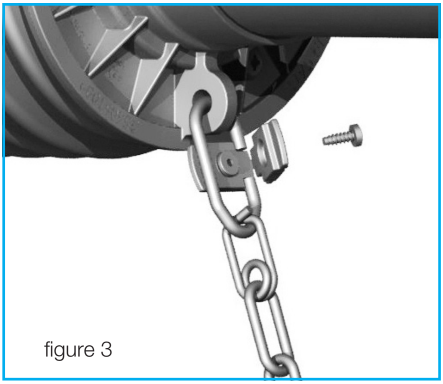


figure 3

Fit the chain and reposition the clip (figure 3).

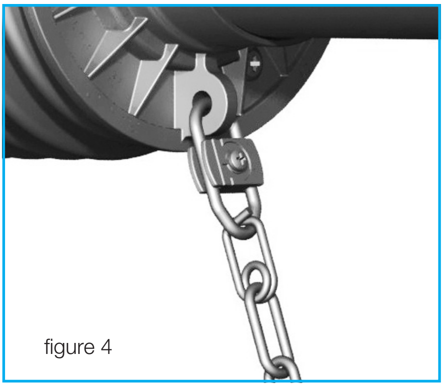


figure 4

Close clip (figure 4) and replace the screw.

Safety shields

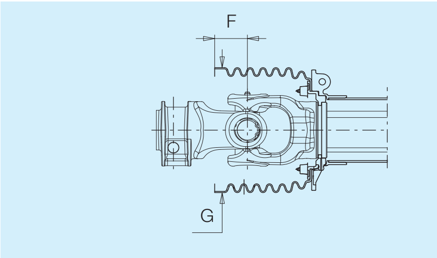
Ordering complete shield kits
Drivelines are equipped with shield restraint for all markets, except the USA and Canada where they are optional.
S-hook connections of the restraint chains to the shield are standard.
Add letter **"Z"** to the optional position in the shaft code to specify Spring Link device.

The table below shows the characters used to specify the type of shield restraint, or to delete the shield restraints, if desired, for USA and Canada.

Country of destination	With restraints	Without restraints
Drivelines bearing the CE mark	**E**	**-**
Drivelines made for USA and Canada	**2**	**S**
Drivelines made for Japan	**P**	**-**
Drivelines made for other countries and for CEE – EFTA countries not bearing CE mark	**X**	**-**

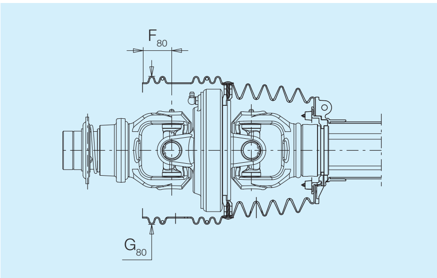
Standard shield cone configurations based on the driveline end

Standard shield cones for yokes, torque limiters and overruning clutches.
- Code .... **S**



	F mm	G mm
G1	27	127
G2	23	127
G3	32	137
G4	32	137
G5	40	158
G7	33	158
G8	31	158
G9	30	160

Shield for 80° CV joint.
- Code .... **W**



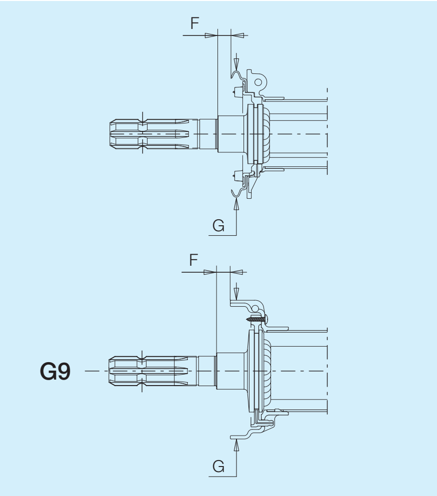
	F_{80} mm	G_{80} mm
G1	- -	- -
G2	36	181
G3	- -	- -
G4	31	181
G5	41	211
G7	41	211
G8	52	233
G9	- -	- -

Driveline shield cones can cover the joint partially or completely, but they are not intended to replace proper implement input connection (IIC) shields, tractor master shields, or other appropriate guarding.

Spare parts code for optional extended cones and plates are shown in the following pages.

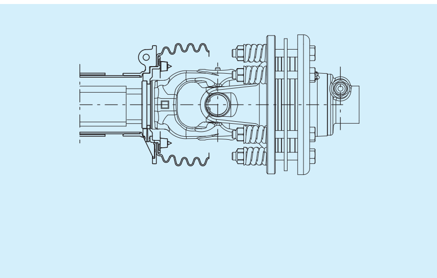
Safety shields

Shield for splined stub shaft.
- Code .... **Q**



	F mm	G mm
G1	- -	- -
G2	- -	- -
G3	- -	- -
G4	16	130
G5	16	149
G7	16	149
G8	16	149
G9	16	161

Shields for FFV and FFNV clutches.
Drivelines with FFV clutches are not EC marked since the shield cone does not entirely cover the inboard yoke, as specified by Machinery Directive 2006/42/CE.
- Code .... **E**



	F mm	G mm
G1	23	127
G2	27	127
G3	19	137
G4	19	137
G5	11	158
G7	18	158
G8	20	158
G9	18	158

Driveline shield cones can cover the joint partially or completely, but they are not intended to replace proper implement input connection (IIC) shields, tractor master shields, or other appropriate guarding.

Spare parts code for optional extended cones and plates are shown in the following pages.

BONDIOLI & PAVESI

Optional extended outer cones

Global shields can be provided with extended outer cones that cover the joint completely. The ends of these extended cones must be supported by the implement by means of a clamp, and the shield must be properly restrained.

Extended outer cones are normally used on internal drivelines that handle the flow of processed material such as fodder or forage.

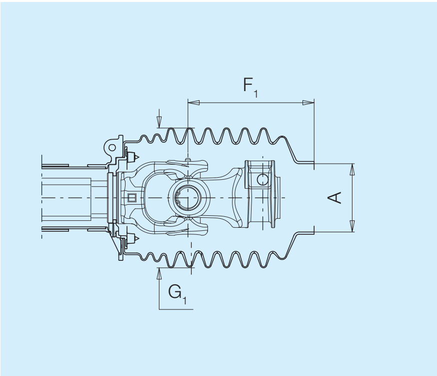
Extended outer cones are available in various lengths and diameters, depending on the size of the driveline.

To have your driveline fitted with one, or two extended outer cones, add the appropriate letter (shown below) in the additional positions of the driveline code.

The letter indicates the type of cone, and which end of the driveline it will be positioned.

Optional extended cone, medium length, narrow diameter

- Tractor end... P
- Implement end...................................M



	A mm	F_1 mm	G_1 mm
G1	83	172	170
G2	83	168	170
G3-G4	83	156	170
* **G5**	83	154	170
* **G7**	115	159	200
* **G8**	115	157	200
* **G9**	115	155	200

* Extended cone available in 1-hole version only.
The access to the greasing fitting is not allowed with torque limiters or overrunning clutches.

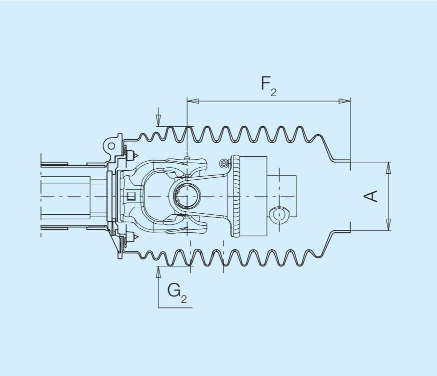
Driveline shield cones can cover the joint partially or completely, but, for safety purposes, they are not intended to replace proper implement input connection (IIC) shields, tractor master shields, or other appropriate guarding.

Codes replacement for optional extended cone and plates with clamps are described below.

Safety shields

Optional extended cone, long length, narrow diameter

- Tractor end.. N
- Implement end.................................... L

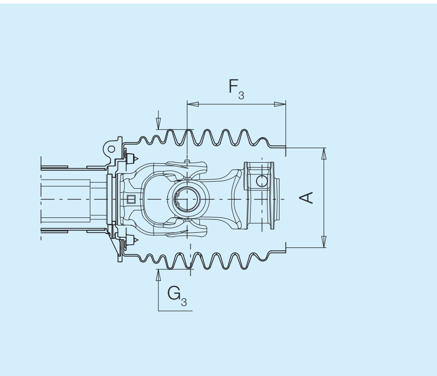


	A mm	F_2 mm	G_2 mm
G1	83	217	170
G2	83	213	170
G3-G4	83	201	170
G5	83	199	170
** **G7**	115	204	200
** **G8**	115	202	200
** **G9**	115	200	200

** Extended cone available in 1-hole version. 2-hole extended cone version for torque limiters and overrunning cluthes is available on request.
F2 = 249 mm for dimension G7.
F2 = 247 mm for dimension G8.
F2 = 245 mm for dimension G9.

Optional extended cone, short length, wide diameter

- Tractor end...F
- Implement end.................................... H

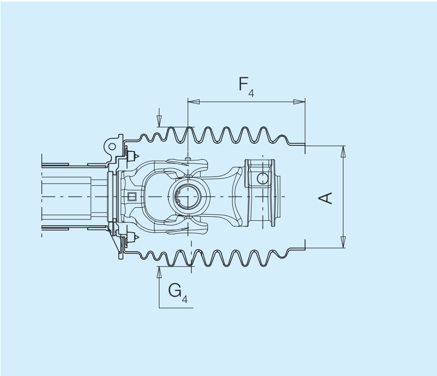


	A mm	F_3 mm	G_3 mm
G1	125	139	170
G2	125	135	170
G3-G4	125	122	170
G5	- -	- -	- -
G7	- -	- -	- -
G8	- -	- -	- -
G9	- -	- -	- -

Driveline shield cones can cover the joint partially or completely, but, for safety purposes, they are not intended to replace proper implement input connection (IIC) shields, tractor master shields, or other appropriate guarding.

Codes replacement for optional extended cone and plates with clamps are described below.

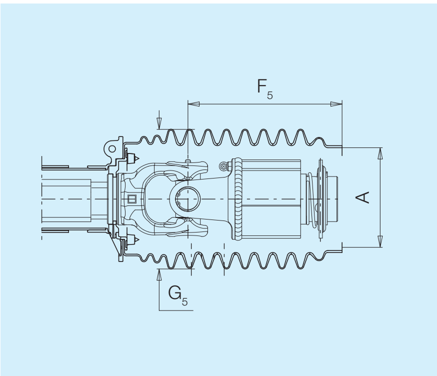
Optional extended cone, medium length, wide diameter.
- Tractor end..R
- Implement end ....T



	A mm	F_4 mm	G_4 mm
G1	125	161	170
G2	125	157	170
G3-G4	125	145	170
*** G5**	125	143	170
*** G7**	145	141	200
*** G8**	145	139	200
*** G9**	145	137	200

* Extended cone available in 1-hole version only.
The access to the greasing fitting is not allowed with torque limiters or overrunning clutches.

Optional extended cone, long length, wide diameter.
- Tractor end..V
- Implement end ....Y



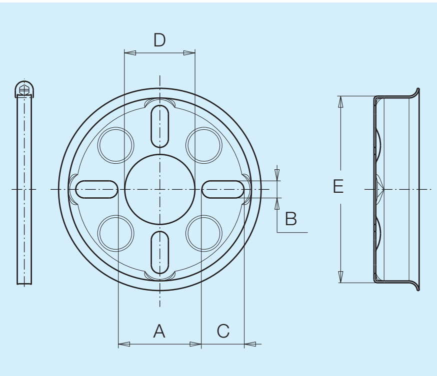
	A mm	F_5 mm	G_5 mm
G1	- -	- -	- -
G2	- -	- -	- -
G3-G4	125	190	170
G5	125	188	170
G7	- -	- -	- -
G8	- -	- -	- -
G9	- -	- -	- -

Driveline shield cones can cover the joint partially or completely, but, for safety purposes, they are not intended to replace proper implement input connection (IIC) shields, tractor master shields, or other appropriate guarding.

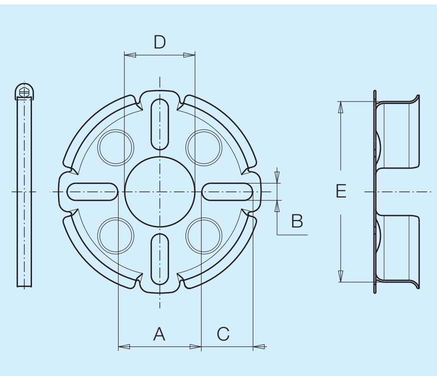
Codes replacement for optional extended cone and plates with clamps are described below.

Safety shields

Extended cones with diameters of 125 or 145 mm may be attached to the implement with the slotted plates shown below. These plates should be bolted to the implement, and the extended cone clamped around their circumference. The codes listed in the tables below include the slotted plate and an appropriate sized clamp.



E mm	A mm	B x C mm	D mm	Code
125	54	11 x 27	46	395011211R
145	66	11 x 34	52	395011411R



E mm	A mm	B x C mm	D mm	Code
125	84	11 x 20	52	395011261R

Complete shield kits for spare part
Complete shield kits for spare parts are sized to fit the drivelines on which they will be used.

Shield tubes can be cut to fit a specific driveline length, but the shield tubes should maintain sufficient overlap for all operating and transport conditions.

Different types of joints, yokes, torque limiters and clutches have different shield requirements. The types of shield cones available are illustrated on the following pages.

Safety labels and operator's manuals are included according to the standards and regulations of the country of destination.

Shield kits are supplied with chains except for USA- Canada, where shields restraints are optional and may be deleted at the customer's request.

Standard chains are fitted to shields with a S-hooks. Add the letter "Z" to the optional position in the shield kit code to have your chain fitted with Spring Link.

Bondioli & Pavesi drivelines and shields are tested to comply with UNI EN ISO 5674, UNI EN 12965 standards and are EC certified. Complete shields are supplied as spare parts and therefore, in compliance with the Machinery Directive, do not require CE marking. However, shield kits may be EC marked on request.

RegulationsUNI EN ISO 4254-1 and ANSI/ASABE S604.1 prescribe a 50 mm overlap of the driveline shield with the implement input connection shield.

Codes for Global driveline complete shield kit

1	2
5	C

Shield kit.
5C

3	4

Size.
G1 - G2 - G3 - G4 - G5 - G7 - G8 - G9.
See chapter “Size, torque and power”.

5	6	7

Length.
Triangle profile tube:
041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.
Splined telescoping members:
041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081.
See chapter “Length”.

8	9

Warning labels, operator’s manual and restrain chains.

Country of destination	with chains	without chains
CEE-EFTA countries bearing EC mark.	**CE**	**-**
North America (USA, Canada and Mexico)	**U2**	**US**
Japan	**JP**	**-**
Other countries and CEE-EFTA countries not bearing CE mark.	**FX**	**-**

10	11

Shield cone.

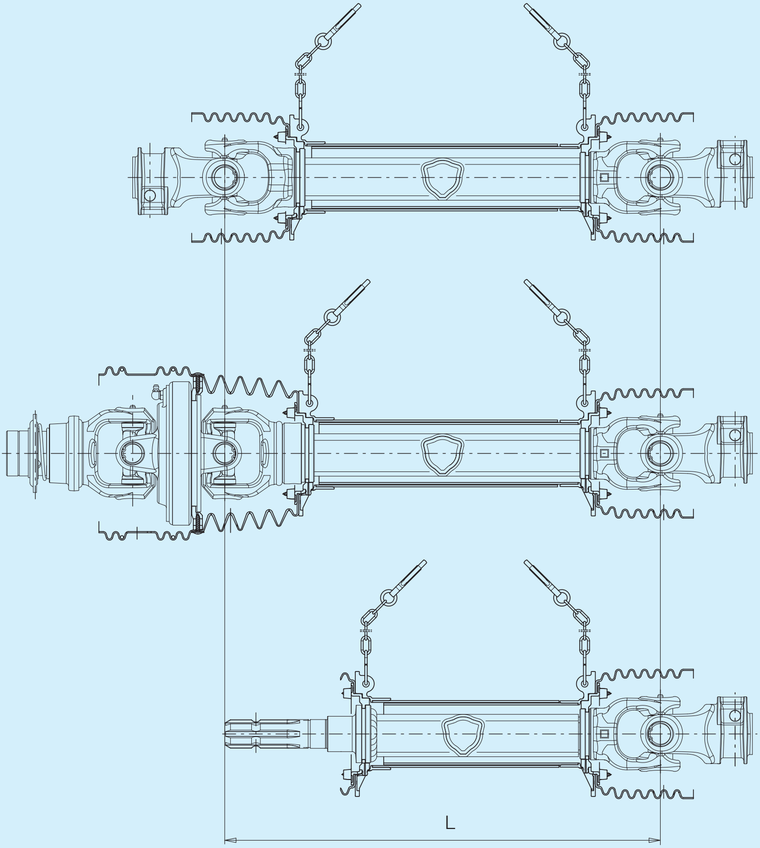
End type	tractor end	implement end
Single cardan joint	**S**	**S**
80° CV joint	**W**	**W**
Splined stub	**Q**	**-**
Single cardan joint with FFV or FFNV clutches	**-**	**E**
Extended cone, medium length, narrow diameter	**P**	**M**
Extended cone, long length, narrow diameter	**N**	**L**
Extended cone, short length, wide diameter	**F**	**H**
Extended cone, medium length, wide diameter	**R**	**T**
Extended cone, long length, wide diameter	**V**	**Y**

12

Optional feature.
Z : Spring Link chains.

All rotating parts must be guarded. The shields on the tractor and on the implement machine work with the integral driveline guard to form an interactive guarding system.
For primary drivelines (i.e. the driveline connecting the tractor PTO to the initial power input connection on the implement), torque limiters or overrunning clutches must be fitted on the implement end of the driveline.

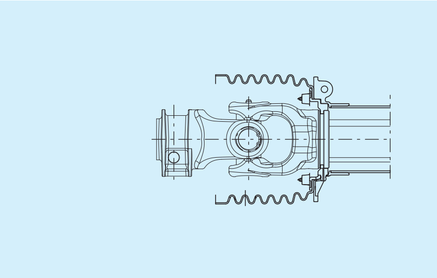
Shield length



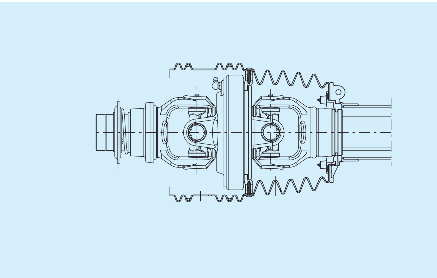
L [mm]	410	460	510	560	610	660	710	760	810	860	910	1010	1110	1210
Code	**041**	**046**	**051**	**056**	**061**	**066**	**071**	**076**	**081**	**086**	**091**	**101**	**111**	**121**

Safety shields

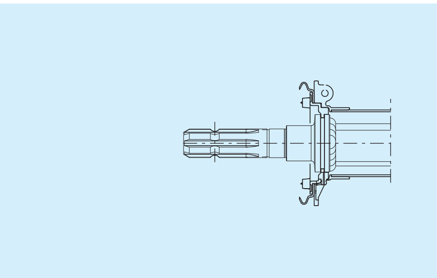
Standard shield cone configurations based on the driveline end



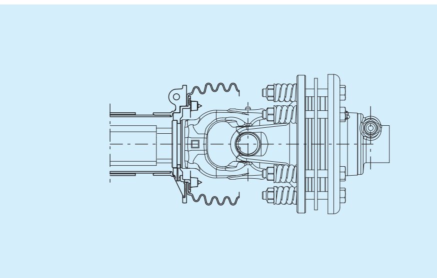
Standard shield cones for yokes, torque limiters and overruning clutches.
- Code .... **S**



Shield for 80° CV joint.
- Code .... **W**



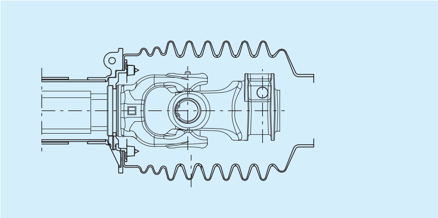
Shield for splined stub shaft.
- Code .... **Q**



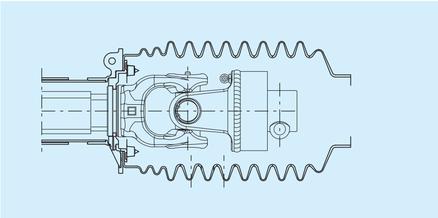
Shields for FFV and FFNV clutches. Drivelines with FFV clutches are not EC marked since the shield cone does not entirely cover the inboard yoke, as specified by Machinery Directive 2006/42/CE.
- Code .... **E**

Driveline shield cones can cover the joint partially or completely, but they are not intended to replace proper implement input connection (IIC) shields, tractor master shields, or other appropriate guarding.

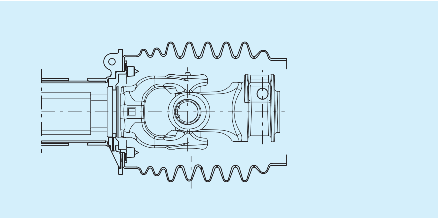
Shield cone configurations



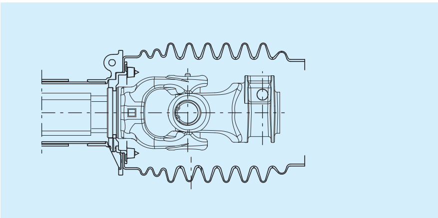
Extended cone, medium length, narrow diameter.
- Tractor end .... P
- Implement end .... M



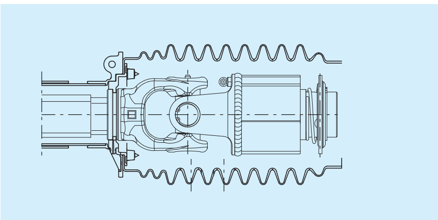
Extended cone, long length, narrow diameter.
- Tractor end .... N
- Implement end L



Extended cone, short length, wide diameter.
- Tractor end .... F
- Implement end .... H



Extended cone, medium length, wide diameter.
- Tractor end .... R
- Implement end .... T



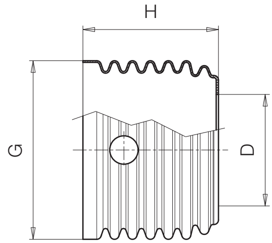
Extended cone, long length, wide diameter.
- Tractor end V
- Implement end .... Y

Driveline shield cones can cover the joint partially or completely, but they are not intended to replace proper implement input connection (IIC) shields, tractor master shields, or other appropriate guarding.

Spare parts for shields

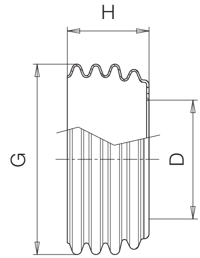
End cones for single cardan joints

	G mm	H mm	D mm	Spare part code
G1	127	87	77	219021001R
G2	127	87	77	219021001R
G3	137	102	83	219041001R
G4	137	102	83	219041001R
G5	158	119	98	219051001R
G7	158	119	98	219051001R
G8	158	119	98	219051001R
G9	160	120	100	2190L0201R



End cone for FFV and FFNV clutches

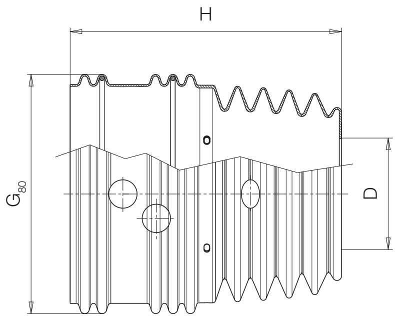
	G mm	H mm	D mm	Spare part code
G1	127	37	77	219021002R
G2	127	37	77	219021002R
G3	137	52	83	219041002R
G4	137	52	83	219041002R
G5	158	68	98	219051002R
G7	158	68	98	219051002R
G8	158	68	98	219051002R
G9	158	71	100	2190L0207R



End cones for 80° CV joints

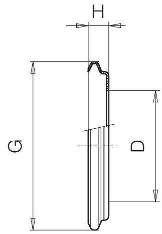
	G_{80} mm	H mm	D mm	Spare part code
G1	- -	- -	- -	- -
G2	181	208	77	219021401R
G3	- -	- -	- -	- -
G4	181	208	83	219041401R
G5	211	239	98	219051401R
G7	211	239	98	219051401R
G8	233	268	98	219081401R
G9	- -	- -	- -	- -

The code also includes the reinforcement metal rings.



End cones for splined stub shaft

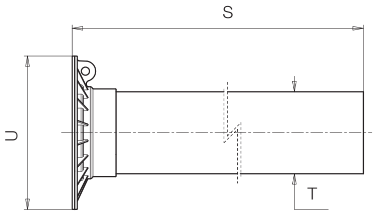
	G mm	H mm	D mm	Spare part code
G1	- -	- -	- -	- -
G2	- -	- -	- -	- -
G3	- -	- -	- -	- -
G4	130	18	83	219041006R
G5	149	18	98	219051006R
G7	149	18	98	219051006R
G8	149	18	98	219051006R
G9	- -	- -	- -	- -



Outer tube + cone assembly

	T mm	U mm	S mm	Spare part code
G1	60.8	119	1048	5TNN1G1121FR
G2	60.8	119	1037	5TNN1G2121FR
G3	66.6	132	1023	5TNN1G3121FR
G4	66.6	132	1023	5TNN1G4121FR
G5	81.2	152	1006	5TNN1G5121FR
G7	81.2	152	991	5TNN1G7121FR
G8	81.2	152	989	5TNN1G8121FR
G9	96.0	161	1032	5TNN1G9121FR

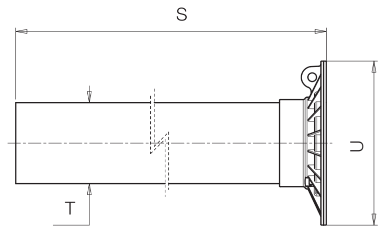
Codes refer to the tube + cone assemblies for drivelines of length L=1210 mm.
Replace the letter **"F"** with **"U"** for North America, or **"J"** for Japan.



Inner tube + cone assembly

	T mm	U mm	S mm	Spare part code
G1	55.6	119	1048	5MNN1G1121FR
G2	55.6	119	1037	5MNN1G2121FR
G3	60.8	132	1023	5MNN1G3121FR
G4	60.8	132	1023	5MNN1G4121FR
G5	75.0	152	1006	5MNN1G5121FR
G7	75.0	152	991	5MNN1G7121FR
G8	75.0	152	989	5MNN1G8121FR
G9	90.0	161	1032	5MNN1G9121FR

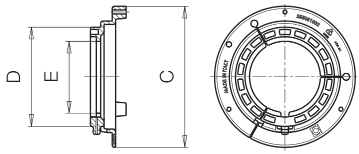
Codes refer to the tube + cone assemblies for drivelines of length L=1210 mm.
Replace the letter **"F"** with **"U"** for North America, or **"J"** for Japan.



Safety shields

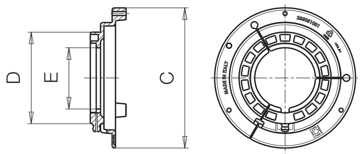
Shield bearings for outer tube

	D mm	E mm	C mm	Spare part code
G1	66.0	40.4	103	255011002R02
G2	66.0	47.4	103	255021002R02
G3	72.5	53.4	109	255041002R02
G4	72.5	53.4	109	255041002R02
G5	87.2	62.4	124	255051002R02
G7	87.2	68.4	124	255071002R02
G8	87.2	68.4	124	255071002R02
G9	- -	89.0	132	2550G0001R02



Shield bearings for inner tube

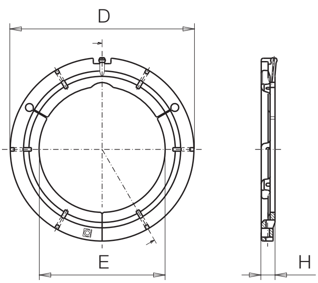
	D mm	E mm	C mm	Spare part code
G1	60.6	34.4	103	255011001R02
G2	60.6	40.4	103	255021001R02
G3	67.0	46.4	109	255041001R02
G4	67.0	46.4	109	255041001R02
G5	81.0	53.4	124	255051001R02
G7	81.0	59.4	124	255071001R02
G8	81.0	59.4	124	255071001R02
G9	- -	86.0	132	2550G0002R02



CV shield bearings for 80° CV joint

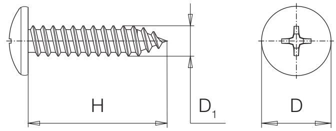
	D mm	E mm	H mm	Spare part code
G1	- -	- -	- -	- -
G2	160	101	12	2550E0005R02
G3	- -	- -	- -	- -
G4	160	101	12	2550E0005R02
G5	187	128	13	2550G0024R02
G7	187	128	13	2550G0024R02
G8	206	147	13	2550L0023R02
G9	- -	- -	- -	- -

The code also includes the restrain spring.



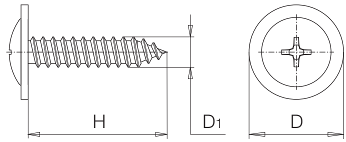
Self-tapping screws

	D_1 mm	H mm	D mm	Spare part code
All sizes	4.8	19	11	310001431R30



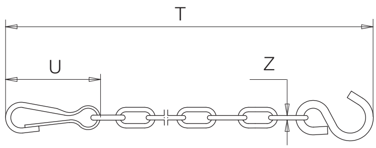
Flange self-tapping screws

	D_1 mm	H mm	D mm	Spare part code
All sizes	4.8	22	15	310001428R30



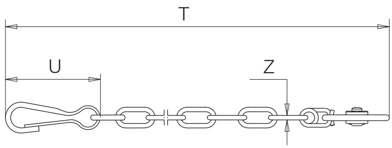
Chains with S-hook

	T mm	U mm	Z mm	Spare part code
All sizes	500±10	60	2.6	252000050R02



Chains with Spring Link

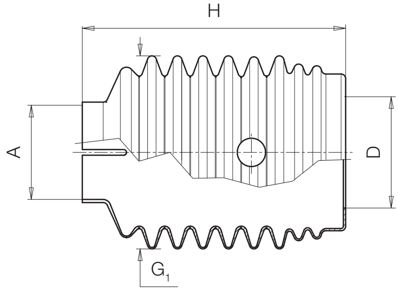
	T mm	U mm	Z mm	Spare part code
All sizes	500±10	70	3.4	252000101R02



Safety shields

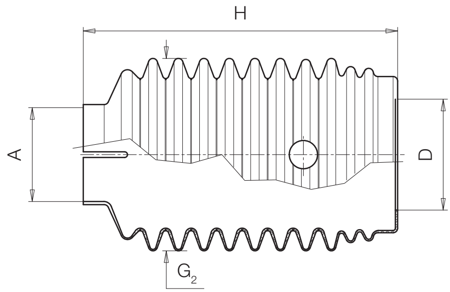
Extended cone, medium length, narrow diameter

	A mm	H mm	G_1 mm	D mm	Spare part code
G1	83	232	170	77	219021102R
G2	83	232	170	77	219021102R
G3	83	226	170	83	219041102R
G4	83	226	170	83	219041102R
G5	83	233	170	98	219051102R
G7	115	245	200	98	219071102R
G8	115	245	200	98	219071102R
G9	115	245	200	103	2190G0170R



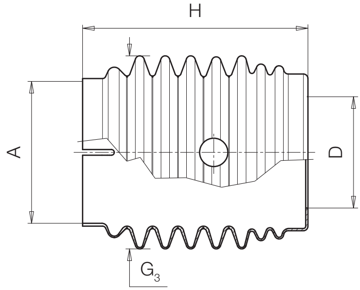
Extended cone, long length, narrow diameter

	A mm	H mm	G_2 mm	D mm	Spare part code
G1	83	277	170	77	219021103R
G2	83	277	170	77	219021103R
G3	83	271	170	83	219041103R
G4	83	271	170	83	219041103R
G5	83	278	170	98	219051103R
G7	115	290	200	98	219071103R
G8	115	290	200	98	219071103R
G9	115	290	200	103	2190G0171R



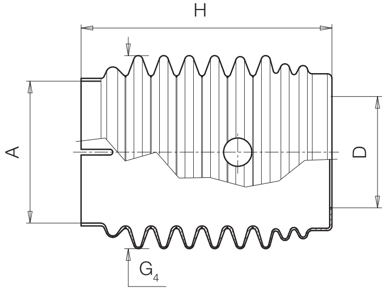
Extended cone, short length, wide diameter

	A mm	H mm	G_3 mm	D mm	Spare part code
G1	125	199	170	77	219021201R
G2	125	199	170	77	219021201R
G3	125	193	170	83	219041201R
G4	125	193	170	83	219041201R
G5	- -	- -	- -	- -	- -
G7	- -	- -	- -	- -	- -
G8	- -	- -	- -	- -	- -
G9	- -	- -	- -	- -	- -



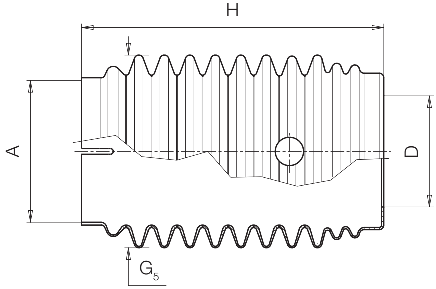
Extended cone, medium length, wide diameter

	A mm	H mm	G_4 mm	D mm	Spare part code
G1	125	221	170	77	219021202R
G2	125	221	170	77	219021202R
G3	125	215	170	83	219041202R
G4	125	215	170	83	219041202R
G5	125	222	170	98	219051202R
G7	145	227	200	98	219071202R
G8	145	227	200	98	219071202R
G9	145	227	200	103	2190G0172R



Extended cone, long length, wide diameter

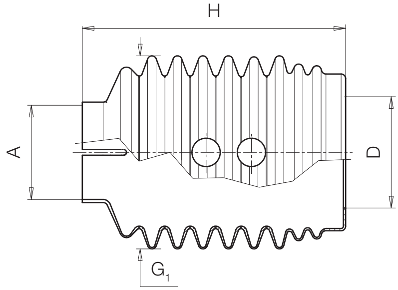
	A mm	H mm	G_5 mm	D mm	Spare part code
G1	- -	- -	- -	- -	- -
G2	- -	- -	- -	- -	- -
G3	125	260	170	83	219041203R
G4	125	260	170	83	219041203R
G5	125	267	170	98	219051203R
G7	- -	- -	- -	- -	- -
G8	- -	- -	- -	- -	- -
G9	- -	- -	- -	- -	- -



Safety shields

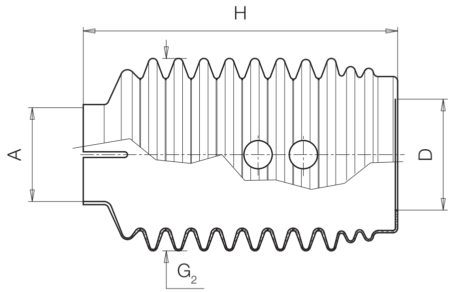
Extended cone, medium length, narrow diameter for overrunning clutches and ratchet torque limiters.

	A mm	H mm	G_1 mm	D mm	Spare part code
G1	83	232	170	77	219021104R
G2	83	232	170	77	219021104R
G3	83	226	170	83	219041104R
G4	83	226	170	83	219041104R
G5	- -	- -	- -	- -	- -
G7	- -	- -	- -	- -	- -
G8	- -	- -	- -	- -	- -
G9	- -	- -	- -	- -	- -



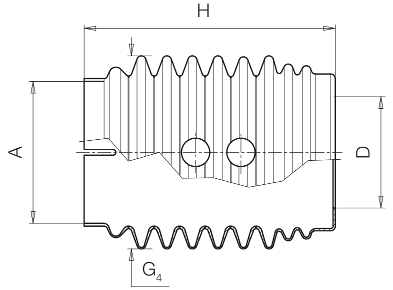
Extended cone, long length, narrow diameter for overrunning clutches and ratchet torque limiters.

	A mm	H mm	G_2 mm	D mm	Spare part code
G1	83	277	170	77	219021105R
G2	83	277	170	77	219021105R
G3	83	271	170	83	219041105R
G4	83	271	170	83	219041105R
G5	83	278	170	98	219051105R
G7	- -	- -	- -	- -	- -
G8	- -	- -	- -	- -	- -
G9	- -	- -	- -	- -	- -



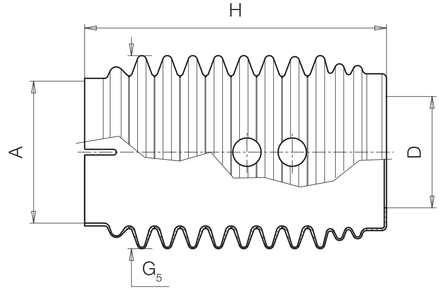
Extended cone, medium length, wide diameter for overrunning clutches and ratchet torque limiters.

	A mm	H mm	G_4 mm	D mm	Spare part code
G1	125	221	170	77	219021203R
G2	125	221	170	77	219021203R
G3	125	215	170	83	219041204R
G4	125	215	170	83	219041204R
G5	- -	- -	- -	- -	- -
G7	- -	- -	- -	- -	- -
G8	- -	- -	- -	- -	- -
G9	- -	- -	- -	- -	- -



Extended cone, long length, wide diameter for overrunning clutches and ratchet torque limiters.

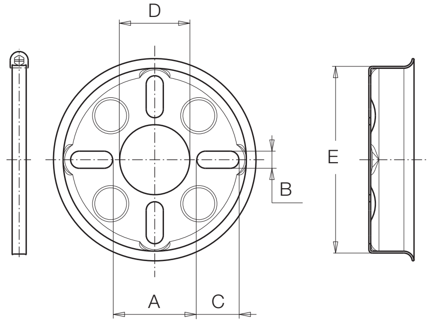
	A mm	H mm	G_5 mm	D mm	Spare part code
G1	- -	- -	- -	- -	- -
G2	- -	- -	- -	- -	- -
G3	125	260	170	83	219041205R
G4	125	260	170	83	219041205R
G5	125	267	170	98	219051204R
G7	- -	- -	- -	- -	- -
G8	- -	- -	- -	- -	- -
G9	- -	- -	- -	- -	- -



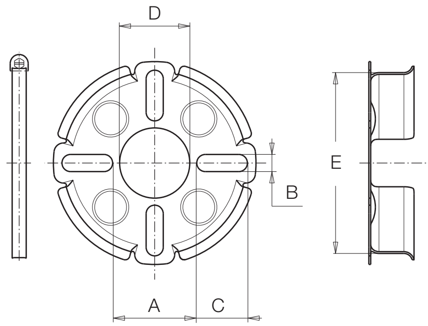
Safety shields

Slotted plates with clamps for optional extended cones.

E mm	A mm	B x C mm	D mm	Spare part code
125	54	11 x 27	46	395011211R
145	66	11 x 34	52	395011411R



E mm	A mm	B x C mm	D mm	Spare part code
125	84	11 x 20	52	395011261R



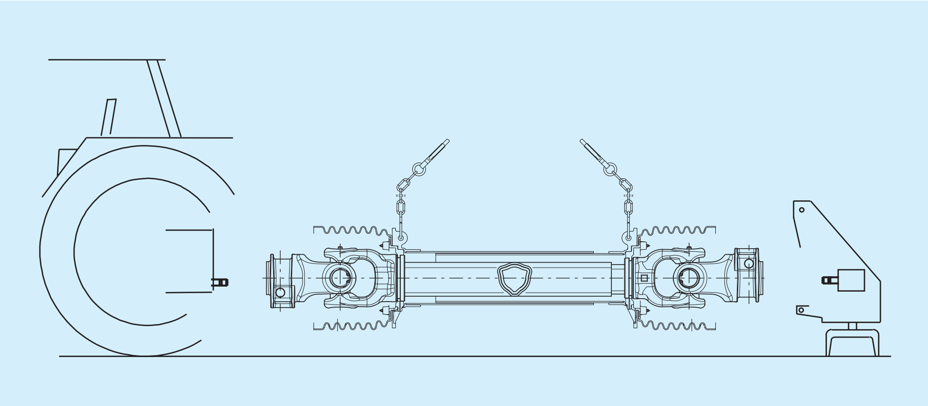
Yoke - shaft connections

In farming, the most common way to transmit power from a tractor to an implement is by a driveline, connected to the PTO (Power Take Off) of the tractor to the IIC (Implement Input Connection). Drivelines are also commonly connected to shafts within the implement to transmit power to various mechanisms.
Standards ISO 500, DIN 9611 and ANSI/ ASABE AD500: specify the dimensions of the common PTO types

- Type 1 : 1 3/8" Z6 (540 min^{-1})
- Type 2 : 1 3/8" Z21 (1000 min^{-1})
- Type 3 : 1 3/4" Z20 (1000 min^{-1}).

Coupling a driveline to a PTO should be quick and simple, because in normal use tractors must operate a number of different implements. Consequently, yokes on the tractor-end of the driveline are fitted with a quick-disconnect system, such as push-pin, ball collar, or automatic ball collar.

Specifications for a driveline, including the way it is coupled to a PTO, depends upon the implement.
Yokes on the IIC side are rarely disconnected and may be fastened by quick-lock couplings (push-pin or ball collar) or semi-permanent couplings that can only be removed using tools.
Taper pins are the most stable connection for splined shafts, and are commonly used in yokes and torque limiters. Taper pins are also often used to connect internal drive shafts on drivelines that are not frequently disconnected.
Torque limiters and clutches must always be installed on the implement side of the primary driveline.



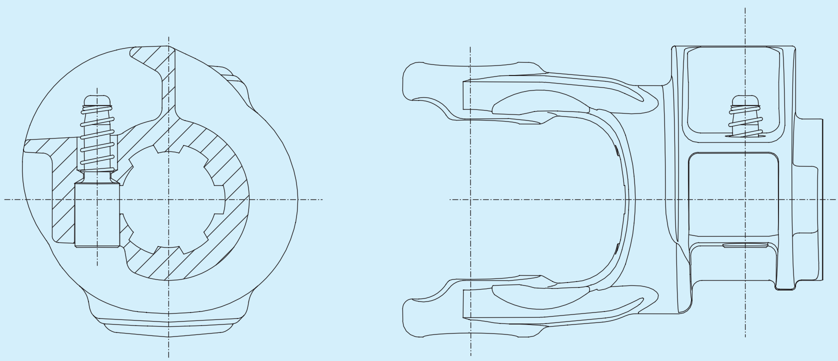
Yoke - shaft connections

Taper pin yokes

Push-pin yokes provide a quick and reliable connection to the PTO. The push-pin is simple and easy to use – no special tools are required.

The pin is encased by the rounded profile of the hub to eliminate protrusions, as required by international safety standards.

Make sure the pin snaps back to its original position after connection to the PTO.

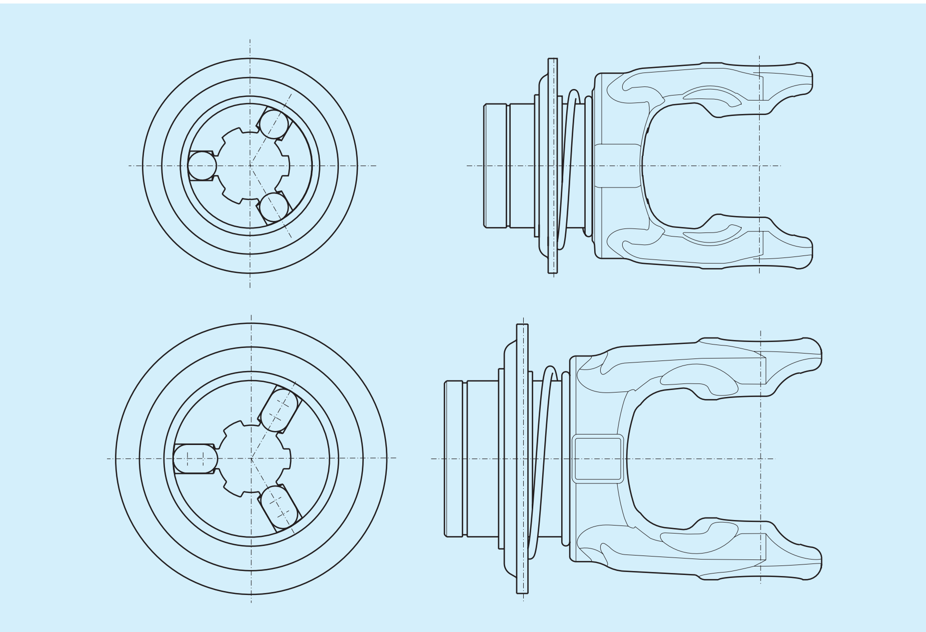


BONDIOLI & PAVESI

Ball collar yokes

Ball collar yokes provide easy and fast connection (or disconnection) of the yoke to the PTO, with no tools required.
Connection is secured by hardened steel balls or rounded pins that engage the annular groove of a splined shaft, such as a tractor's PTO.
The balls or pins are arranged symmetrically so thrust forces generated by the telescoping driveline are uniformly distributed to the splined shaft.
Yokes are designed to enable field conversion from a standard ball collar to an automatic ball collar. Only the collar needs to be changed, without changing the entire yoke.

Make sure the collar snaps back to its original position after connecting to the PTO.



Yoke - shaft connections

Taper-pin yokes

Drivelines are rarely removed from the implement to which they are attached. For this reason, yokes are commonly coupled to the implement shaft with a semi-permanent type of connection. These types of connections usually require the use of tools to install or disconnect.

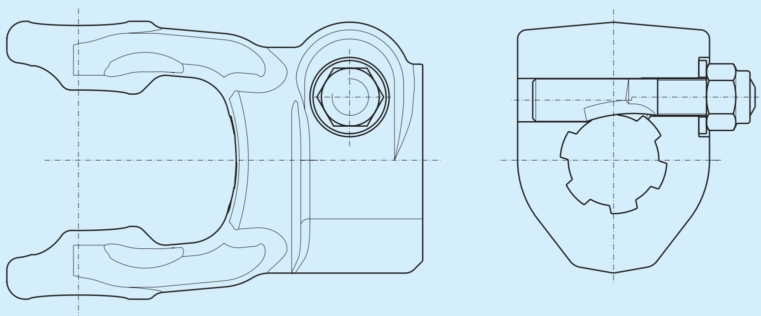
Tapered pins provide a fixed coupling between yoke and PTO. Tapered pin yokes are intended for use on the implement end of primary driveline (those that connect the tractor PTO to the first implement input shaft), or may be used on either or both ends of drivelines internal to the machine.

The tapered shape of the pin fits snugly into the annular groove of a splined shaft, reducing play between the splines to a minimum.

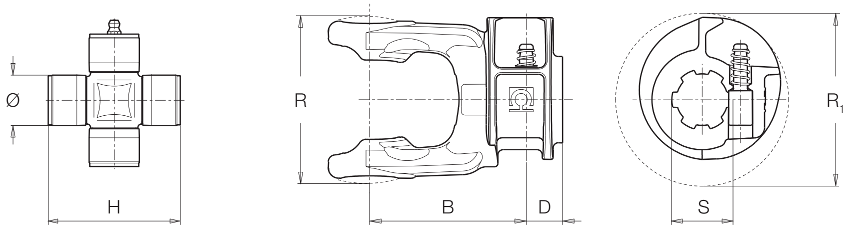
Profile	Taper pin nut torque
1 3/8” Z6	150 Nm - 1330 in·lbs
1 3/8” Z21	150 Nm - 1330 in·lbs
1 3/4” Z6	220 Nm - 1950 in·lbs
1 3/4” Z20	220 Nm - 1950 in·lbs

Do not replace taper pin with standard bolts- ask for the correct tapered pins from Bondioli & Pavesi.

Ensure the nut is tight before each use.



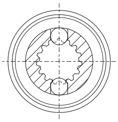
Push pin yokes



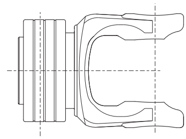
	Ø mm	H mm	S	D mm	B mm	R mm	R_1 mm	Driveline code	Spare part code	
G1	22.0	54.0	1 3/8” Z6	18	75	67	85	**007**	5070B0355	403000021R10
			1 3/8” Z21	26	67	67	85	**008**	5070B3755	403000021R10
			D8x32x38	18	75	67	85	**093**	5070B2151	403000021R10
G2	23.8	61.3	1 3/8” Z6	21	78	76	85	**007**	5070C0355	403000021R10
			1 3/8” Z21	29	70	76	85	**008**	5070C3755	403000021R10
			D8x32x38	21	78	76	85	**093**	5070C2151	403000021R10
G3-G4	27.0	74.6	1 3/8” Z6	21	85	89	100	**007**	5070E0355	403000001R10
			1 3/8” Z21	29	77	89	100	**008**	5070E3755	403000001R10
			D8x32x38	21	85	89	100	**093**	5070E2151	403000001R10
G5	30.2	79.4	1 3/8” Z6	21	91	98	100	**007**	5070G0355	403000001R10
			1 3/8” Z21	29	83	98	100	**008**	5070G3755	403000001R10
			D8x32x38	21	91	98	100	**093**	5070G2151	403000001R10
			1 3/4” Z6	- -	- -	- -	- -	**- -**	- -	- -
			1 3/4” Z20	- -	- -	- -	- -	**- -**	- -	- -
G7	30.2	91.4	1 3/8” Z6	24	95	108	100	**007**	5070H0355	403000001R10
			1 3/8” Z21	32	87	108	100	**008**	5070H3755	403000001R10
			D8x32x38	24	95	108	100	**093**	5070H2151	403000001R10
			1 3/4” Z6	- -	- -	- -	- -	**- -**	- -	- -
			1 3/4” Z20	- -	- -	- -	- -	**- -**	- -	- -
G8	34.9	93.5	1 3/8” Z6	24	98	113	108	**007**	5070L0355	403000032R10
			1 3/8” Z21	32	90	113	108	**008**	5070L3755	403000032R10
			D8x32x38	24	98	113	108	**093**	5070L2151	403000032R10
			1 3/4” Z6	- -	- -	- -	- -	**- -**	- -	- -
			1 3/4” Z20	- -	- -	- -	- -	**- -**	- -	- -
G9	34.9	106.0	1 3/8” Z6	24	103	124	107	**007**	5070M0355	403000032R10
			1 3/8” Z21	32	95	124	107	**008**	5070M3755	403000032R10
			D8x32x38	24	103	124	107	**093**	5070M2151	403000032R10
			1 3/4” Z6	- -	- -	- -	- -	**- -**	- -	- -
			1 3/4” Z20	- -	- -	- -	- -	**- -**	- -	- -

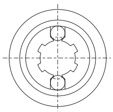
Yokes for single cardan joints

Ball collar yokes
RT

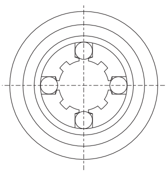


Collar 1” Z15

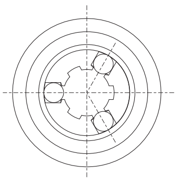




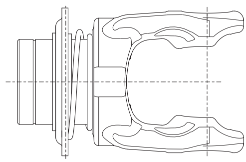
Collar type A2

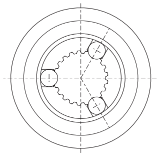


Collar type A1

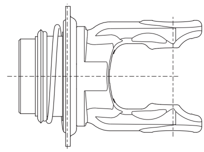


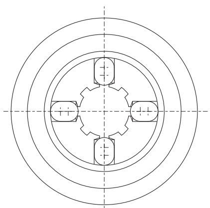
Collar type A



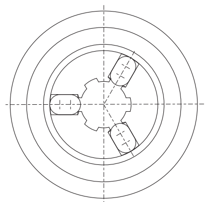


Collar type B

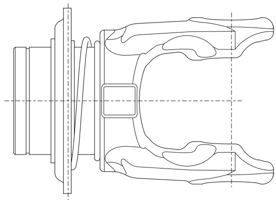


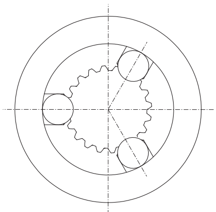


Collar type C1

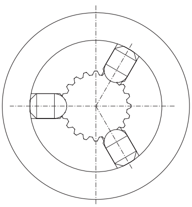


Collar type C

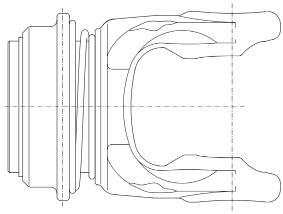




Collar type D1

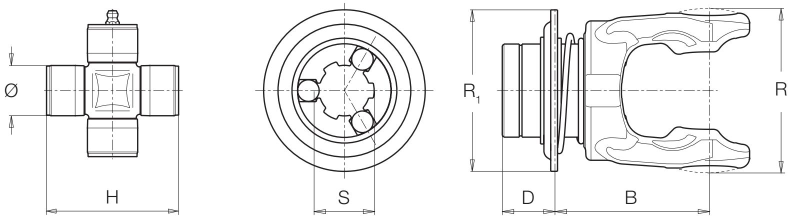


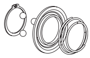
Collar type D



Yokes for single cardan joints

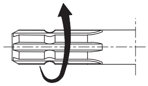
Ball collar yokes
RT



	Ø mm	H mm	S	D mm	B mm	R_1 mm	R mm	Type	Driveline code	Spare part code	
G1	22.0	54.0	1" Z15	13	65	58	73	-	**R12**	505010651	240002021R
			1 3/8" Z6	18	75	90	67	A	**R07**	5720B0355	435000320R
			1 3/8" Z21	28	65	90	67	B	**R08**	5720B3776	435000300R
			21 UNI221	14	64	58	67	A2	**R01**	5050B0951	435000901R
G2	23.8	61.3	1 3/8" Z6	21	78	90	76	A	**R07**	5720C0355	435000320R
			1 3/8" Z21	31	68	90	76	B	**R08**	5720C3776	435000300R
			21 UNI 221	16	71	58	76	A2	**R01**	5050C0951	435000901R
G3-G4	27.0	74.6	1 3/8" Z6	31	85	95	89	A	**R07**	5720E0355	435000321R
			1 3/8" Z21	31	85	95	89	A	**R08**	5720E3755	435000321R
			D8x32x38	31	85	95	89	A1	**R93**	5720E2151	435002115R
G5	30.2	79.4	1 3/8" Z6	31	91	95	98	A	**R07**	5720G0355	435000321R
			1 3/8" Z21	31	91	95	98	A	**R08**	5720G3755	435000321R
			D8x32x38	31	91	95	98	A1	**R93**	5720G2151	435002115R
			1 3/4" Z6	31	95	120	98	A	**R09**	5720G0455	435000418R
			1 3/4" Z20	31	95	120	98	A	**R10**	5720G3855	435000418R
G7	30.2	91.4	1 3/8" Z6	31	98	95	108	A	**R07**	5720H0355	435000321R
			1 3/8" Z21	31	98	95	108	A	**R08**	5720H3755	435000321R
			D8x32x38	31	98	95	108	A1	**R93**	5720H2151	435002115R
			1 3/4" Z6	31	100	120	108	A	**R09**	5720H0455	435000418R
			1 3/4" Z20	31	100	120	108	A	**R10**	5720H3855	435000418R
G8	35.0	93.5	1 3/8" Z6	35	105	120	113	C	**R07**	5720L0355	435000322R
			1 3/8" Z21	35	105	120	113	C	**R08**	5720L3755	435000322R
			D8x32x38	35	105	120	113	C1	**R93**	5720L2151	435002116R
			1 3/4" Z6	35	105	120	113	A	**R09**	5720L0455	435000419R
			1 3/4" Z20	35	105	120	113	A	**R10**	5720L3855	435000419R
G9	34.9	106.0	1 3/8" Z6	35	109	105	124	D	**R07**	5720M0351	435000332R
			1 3/8" Z21	35	109	105	124	D	**R08**	5720M3751	435000332R
			D8x32x38	35	109	105	124	D	**R93**	5720M2153	435002118R
			1 3/4" Z6	35	109	105	124	D1	**R09**	5720M0451	435000425R
			1 3/4" Z20	35	109	105	124	D1	**R10**	5720M3851	435000425R

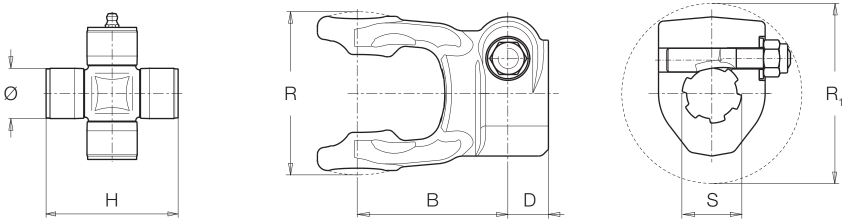
Yokes for single cardan joints

Taper pin yokes with counter-clockwise rotation



Do not use on tractor PTO (Power Take Off)

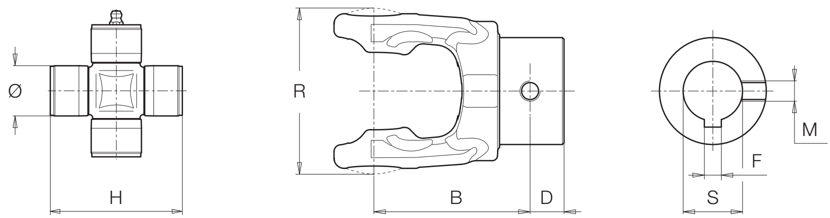
Recommended tightening torque:
150 Nm for 1 3/8” Z6 – Z21
220 Nm for 1 3/4” Z6 – Z20



	Ø mm	H mm	S	D mm	B mm	R mm	R_1 mm	Driveline code	Spare part code	
G1	22.0	54.0	1 3/8” Z6	- -	- -	- -	- -	**- -**	- -	- -
			1 3/8” Z21	- -	- -	- -	- -	**- -**	- -	- -
G2	23.8	61.3	1 3/8” Z6	- -	- -	- -	- -	**- -**	- -	- -
			1 3/8” Z21	- -	- -	- -	- -	**- -**	- -	- -
G3-G4	27.0	74.6	1 3/8” Z6	24	85	89	105	**014**	5090E0360	408000075R
			1 3/8” Z21	24	85	89	105	**015**	5090E3760	408000075R
G5	30.2	79.4	1 3/8” Z6	24	89	97	106	**014**	5090G0360	408000075R
			1 3/8” Z21	24	89	97	106	**015**	5090G3760	408000075R
			1 3/4” Z6	24	89	97	124	**016**	5090G0460	408000076R
			1 3/4” Z20	24	89	97	124	**017**	5090G3860	408000076R
G7	30.2	91.4	1 3/8” Z6	24	94	108	106	**014**	5090H0360	408000075R
			1 3/8” Z21	24	94	108	106	**015**	5090H3760	408000075R
			1 3/4” Z6	24	94	108	124	**016**	5090H0460	408000076R
			1 3/4” Z20	24	94	108	124	**017**	5090H3860	408000076R
G8	35.0	93.5	1 3/8” Z6	31	97	113	107	**014**	5090L0360	408000075R
			1 3/8” Z21	31	97	113	107	**015**	5090L3760	408000075R
			1 3/4” Z6	31	97	113	124	**016**	5090L0460	408000076R
			1 3/4” Z20	31	97	113	124	**017**	5090L3860	408000076R
G9	34.9	106.0	1 3/8” Z6	31	103	124	107	**014**	5090M0360	408000075R
			1 3/8” Z21	31	103	124	107	**015**	5090M3760	408000075R
			1 3/4” Z6	31	103	124	124	**016**	5090M0460	408000076R
			1 3/4” Z20	31	103	124	124	**017**	5090M3860	408000076R

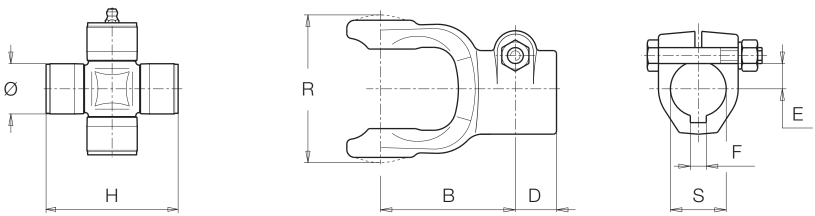
Yokes for single cardan joints

Round bore yokes



	Ø mm	H mm	S^{H8} mm	R mm	B mm	D mm	F^{Js9} mm	M	Driveline code	Spare part code
G1	22.0	54.0	20	67	66	20	6	M8	**051**	2120B6755
			25	67	66	20	8	M10	**053**	2120B6155
			30	67	66	20	8	M10	**054**	2120B6255
G2	23.8	61.3	25	76	70	20	8	M10	**053**	2120C6155
			30	76	70	20	8	M10	**054**	2120C6255
G3-G4	27.0	74.6	30	90	80	20	8	M12	**054**	2120E6255
			35	90	70	20	10	M12	**055**	212046351

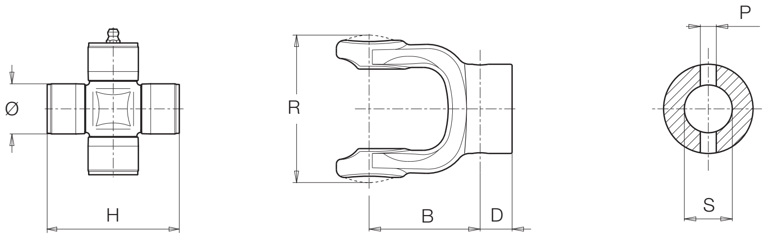
Interfering bolt yokes



	Ø mm	H mm	S^{H8} mm	R mm	B mm	D mm	F^{Js9} mm	E mm	Driveline code	Spare part code	
G1	22.0	54.0	30	73	76	14	8	13.0	**035**	509016252	408000003R02
G2	23.8	61.3	30	80	80	19	8	13.0	**035**	509026252	408000003R02
G3-G4	27.0	74.6	30	94	88	19	8	13.0	**035**	509046252	408000009R02
			35	94	88	19	10	15.5	**036**	509046352	408000009R02
G5	30.2	79.4	35	100	90	19	10	15.5	**036**	509056352	408000009R02
G7	30.2	91.4	35	115	97	19	10	15.5	**036**	509066352	408000009R02

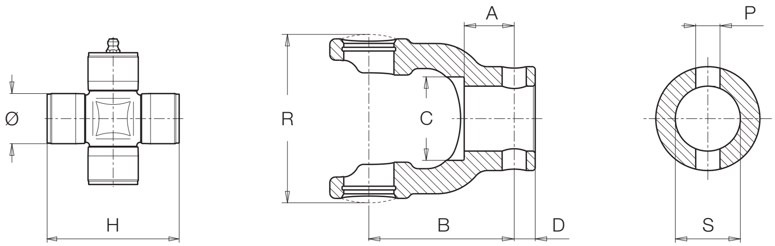
Yokes for single cardan joints

Round bore yokes



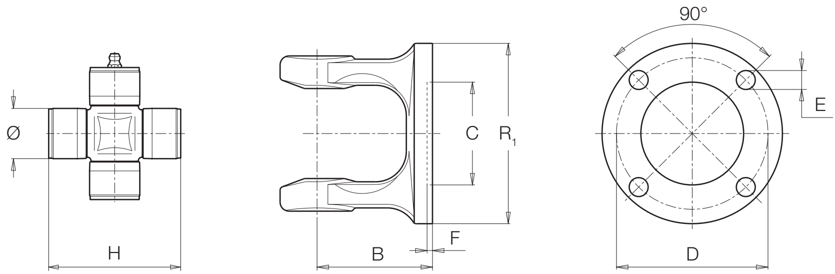
	Ø mm	H mm	S^{H8} mm	R mm	B mm	D mm	P^{H12} mm	Driveline code	Spare part code
G1	22.0	54.0	20	73	63	15	6	**069**	211014451
			25	73	63	15	8	**071**	211014651
			30	73	65	15	10	**072**	211014851
G2	23.8	61.3	20	80	67	15	6	**069**	211024451
			25	80	67	15	8	**071**	211024651
			30	80	67	15	10	**072**	211024851
G3-G4	27.0	74.6	25	94	70	20	8	**071**	211044651
			30	94	70	20	10	**072**	211044851

Round bore yokes da cutter



	Ø mm	H mm	S^{H8} mm	R mm	B mm	D mm	C mm	A mm	P^{H12} mm	Driveline code	Spare part code
G3-G4	27.0	74.6	35	94	79	11	45	26.9	13	**073**	211044955
G5	30.2	79.4	35	100	82	16	43	27.8	13	**073**	211054954

Flange yokes

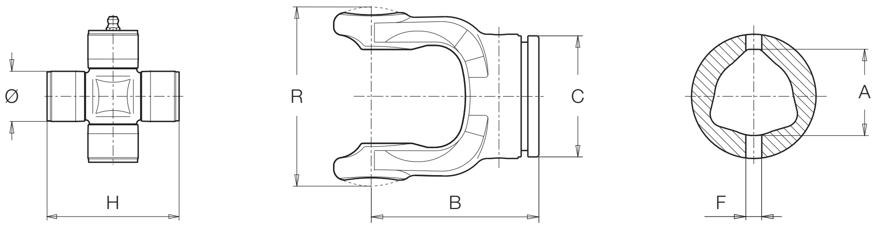


	Ø mm	H mm	B mm	F mm	C^{H8} mm	R_1 mm	D mm	E mm	Driveline code	Spare part code
G1	22.0	54.0	49	2.5	47	89	74.5	8.5	**090**	221017153
G2	23.8	61.3	54	2.5	47	89	74.5	8.5	**090**	221027153
G3-G4	27.0	74.6	64	2.5	57	100	84.0	10.5	**090**	221047153
G5	30.2	79.4	68	2.5	57	110	94.0	10.5	**090**	221057153
G7	30.2	91.4	77	2.5	75	130	101.5	12.5	**090**	221067153
G8	34.9	93.5	79	3.0	85	148	120.0	15.0	**090**	221177151
G9	34.9	106.0	79	3.0	85	148	120.0	15.0	**090**	221087153

Yokes for single cardan joints

Yokes for outer tube

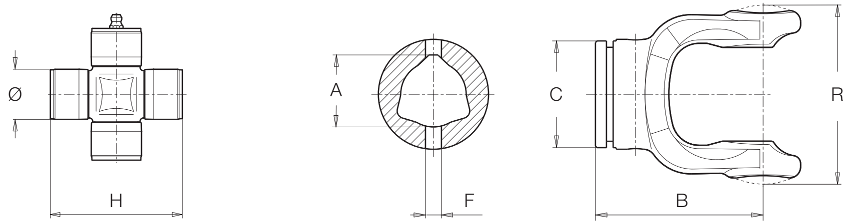
Same type of yoke is used for regular, Rilsan®-coated and heat-treated tubes.



	Ø mm	H mm	R mm	B mm	C mm	F mm	A mm	Spare part code	
G1	22.0	54.0	73	78	47	8	32.5	204016851	341036000R10
G2	23.8	61.3	80	82	54	8	36.0	204026851	341048000R10
G3	27.0	74.6	94	90	61	8	43.5	204046851	341038000R10
G4	27.0	74.6	94	90	61	8	43.5	204046851	341038000R10
G5	30.2	79.4	100	98	70	10	51.6	204056860	341053000R10
G7	30.2	91.4	115	105	76	10	54.0	204066851	341042000R10
G8	34.9	93.5	119	107	76	10	54.0	204176851	341042000R10
G9	34.9	106.0	132	120	88	12	63.0	204086879	341045000R10

Yokes for inner tube

Same type of yoke is used for regular, Rilsan®-coated and heat-treated tubes.

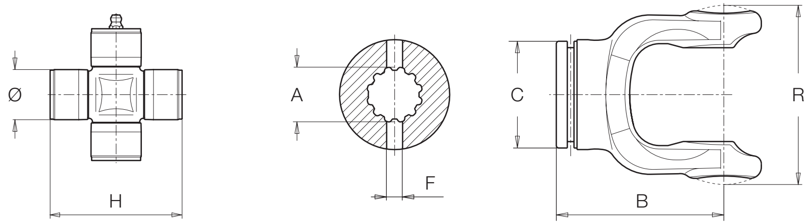


	Ø mm	H mm	A mm	F mm	C mm	B mm	R mm	Spare part code	
G1	22.0	54.0	26.5	8	41	78	73	204016852	341037000R10
G2	23.8	61.3	29.0	8	47	82	80	204026852	341036000R10
G3	27.0	74.6	36.0	8	54	90	94	204046852	341048000R10
G4	27.0	74.6	36.0	8	54	90	94	204046852	341048000R10
G5	30.2	79.4	45.0	10	64	98	100	204056861	341002000R10
G7	30.2	91.4	45.0	10	67	105	115	204066852	341043000R10
G8	34.9	93.5	45.0	10	67	107	119	204176852	341043000R10
G9	34.9	106.0	54.0	12	78	120	132	204086880	341055000R10

Yokes for single cardan joints

Yokes for splined bar

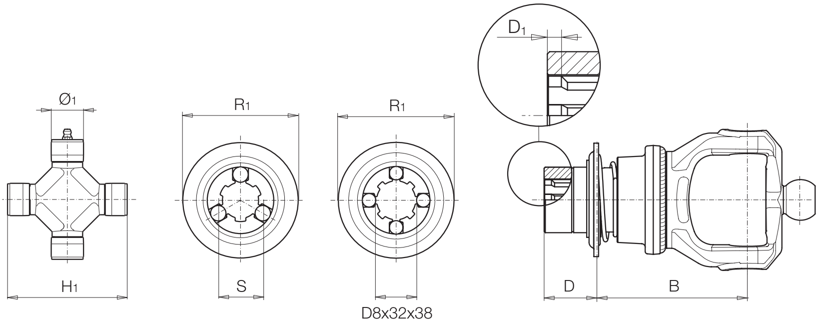
Same type of yoke is used for regular, Rilsan®-coated and heat-treated tubes.



	Ø mm	H mm	A mm	Z mm	F mm	C mm	B mm	R mm	Spare part code	
G1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G3	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
G4	27.0	74.6	30	10	8	54	90	94	204043251	345013000R10
G5	30.2	79.4	35	12	10	61	98	100	204053361	345012000R10
G7	30.2	91.4	35	12	10	67	105	115	204063361	345001000R10
G8	34.9	93.5	40	14	10	67	107	119	204173451	345001000R10
G9	34.9	106.0	40	14	10	78	120	124	204083461	345002000R10

See chapter 5 - Telescoping members for codes of yoke, tube, and sleeve assemblies as spare parts.

Ball collar yokes TRACTOR SIDE
RT

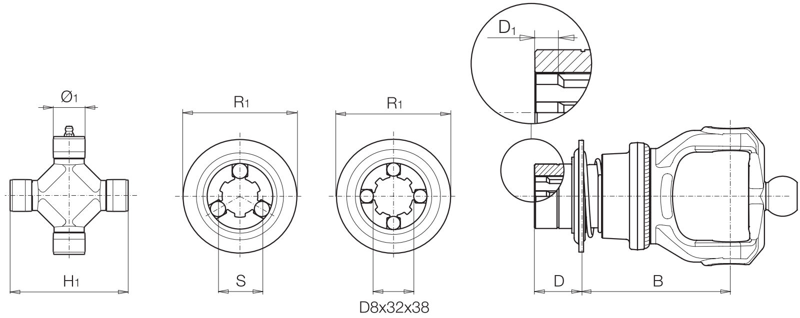


	$\varnothing_1$ mm	H_1 mm	S	R_1 mm	D mm	D_1 mm	B mm	Driveline code	Spare part code	
G2	22.0	76.0	1 3/8” Z6	95	31	2	87	**WR7**	5730C0377	435000323R
			1 3/8” Z21	95	31	2	87	**WR8**	5730C3789	435000323R
			D8x32x38	95	31	2	89	**WR6**	5730C2175	435002115R
G4	22.0	86.0	1 3/8” Z6	95	29	2	103	**WR7**	5730E0384	435000323R
			1 3/8” Z21	95	40	2	91	**WR8**	5730E3784	435000323R
			D8x32x38	95	29	2	103	**WR6**	5730E2184	435002115R
			1 3/4” Z6	120	40	2	109	**WR9**	5730E0484	435000420R
			1 3/4” Z20	120	40	2	109	**WR0**	5730E3884	453000420R
G5-G7	27.0	100.0	1 3/8” Z6	95	35	7	119	**WR7**	5730G0384	435000323R
			1 3/8” Z21	95	40	2	106	**WR8**	5730G3784	435000323R
			D8x32x38	95	35	2	119	**WR6**	5730G2184	435002117R
			1 3/4” Z6	120	40	2	120	**WR9**	5730G0484	435000420R
			1 3/4” Z20	120	40	2	120	**WR0**	5730G3884	435000420R
G8	30.2	106.0	1 3/8” Z6	95	38	2	123	**WS7**	5730L0387	435000323R
			1 3/8” Z21	95	40	2	114	**WR8**	5730L3784	435000323R
			D8x32x38	95	38	2	123	**WR6**	5730L2184	435002117R
			1 3/4” Z6	120	40	2	127	**WR9**	5730L0484	435000420R
			1 3/4” Z20	120	50	2	127	**WS0**	5730L3887	435000420R

Yokes for 80° constant velocity joints

Ball collar yokes IMPLEMENT SIDE

RT



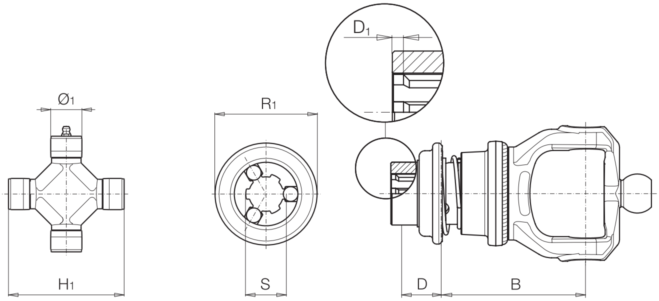
	Ø1 mm	H1 mm	S	R1 mm	D mm	D1 mm	B mm	Driveline code	Spare part code	
G2	22.0	76.0	1 3/8” Z6	95	31	2	87	**WR7**	5730C0377	435000323R
			1 3/8” Z21	95	31	2	87	**WR8**	5730C3789	435000323R
			D8x32x38	95	31	2	89	**WR6**	5730C2175	435002115R
G4	22.0	86.0	1 3/8” Z6	95	29	2	103	**WR7**	5730E0384	435000323R
			1 3/8” Z21	95	40	2	91	**WR8**	5730E3784	435000323R
			D8x32x38	95	29	2	103	**WR6**	5730E2184	435002115R
			1 3/4” Z6	120	40	2	109	**WR9**	5730E0484	435000420R
			1 3/4” Z20	120	40	2	109	**WR0**	5730E3884	453000420R
G5-G7	27.0	100.0	1 3/8” Z6	95	35	7	119	**WR7**	5730G0384	435000323R
			1 3/8” Z21	95	40	2	106	**WR8**	5730G3784	435000323R
			D8x32x38	95	35	2	119	**WR6**	5730G2184	435002117R
			1 3/4” Z6	120	40	2	120	**WR9**	5730G0484	435000420R
			1 3/4” Z20	120	40	2	120	**WR0**	5730G3884	435000420R
G8	30.2	106.0	1 3/8” Z6	95	38	10	123	**WR7**	5730L0384	435000323R
			1 3/8” Z21	95	40	2	114	**WR8**	5730L3784	435000323R
			D8x32x38	95	38	2	123	**WR6**	5730L2184	435002117R
			1 3/4” Z6	120	40	2	127	**WR9**	5730L0484	435000420R
			1 3/4” Z20	120	50	14	127	**WR0**	5730L3884	435000420R

BONDIOLI & PAVESI

Yokes for 80° constant velocity joints

Automatic ball collar yokes TRACTOR SIDE

RTA

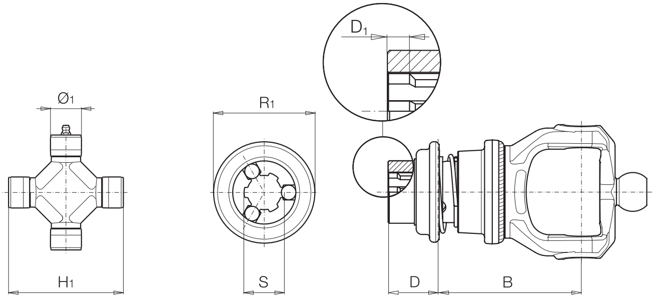


	Ø1 mm	H1 mm	S	R1 mm	D mm	D1 mm	B mm	Driveline code	Spare part code	
G4	22.0	86.0	1 3/8" Z6	88	29	2	103	**WQ7**	5730E0391	435000311R
			1 3/8" Z21	88	40	2	91	**WQ8**	5730E3791	435000311R
			1 3/4" Z6	110	40	2	109	**WQ9**	5730E0491	435000411R
			1 3/4" Z20	110	40	2	109	**WQ0**	5730E3891	435000411R
G5-G7	27.0	100.0	1 3/8" Z6	88	35	7	119	**WQ7**	5730G0391	435000311R
			1 3/8" Z21	88	40	2	106	**WQ8**	5730G3791	435000311R
			1 3/4" Z6	110	40	2	120	**WQ9**	5730G0491	435000411R
			1 3/4" Z20	110	40	2	120	**WQ0**	5730G3891	435000411R
G8	30.2	106.0	1 3/8" Z6	88	38	2	123	**WP7**	5730L0392	435000311R
			1 3/8" Z21	88	40	2	114	**WQ8**	5730L3791	435000311R
			1 3/4" Z6	110	40	2	127	**WQ9**	5730L0491	435000411R
			1 3/4" Z20	110	50	2	127	**WP0**	5730L3892	435000411R

Yokes for 80° constant velocity joints

Automatic ball collar yokes IMPLEMENT SIDE

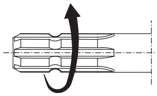
RTA

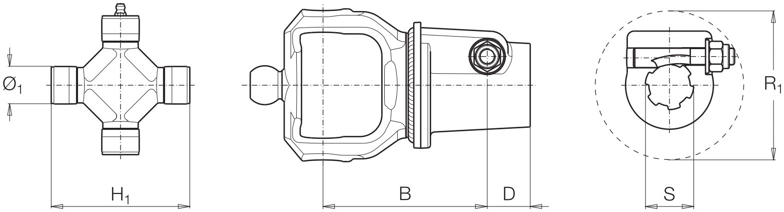


	$Ø_1$ mm	H_1 mm	S	R_1 mm	D mm	D_1 mm	B mm	Driveline code	Spare part code	
G4	22.0	86.0	1 3/8” Z6	88	29	2	103	**WQ7**	5730E0391	435000311R
			1 3/8” Z21	88	40	2	91	**WQ8**	5730E3791	435000311R
			1 3/4” Z6	110	40	2	109	**WQ9**	5730E0491	435000411R
			1 3/4” Z20	110	40	2	109	**WQ0**	5730E3891	435000411R
G5-G7	27.0	100.0	1 3/8” Z6	88	35	7	119	**WQ7**	5730G0391	435000311R
			1 3/8” Z21	88	40	2	106	**WQ8**	5730G3791	435000311R
			1 3/4” Z6	110	40	2	120	**WQ9**	5730G0491	435000411R
			1 3/4” Z20	110	40	2	120	**WQ0**	5730G3891	435000411R
G8	30.2	106.0	1 3/8” Z6	88	38	10	123	**WQ7**	5730L0391	435000311R
			1 3/8” Z21	88	40	2	114	**WQ8**	5730L3791	435000311R
			1 3/4” Z6	110	40	2	127	**WQ9**	5730L0491	435000411R
			1 3/4” Z20	110	50	14	127	**WQ0**	5730L3891	435000411R

Yokes for 80° constant velocity joints

Taper pin yokes for counter-clockwise rotating drivelines

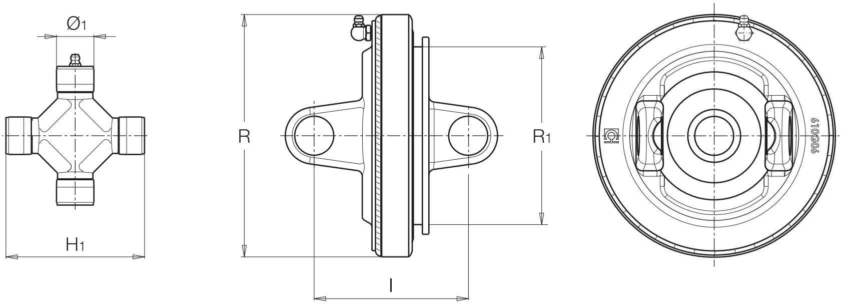




	Ø1 mm	H1 mm	S	B mm	D mm	R1 mm	Driveline code	Spare part code	
G4	22.0	86.0	1 3/8” Z6	103	31	106	**W14**	5110E0361	408000075R
			1 3/8” Z21	91	31	106	**W15**	5110E3761	408000075R
G5-G7	27.0	100.0	1 3/8” Z6	119	31	106	**W14**	5110G0361	408000075R
			1 3/8” Z21	106	31	106	**W15**	5110G3761	408000075R
			1 3/4” Z6	120	31	126	**W16**	5110G0461	408000076R
			1 3/4” Z20	120	31	126	**W17**	5110G3861	408000076R
G8	30.2	106.0	1 3/8” Z6	126	31	106	**W14**	5110L0361	408000075R
			1 3/8” Z21	114	31	106	**W15**	5110L3761	408000075R
			1 3/4” Z6	127	31	126	**W16**	5110L0461	408000076R
			1 3/4” Z20	127	31	126	**W17**	5110L3861	408000076R

Yokes for 80° constant velocity joints

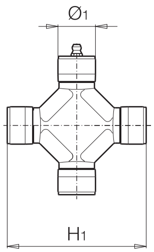
Central housing

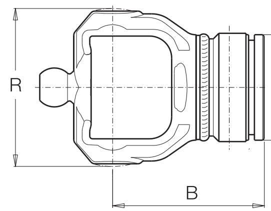


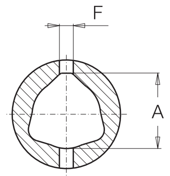
	$Ø_1$ mm	H_1 mm	I mm	R mm	R_1 mm	Spare part code
G2	22.0	76.0	85	127	101	5110C0053
G4	22.0	86.0	93	140	101	5110E0052
G5-G7	27.0	100.0	112	175	128	5110G0061
G8	30,2	106,0	119	190	146	5110L0063

Yokes for 80° constant velocity joints

Yokes for outer tube

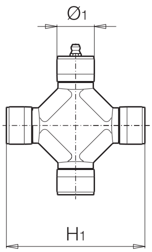


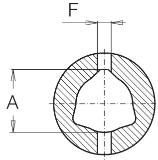


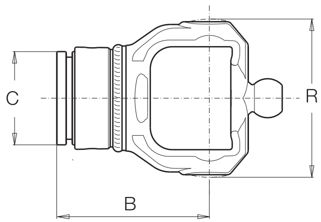


	$Ø_1$ mm	H_1 mm	R mm	B mm	C mm	F mm	A mm	Spare part code	
G2	22.0	76.0	88	102	54	8	36.0	2150C6864	341048000R10
G4	22.0	86.0	96	99	61	8	43.5	2150E6885	341038000R10
G5	27.0	100.0	106	109	70	10	51.6	2150G6891	341053000R10
G7	27.0	100.0	106	109	76	10	54.0	2150G6893	341042000R10
G8	30.2	106.0	123	124	88	12	54.0	2150L6875	341042000R10

Yokes for inner tube



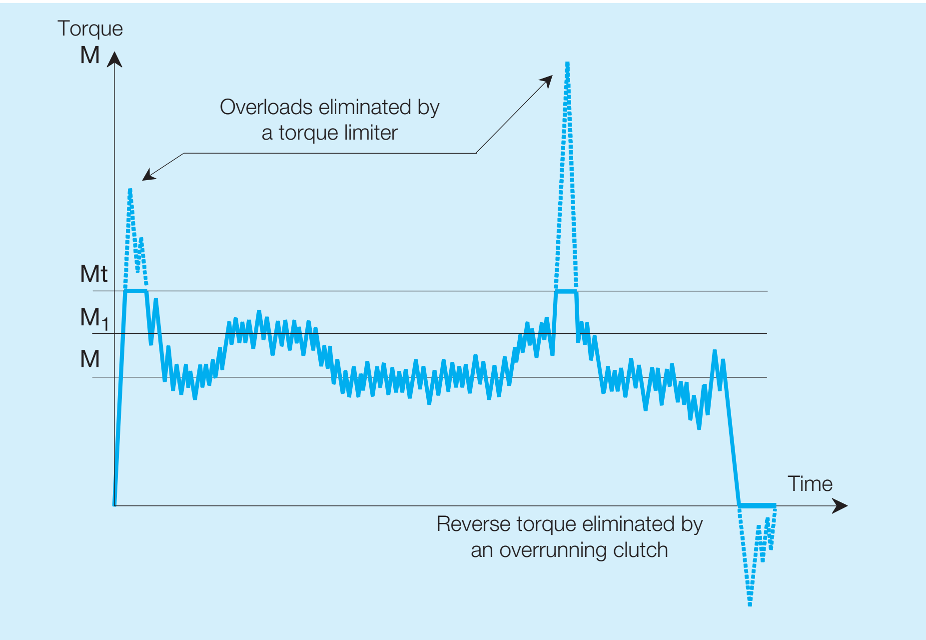




	$Ø_1$ mm	H_1 mm	R mm	B mm	C mm	F mm	A mm	Spare part code	
G2	22.0	76.0	88	102	47	8	29.0	2150C6865	341036000R10
G4	22.0	86.0	96	99	54	8	36.0	2150E6887	341048000R10
G5	27.0	100.0	106	109	61	10	45.0	2150G6892	341053000R10
G7	27.0	100.0	106	109	67	10	45.0	2150G6894	341053000R10
G8	30.2	106.0	123	124	76	12	45.0	2150L6876	341053000R10

Torque limiters and overrunning clutches

Implements are designed to work for a certain lifetime, determined by a specific duty cycle associated with the application. Due to accidental overloads or unusual working conditions, loads may exceed what is considered normal. When this happens, the implement must absorb whatever power is available from the tractor. Generally, the tractor can supply more power than the implement can reliably absorb.
Extremely high torque peaks can be generated by overloads, blockages, or sudden starts and stops of the implement. Eventually, these torque peaks may cause premature wear of the driveline and other implement components. Protection against overloads is achieved by installing a torque limiter or clutch on the driveline to help prevent damage and allow more rational sizing of power transmission components.
Different types of torque limiters and clutches are available. They should be selected according to the specific features of each implement and the particular duty cycle involved.
The torque absorbed by a farm implement usually varies, such as shown in the following diagram. Along with normal working conditions (torque M), variations occur (torque M_1), and overloads (shown eliminated by a torque limiter Mt) are possible as well.
For implements with high inertia (flywheels, heavy rotors), torque peaks are possible during startup and stopping. The reverse loads caused by stopping these types of implements are eliminated by an overrunning clutch.



Torque limiters and overrunning clutches

The type of torque limiter must be selected according to the type of loads transmitted to the implement. The setting (Mt) is made according to the median torque transmitted (M) and to the torque limit of the system (Mmax for the driveline).
When determining the setting, it is recommended to consider a tolerance of at least ±10% with respect to the nominal value. It is also suggested to consider factors of safety with respect to the strength of the entire power transmission system.
Overrunning clutches are used to eliminate reverse torques generated by the inertial load of implements with large rotating masses such as flywheels. These reverse loads occur during deceleration or stopping the implement.
The torsionally resilient joints are able to limit torque peaks by temporarily absorbing them. This smoothes vibrations and alternating loads that generate fatigue stresses in the driveline.
Ratchet torque limiters, shear bolt limiters and automatic torque limiters are used with implements with constant or alternating torque cycles, with possible overloads or torque peaks. The setting (Mt) of these torque limiters is usually 2 to 3 times the median torque M.
In respect to torque limiter settings and the nominal torque Mn of the driveline, adequate settings for LR automatic torque limiter (used at 1000 min^{-1}) are defined. These settings are marked with (*) in the charts on the following pages.
It is suggested to use ratchet torque limiters for drivelines operating at a speed of 700 min^{-1} or less.

Friction torque limiters are used on implements with alternating torque cycles and frequent overloads. They are able to protect the drive system from overloads, but allow work to continue without stopping.
Friction torque limiters with incorporated overrunning clutches are used on implements with high inertia (flywheels, rotors), subject to torque peaks (especially during start up) and overloads.
The setting of friction torque limiters (Mt) is usually 2 times the median torque M.
Standard settings for friction clutch torque limiters have been defined considering the pressure on the linings and the slipping velocity. As a consequence, maximum suggested settings have been defined for each friction torque limiter model and size, for drivelines operating at 1000 min^{-1}.
These settings are marked with (*) and shown on the following pages.

Overrunning clutches and torsionally resilient joints

	G1	G2	G3	G4	G5	G7	G8	G9
Mmax (Nm):	750	1050	1700	2000	2500	2900	3500	3900
Overrunning clutch weekly lubrication **RA** - Overrunning clutch permanently lubricated **RL**								
	RA1	RA1	RA1	RA1	RA1			
					RA2	RA2	RA2	
								RLA
Torsionally resilient joints **GE**								
				GE4	GE4			
						GE6		
							GE8	GE8

Standard settings

	G1	G2	G3	G4	G5	G7	G8	G9
Mmax (Nm):	750	1050	1700	2000	2500	2900	3500	3900
Ratchet torque limiters, uni-directional, weekly lubrication **SA**								
SA1	400							
SA2	650	650						
		800						
SA3		900						
			1000	1000				
			1200	1200	1200			
SA4			1400	1400	1400	1400		
			1600	1600	1600	1600		
Ratchet torque limiters, symmetrical, weekly lubrication **LN**								
LN1	300							
LN2	460							
	600	600						
LN3		800						
		900						
LN4			1000	1000				
			1200	1200	1200			
Shear bolt torque limiters								
LB	650							
	700							
		950						
		1050						
			1400	1400				
			1700	1700				
				2000				
					2100			
					2400	2400		
						2700	2700	3000
							3200	3500

Mmax: maximum torque allowed for driveline with regular triangle tubes.
Settings marked with (*) are suggested for use at 1000 min^{-1}.

Torque limiters and overrunning clutches

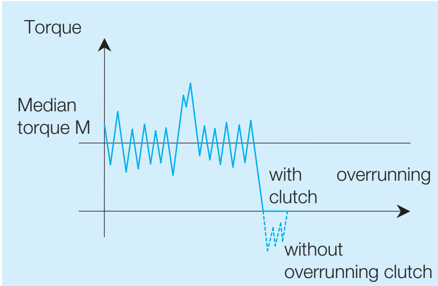
Mmax (Nm):	G1 750	G2 1050	G3 1700	G4 2000	G5 2500	G7 2900	G8 3500	G9 3900
Automatic torque limiters								
LR23				*1200 1500 1700	*1500 1700 1900 2100	*2100		
LR24						2600	*2500 3000	*2500 3000
LR35								3500
Adjustable friction torque limiters								
FV22 - FFV22	*400 500	*500 600	*600 800	800				
FV32 - FFV32				*900 1000	900 1000 *1100	900 1000 *1100		
FV42 - FFV42					1200	*1200 1350 1450	1350 *1450 1600 1800	1350 *1450 1600 1800
FV34 - FFV34					1200	*1200 1350 1450	1350 *1450 1600 1800	*1800 2000
FV44 -FFV44							1800	*1800 2000 2200
Non-adjustable friction torque limiters								
FT22 - FK22	*400 500	*500 600	*600 800	800				
FT32 - FK32				*900 1000	900 1000 *1100			
FT42 - FK42					1200	*1200 1450	*1450 1800	
FT34 - FK34					1200	*1200 1450	*1450 1800	*1800
FT44 - FK44							1800	*1800 2200

Torque limiters and overrunning clutches

	G1	G2	G3	G4	G5	G7	G8	G9
Mmax (Nm):	750	1050	1700	2000	2500	2900	3500	3900
Adjustable friction torque limiters with overrunning clutch								
FNV34 - FFNV34					1200	*1200		
						1350	1350	
						1450	*1450	
							1600	
							1800	*1800
								2000
FNV44 - FFNV44							1800	*1800
								2000
								2200
Non-adjustable friction torque limiters with overrunning clutch								
FNT34					1200	*1200		
						1450	*1450	
							1800	*1800
FNT44							1800	*1800
								2200

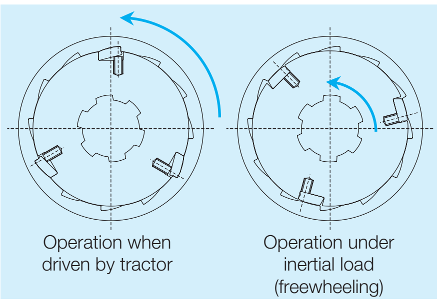
Mmax: maximum torque allowed for driveline with regular triangle tubes.
Settings marked with (*) are suggested for use at 1000 min^{-1}.

An overrunning clutch transmits rotary motion only in one direction. It is used to eliminate torque peaks generated by the inertia of implements with heavy rotating masses, such as rotors or flywheels during deceleration or stopping.
A standard overrunning clutch is designed to operate with counter-clockwise rotation of the driveline on which it is installed. This is the typical rotation of an overrunning clutch installed on the implement side of a driveline connecting a tractor's rear-mounted PTO (clockwise rotation viewed into the shaft) to the implement PIC (counter-clockwise rotation viewed into the shaft), as shown below.
During normal operation (tractor driving implement), the three pawls transmit motion from the housing to the hub. During sudden deceleration or stopping, the driveline is driven by the inertia of the implement, which is connected to the hub of the overrunning clutch.
The pawls are depressed into grooves machined into the hub, and consequently motion is not transmitted to the housing or other driveline components.
The pawls, under pressure from the underlying springs, automatically reengage the grooves in the housing when transmission of motion is restored in the normal direction.

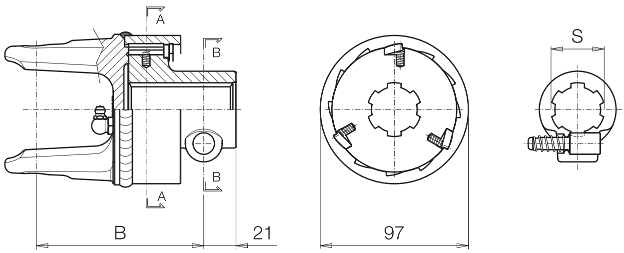


Three sizes of overrunning clutches are available, with different lengths of pawls and attachments to the PTO.
- **RA1:** Push-pin attachment, for sizes **G1, G2, G3, G4 and G5**.
- **RA2:** Taper pin attachment, for sizes **G5, G7 and G8**.
- **RLA:** RT ball collar attachment, for size **G9**.

Versions RA1 and RA2 are equipped with a grease fitting and lubrication is recommended every 50 hours of use with NLGI grade 2 grease.
The RLA version overrunning clutches are lubricated with grease during assembly.



RA1



Maximum torque 2400 Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	94	94	- -	- -
G2	100	100	- -	- -
G3-G4	109	109	- -	- -
G5	112	112	- -	- -

Driveline codes RA1

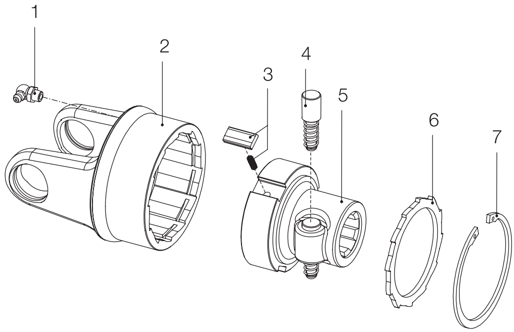
	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
	096	**631**	**- -**	**- -**

Spare parts codes RA1

	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	601101701R	601101702R	- -	- -
G2	601102701R	601102702R	- -	- -
G3-G4	601104701R	601104702R	- -	- -
G5	601105704R	601105702R	- -	- -

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

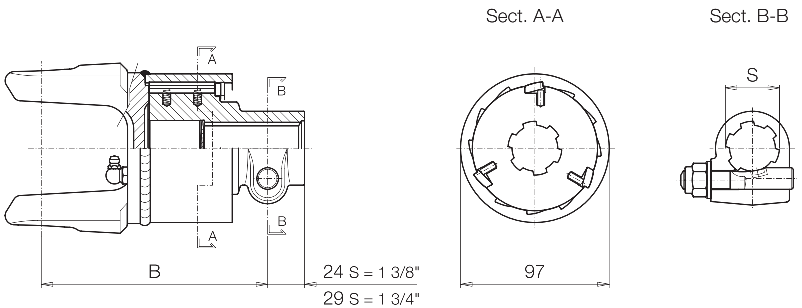
RA1



Ref	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G1**	418011201R	Outer housing + yoke	
	G2	418021201R		
	G3-G4	418041203R		
	G5	418051201R		
3		4210C0001R03	Pawl + spring kit	
4		403000001R10	Push-pin kit	
5		5130C0301R	Hub with push-pin	1 3/8” Z6
		5130C3701R		1 3/8” Z21
6		246000132R02	Locking plate	
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

Overrunning clutches

RA2



Maximum torque 3800 Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	140	140	142	142
G7	147	147	149	149
G8	160	160	162	162

Driveline codes RA2

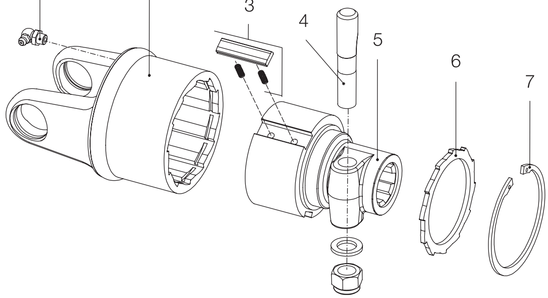
	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
	A50	**A51**	**A52**	**A53**

Spare parts codes RA2

	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	601205601R	601205602R	601205603R	601205604R
G7	601206601R	601206602R	601206603R	601206604R
G8	601217601R	601217602R	601217603R	601217604R

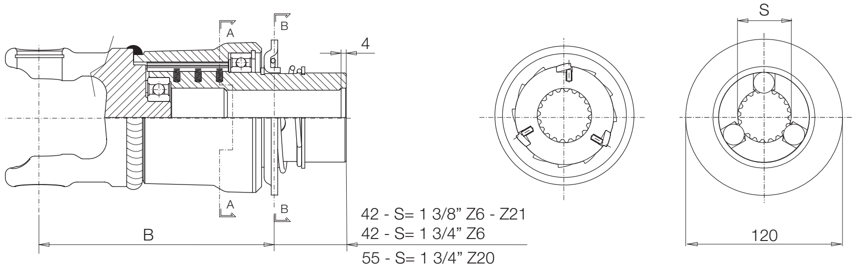
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

RA2



Ref	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G5** **G7** **G8**	418052203R 418062203R 418172203R	Outer housing + yoke	
3		4210E0001R03	Pawl + spring kit	
4		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
5		5150E0301R 5150E3701R 5150E0401R 5150E3801R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
6		246000132R02 246000134R02	Locking plate Split locking plate	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

RLA
(permanent lubrication)



Maximum torque	B (mm)			
6200 Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G9	193	193	193	193

Driveline codes RLA

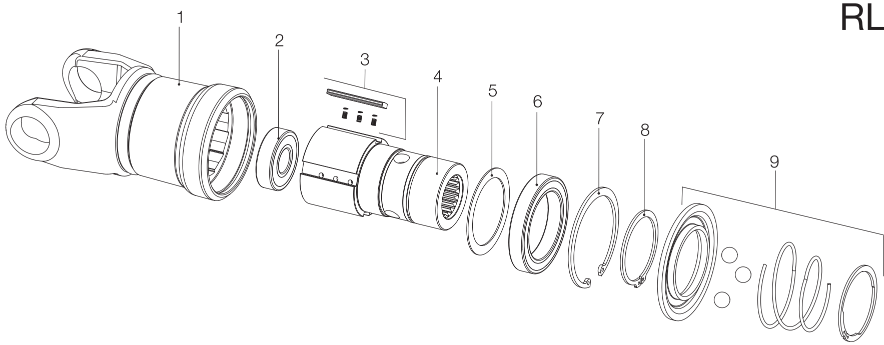
	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
	A33	**A34**	**A36**	**A37**

Spare parts codes RL3

	B (mm)			
	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G9	60170M101R	60170M102R	60170M103R	60170M104R

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

RLA



Ref.	Size	Spare part code	Description	Technical data
1	G9	4180M7010R	Outer Housing + Yoke	
2		354108025R	Bearing	6305 (25x62x17)
3	G9	4210G0001R03		
4	G9	2270G0306R 2270G3706R 2270G0406R 2270G3806R	Hub	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
5		340070014R	Spacer	
6		354114070R	Bearing	61914 (70x100x16)
7		338000100R20	Snap ring	100 x 3,0 DIN 472/1
8		337001070R20	Snap ring	70 x 2,5 DIN 471/1
9		435000341R 435000440R	RT ball collar kit	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20

Torsionally resilient joints

The GE torsionally resilient joint is used on drivelines for different functions depending upon the specific application

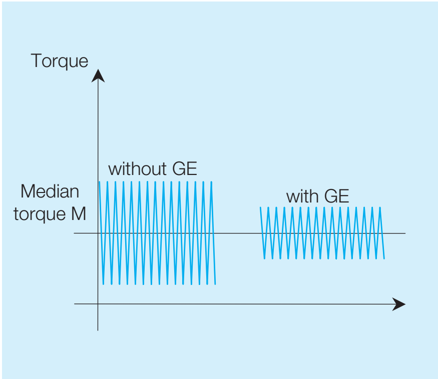
- The GE can reduce torque peaks generated by the inertia of machines with heavy flywheels or rotors during abrupt starts or deceleration.
- The GE can smooth alternating or pulsating loads that may shorten the life of power transmission components.
- The GE can modify the natural frequency of a system, to avoid resonance events that could cause failures.
- The GE can smooth torsional vibrations generated by unequal working angles on drivelines with more than one joint.

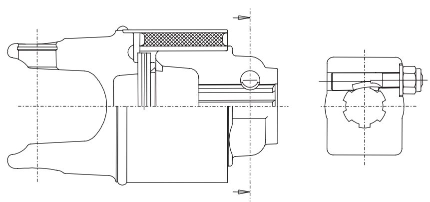
A rubber ring within the GE operates like a torsional spring. This rubber ring connects the yoke / housing to the hub. The rubber is vulcanized to both the inner and outer metal surfaces to prevent the hub from slipping and to maintain phasing of the yokes.

The GE torsionally resilient joint has an internal limit pin that constrains flexure to ± 20°. This avoids excessive deformations that could create failure of the components.

GE torsionally resilient joints can be supplied without the 20° limit pin upon request.

In case of high torque peaks, it is sometimes recommended to install a torque limiter (e.g. automatic torque limiter or shear bolt torque limiter).





GE torsionally resilient joints are installed at the end of the driveline, outboard the inner yokes. Consequently the joints maintain proper phasing even when the hub is deformed to its flexural limit.

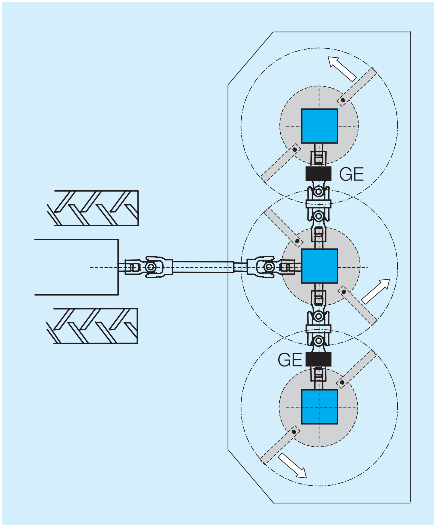
Torsionally resilient joints

GE torsionally resilient joint is supplied in three models:
- GE4 for sizes G4 and G5
- GE6 for size G7
- GE8 for size G8.

The typical operating features of the torsionally resilient joint are expressed by torsional rigidity (R) and torque at maximum deformation (M_{20}). Beyond the latter value, torque will be transmitted without resiliency. It is recommended to consider these parameters when selecting the proper joint and to use a torque limiter (e.g. shear bolt) able to eliminate torque peaks exceeding torque at maximum deformation M_{20}.
Torsional rigidity is defined as the torque that creates 1° angular deformation of the torsionally resilient joint. This is an indicative value; in fact, deformation of rubber parts is linear only with small deformations. The torque at maximum deformation ($M_{20°}$) and the torsional rigidity (R) of the GE varies according to the Shore hardness of the rubber (see chart below). GE6 torsionally resilient joints can be supplied with rubber in either 55 or 65 Shore hardness.

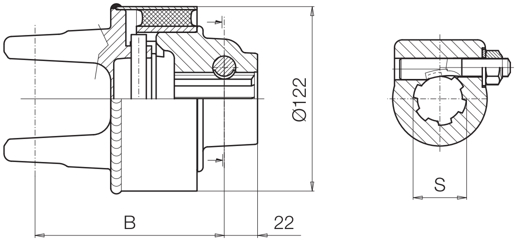
	Shore hardness	R Nm/(°)	M20° Nm
GE4	65 Sh	50	1700
GE6	55 Sh	50	1700
	65 Sh	100	3000
GE8	65 Sh	250	5000

Cardan shafts with torsionally resilient joints are often used on multi-spindle rotary cutters, whose blades have overlapping cutting edges.



When an overload slows a rotor, the GE joint can absorb the inertia of the rotor as a deformation of the elastic member.
The amplitude of this deformation varies with respect to the torsional rigidity of the elastic member and the 20° limit pin.
The torsionally resilient joint can reduce overloads but still maintain proper phasing of the rotors. Unlike other torque limiters (e.g. friction clutch), this avoids collision and damage to the blades.
Torsionally resilient joints can also smooth vibrations, alternating, and / or pulsating loads that could generate fatigue stress in the driveline.

GE4



	B (mm) S = 1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20
G4	125	125	- -	- -
G5	134	134	- -	- -

Driveline codes GE4

M20° Nm	Shore hardness	S = 1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20
1700	65 Sh	**0D4**	**0D5**	- -	- -

GE4 spare parts codes

		S = 1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20
G4	65 Sh	608E46501R	608E46502R	- -	- -
G5	65 Sh	608G46501R	608G46502R	- -	- -

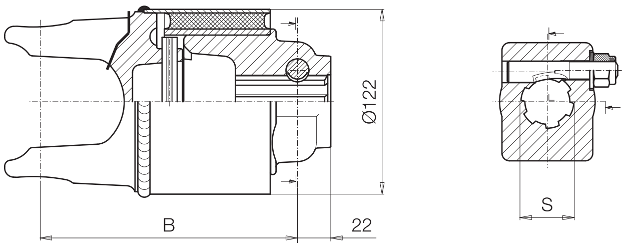
Codes for taper pins

S = 1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20
408000047R02	408000047R02	- -	- -

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

Torsionally resilient joints

GE6



	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G7	170	170	170	170

Driveline codes GE6

M20° Nm	Shore hardness	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1700	55 Sh	**0D0**	**0D1**	**0D2**	**0D3**
3000	65 Sh	**0D4**	**0D5**	**0D6**	**0D7**

GE6 spare parts codes

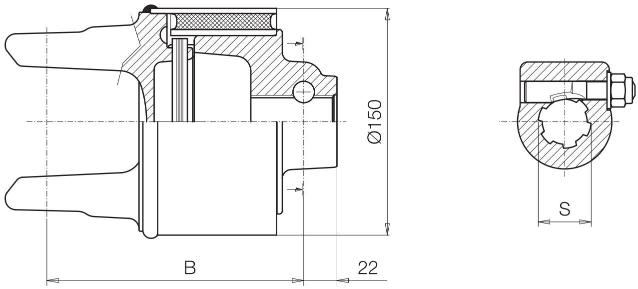
		S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G7	55 Sh	608H65501R	608H65502R	608H65503R	608H65504R
	65 Sh	608H66501R	608H66502R	608H66503R	608H66504R

Codes for taper pins

S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
408000047R02	408000047R02	408000046R02	408000046R02

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

GE8



	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	169	169	169	169
G9	170	170	170	170

Driveline codes GE8

M20° Nm	Shore hardness	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5000	65 Sh	**0D4**	**0D5**	**0D6**	**0D7**

GE8 spare parts codes

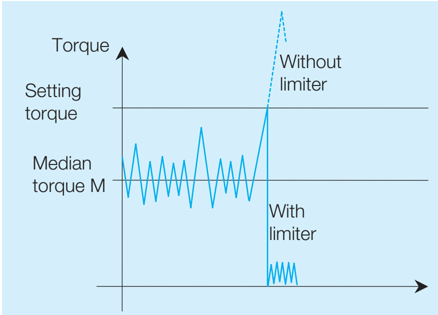
	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	608L86501R	608L86502R	608L86503R	608L86504R
G9	608M86501R	608M86502R	608M86503R	608M86504R

Codes for taper pins

S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
408000047R02	408000047R02	408000046R02	408000046R02

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

A ratchet torque limiter is a device able to interrupt the transmission of power in the event of a torque peak or overload that exceeds the setting. The torque limiter is automatically re-engaged after the cause of the overload is removed. Ratchet torque limiters are generally employed to protect implements subject to constant or alternating torques from overloads.
The setting is normally two to three times the median torque to be transmitted.
When the device is slipping, the user should promptly stop the PTO to avoid excessive wear.
Ratchet torque limiters should be used only on drivelines operating at speeds less than 700 min^{-1}.
Ratchet torque limiters may be supplied in either symmetrical (LN) or one-way types (SA). Their lubrication interval is 50-hours with NLGI 2 grease.
SA1 and SA2 models (with one and two rows of ratchets, respectively) have a push pin attachment. SA3 and SA4 models (with three and four rows of ratchets, respectively) have a ball collar attachment.

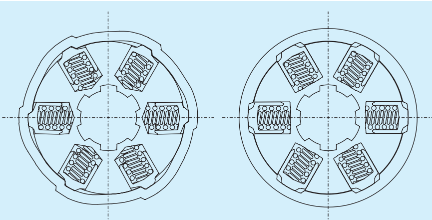


Standard settings (Nm)

	SA1	SA2	SA3	SA4
G1	400	650	-	-
G2	-	650 800	900	-
G3-G4	-	-	1000 1200	1400 1600
G5	-	-	1200	1400 1600
G7	-	-	-	1400 1600

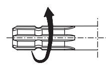
Standard settings (Nm)

	LN1	LN2	LN3	LN4
G1	300	460 600	-	-
G2	-	600	800 900	-
G3-G4	-	-	-	1000 1200
G5	-	-	-	1200



One-way SA

Symmetrical LN

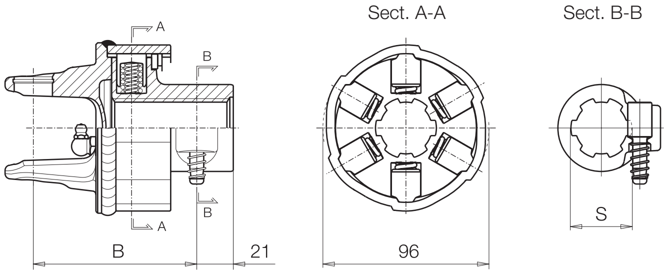


Standard one-way ratchet torque limiters are designed to operate on a driveline with counter-clockwise rotation. It transmits approximately 15% of the rated torque in the opposite direction.
Symmetrical ratchet torque limiters transmit the same torque in both direction of rotation.

Ratchet torque limiters

SA1

one-way



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	400	94	- -	- -	- -

Driveline codes SA1

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
400	**117**	**- -**	**- -**	**- -**

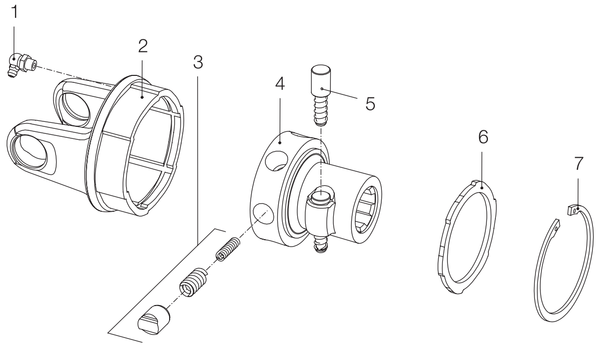
SA1 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
G1	400	610124001R	- -	- -	- -	6	6

To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

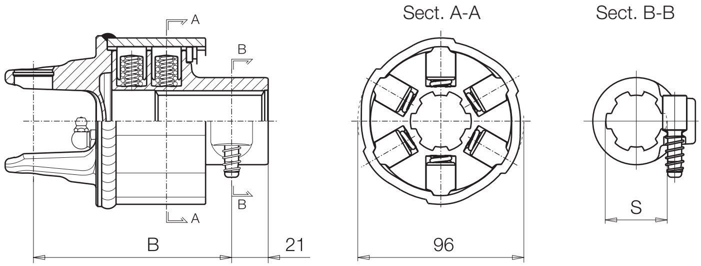
SA1
one-way



Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G1**	422011020R	Outer housing + yoke	
3		421340001R06	Ratchet + spring kit	
4		513340302R	Hub with push-pin	1 3/8” Z6
5		403000001R10	Push-pin kit	
6		240000033R02	Locking plate	
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

Ratchet torque limiters

SA2
one-way



	Setting Nm		B (mm)		
		S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	650	114	- -	- -	- -
G2	650	120	- -	- -	- -
	800				

Driveline codes SA2

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
650	**128**	- -	- -	- -
800	**136**	- -	- -	- -

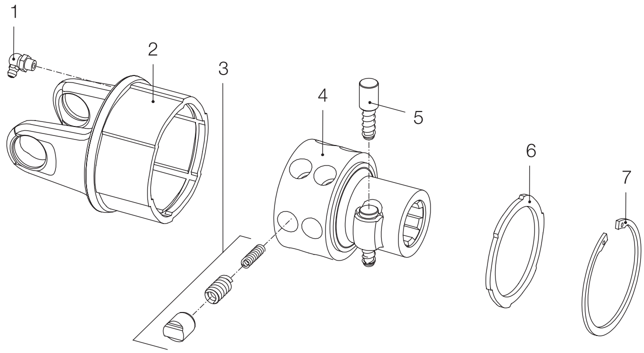
SA2 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
G1	650	610234001R	- -	- -	- -	12	3
G2	650	611234005R	- -	- -	- -	12	3
	800	611239001R	- -	- -	- -	12	12

To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

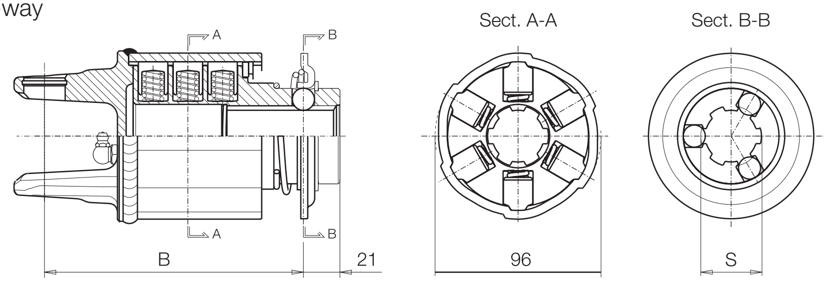
SA2
one-way



Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G1** **G2**	422012020R 422022020R	Outer housing + yoke	
3		421340001R06	Ratchet + spring kit	
4		513350302R	Hub with push-pin	1 3/8” Z6
5		403000001R10	Push-pin kit	
6		240000033R02	Locking plate	
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

Ratchet torque limiters

SA3
one-way



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G2	900	149	- -	- -	- -
G3-G4	1000 1200	158	- -	- -	- -
G5	1200	161	- -	- -	- -

Driveline codes SA3

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
900	**153**	**- -**	**- -**	**- -**
1000	**156**	**- -**	**- -**	**- -**
1200	**159**	**- -**	**- -**	**- -**

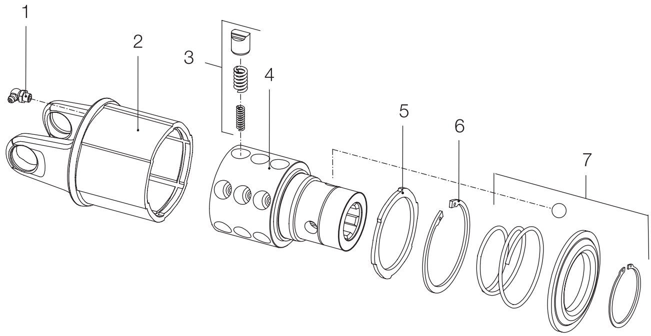
SA3 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
G2	900	611341501R	- -	- -	- -	18	0
G3-G4	1000	613344501R	- -	- -	- -	18	6
	1200	613348501R				18	18
G5	1200	614348501R	- -	- -	- -	18	18

To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

SA3
one-way

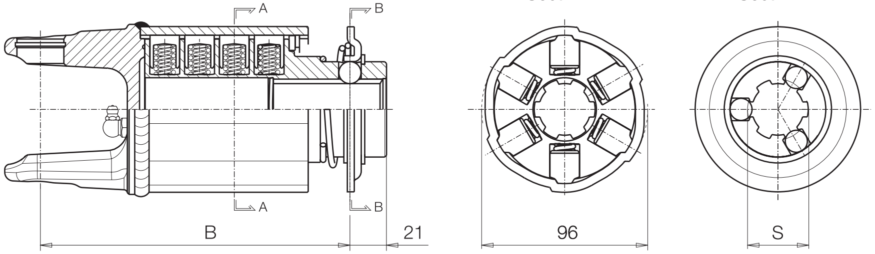


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G2** **G3-G4** **G5**	422023020R 422043020R 422053020R	Outer housing + yoke	
3		421340001R06	Ratchet + spring kit	
4		2270Q0303R	Hub	1 3/8” Z6
5		240000033R02	Locking plate	
6		338005000R20	Snap ring	82 x 2.5 DIN 472/1
7		435000321R	Ball collar kit	

Ratchet torque limiters

SA4

one-way



	Setting Nm	B (mm)			
		S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G3-G4	1400 1600	178	- -	- -	- -
G5	1400 1600	181	- -	- -	- -
G7	1400 1600	188	- -	- -	- -

Driveline codes SA4

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1400	**168**	**- -**	**- -**	**- -**
1600	**170**	**- -**	**- -**	**- -**

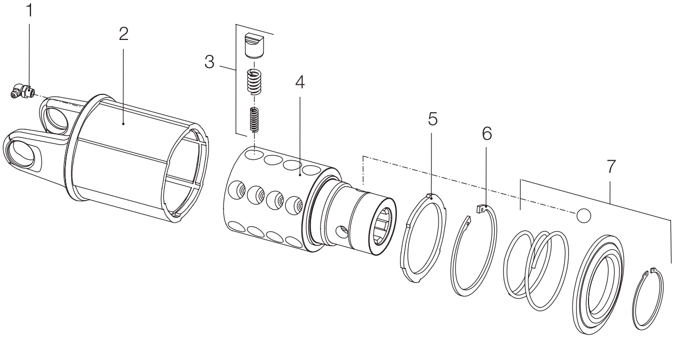
SA4 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
G3-G4	1400	613452501R	- -	- -	- -	24	11
	1600	613456501R				24	24
G5	1400	614452501R	- -	- -	- -	24	11
	1600	614456501R				24	24
G7	1400	615452501R	- -	- -	- -	24	11
	1600	615456501R				24	24

To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

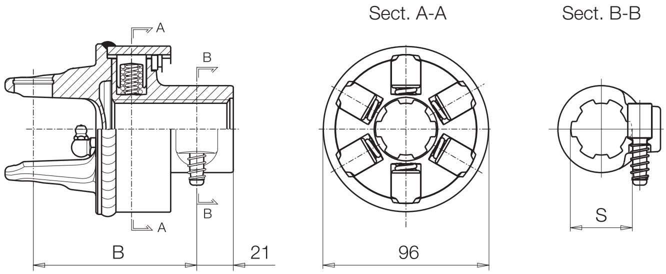
SA4
one-way



Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G3-G4** **G5** **G7**	422044020R 422054020R 422064020R	Outer housing + yoke	
3		421340001R06	Ratchet + spring kit	
4		2270R0302R	Hub	1 3/8" Z6
5		240000033R02	Locking plate	
6		338005000R20	Snap ring	82 x 2.5 DIN 472/1
7		435000321R	Ball collar kit	

Ratchet torque limiters

LN1
symmetrical



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	300	94	- -	- -	- -

Driveline codes LN1

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
300	**0E4**	**- -**	**- -**	**- -**

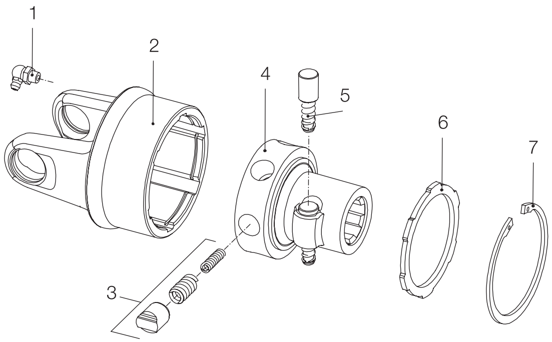
LN1 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
G1	300	60A1B1903R	- -	- -	- -	6	6

To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side. All rotating parts must be guarded.

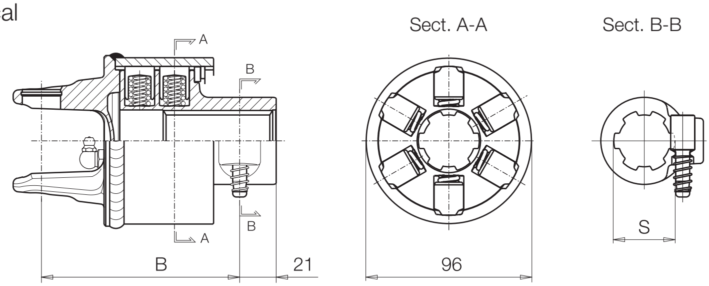
LN1
symmetrical



Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G1**	422B0S301R	Outer housing + yoke	
3		421340007R06	Ratchet + spring kit	
4		513340302R	Hub with push-pin	1 3/8” Z6
5		403000001R10	Push-pin kit	
6		240000294R02	Locking plate	
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

LN2

symmetrical



	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
		B (mm)			
G1	460	114	- -	- -	- -
	600				
G2	600	120	- -	- -	- -

Driveline codes LN2

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
460	**0E7**	**- -**	**- -**	**- -**
600	**0E9**	**- -**	**- -**	**- -**

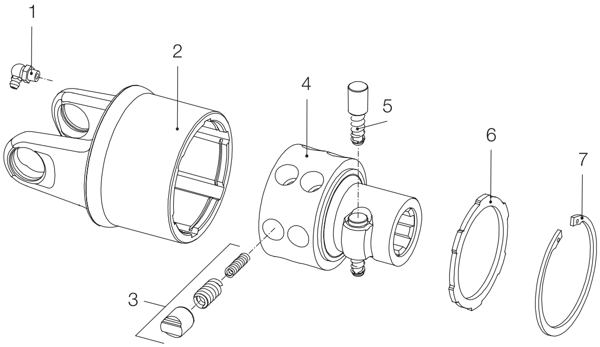
LN2 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
G1	460	60A2B2603R	- -	- -	- -	12	0
	600	60A2B3203R				12	12
G2	600	60A2C3203R	- -	- -	- -	12	12

To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

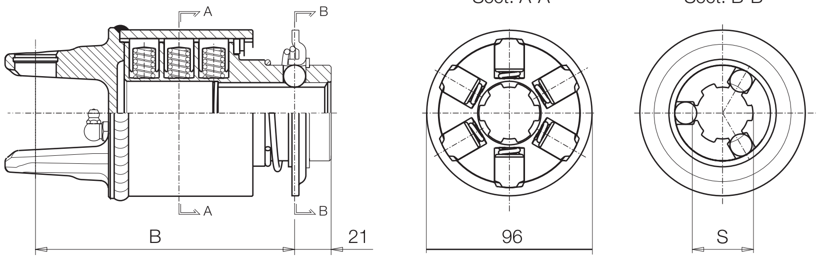
LN2
symmetrical



Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G1** **G2**	422B0T301R 422C0T301R	Outer housing + yoke	
3		421340007R06	Ratchet + spring kit	
4		513350302R	Hub with push-pin	1 3/8” Z6
5		403000001R10	Push-pin kit	
6		240000294R02	Locking plate	
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

Ratchet torque limiters

LN3
symmetrical



	Setting Nm	B (mm) S = 1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20
G2	800 900	149	- -	- -	- -

Driveline codes LN3

Setting Nm	S = 1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20
800	**0F3**	- -	- -	- -
900	**0F4**	- -	- -	- -

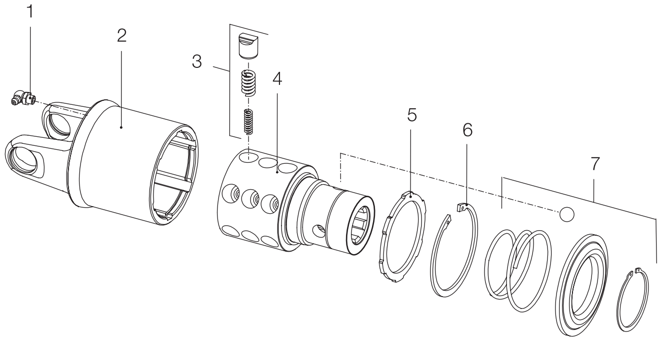
LN3 codes as spare parts

	Setting Nm	S = 1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20		
G2	800	60B3C3903R	- -	- -	- -	18	10
	900	60B3C4103R				18	18

To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

LN3
symmetrical

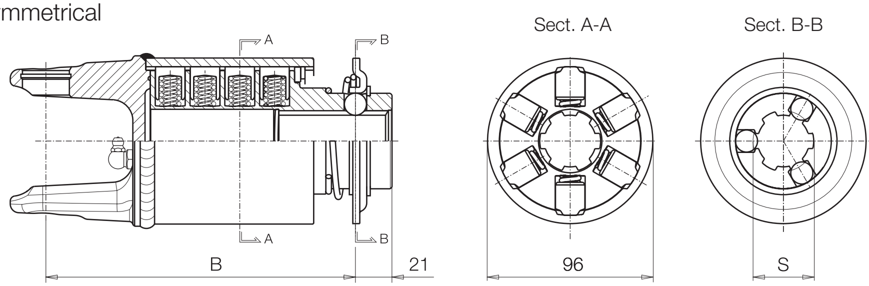


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G2**	422C0U301R	Outer housing + yoke	
3		421340007R06	Ratchet + spring kit	
4		2270Q0303R	Hub	1 3/8” Z6
5		240000294R02	Locking plate	
6		338005000R20	Snap ring	82 x 2.5 DIN 472/1
7		435000321R	Ball collar kit	

Ratchet torque limiters

LN4

symmetrical



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G3-G4	1000 1200	178	- -	- -	- -
G5	1200	181	- -	- -	- -

Driveline codes LN4

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1000	**0F7**	- -	- -	- -
1200	**0F9**	- -	- -	- -

LN4 codes as spare parts

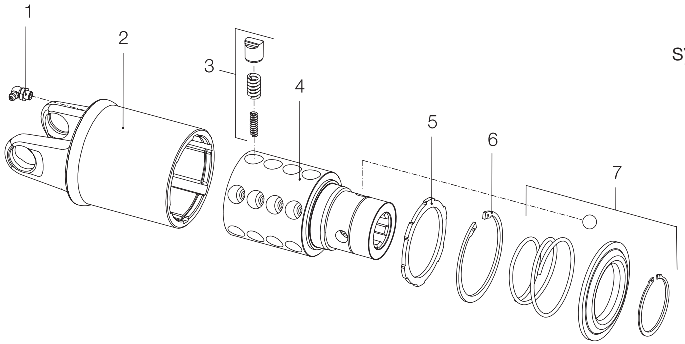
	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
G3-G4	1000	60B4E4403R	- -	- -	- -	24	9
	1200	60B4E4803R				24	24
G5	1200	60B4G4803R	- -	- -	- -	24	24

To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

BONDIOLI & PAVESI

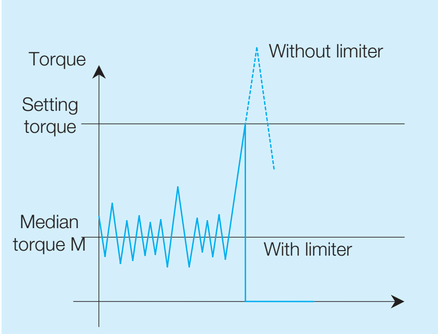
LN4
symmetrical



Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	**G3-G4** **G5**	422E0V301R 422G0V301R	Outer housing + yoke	
3		421340007R06	Ratchet + spring kit	
4		2270R0302R	Hub	1 3/8” Z6
5		240000294R02	Locking plate	
6		338005000R20	Snap ring	82 x 2.5 DIN 472/1
7		435000321R	Ball collar kit	

Shear bolt torque limiters LB

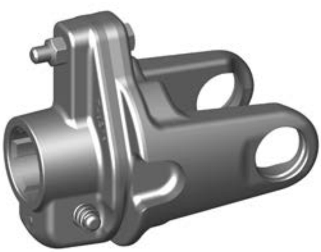
Shear bolt torque limiters type LB are devices able to interrupt power transmission when the torque transmitted exceeds the setting. This interruption in power is caused by the shearing of a bolt. This bolt must be replaced before power can be restored.
Use of shear bolt torque limiters is recommended to avoid damage to drivelines mounted on implements subject to accidental overloads or torque peaks.
The torque setting for shear bolt torque limiters is usually two or three times the median torque M and must never exceed maximum torque of the driveline (Mmax).
Standard settings for each size of driveline -according to the telescoping member used- are listed in the table to the right.
LB shear bolt limiters are designed to more evenly distribute their mass with respect to the axis of rotation, thereby helping to decrease vibrations.
LB shear bolt limiters are lubricated during assembly. No further lubrication is required for versions installed on size G1 and G2 drivelines, therefore no grease fitting is provided.
For other sizes it is recommended to lubricate at least once in a season.
The grease is necessary to lubricate the surfaces of the hub and yoke that rotate independently after the bolt has sheared.



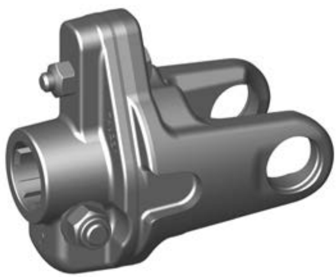
Maximum settings LB

	Nm	in·Lb
G1	700	6200
G2	1050	9300
G3	1700	15060
G4	2000	17700
G5	2400	21240
G7	2700	23900
G8	3200	28340
G9	3500	31000

LB torque limiters up to size G4 have push-pin attachment to the PTO. Larger sizes use a taper-pin attachment.



LB with push pin for
sizes G1 - G2 - G3 - G4



LB with taper-pin
for sizes G5 - G7 - G8-G9

Shear bolt torque limiters LB

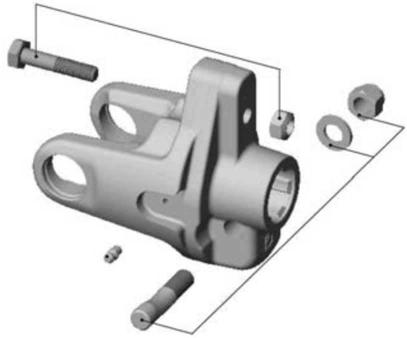
LB shear bolt limiters are integrated devices that cannot be separated after assembly. Components supplied as spare parts include the complete torque limiter, shear bolts (packaged in quantities of five pieces, including the nuts), push-pins or taper pins, and grease fittings.

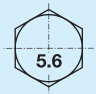
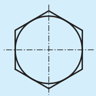
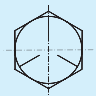
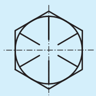
Bolts used on standard LB shear bolt limiters are metric class 8.8, steel, with a minimum strength (R_m) equal to 800 N/mm^2. ISO standards and SAE standards (for USA) for shear bolts with corresponding strengths (Rm) are tabulated to the right.
The setting is increased by approximately 20% when replacing the standard class 8.8 bolt with one of the same diameter but class 10.9.
Standard bolts are partially threaded, and the nominal settings usually are referenced to shearing on the un-threaded shank of the bolt.
The nominal setting is reduced approximately 20% when replacing the standard bolt with another of the same class, but will shear on the threaded portion of the bolt.

Recommended tightening torques for standard bolts.

Recommended tightening torques		
	Nm	in·Lb
M6	10.4	92
M8	25.0	221
M10	50.0	443
M12	86.0	761

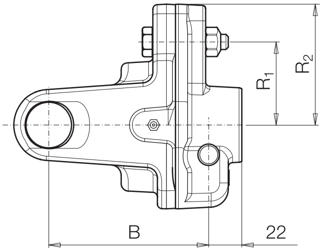
For the safety of the operator and reliable function of the driveline, replace the bolt only with one equal in length, diameter, and grade as the original.

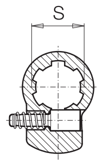


ISO standard	Class	Rm minimum
	**5.6**	500 N/mm^2
	**8.8**	800 N/mm^2
	**10.9**	1000 N/mm^2
SAE standard	**Class**	**Rm minimum**
	**2**	74000 psi 510 N/mm^2
	**5**	120000 psi 827 N/mm^2
	**8**	150000 psi 1034 N/mm^2

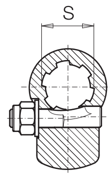
Shear bolt torque limiters LB

LB





Push-pin for sizes
G1-G2- G3-G4



Taper pin for sizes
G5-G7-G8-G9

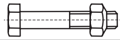
	Setting Nm	B mm	Driveline code 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	R_1 mm	R_2 mm
G1	650	80	**1R0**	**1S0**	- -	- -	37	68
	700		**098**	**161**	- -	- -	40	
G2	950	87	**098**	**161**	- -	- -	55	68
	1050		**1R1**	**1S1**	- -	- -	60	
G3	1400	93	**1R0**	**1S0**	- -	- -	45	68
	1700		**098**	**161**	- -	- -	55	
G4	1400	93	**1R0**	**1S0**	- -	- -	45	68
	1700		**098**	**161**	- -	- -	55	
	2000		**1R2**	**1S2**	- -	- -	43	
G5	2100	106	**1R0**	**1S0**	**1R4**	**1S4**	67	80
	2400		**1R1**	**1S1**	**1R5**	**1S5**	50	
G7	2400	112	**1R0**	**1S0**	**1R4**	**1S4**	50	80
	2700		**098**	**161**	**099**	**162**	55	
G8	2700	115	**1R0**	**1S0**	**1R4**	**1S4**	55	80
	3200		**1R1**	**1S1**	**1R5**	**1S5**	66	
G9	3000	121	**1R0**	**1S0**	**1R4**	**1S4**	62	80
	3500		**1R1**	**1S1**	**1R5**	**1S5**	50	

The torque setting, assigned according to type and size of telescoping members, must never exceed the maximum torque of the driveline Mmax.

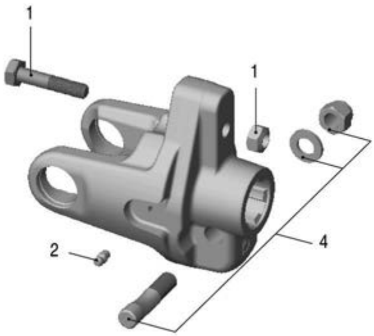
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

Shear bolt torque limiters LB

LB codes as spare parts

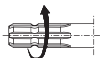
	Setting Nm	S				
		1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20	
G1	650	6060B0304R	6060B3703R	- -	- -	M6x40 Cl. 8.8
	700	6060B0302R	6060B3702R	- -	- -	M6x40 Cl. 8.8
G2	950	6060C0302R	6060C3702R	- -	- -	M6x40 Cl. 8.8
	1050	6060C0308R	6060C3704R	- -	- -	M6x40 Cl. 8.8
G3	1400	6060E0303R	6060E3704R	- -	- -	M8x45 Cl. 8.8
	1700	6060E0302R	6060E3702R	- -	- -	M8x45 Cl. 8.8
G4	1400	6060E0303R	6060E3704R	- -	- -	M8x45 Cl. 8.8
	1700	6060E0302R	6060E3702R	- -	- -	M8x45 Cl. 8.8
	2000	6060E0309R	6060E3711R	- -	- -	M10x50 Cl. 8.8
G5	2100	6060G0319R	6060G3710R	6060G0408R	6060G3803R	M8x45 Cl. 8.8
	2400	6060G0304R	6060G3704R	6060G0404R	6060G3804R	M10x50 Cl. 8.8
G7	2400	6060H0306R	6060H3707R	6060H0404R	6060H3807R	M10x50 Cl. 8.8
	2700	6060H0302R	6060H3702R	6060H0402R	6060H3802R	M10x50 Cl. 8.8
G8	2700	6060L0303R	6060L3703R	6060L0404R	6060L3807R	M10x50 Cl. 8.8
	3200	6060L0305R	6060L3704R	6060L0407R	6060L3808R	M10x50 Cl. 8.8
G9	3000	6060M0306R	6060M3705R	6060M0405R	6060M3811R	M10x50 Cl. 8.8
	3500	6060M0307R	6060M3703R	6060M0407R	6060M3809R	M12x55 Cl. 8.8

Spare part codes

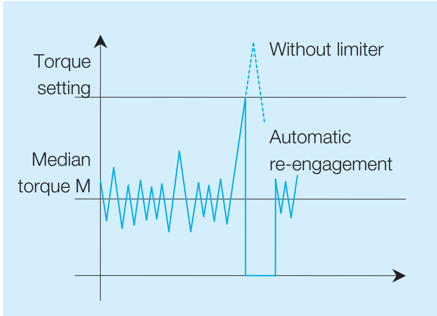


Ref.	Size	Spare part code	Description	Technical data
1		432000002R05	Bolt	M6x40 Cl. 8.8
		432000047R05		M8x45 Cl. 8.8
		432000053R05		M10x50 Cl. 8.8
		432000124R05		M12x55 Cl. 8.8
2		348017000R20	Grease fitting	
3		403000001R10	Push-pin kit	1 3/8” Z6 - Z21
4		408000048R02	Taper pin	1 3/8” Z6 - Z21
		408000052R02		1 3/4” Z6 - Z20

LR automatic torque limiters interrupt transmission of power in the event of torque peaks that exceed the setting.
The LR will automatically re-engage after removing the cause of the overload and allowing the driveline to a slow to a lower speed.
LR torque limiters apply to implements subject to accidental overloads or torque peaks, such as tillers, square balers, and feed mixers.
The torque setting is generally two or three times the median torque M.
LR torque limiters are designed to operate in one direction. Standard versions are suitable for drivelines operated by the



rear-mounted PTO of a tractor, in the direction of rotation shown.
Special versions with the opposite direction of rotation can be supplied upon request.
LR torque limiters are lubricated with NLGI 2 molybdenum disulphide grease during assembly. No additional lubrication is required for the service life of the unit.
The torque setting can be easily reset by substitution of different spring pack.
LR torque limiters have taper pin attachment to the PTO.
Standard LR24 and LR35 models re-engage only once per revolution.
Special models LR24 and LR35 are available that re-engage either in three positions (LR23) four positions (LR24) or five positions (LR35). These have been developed especially for operation at 1000 min^{-1}, but can also be used at lower speeds.



Special LR24 and LR35 for use at 1000 min^{-1} are identified by the letter "L" stamped on the flange fork, next to the value of the nominal torque setting.

Ensure the device is properly attached and the taper pin is properly tightened before operating the implement.

Recommended tightening torques:
- 150 Nm for profiles 1 3/8"-6 ed 1 3/8"-21
- 220 Nm for profiles 1 3/4"-6 ed 1 3/4"-20

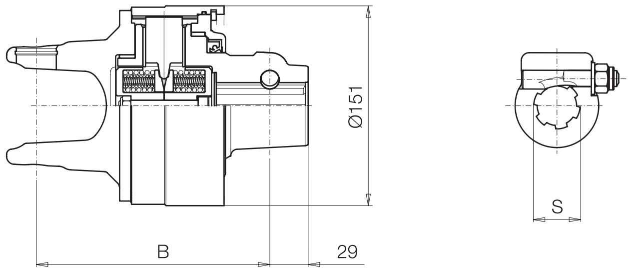
Standard settings (Nm)

	G1	G2	G3	G4	G5	G7	G8	G9
LR23 D=151 mm 3 cams				*1200 1500 1700	*1500 1700 1900 2100	*2100		
LR24 D=151 mm 4 cams						2600	*2500 3000	*2500 3000
LR35 D=176 mm 5 cams								3500

*Recommended settings for use at 1000 min^{-1}

Automatic torque limiter LR

LR23



	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	*1200	172	172	172	172
	1500				
	1700				
G5	*1500	177	177	177	177
	1700				
	1900				
	2100				
G7	*2100	184	184	184	184

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes LR23 for use at 540 min^{-1}

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**00B**	**06B**	**70B**	**80B**
1500	**02B**	**08B**	**72B**	**82B**
1700	**17A**	**22A**	**73B**	**83B**
1900	**03B**	**09B**	**74B**	**84B**
2100	**19A**	**24A**	**76B**	**86B**

Driveline codes LR23 for use at 1000 min^{-1}

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**00C**	**05C**	**10C**	**15C**
1500	**01C**	**06C**	**11C**	**16C**
1700	**02C**	**07C**	**12C**	**17C**
1900	**03C**	**08C**	**13C**	**18C**
2100	**04C**	**09C**	**14C**	**19C**

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

LR23

Spare parts codes LR23 for use at 540 min^{-1}

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	1200	6WE148003R	6WE148037R	6WE148004R	6WE148038R
	1500	6WE154003R	6WE154037R	6WE154004R	6WE154038R
	1700	6WE157003R	6WE157037R	6WE157004R	6WE157038R
G5	1500	6WG154003R	6WG154037R	6WG154004R	6WG154038R
	1700	6WG157003R	6WG157037R	6WG157004R	6WG157038R
	1900	6WG159003R	6WG159037R	6WG159004R	6WG159038R
	2100	6WG161003R	6WG161037R	6WG161004R	6WG161038R
G7	2100	6WH161003R	6WH161037R	6WH161004R	6WH161038R

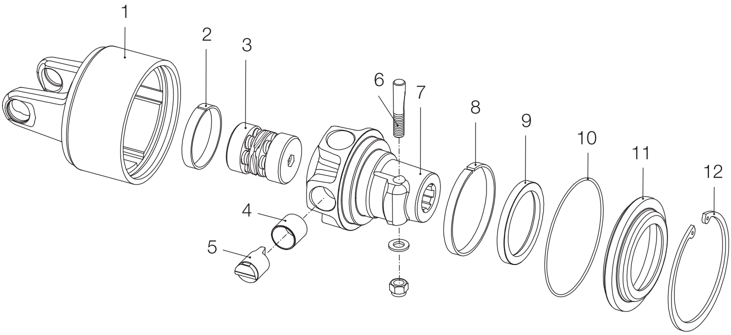
Spare parts codes LR23 for use at 1000 min^{-1}

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	*1200	6WEA48003R	6WEA48037R	6WEA48004R	6WEA48038R
	1500	6WEA54003R	6WEA54037R	6WEA54004R	6WEA54038R
	1700	6WEA57003R	6WEA57037R	6WEA57004R	6WEA57038R
G5	*1500	6WGA54003R	6WGA54037R	6WGA54004R	6WGA54038R
	1700	6WGA57003R	6WGA57037R	6WGA57004R	6WGA57038R
	1900	6WGA59003R	6WGA59037R	6WGA59004R	6WGA59038R
	2100	6WGA61003R	6WGA61037R	6WGA61004R	6WGA61038R
G7	*2100	6WHA61003R	6WHA61037R	6WHA61004R	6WHA61038R

*Recommended settings for a 1000 min^{-1} velocity

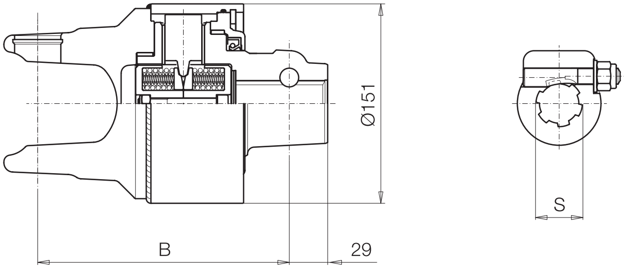
Automatic torque limiter LR

LR23



Ref	Size	Spare part code	Description	Technical data
1	**G4**	4310E1151R	LR23 Outer housing + yoke	
	G5	4310G1151R	for use at 540 min-1	
	G7	431061151R		
	G4	4310E1152R	LR23 Outer housing + yoke	
	G5	4310G1158R	for use at 1000 min^{-1}	
	G7	4310H1151R		
2		240000205R02	Bushing	
3		421154801R	Spring pack LR23	1200 Nm
		421155401R		1500 Nm
		421155701R		1700 Nm
		421155901R		1900 Nm
		421156101R		2100 Nm
4		258000100R05	Bushing	
5		250000101R05	Cam	
6		408000047R02	Taper pin	1 3/8" Z6 - Z21
		408000052R02		1 3/4” Z6 - Z20
7		515150301R	Hub with taper pin and bushings	1 3/8" Z6
		515153701R		1 3/8" Z21
		515150401R		1 3/4” Z6
		515153801R		1 3/4” Z20
8		240000201R02	Bushing	
9		355006080R02	Sealing ring	80 x 100 x 10 mm
10		358000006R02	O-ring	139 x 2.6 mm
11		240000202R02	Locking plate	
12		338000138R20	Snap ring	138 x 4 DIN 472/1

LR24



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G7	2600	184	184	184	184
G8	*2500 3000	184	184	184	184
G9	*2500 3000	192	192	192	192

*Recommended settings for a 1000 min^{-1} velocity

Codes LR24 for use at 540 min^{-1}

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
2500	**26A**	**30A**	**34A**	**38A**
2600	**27A**	**31A**	**35A**	**39A**
3000	**29A**	**33A**	**37A**	**41A**

Codes LR24 for use at 1000 min^{-1}

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
2500	**50C**	**54C**	**58C**	**62C**
2600	**51C**	**55C**	**59C**	**63C**
3000	**53C**	**57C**	**61C**	**65C**

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

Automatic torque limiter LR

LR24

Spare parts codes LR24 for use at 540 min^{-1}

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G7	2600	6WH266003R	6WH266037R	6WH266004R	6WH266038R
G8	2500	6WL265003R	6WL265037R	6WL265004R	6WL265038R
	3000	6WL270003R	6WL270037R	6WL270004R	6WL270038R
G9	2500	6WM265003R	6WM265037R	6WM265004R	6WM265038R
	3000	6WM270003R	6WM270037R	6WM270004R	6WM270038R

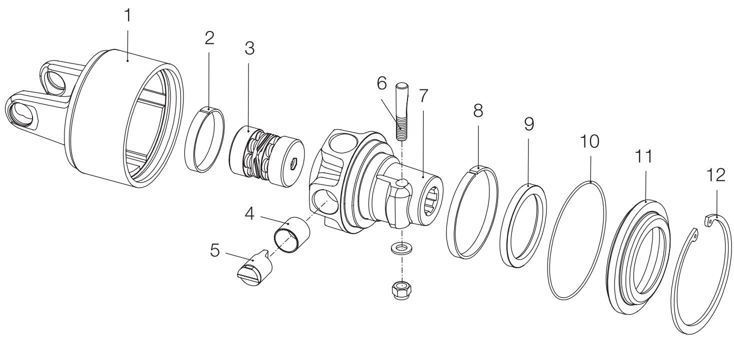
Spare parts codes LR24 for use at 1000 min^{-1}

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G7	2600	6WHE66003R	6WHE66037R	6WHE66004R	6WHE66038R
G8	*2500	6WLE65003R	6WLE65037R	6WLE65004R	6WLE65038R
	3000	6WLE70003R	6WLE70037R	6WLE70004R	6WLE70038R
G9	*2500	6WME65003R	6WME65037R	6WME65004R	6WME65038R
	3000	6WME70003R	6WME70037R	6WME70004R	6WME70038R

*Recommended settings for a 1000 min^{-1} velocity

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

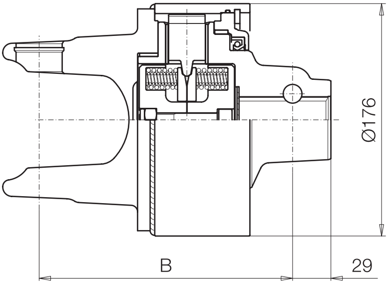
LR24

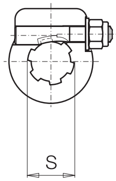


Ref	Size	Spare part code	Description	Technical data
1	**G7** **G8** **G9**	431062152R 4310L2152R 431082152R	Outer body LR24 for use at 540 min^{-1}	
	G7 **G8** **G9**	4310HE151R 4310LE151R 4310ME151R	Outer body LR24 with impruved re-engagement	
2		240000205R02	Bushing	
3		421166502R 421166601R 421167001R	Calibration kit LR24 for use at 540 min^{-1}	2500 Nm 2600 Nm 3000 Nm
		421166505R 421166605R 421167005R	Calibration kit LR24 with impruved re-engagement	2500 Nm 2600 Nm 3000 Nm
4		258000100R05	Bushing	
5		250000108R05	Calibration kit LR24 for use at 540 min^{-1}	
		250000101R05	Calibration kit LR24 with impruved re-engagement	
6		408000047R02 408000052R02	Taper pin	1 3/8" Z6 - Z21 1 3/4" Z6 - Z20
7		515160301R 515163701R 515160401R 515163801R	Hub LR24 with tapered bolt and bushes for use at 540 min^{-1}	1 3/8" Z6 1 3/8" Z21 1 3/4" Z6 1 3/4" Z20
		515160305R 515163705R 515160405R 515163805R	Hub LR24 with taper pin and bushings with impruved re-engagement	1 3/8" Z6 1 3/8" Z21 1 3/4" Z6 1 3/4" Z20
8		240000201R02	Bushing	
9		355006080R02	Sealing ring	80 x 100 x 10 mm
10		358000006R02	O-ring	139 x 2.6 mm
11		240000202R02	Locking plate	
12		338000138R20	Snap ring	138 x 4 DIN 472/1

Automatic torque limiter LR

LR35





	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G9	3500	192	192	192	192

Driveline codes LR35 for use at 540 min^{-1}

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
3500	**43A**	**48A**	**53A**	**58A**

Driveline codes LR35 with impruved re-engagement

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
3500	**70C**	**73C**	**76C**	**79C**

Codes as spare parts for use at 540 min^{-1}

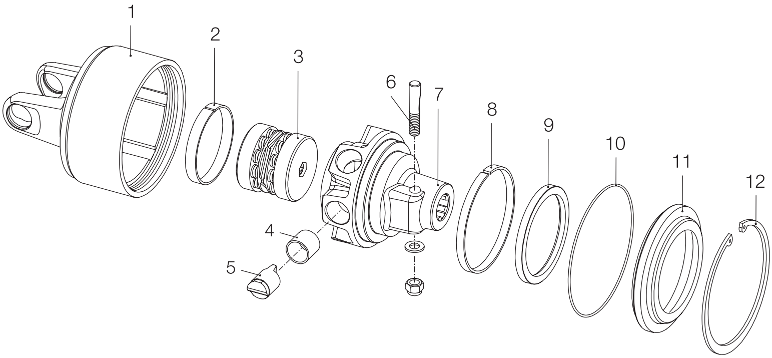
	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G9	3500	6WM481003R	6WM481037R	6WM481004R	6WM481038R

Codes as spare parts with impruved re-engagement

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G9	3500	6WMF81003R	6WMF81037R	6WMF81004R	6WMF81038R

⚠ For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

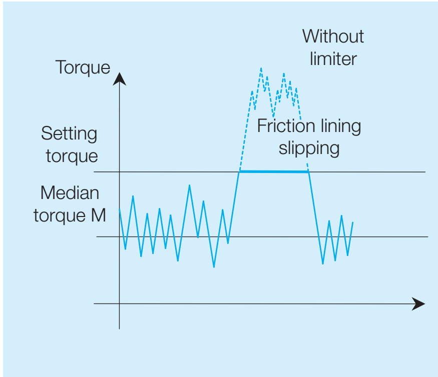
LR35



Ref.	Size	Spare part code	Description	Technical data
1	G9	431084151R	Outer body LR35 for use at 540 min^{-1}	
	G9	4310MF151R	Outer body LR35 with impruved re-engagement	
2		240000711R02	Bushing	
3		421188101R	Calibration kit LR35 for use at 540 min^{-1}	3500 Nm
		421188105R	Calibration kit LR35 with impruved re-engagement	3500 Nm
4		258000100R05	Bushing	
5		250000101R05	Cams	
6		408000047R02 408000052R02	Calibration kit LR35 for use at 540 min^{-1}	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
		408000047R02 408000046R02	Calibration kit LR35 with impruved re-engagement	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
7		515180301R 515183701R 515180401R 515183801R	Hub LR35 with tapered bolt and bushes for use at 540 min^{-1}	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
		515180305R 515183705R 515180405R 515183805R	Hub LR35 with taper pin and bushings with impruved re-engagement	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
8		240000712R02	Bushing	
9		355000105R02	Sealing ring	105 x 125 x 10 mm
10		358000007R02	O-ring	64.7 x 2.6 mm
11		240000710R02	Locking plate	
12		338000162R20	Snap ring	162 x 4 DIN 472/1

Friction torque limiter

Friction torque limiters, commonly referred to as friction clutches, are devices used to limit torque during overloads.
During operation, the plates of the torque limiter slip against friction linings, transmitting torque at the clutch setting.
The friction clutch is effective in limiting possible overloads and torque peaks generated during start-up by implements with high inertia (i.e. those equipped with flywheels or heavy rotating masses).
On these implements, a friction clutch is normally used with an overrunning clutch, able to eliminate reverse torque peaks during deceleration or stopping.
The torque setting of friction clutches is generally 2 times that of the median torque M.
Friction clutches are supplied as two types: torque limiters with an adjustable setting (FV, FFV) or torque limiters with a non-adjustable setting (FT, FK).
All versions have metal surfaces that are specially treated to help prevent sticking and corrosion of the friction linings.
FT models can be supplied with the Spring Release System. This system permits the spring pressure to be reduced during storage, without requiring disassembly of the torque limiter.



Friction torque limiter **FV** with adjustable setting

Friction torque limiter **FFV** with adjustable setting (only for shafts not bearing CE mark)

Friction torque limiter **FT** with non-adjustable setting

Friction torque limiter **FK** with non-adjustable setting

Friction torque limiter

pv Factor

The reliable function of a friction clutch is highly dependent on many different parameters. Temperature is important. When slipped frequently and for long periods, friction clutches may become hot. This can impair the condition of the clutch, and alter the torque setting drastically.

Temperature increases rapidly with longer slipping cycles. It is recommended to select a setting suitable for each specific application, allowing only occasional and brief slipping (only a few seconds per cycle should be permitted).

After the setting has been chosen in accordance with the conditions of the application (median torque M, torque limit of driveline), one must select the proper type of friction clutch in regards to diameter and number of plates or friction linings.

When selecting a suitable type of friction clutch, pressure p and slipping velocity v must also be taken into account.

The pressure on the friction linings is determined by the force exerted from the springs, and their surface area.

Slipping velocity is influenced by overloads (starting, stopping or blockages of the implement) and is related to the speed of rotation for the driveline.

The influence of pressure p and velocity v on the clutch is considered by factor p·v, equal to their product. The maximum value of factor p·v, suggested for reliable function of a friction clutch, is usually determined by experimentation.

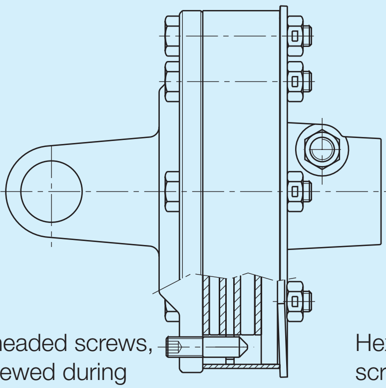
Maximum recommended torque settings for 1000 min^{-1} speed are determined in accordance with this limiting value and shown on the opposite page (marked with *).

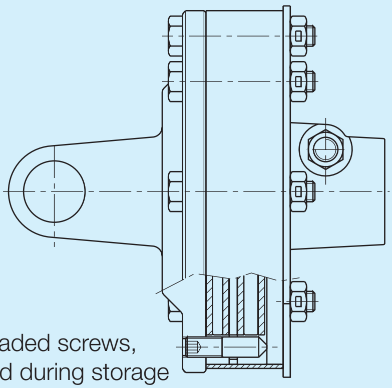
Friction clutches may become hot. **Do not touch!**

Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.

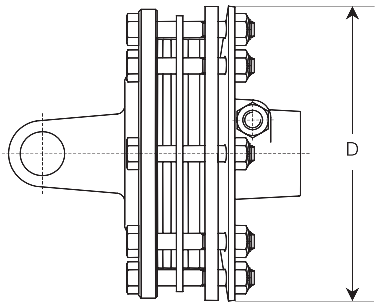
Release System

The materials used in friction linings can react with the metal surfaces of the clutch, and over time this can cause adhesion phenomena, or seizure of the clutch. Several parameters that are difficult to quantify influence this reaction, but high pressure and humid environments help cause adhesion over time.
Certain metal surfaces of the FV and FT clutches are specially treated to reduce chances of seizure. Nevertheless, reducing the pressure on the linings during storage, and storing the clutch in a dry environment are recommended for any friction clutch.
The Release System permits reduction of the pressure on the linings during storage without disassembly of the clutch. The system also permits verification of proper operation after storage.
Pressure on the linings is reduced to a minimum by turning four socket headed screws (located on the flange yoke) completely into the flange yoke.
The screws are only threaded on a portion of their body, so they are captured in the clutch and can be removed only upon disassembly of the clutch.
All friction clutches with the Release System are equipped with a hex wrench (code 399000030) to adjust the screws, and an operator’s manual (code 399FRR001) to explain the proper use of the system.
To check proper function of a friction clutch with the Release System, the four socket screws are turned all the way in. Start the PTO at low sped so the clutch will slip for two or three seconds (longer slipping may cause damage). If the clutch will not slip after two or three attempts, disassemble the clutch and clean the contact surfaces, and replace any damaged parts.
Before operating a clutch with the Release System, pressure on the linings must be restored by turning the four set screws completely out.
Letter **R** in the shaft code identifies friction clutches equipped with Release System.


Hex headed screws, unscrewed during operation


Hex headed screws, screwed during storage

FV friction clutches are equipped with special Belleville springs, designed to apply pressure that varies with the amount of compression.
Five models of FV friction clutches are available, with different diameters and number of friction linings.
All versions are available with treated hubs and driving plates to help prevent sticking and corrosion of the friction linings.
The chart below indicates the diameter D, number of linings, and the standard settings for each model, corresponding to each driveline size.
Maximum settings recommended for use at 1000 min^{-1} are marked (*).



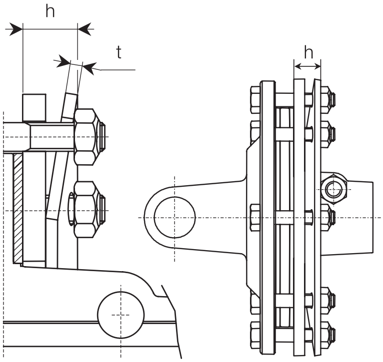
Standard settings (Nm)

	G1	G2	G3	G4	G5	G7	G8	G9
FV22	*400							
D = 155 mm	500	*500						
2 plates		600	*600					
			800	800				
FV32				*900	900	900		
D = 180 mm				1000	1000	1000		
2 plates					*1100	*1100		
FV42					1200	*1200		
D = 202 mm						1350	1350	1350
2 plates						1450	*1450	*1450
							1600	1600
							1800	1800
FV34					1200	*1200		
D = 180 mm						1350	1350	
2 plates						1450	*1450	
							1600	
							1800	*1800
								2000
FV44							1800	*1800
D = 202 mm								2000
2 plates								2200

* Recommended settings for a 1000 min^{-1} velocity

Friction torque limiters FV

FV friction torque limiters have an adjustable torque setting. The torque setting of FV friction clutches varies with different compression (h) of the Belleville spring.



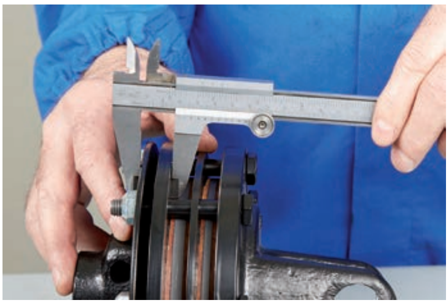
The compression of the Belleville springs used on FV friction clutches must be adjusted to compensate for wear of the friction linings and to maintain the desired setting.

Do not over-tighten the bolts. This may endanger the function of the clutch.

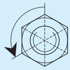
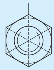
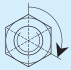
To avoid excessive wear to the implement, driveline, or tractor, Bondioli & Pavesi recommends that the defined setting not be altered.

Friction clutches may become hot. **Do not touch!**
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.

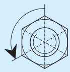
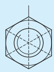
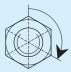
The tables below set out spring codes, thicknesses and compression "h" measured as shown in the figure for standard settings.
The height of the spring is measured next to each bolt and may be ± 0.2 mm of the listed value.
The tables also show the amount of rotation of each bolt required to achieve the next higher or lower setting, relative to the nominal setting (listed with no rotation noted on the bolt).
In addition to the listed settings, intermediate settings may be obtained by tightening or loosening the bolts proportionately.



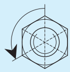
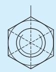
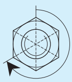
FV22 Friction clutches
2 plates, diameter 155 mm

Spring code	t mm	Setting Nm	h mm	
367005850R	3.75	400	13.5	
		600	13.0	
		800	12.5	

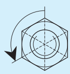
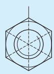
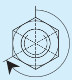
FV32 Friction clutches
2 plates, diameter 180 mm

Spring code	t mm	Setting Nm	h mm	
367008860R	3.75	900	17.5	
		1000	17.0	
		1100	16.5	

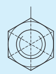
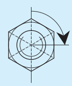
FV34 Friction clutches
4 plates, diameter 180 mm

Spring code	t mm	Setting Nm	h mm	
367008860R	3.75	1200	18.0	
		1600	17.5	
		2200	16.5	

FV42 Friction clutches
2 plates, diameter 202 mm

Spring code	t mm	Setting Nm	h mm	
367009870R	4.25	1200	18.5	
		1450	18.0	
		1800	17.0	

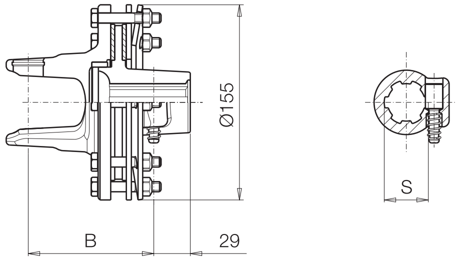
FV44 Friction clutches
4 plates, diameter 202 mm

Spring code	t mm	Setting Nm	h mm	
367009870R	4.25	1800	19.0	
		2200	18.6	

Friction torque limiters FV

FV22

adjustable
setting

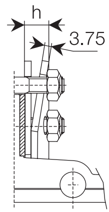


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	*400	92	92	- -	- -
	500				
G2	*500	100	100	- -	- -
	600				
G3	*600	101	101	- -	- -
	800				
G4	800	101	101		

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FV22

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
400	**N06**	**N09**	**- -**	**- -**
500	**N00**	**N03**	**- -**	**- -**
600	**N07**	**N10**	**- -**	**- -**
800	**N08**	**N11**	**- -**	**- -**

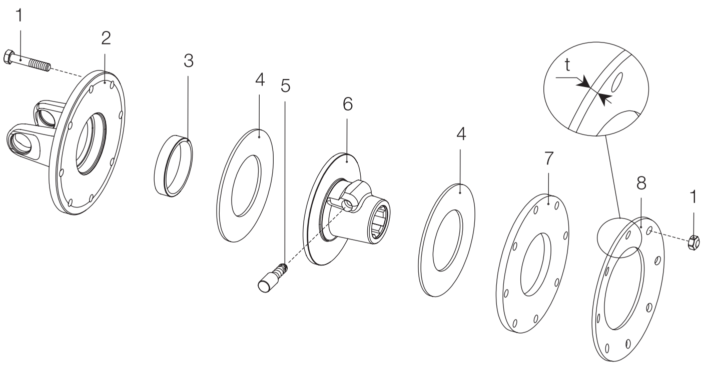


FV22 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G1	*400	661B24103R	661B24137R	- -	- -	13.5
	500	661B28103R	661B28137R	- -	- -	
G2	*500	661C28103R	661C28137R	- -	- -	
	600	661C32103R	661C32137R	- -	- -	13.0
G3	*600	661E32103R	661E32137R	- -	- -	13.0
	800	661E39103R	661E39137R	- -	- -	12.5
G4	800	661E39103R	661E39137R	- -	- -	12.5

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

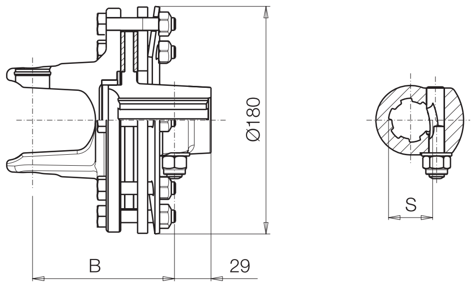
FV22
adjustable setting



Ref.	Size	Spare part code	Description	Technical data
1		432000003R08	Bolt	M8 x 50 mm
2	**G1** **G2** **G3-G4**	2530B8503R 2530C8503R 2530E8503R	Flange yoke	
3		258005320R02	Bushing	
4		247006151R08	Friction lining	D = 124 ; d = 67 mm
5		403000001R10	Push-pin kit	1 3/8" Z6 - Z21
6		513850307R 513853707R	Hub with push pin	1 3/8" Z6 1 3/8" Z21
7		2481A0001R02	Pressure plate	Thickness = 4 mm
8		367005850R	Belleville spring	t = 3.75 mm

Friction torque limiters FV

FV32
adjustable
setting

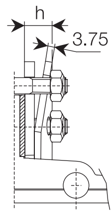


	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	*900	113	113	- -	- -
	1000				
G5	900	117	117	- -	- -
	1000				
	*1100				
G7	900	124	124	- -	- -
	1000				
	*1100				

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FV32

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
900	**N14**	**N17**	**- -**	**- -**
1000	**N31**	**N33**	**- -**	**- -**
1100	**N12**	**N15**	**- -**	**- -**

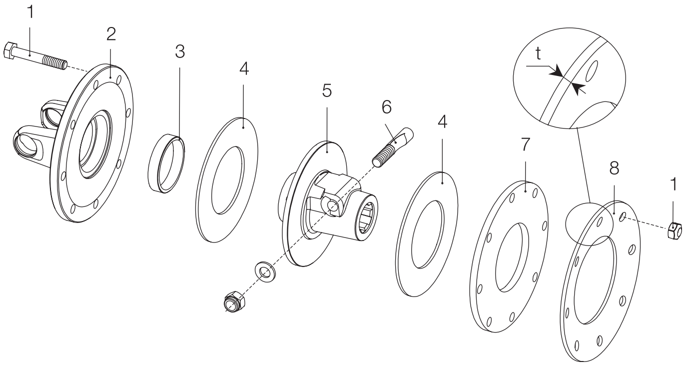


FV32 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G4	*900	661E41203R	661E41237R	- -	- -	17.5
	1000	661E44203R	661E44237R	- -	- -	17.0
G5	900	661G41203R	661G41237R	- -	- -	17.5
	1000	661G44203R	661G44237R	- -	- -	17.0
	*1100	661G46203R	661G46237R	- -	- -	16.5
G7	900	661H41203R	661H41237R	- -	- -	17.5
	1000	661H44203R	661H44237R	- -	- -	17.0
	*1100	661H46203R	661H46237R	- -	- -	16.5

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FV32
adjustable setting

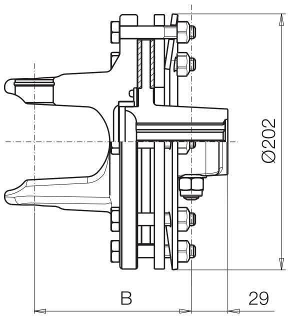


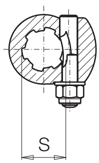
Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 55 mm
2	**G4** **G5** **G7**	253048602R 253058901R 253068903R	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	D = 141 ; d = 77 mm
5		515860305R 515863705R	Hub with push pin	1 3/8” Z6 1 3/8” Z21
6		408000047R02	Taper pin	1 3/8” Z6 - Z21
7		248860007R02	Pressure plate	Thickness = 8 mm
8		367008860R	Belleville spring	t = 3.75 mm

Friction torque limiters FV

FV42

adjustable
setting



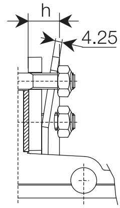


	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	117	117	122	122
G7	*1200 1350 1450	125	125	130	130
G8	1350 *1450 1600 1800	131	131	136	136
G9	1350 *1450 1600 1800	133	133	138	138

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FV42

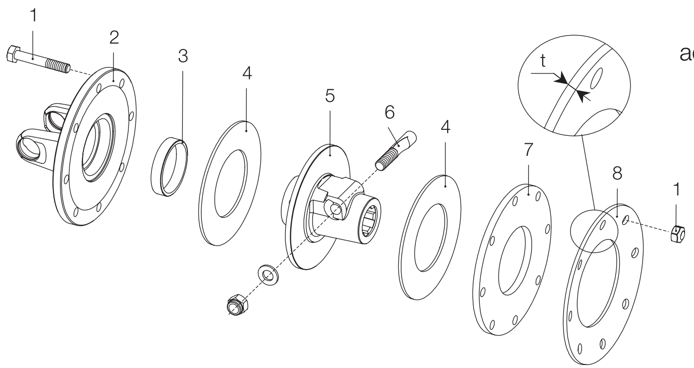
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**N20**	**N23**	**N26**	**N29**
1350	**N35**	**N37**	**N0A**	**N0D**
1450	**N18**	**N21**	**N24**	**N27**
1600	**N36**	**N38**	**N0C**	**N0E**
1800	**N19**	**N22**	**N25**	**N28**



FV42 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G5	1200	661G48403R	661G48437R	661G48404R	661G48438R	18.5
G7	*1200	661H48403R	661H48437R	661H48404R	661H48438R	18.5
	1350	661H51403R	661H51437R	661H51404R	661H51438R	
	1450	661H53403R	661H53437R	661H53404R	661H53438R	18.0
G8	1350	661L51403R	661L51437R	661L51404R	661L51438R	
	*1450	661L53403R	661L53437R	661L53404R	661L53438R	18.0
	1600	661L56403R	661L56437R	661L56404R	661L56438R	
	1800	661L58403R	661L58437R	661L58404R	661L58438R	17.0
G9	1350	661M51403R	661M51437R	661M51404R	661M51438R	
	*1450	661M53403R	661M53437R	661M53404R	661M53438R	18.0
	1600	661M56403R	661M56437R	661M56404R	661M56438R	
	1800	661M58403R	661M58437R	661M58404R	661M58438R	17.0

FV42
adjustable setting



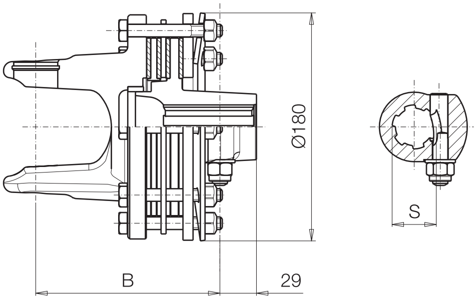
Ref.	Size	Spare part code	Description	Technical data
1		432000008R08	Bolt	M10 x 60 mm
2	**G5** **G7** **G8** **G9**	253058701R 253069001R 253078702R 253089001R	Flange yoke	
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		515870305R 515873705R 515870405R 515873805R	Hub with push pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
6		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
7		248870007R	Pressure plate	Thickness = 8 mm
8		367FT420D	Belleville spring	t = 4.25 mm

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

Friction torque limiters FV

FV34

adjustable setting

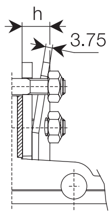


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	133	133	138	138
G7	*1200	140	140	145	145
	1350				
	1450				
G8	1350	146	146	151	151
	*1450				
	1600				
	1800				
G9	*1800	148	148	153	153
	2000				

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FV34

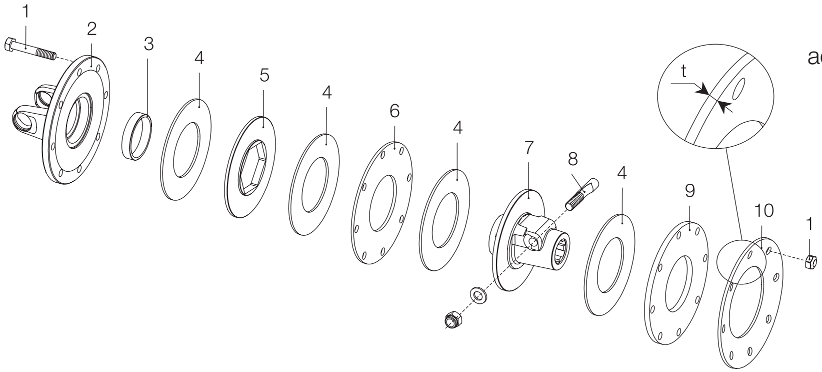
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**N45**	**N51**	**N57**	**N63**
1350	**N46**	**N52**	**N58**	**N64**
1450	**N47**	**N53**	**N59**	**N65**
1600	**N0F**	**N0H**	**N0K**	**N0M**
1800	**N43**	**N49**	**N55**	**N61**
2000	**N0G**	**N0J**	**N0L**	**N0N**



FV34 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G5	1200	661G48303R	661G48337R	661G48304R	661G48338R	18.0
G7	*1200	661H48303R	661H48337R	661H48304R	661H48338R	18.0
	1350	661H51303R	661H51337R	661H51304R	661H51338R	
	1450	661H53303R	661H53337R	661H53304R	661H53338R	
G8	1350	661L51303R	661L51337R	661L51304R	661L51338R	
	*1450	661L53303R	661L53337R	661L53304R	661L53338R	
	1600	661L56303R	661L56337R	661L56304R	661L56338R	17.5
	1800	661L58303R	661L58337R	661L58304R	661L58338R	17.0
G9	*1800	661M58303R	661M58337R	661M58304R	661M58338R	
	2000	661M60303R	661M60337R	661M60304R	661M60338R	16.5

FV34
adjustable setting

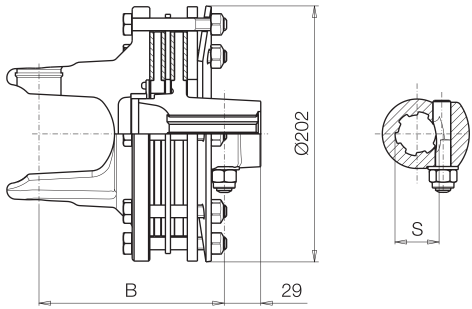


Ref.	Size	Spare part code	Description	Technical data
1		432000114R08	Bolt	M10 x 75 mm
2	**G5** **G7** **G8** **G9**	253058901R 253068903R 253078601R 253088903R	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	D = 141 ; d = 77 mm
5		248727702R02	Driving plate	
6		248860001R02	Inner plate	Thickness = 4 mm
7		515890305R 515893705R 515890405R 515893805R	Hub with push pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
8		408000047R02 408000049R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
9		248860007R02	Pressure plate	Thickness = 8 mm
10		367008860R	Belleville spring	t = 3.75 mm

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

Friction torque limiters FV

FV44
adjustable
setting

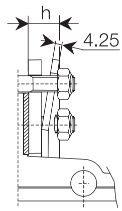


	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	147	147	152	152
G9	*1800 2000 2200	149	149	154	154

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FV44

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	**N39**	**N72**	**N77**	**N82**
2000	**N71**	**N76**	**N81**	**N86**
2200	**N40**	**N73**	**N78**	**N83**

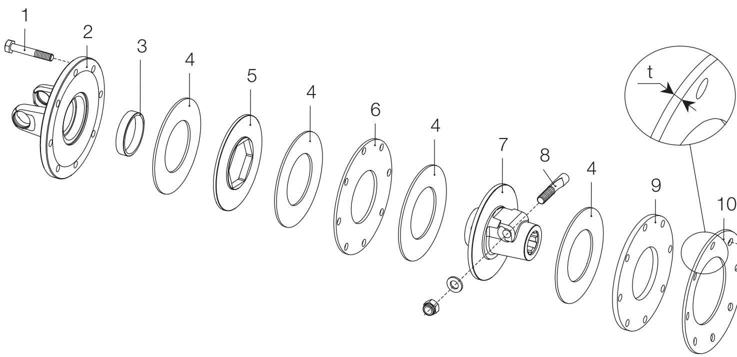


FV44 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G8	1800	661L58503R	661L58537R	661L58504R	661L58538R	19.0
G9	*1800	661M58503R	661M58537R	661M58504R	661M58538R	19.0
	2000	661M60503R	661M60537R	661M60504R	661M60538R	
	2200	661M62503R	661M62537R	661M62504R	661M62538R	18.6

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FV44
adjustable setting

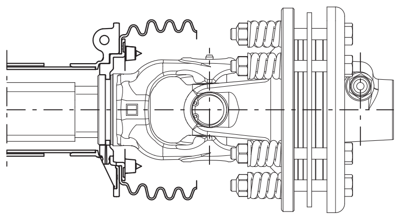


Ref.	Size	Spare part code	Description	Technical data
1		432000114R08	Bolt	M10 x 75 mm
2	**G8**	253078702R	Flange yoke	
	G9	253089001R		
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		248737702R02	Driving plate	
6		248870011R02	Inner plate	Thickness = 4 mm
7		515900305R	Hub with push pin	1 3/8” Z6
		515903705R		1 3/8” Z21
		515900405R		1 3/4” Z6
		515903805R		1 3/4” Z20
8		408000047R02	Taper pin	1 3/8” Z6 - Z21
		408000046R02		1 3/4” Z6 - Z20
9		248870007R	Pressure plate	Thickness = 8 mm
10		367009870R	Belleville spring	t = 4.25 mm

Friction torque limiters FFV

FFV friction clutches are equipped with helical (coil) springs, that apply pressure in proportion to their compression.
Five models of FFV friction clutches are available, with different diameters and number of friction linings
All versions are available with treated hubs and driving plates to reduce corrosion and help prevent seizure.
The chart below indicates the diameter D, number of linings, and the standard settings for each model, corresponding to each driveline size. Maximum settings recommended for use at 1000 min^{-1} are marked (*).

Drivelines with FFV clutches are not EU marked because the shield does not cover the entire inner yoke as required by Machinery Directive 2006/42/CE.
An implement with an FFV clutch on the primary driveline must have a shield that overlaps the driveline guard by at least 50 mm overlap as specified by UNI EN ISO 4254-1 and ANSI/ASABE AD500.



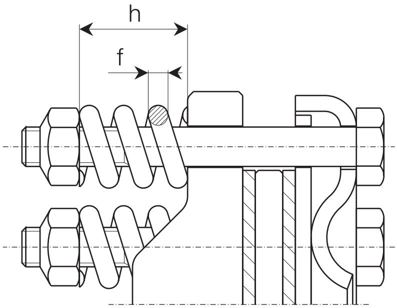
Standard Settings (Nm)

	G1	G2	G3	G4	G5	G7	G8	G9
FFV22	*400							
D = 159 mm	500	*500						
2 plates		600	*600					
			800	800				
FFV32				*900	900	900		
D = 180 mm				1000	1000	1000		
2 plates					*1100	*1100		
FFV42					1200	*1200		
D = 202 mm						1350	1350	1350
2 plates						1450	*1450	*1450
							1600	1600
							1800	1800
FFV34					1200	*1200		
D = 180 mm						1350	1350	
4 plates						1450	*1450	
							1600	
							1800	*1800
								2000
FFV44							1800	*1800
D = 202 mm								2000
4 plates								2200

* Recommended settings for a 1000 min^{-1} velocity

Friction torque limiters FFV

FFV friction clutches have an adjustable torque setting. The torque setting varies with different compression (h) of the springs.



The compression of the springs must be adjusted to compensate for wear of the friction linings and to maintain the desired torque setting.

To avoid excessive wear to the implement, driveline, or tractor, Bondioli & Pavesi recommends that the defined setting not be altered.

Do not over-tighten the bolts; this may impair the function of friction clutches.

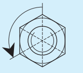
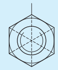
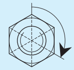
The tables below show the spring code, thickness f and compression height h for standard settings.
Check the compression of each spring using a sliding caliper as shown below.
The height of the spring may be ± 0.2 mm of the "h" value shown.

The tables also show the amount of rotation of each bolt required to achieve the next higher or lower setting, relative to the nominal setting (listed with no rotation noted on the bolt).
In addition to the listed settings, intermediate settings may be obtained by tightening or loosening the bolts proportionately.

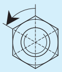
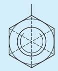
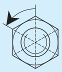
Friction clutches may become hot during use. **Do not touch!**
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.

BONDIOLI & PAVESI

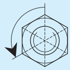
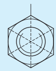
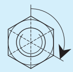
FFV22 Friction clutches
2 plates, diameter 159 mm

Spring code	f mm	Setting Nm	h mm	
351015001	6	400	30.0	
		600	29.5	
		800	29.0	

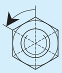
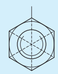
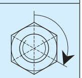
FFV32 Friction clutches
2 plates, diameter 180 mm

Spring code	f mm	Setting Nm	h mm	
351022370	6	900	28.8	
		1000	28.5	
		1100	28.2	

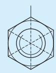
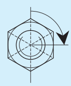
FFV34 Friction clutches
4 plates, diameter 180 mm

Spring code	f mm	Setting Nm	h mm	
351022370	6	1200	29.5	
		1450	29.0	
		1800	28.5	

FFV42 Friction clutches
2 plates, diameter 202 mm

Spring code	f mm	Setting Nm	h mm	
351013370	7	1200	29.5	
		1450	29.2	
		1800	28.8	

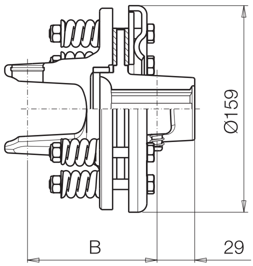
FFV44 Friction clutches
4 plates, diameter 202 mm

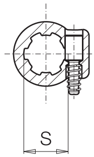
Spring code	f mm	Setting Nm	h mm	
351013370	7	1800	30.0	
		2200	29.6	

Friction torque limiters FFV

FFV22

adjustable
setting,
coil springs



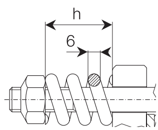


	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
		B (mm)			
G1	*400	92	92	- -	- -
	500				
G2	*500	100	100	- -	- -
	600				
G3	*600	101	101	- -	- -
	800				
G4	800	101	101	- -	- -

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FFV22

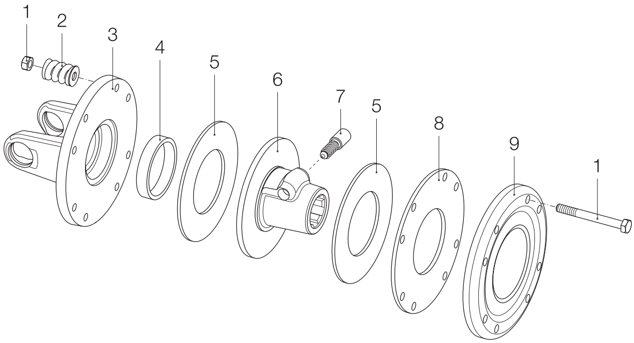
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
400	**0R1**	**0R6**	**- -**	**- -**
500	**0R2**	**0R7**	**- -**	**- -**
600	**0R3**	**0R8**	**- -**	**- -**
800	**0R4**	**0R9**	**- -**	**- -**



FFV22 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G1	*400	635B24103R	635B24137R	- -	- -	30.0
	500	635B28103R	635B28137R	- -	- -	
G2	*500	635C28103R	635C28137R	- -	- -	
	600	635C32103R	635C32137R	- -	- -	29.5
G3	*600	635E32103R	635E32137R	- -	- -	29.5
	800	635E39103R	635E39137R	- -	- -	29.0
G4	800	635E39103R	635E39137R	- -	- -	29.0

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.



FFV22

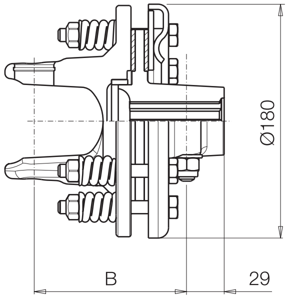
adjustable setting, coil springs

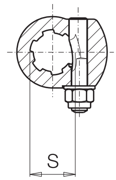
Ref.	Size	Spare part code	Description	Technical data
1		432000031R08	Bolt	M8 x 75 mm
2		351015001R08	Coil springs	f = 6 mm
3	**G1** **G2** **G3-G4**	2530B1A05R 2530C1A05R 2530E1A05R	Flange yoke	
4		258005320R02	Bushing	
5		247006151R08	Friction linings	D = 124 ; d = 67 mm
6		513850307R 513853707R	Hub with push pin	1 3/8” Z6 1 3/8” Z21
7		403000001R10	Push-pin kit	1 3/8” Z6 - Z21
8		2481A0007R02	Inner plate	Thickness = 4 mm
9		2481A0006R02	Pressure plate	

Friction torque limiters FFV

FFV32

adjustable setting, coil springs



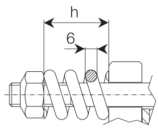


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	*900	113	113	- -	- -
	1000				
G5	900	117	117	- -	- -
	1000				
	*1100				
G7	900	124	124	- -	- -
	1000				
	*1100				

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FFV32

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
900	**0S1**	**0S6**	**- -**	**- -**
1000	**0S2**	**0S7**	**- -**	**- -**
1100	**0S3**	**0S8**	**- -**	**- -**



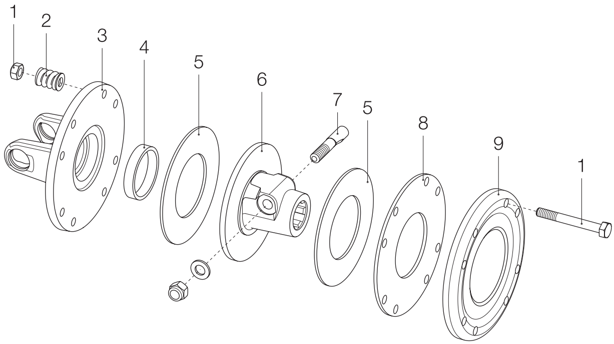
FFV32 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G4	*900	635E41203R	635E41237R	- -	- -	28.8
	1000	635E44203R	635E44237R	- -	- -	28.5
G5	900	635G41203R	635G41237R	- -	- -	28.8
	1000	635G44203R	635G44237R	- -	- -	28.5
	*1100	635G46203R	635G46237R	- -	- -	28.2
G7	900	635H41203R	635H41237R	- -	- -	28.8
	1000	635H44203R	635H44237R	- -	- -	28.5
	*1100	635H46203R	635H46237R	- -	- -	28.2

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FFV32

adjustable setting, coil springs

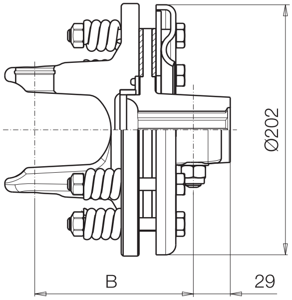


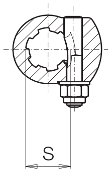
Ref.	Size	Spare part code	Description	Technical data
1		432000006R08	Bolt	M10 x 85 mm
2		351022370R08	Coil springs	f = 6 mm
3	**G4** **G5** **G7**	2530E1C05R 2530G1C05R 2530H1C05R	Flange yoke	
4		258005320R02	Bushing	
5		247006251R08	Friction lining	D = 141 ; d = 77 mm
6		515860305R 515863705R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
7		408000047R02	Taper pin	1 3/8” Z6 - Z21
8		2481C0007R02	Inner plate	Thickness = 4 mm
9		248220007R02	Pressure plate	

Friction torque limiters FFV

FFV42

adjustable
setting,
coil springs



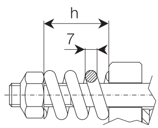


	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	117	117	122	122
G7	*1200 1350 1450	125	125	130	130
G8	1350 *1450 1600 1800	131	131	136	136
G9	1350 *1450 1600 1800	133	133	138	138

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FFV42

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**0Z1**	**0Z6**	**0Y1**	**0Y6**
1350	**0Z2**	**0Z7**	**0Y2**	**0Y7**
1450	**0Z3**	**0Z8**	**0Y3**	**0Y8**
1600	**0Z4**	**0Z9**	**0Y4**	**0Y9**
1800	**0Z5**	**0Z0**	**0Y5**	**0Y0**



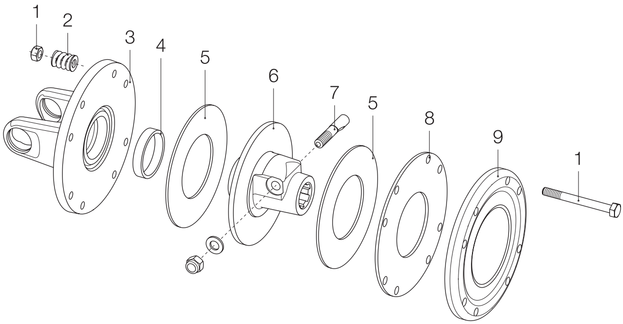
FFV42 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G5	1200	635G48403R	635G48437R	635G48404R	635G48438R	29.5
G7	*1200	635H48403R	635H48437R	635H48404R	635H48438R	29.5
	1350	635H51403R	635H51437R	635H51404R	635H51438R	
	1450	635H53403R	635H53437R	635H53404R	635H53438R	29.2
G8	1350	635L51403R	635L51437R	635L51404R	635L51438R	
	*1450	635L53403R	635L53437R	635L53404R	635L53438R	29.2
	1600	635L56403R	635L56437R	635L56404R	635L56438R	
	1800	635L58403R	635L58437R	635L58404R	635L58438R	28.8
G9	1350	635M51403R	635M51437R	635M51404R	635M51438R	
	*1450	635M53403R	635M53437R	635M53404R	635M53438R	29.2
	1600	635M56403R	635M56437R	635M56404R	635M56438R	
	1800	635M58403R	635M58437R	635M58404R	635M58438R	28.8

BONDIOLI & PAVESI

FFV42

adjustable setting, coil springs

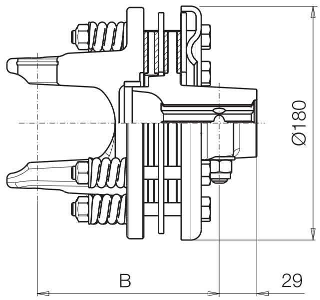


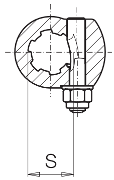
Ref.	Size	Spare part code	Description	Technical data
1		432000006R08	Bolt	M10 x 85 mm
2		351013370R08	Coil springs	f = 7 mm
3	**G5** **G7** **G8** **G9**	2530G1E05R 2530H1E05R 2530L1E05R 2530M1E05R	Flange yoke	
4		258005320R02	Bushing	
5		247006351R08	Friction lining	D = 162 ; d = 85 mm
6		515870305R 515873705R 515870405R 515873805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
7		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
8		2481E0007R02	Inner plate	Thickness = 4 mm
9		248230006R02	Pressure plate	

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

Friction torque limiters FFV

FFV34
adjustable
setting,
coil springs



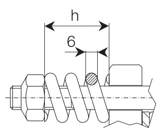


	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	133	133	138	138
G7	*1200 1350 1450	140	140	145	145
G8	1350 *1450 1600 1800	146	146	151	151
G9	*1800 2000	148	148	153	153

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FFV34

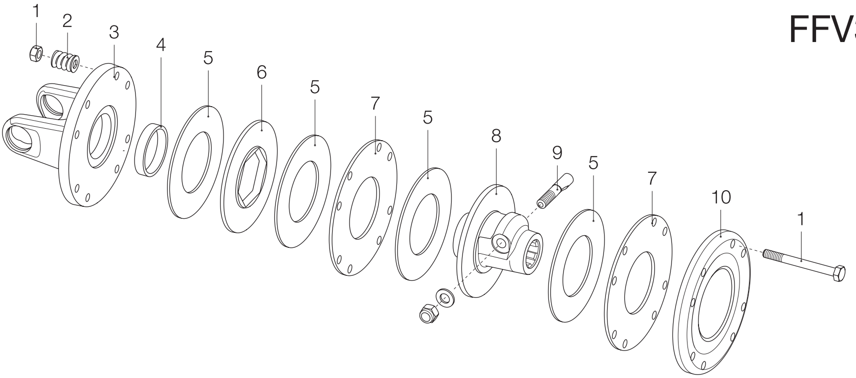
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**0T1**	**0T8**	**0U5**	**0V2**
1350	**0T2**	**0T9**	**0U6**	**0V3**
1450	**0T3**	**0T0**	**0U7**	**0V4**
1600	**0T4**	**0U1**	**0U8**	**0V5**
1800	**0T5**	**0U2**	**0U9**	**0V6**
2000	**0T6**	**0U3**	**0U0**	**0V7**



FFV34 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G5	1200	635G48303R	635G48337R	635G48304R	635G48338R	29.5
G7	*1200	635H48303R	635H48337R	635H48304R	635H48338R	29.5
	1350	635H51303R	635H51337R	635H51304R	635H51338R	
	1450	635H53303R	635H53337R	635H53304R	635H53338R	29.0
G8	1350	635L51303R	635L51337R	635L51304R	635L51338R	
	*1450	635L53303R	635L53337R	635L53304R	635L53338R	29.0
	1600	635L56303R	635L56337R	635L56304R	635L56338R	
	1800	635L58303R	635L58337R	635L58304R	635L58338R	28.5
G9	*1800	635M58303R	635M58337R	635M58304R	635M58338R	28.5
	2000	635M60303R	635M60337R	635M60304R	635M60338R	

FFV34



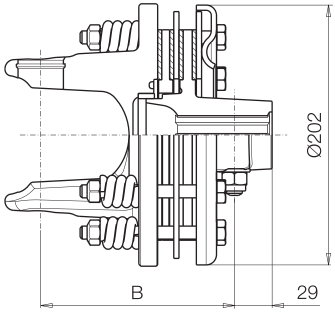
Ref.	Size	Spare part code	Description	Technical data
1		432000007R08	Bolt	M10 x 100 mm
2		351022370R08	Coil springs	f = 6 mm
3	**G5** **G7** **G8** **G9**	2530G1C05R 2530H1C05R 2530L1C05R 2530M1C05R	Flange yoke	
4		258005320R02	Bushing	
5		247006251R08	Friction lining	D = 141 ; d = 77 mm
6		248727702R02	Driving disc	
7		2481C0007R02	Inner plate	Thickness = 4 mm
8		515890305R 515893705R 515890405R 515893805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
9		408000047R02 408000049R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
10		248220007R02	Pressure plate	

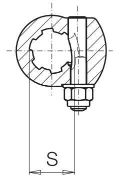
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

Friction torque limiters FFV

FFV44

adjustable setting, coil springs



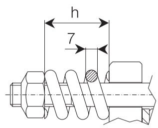


	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
		B (mm)			
G8	1800	147	147	152	152
G9	*1800	149	149	154	154
	2000				
	2200				

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FFV44

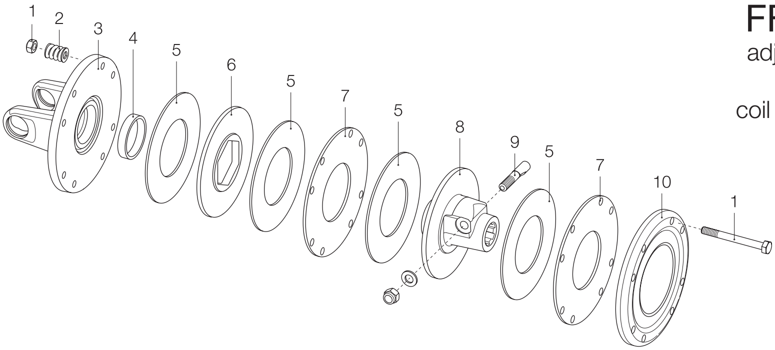
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	**0J1**	**0J9**	**0K7**	**0W5**
2000	**0J2**	**0J0**	**0K8**	**0W6**
2200	**0J3**	**0K1**	**0K9**	**0W7**



FFV44 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G8	1800	635L58503R	635L58537R	635L58504R	635L58538R	30.0
G9	*1800	635M58503R	635M58537R	635M58504R	635M58538R	30.0
	2000	635M60503R	635M60537R	635M60504R	635M60538R	
	2200	635M62503R	635M62537R	635M62504R	635M62538R	29.6

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

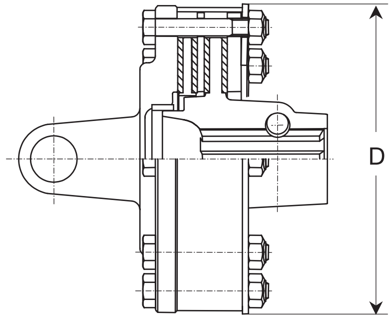


FFV44

adjustable setting, coil springs

Ref.	Size	Spare part code	Description	Technical data
1		432000122R08	Bolt	M10 x 105 mm
2		351013370R08	Coil springs	f = 7 mm
3	**G8** **G9**	2530L8710R 2530M1E05R	Flange yoke	
4		258005320R02	Bushing	
5		247006351R08	Friction lining	D = 162 ; d = 85 mm
6		248737702R02	Driving disc	
7		2481E0007R02	Inner plate	Thickness = 4 mm
8		515900305R 515903705R 515900405R 515903805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
9		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
10		248230006R02	Pressure plate	

FT friction clutches are equipped with Belleville springs, designed to apply nearly constant pressure, self-compensating for friction lining wear. Therefore the setting is maintained without adjustment over the life of the linings.
FT friction clutches are non-adjustable. Torque is determined by the thickness of the Belleville spring.
Five models of FV friction clutches are available, with different diameters and number of friction linings.
All versions are available with treated hubs and driving plates to reduce corrosion and help prevent seizure. All versions are available with Release System.
The chart below indicates the diameter D, number of linings, and the standard settings for each model, corresponding to each driveline size. Maximum settings recommended for use at 1000 min^{-1} are marked (*).



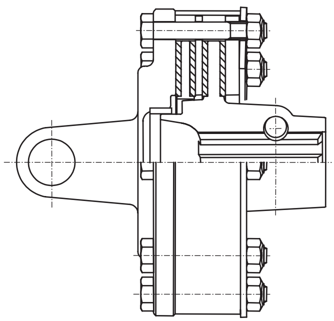
Standard settings (Nm)

	G1	G2	G3	G4	G5	G7	G8	G9
FT22	*400							
D = 155 mm	500	*500						
2 plates		600	*600					
			800	800				
FT32				*900	900			
D = 180 mm				1000	1000			
2 plates					*1100			
FT42					1200	*1200		
D = 202 mm						1450	*1450	
2 plates							1800	
FT34					1200	*1200		
D = 180 mm						1450	*1450	
4 plates							1800	*1800
FT44							1800	*1800
D = 202 mm								2200
4 plates								

* Recommended settings for a 1000 min^{-1} velocity

Friction torque limiters FT

The torque setting of FT friction clutches is determined by the Belleville spring. The tables below show the spring codes for each friction clutch and standard setting.



FT22 - FT22R friction clutches	
Setting Nm	Spring code
400	367FT220A
500	367FT220C
600	367FT220D
800	367FT220E

FT32 - FT32R friction clutches	
Setting Nm	Spring code
900	367FT320A
1000	367FT320C
1100	367FT320D

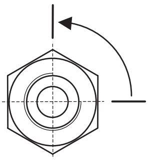
FT42 - FT42R friction clutches	
Setting Nm	Spring code
1200	367FT420A
1450	367FT420C
1800	367FT420D

FT34 - FT34R friction clutches	
Setting Nm	Spring code
1200	367FT340A
1450	367FT340C
1800	367FT340D

FT44 - FT44R friction clutches	
Setting Nm	Spring code
1800	367FT440A
2200	367FT440C

FT clutches are equipped with a metal band to be used as reference to properly compress the Belleville spring.

Proper compression occurs when the Belleville spring is evenly compressed to the height of the metal band.

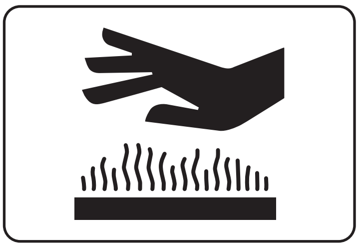


To do this properly, tighten the bolts until the Belleville spring contacts the metal band. Then back off each nut 1/4 turn.

Do not over-tighten bolts; this may endanger the function of friction clutches.

To avoid excessive wear to the implement, driveline or tractor Bondioli & Pavesi recommends that the setting not be changed.

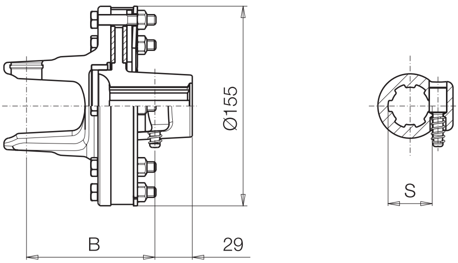
Friction clutches may become hot during use. **Do not touch!**
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.



Friction torque limiters FT

FT22

non-adjustable
setting



	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	*400	92	92	- -	- -
	500				
G2	*500	100	100	- -	- -
	600				
G3	*600	101	101	- -	- -
	800				
G4	800	101	101		

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT22

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
400	**Q05**	**Q08**	**- -**	**- -**
500	**Q00**	**Q02**	**- -**	**- -**
600	**Q06**	**Q09**	**- -**	**- -**
800	**Q07**	**Q10**	**- -**	**- -**

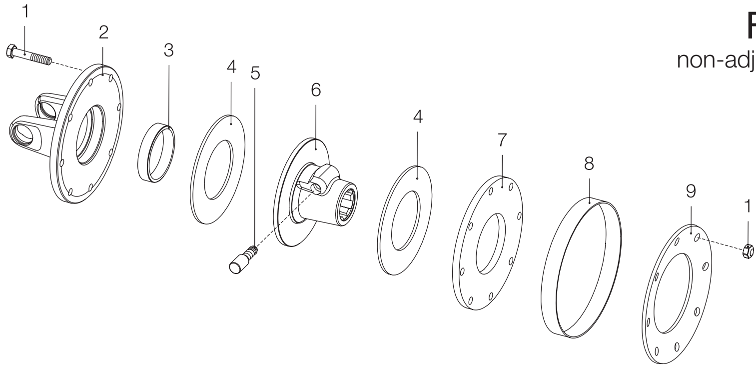
FT22 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	*400	663B24103R	663B24137R	- -	- -
	500	663B28103R	663B28137R	- -	- -
G2	*500	663C28103R	663C28137R	- -	- -
	600	663C32103R	663C32137R	- -	- -
G3	*600	663E32103R	663E32137R	- -	- -
	800	663E39103R	663E39137R	- -	- -
G4	800	663E39103R	663E39137R	- -	- -

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FT22

non-adjustable setting

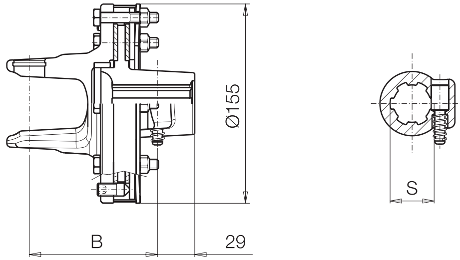


Ref.	Size	Spare part code	Description	Technical data
1		432000047R08	Bolt	M8 x 75 mm
2	**G1** **G2** **G3-G4**	2530B8503R 2530C8503R 2530E8503R	Flange yoke	
3		258005320R02	Bushing	
4		247006151R08	Friction lining	D = 124 ; d = 67 mm
5		403000001R10	Push-pin kit	1 3/8” Z6 - Z21
6		513850307R 513853707R	Hub with push pin	1 3/8” Z6 1 3/8” Z21
7		2481A0002R02	Pressure plate	Thickness = 4 mm
8		240001059R02	Adjustment band	
9		367FT220A 367FT220C 367FT220D 367FT220E	Belleville spring	400 Nm 500 Nm 600 Nm 800 Nm

Friction torque limiters FT

FT22R

non-adjustable setting, release system



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	*400	92	92	- -	- -
	500				
G2	*500	100	100	- -	- -
	600				
G3	*600	101	101	- -	- -
	800				
G4	800	101	101		

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT22R

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
400	**H05**	**H08**	**- -**	**- -**
500	**H00**	**H02**	**- -**	**- -**
600	**H06**	**H09**	**- -**	**- -**
800	**H07**	**H10**	**- -**	**- -**

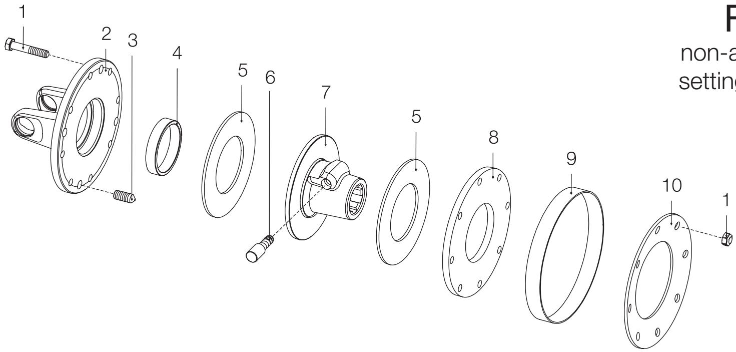
FT22R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	*400	663B24A03R	663B24A37R	- -	- -
	500	663B28A03R	663B28A37R	- -	- -
G2	*500	663C28A03R	663C28A37R	- -	- -
	600	663C32A03R	663C32A37R	- -	- -
G3	*600	663E32A03R	663E32A37R	- -	- -
	800	663E39A03R	663E39A37R	- -	- -
G4	800	663E39A03R	663E39A37R	- -	- -

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FT22R

non-adjustable setting, release system

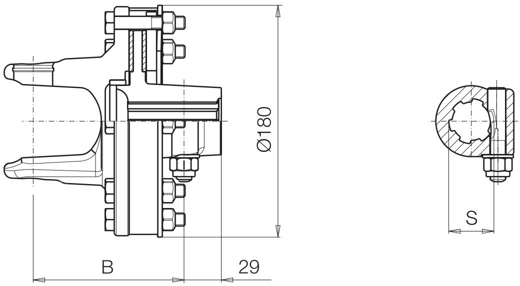


Ref.	Size	Spare part code	Description	Technical data
1		432000047R08	Bolt	M8 x 45 mm
2	**G1** **G2** **G3-G4**	2530B8504R 2530C8504R 2530E8504R	Flange yoke	
3		310001300R04	Special socket head set screw	M10 x 25 mm
4		258005320R02	Bushing	
5		247006151R08	Friction lining	D = 124 ; d = 67 mm
6		403000001R10	Push-pin kit	1 3/8” Z6 - Z21
7		513850307R 513853707R	Hub with push pin	1 3/8” Z6 1 3/8” Z21
8		2481A0002R02	Pressure plate	Thickness = 4 mm
9		240001059R02	Adjustment band	
10		367FT220A 367FT220C 367FT220D 367FT220E	Belleville spring	400 Nm 500 Nm 600 Nm 800 Nm

Friction torque limiters FT

FT32

non-adjustable
setting



	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	*900 1000	113	113	- -	- -
G5	900 1000 *1100	117	117	- -	- -

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT32

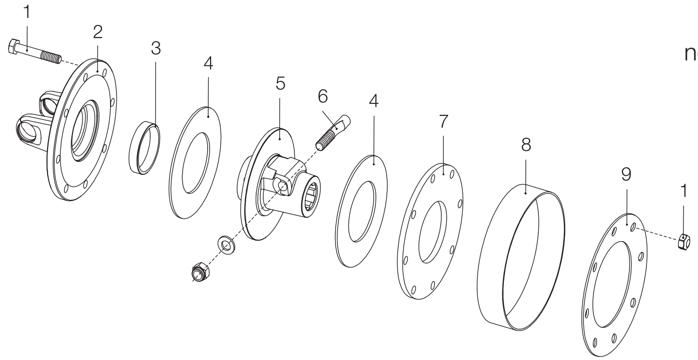
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
900	**Q11**	**Q16**	**- -**	**- -**
1000	**Q14**	**Q19**	**- -**	**- -**
1100	**Q15**	**Q20**	**- -**	**- -**

FT32 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	*900	663E41203R	663E41237R	- -	- -
	1000	663E44203R	663E44237R	- -	- -
G5	900	663G41203R	663G41237R	- -	- -
	1000	663G44203R	663G44237R	- -	- -
	*1100	663G46203R	663G46237R		

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FT32
non-adjustable setting

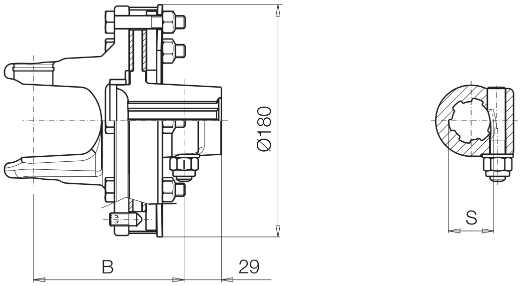


Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 85 mm
2	**G4** **G5**	253048602R 253058901R	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	D = 141 ; d = 77 mm
5		515860305R 515863705R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
6		408000047R02	Taper pin	1 3/8” Z6 - Z21
7		248860005R02	Pressure plate	Thickness = 8 mm
8		240000213R02	Adjustment band	
9		367FT320A 367FT320C 367FT320D	Belleville spring	900 Nm 1000 Nm 1100 Nm

Friction torque limiters FT

FT32R

non-adjustable setting, release system



	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	*900	113	113	- -	- -
	1000				
G5	900	117	117	- -	- -
	1000				
	*1100				

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT32R

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
900	**H11**	**H16**	**- -**	**- -**
1000	**H14**	**H19**	**- -**	**- -**
1100	**H15**	**H20**	**- -**	**- -**

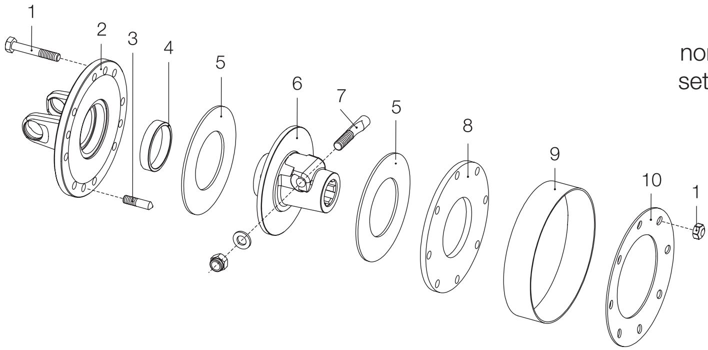
FT32R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	*900	663E41C03R	663E41C37R	- -	- -
	1000	663E44C03R	663E44C37R	- -	- -
G5	900	663G41C03R	663G41C37R	- -	- -
	1000	663G44C03R	663G44C37R	- -	- -
	*1100	663G46C03R	663G46C37R		

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FT32R

non-adjustable setting, release system

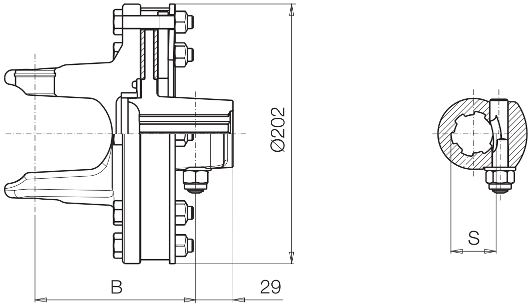


Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 55 mm
2	G4 G5	2530E8605R 2530G8605R	Flange yoke	
3		310001300R04	Special socket head set screw	M10 x 25 mm
4		258005320R02	Bushing	
5		247006251R08	Friction lining	D = 141 ; d = 77 mm
6		515860305R 515863705R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
7		408000047R02	Taper pin	1 3/8” Z6 - Z21
8		248860005R02	Pressure plate	Thickness = 8 mm
9		240000213R02R02	Adjustment band	
10		367FT320A 367FT320C 367FT320D	Belleville spring	900 Nm 1000 Nm 1100 Nm

Friction torque limiters FT

FT42

non-adjustable
setting



	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	117	117	122	122
G7	*1200 1450	125	125	130	130
G8	*1450 1800	131	131	136	136

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT42

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**Q22**	**Q26**	**Q30**	**Q34**
1450	**Q23**	**Q27**	**Q31**	**Q35**
1800	**Q21**	**Q25**	**Q29**	**Q33**

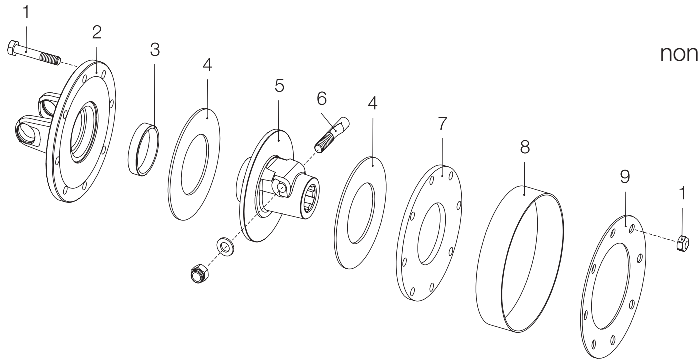
FT42 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	663G48403R	663G48437R	663G48404R	663G48438R
G7	*1200	663H48403R	663H48437R	663H48404R	663H48438R
	1450	663H53403R	663H53437R	663H53404R	663H53438R
G8	*1450	663L53403R	663L53437R	663L53404R	663L53438R
	1800	663L58403R	663L58437R	663L58404R	663L58438R

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FT42

non-adjustable setting

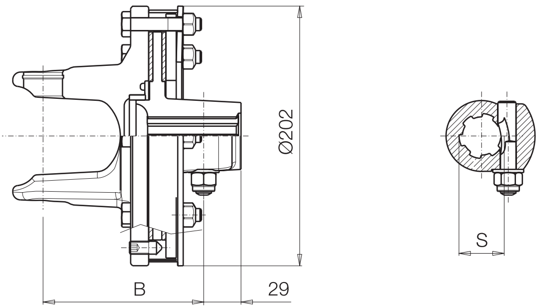


Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 55 mm
2	**G5** **G7** **G8**	253058701R 253069001R 253078702R	Flange yoke	
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		515870305R 515873705R 515870405R 515873805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
6		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
7		248870005R	Pressure plate	Thickness= 8 mm
8		240000214R02	Adjustment band	
9		367FT420A 367FT420C 367FT420D	Belleville spring	1200 Nm 1450 Nm 1800 Nm

Friction torque limiters FT

FT42R

non-adjustable setting, release system



	Setting Nm	S = 1 3/8” Z6	B (mm) 1 3/8” Z21	1 3/4” Z6	1 3/4” Z20
G5	1200	117	117	122	122
G7	*1200 1450	125	125	130	130
G8	*1450 1800	131	131	136	136

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT42R

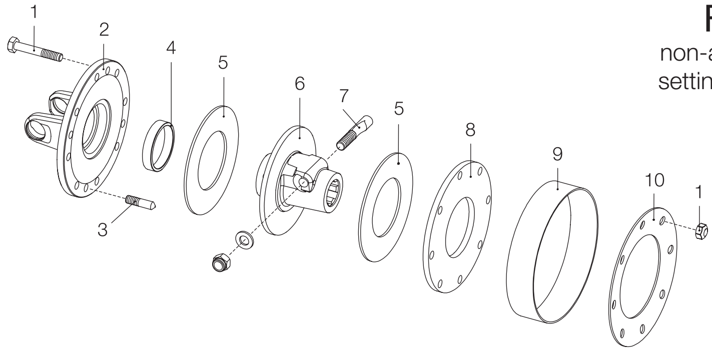
Setting Nm	S = 1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20
1200	**H22**	**H26**	**H30**	**H34**
1450	**H23**	**H27**	**H31**	**H35**
1800	**H21**	**H25**	**H29**	**H33**

FT42R codes as spare parts

	Setting Nm	S = 1 3/8” Z6	1 3/8” Z21	1 3/4” Z6	1 3/4” Z20
G5	1200	663G48F03R	663G48F37R	663G48F04R	663G48F38R
G7	*1200	663H48F03R	663H48F37R	663H48F04R	663H48F38R
	1450	663H53F03R	663H53F37R	663H53F04R	663H53F38R
G8	*1450	663L53F03R	663L53F37R	663L53F04R	663L53F38R
	1800	663L58F03R	663L58F37R	663L58F04R	663L58F38R

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FT42R
non-adjustable setting, release system

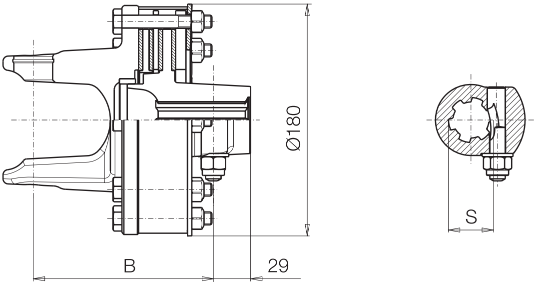


Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 55 mm
2	**G5** **G7** **G8**	2530G8705R 2530H8705R 2530L8705R	Flange yoke	
3		310001300R04	Special socket head set screw	M10 x 25 mm
4		258005320R02	Bushing	
5		247006351R08	Friction lining	D = 162 ; d = 85
6		515870305R 515873705R 515870405R 515873805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
7		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
8		248870005R	Pressure plate	Thickness= 8 mm
9		240000214R02	Adjustment band	
10		367FT420A 367FT420C 367FT420D	Belleville spring	1200 Nm 1450 Nm 1800 Nm

Friction torque limiters FT

FT34

non-adjustable
setting



	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	133	133	138	138
G7	*1200 1450	140	140	145	145
G8	*1450 1800	146	146	151	151
G9	*1800	148	148	153	153

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT34

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**Q51**	**Q58**	**Q65**	**Q72**
1450	**Q52**	**Q59**	**Q66**	**Q73**
1800	**Q54**	**Q61**	**Q68**	**Q75**

FT34 codes as spare parts

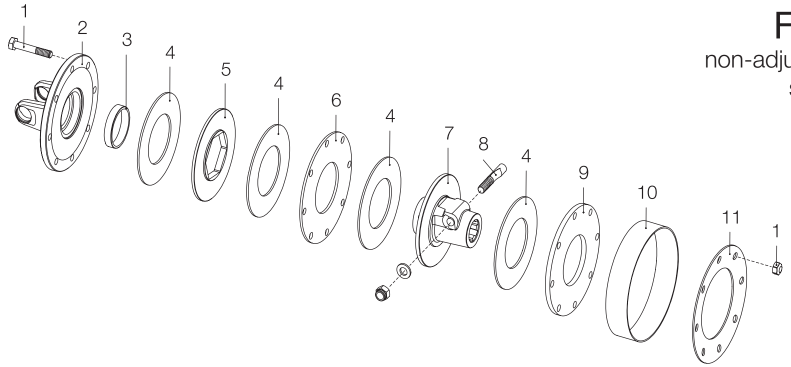
	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	663G48303R	663G48337R	663G48304R	663G48338R
G7	*1200	663H48303R	663H48337R	663H48304R	663H48338R
	1450	663H53303R	663H53337R	663H53304R	663H53338R
G8	*1450	663L53303R	663L53337R	663L53304R	663L53338R
	1800	663L58303R	663L58337R	663L58304R	663L58338R
G8	*1800	663M58303R	663M58337R	663M58304R	663M58338R

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

BONDIOLI & PAVESI

FT34

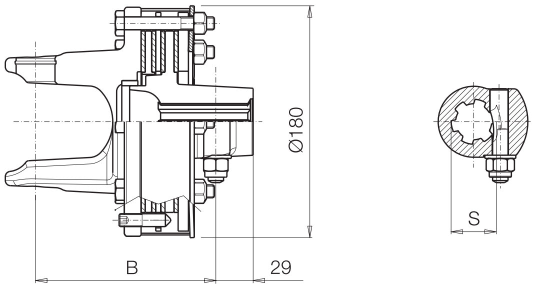
non-adjustable setting



Ref.	Size	Spare part code	Description	Technical data
1		432000045R08	Bolt	M10 x 65 mm
2	**G5** **G7** **G8** **G9**	253058901R 253068903R 253078601R 253088903R	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	D = 141 ; d = 77 mm
5		248727702R02	Driving disc	
6		248860001R02	Inner disc	Thickness = 4 mm
7		515890305R 515893705R 515890405R 515893805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
8		408000047R02 408000049R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
9		248860005R02	Pressure plate	Thickness = 8 mm
10		240000218R02	Adjustment band	
11		367FT340A 367FT340C 367FT340D	Belleville spring	1200 Nm 1450 Nm 1800 Nm

FT34R

non-adjustable setting, release system



	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	133	133	138	138
G7	*1200	140	140	145	145
	1450				
G8	*1450	146	146	151	151
	1800				
G9	*1800	148	148	153	153

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT34R

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**H51**	**H58**	**H65**	**H72**
1450	**H52**	**H59**	**H66**	**H73**
1800	**H54**	**H61**	**H68**	**H75**

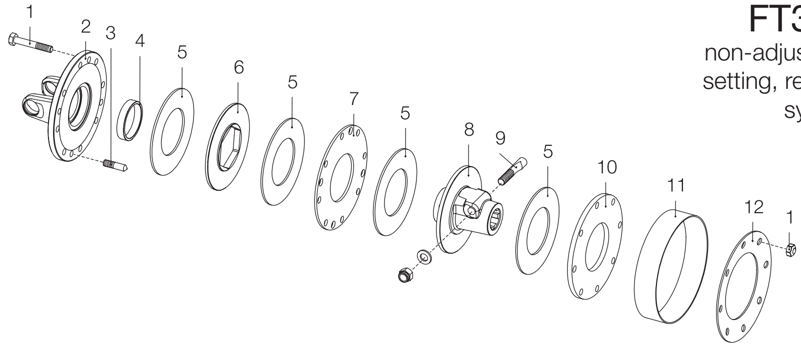
FT34R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	663G48E03R	663G48E37R	663G48E04R	663G48E38R
G7	*1200	663H48E03R	663H48E37R	663H48E04R	663H48E38R
	1450	663H53E03R	663H53E37R	663H53E04R	663H53E38R
G8	*1450	663L53E03R	663L53E37R	663L53E04R	663L53E38R
	1800	663L58E03R	663L58E37R	663L58E04R	663L58E38R
G9	*1800	663M58E03R	663M58E37R	663M58E04R	663M58E38R

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

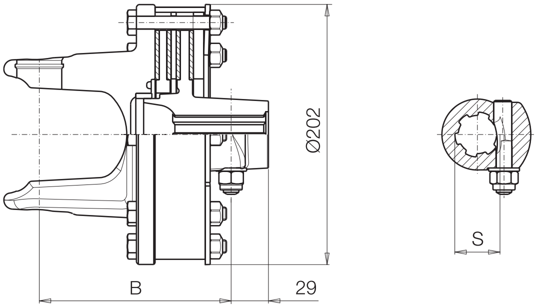
FT34R

non-adjustable setting, release system



Ref.	Size	Spare part code	Description	Technical data
1		432000045R08	Bolt	M10 x 65 mm
2	**G5** **G7** **G8** **G9**	2530G8605R 2530H8605R 2530L8605R 2530M8605R	Flange yoke	
3		310001301R04	Special socket head set screw	M10 x 40 mm
4		258005320R02	Bushing	
5		247006251R08	Friction lining	D = 141 ; d = 77 mm
6		248727702R02	Driving disc	
7		248860006R02	Inner disc	Thickness = 4 mm
8		515890305R 515893705R 515890405R 515893805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
9		408000047R02 408000049R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
10		248860005R02	Pressure plate	Thickness = 8 mm
11		240000218R02	Adjustment band	
12		367FT340A 367FT340C 367FT340D	Belleville spring	1200 Nm 1450 Nm 1800 Nm

FT44
non-adjustable
setting



	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	147	147	152	152
G9	*1800 2200	149	149	154	154

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT44

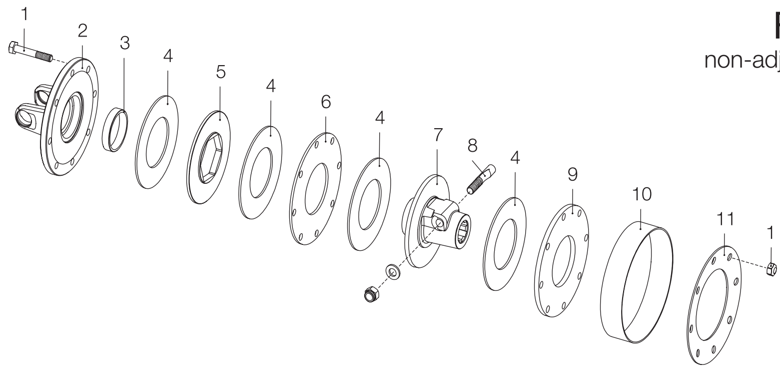
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	**Q37**	**Q39**	**Q41**	**Q43**
2200	**Q38**	**Q40**	**Q42**	**Q44**

FT44 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	663L58503R	663L58537R	663L58504R	663L58538R
G9	*1800	663M58503R	663M58537R	663M58504R	663M58538R
	2200	663M62503R	663M62537R	663M62504R	663M62538R

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

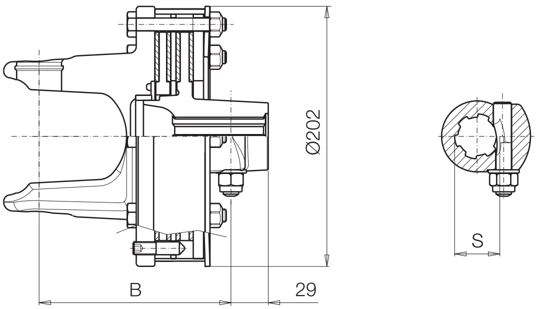
FT44
non-adjustable setting



Ref.	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M10 x 70 mm
2	**G8** **G9**	253078702R 253089001R	Flange yoke	
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		248737702R02	Driving disc	
6		248870011R02	Inner disc	Thickness = 4 mm
7		515900305R 515903705R 515900405R 515903805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
8		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
9		248870005R	Pressure plate	Thickness = 8 mm
10		240000219R02	Adjustment band	
11		367FT440A 367FT440C	Belleville spring	1800 Nm 2200 Nm

FT44R

non-adjustable setting, release system



	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	147	147	152	152
G9	*1800 2200	149	149	154	154

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FT44R

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	**H37**	**H39**	**H41**	**H43**
2200	**H38**	**H40**	**H42**	**H44**

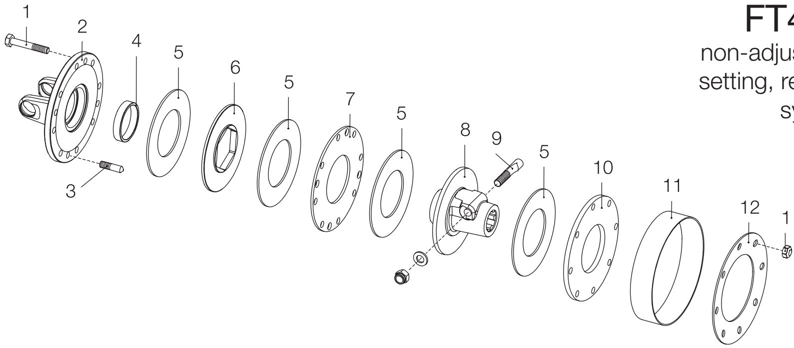
FT44R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	663L58G03R	663L58G37R	663L58G04R	663L58G38R
G9	*1800	663M58G03R	663M58G37R	663M58G04R	663M58G38R
	2200	663M62G03R	663M62G37R	663M62G04R	663M62G38R

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

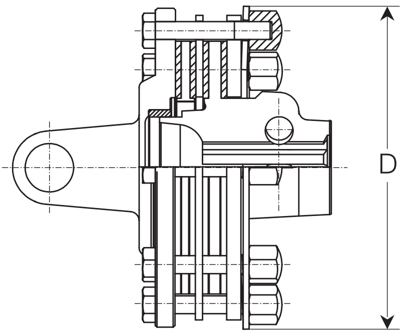
FT44R

non-adjustable setting, release system



Ref.	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M10 x 70 mm
2	**G8** **G9**	2530L8705R 2530M8705R	Flange yoke	
3		310001301R04	Special socket head set screw	M10 x 40 mm
4		258005320R02	Bushing	
5		247006351R08	Friction lining	D = 162 ; d = 85 mm
6		248737702R02	Driving plate	
7		248870013R02	Inner disc	Thickness = 4 mm
8		515900305R 515903705R 515900405R 515903805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
9		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
10		248870005R	Pressure plate	Thickness = 8 mm
11		240000219R02	Adjustment band	
12		367FT440A 367FT440C	Belleville spring	1800 Nm 2200 Nm

FK friction clutches are equipped with Belleville springs, designed to apply nearly constant pressure, self-compensating for friction lining wear. Therefore the setting is maintained without adjustment over the life of the linings.
FK friction clutches are non-adjustable. Torque is determined by the thickness of the Belleville spring. The calibrated screws and cap nuts prevent over-compression of the spring.
Five models of FK friction clutches are available, with different diameters and number of friction linings. All versions are available with treated hubs and driving plates to reduce rust and help prevent seizure.
The chart below indicates the diameter D, number of linings, and the standard settings for each model, corresponding to each driveline size. Maximum settings recommended for use at 1000 min^{-1} are marked (*).



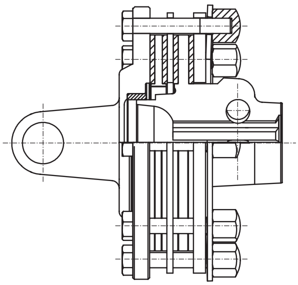
Standard settings (Nm)

	G1	G2	G3	G4	G5	G7	G8	G9
FK22	*400							
D = 155 mm	500	*500						
2 plates		600	*600					
			800	800				
FK32				*900	900			
D = 180 mm				1000	1000			
2 plates					*1100			
FK42					1200	*1200		
D = 202 mm						1450	*1450	
2 plates							1800	
FK34					1200	*1200		
D = 180 mm						1450	*1450	
4 plates							1800	*1800
FK44							1800	*1800
D = 202 mm								2200
4 plates								

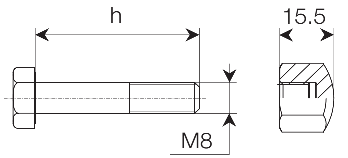
* Recommended settings for a 1000 min^{-1} velocity

Friction torque limiters FK

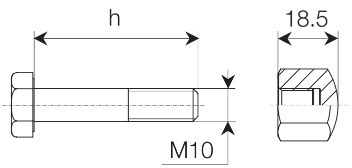
Calibration of FK friction clutches is determined by the characteristics of the spring, the correct compression of which is assured by the use of special bolts and cap nuts.
The adjacent tables show the codes for the spring and special bolt for each clutch model, setting and shaft size.
The spring code is stamped on each spring for identification purposes.



For clutch: **FK22**



For clutches: **FK32 - FK42 - FK34 - FK44**



FK22 Friction clutches

Setting Nm	Spring Code		Bolt Code	h mm
400	367FT220A	G1	432000148R08	40.7
500	367FT220C	G1	432000149R08	41.0
		G2	432000149R08	41.0
600	367FT220D	G2	432000149R08	41.0
		G3	432000151R08	41.5
800	367FT220E	G4	432000152R08	41.7

FK32 Friction clutches

Setting Nm	Spring Code		Bolt Code	h mm
900	367FT320A	G4	432000154R08	49.5
		G5	432000154R08	49.5
1000	367FT320C	G4	432000140R08	50.5
		G5	432000140R08	50.5
1100	367FT320D	G5	432000155R08	49.8

FK42 Friction clutches

Setting Nm	Spring Code		Bolt Code	h mm
1200	367FT420A	G5	432000140R08	50.5
		G7	432000144R08	52.5
1450	367FT420C	G7	432000144R08	52.5
		G8	432000147R08	53.0
1800	367FT420D	G8	432000147R08	53.0

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FK34 Friction clutches

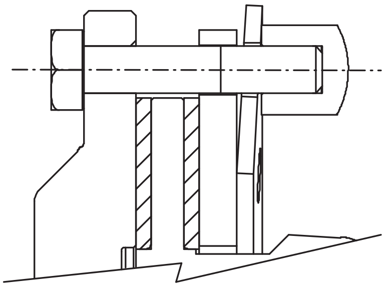
Setting Nm	Spring Code		Bolt Code	h mm
1200	367FT340A	G5	432000143R08	65.0
		G7	432000142R08	66.5
1450	367FT340C	G7	432000142R08	66.5
		G8	432000156R08	68.5
1800	367FT340D	G8	432000157R08	69.0
		G9	432000157R08	69.0

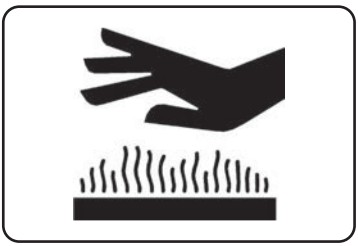
FK44 Friction clutches

Setting Nm	Spring Code		Bolt Code	h mm
1800	367FT440A	G8	432000157R08	69.0
		G9	432000158R08	69.5
2200	367FT440C	G9	432000158R08	69.5

FK friction clutches are equipped with special screws and cap nuts.
Spring compression is correct when the screws are fully tightened.

Recommended tightening torques:
- 25 Nm for FK22
- 50 Nm for FK32, FK42, FK34 and FK44.



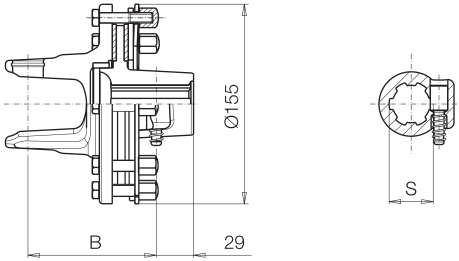


To avoid excessive wear to the implement, driveline or tractor Bondioli & Pavesi recommends that the setting not be changed.

Friction clutches may become hot during use. **Do not touch!**
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.

Friction torque limiters FK

FK22
non-adjustable
setting



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G1	*400 500	92	92	- -	- -
G2	*500 600	100	100	- -	- -
G3	*600 800	101	101	- -	- -
G4	800	101	101		

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FK22

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
400	**7A0**	**7A4**	**- -**	**- -**
500	**7A1**	**7A5**	**- -**	**- -**
600	**7A2**	**7A6**	**- -**	**- -**
800	**7A3**	**7A7**	**- -**	**- -**

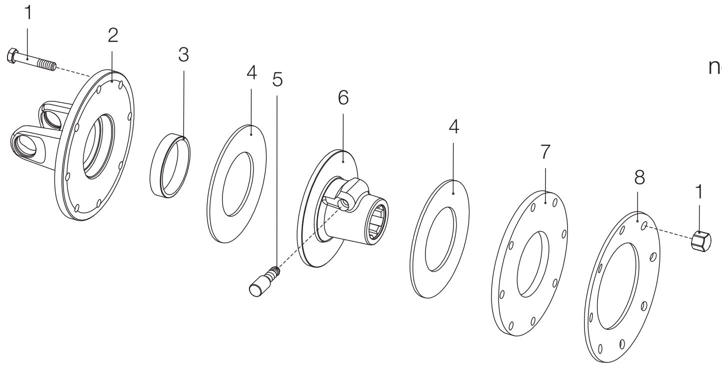
FK22 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	Bolt Code
G1	*400	60KB24103R	60KB24137R	- -	- -	432000148R08
	500	60KB28103R	60KB28137R	- -	- -	432000149R08
G2	*500	60KC28103R	60KC28137R	- -	- -	432000149R08
	600	60KC32103R	60KC32137R	- -	- -	432000149R08
G3	*600	60KE32103R	60KE32137R	- -	- -	432000151R08
	800	60KE39103R	60KE39137R	- -	- -	432000152R08
G4	800	60KE39103R	60KE39137R	- -	-	432000152R08

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FK22

non-adjustable setting

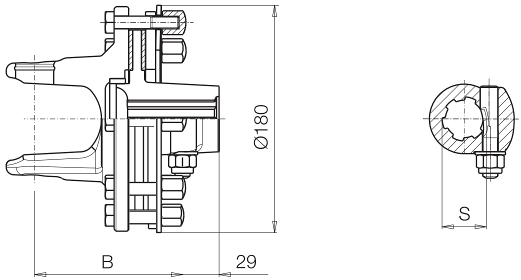


Ref.	Size	Spare part code	Description	Technical data
1		432000148R08 432000149R08 432000151R08 432000152R08	Bolt	M8 x 40.7 mm M8 x 41.0 mm M8 x 41.5 mm M8 x 41.7 mm
2	**G1** **G2** **G3-G4**	2530B8510R 2530C8510R 2530E8510R	Flange yoke	
3		258005320R02	Bushing	
4		247006151R08	Friction lining	D = 124 ; d = 67 mm
5		403000001R10	Push-pin kit	1 3/8” Z6 - Z21
6		513850307R 513853707R	Hub with push-pin	1 3/8” Z6 1 3/8” Z21
7		2481A0002R02	Pressure plate	Thickness = 4 mm
8		367FT220A 367FT220C 367FT220D 367FT220E	Belleville spring	400 Nm 500 Nm 600 Nm 800 Nm

Friction torque limiters FK

FK32

non-adjustable
setting



	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G4	*900	113	113	- -	- -
	1000				
G5	900	117	117	- -	- -
	1000				
	*1100				

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FK32

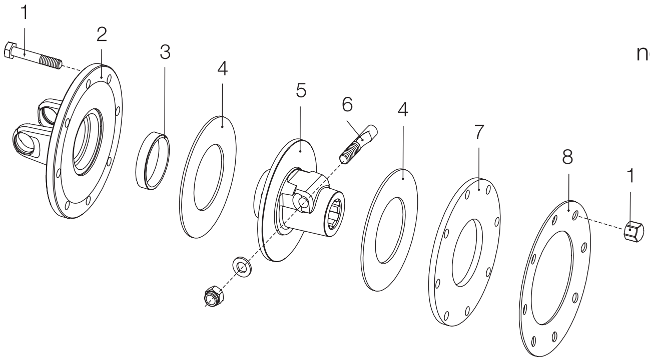
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
900	**7A8**	**7C1**	**- -**	**- -**
1000	**7A9**	**7C2**	**- -**	**- -**
1100	**7C0**	**7C3**	**- -**	**- -**

FK32 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	Bolt Code
G4	*900	60KE41203R	60KE41237R	- -	- -	432000154R08
	1000	60KE44203R	60KE44237R	- -	- -	432000140R08
G5	900	60KG41203R	60KG41237R	- -	- -	432000154R08
	1000	60KG44203R	60KG44237R	- -	- -	432000140R08
	*1100	60KG46203R	60KG46237R			432000155R08

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FK32
non-adjustable
setting

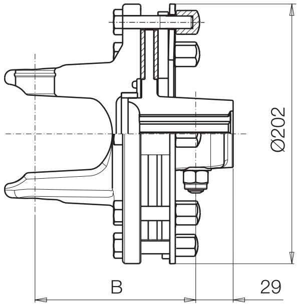


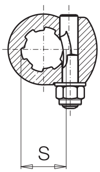
Ref.	Size	Spare part code	Description	Technical data
1		432000154R08 432000140R08 432000155R08	Bolt	M10 x 49.5 mm M10 x 50.5 mm M10 x 49.8 mm
2	**G4** **G5**	2530E8610R 253058902R	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	D = 141 ; d = 77 mm
5		515860305R 515863705R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
6		408000047R02	Taper pin	1 3/8” Z6 - Z21
7		248860005R02	Pressure plate	Thickness = 8 mm
8		367FT320A 367FT320C 367FT320D	Belleville spring	900 Nm 1000 Nm 1100 Nm

Friction torque limiters FK

FK42

non-adjustable
setting





	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	117	117	122	122
G7	*1200 1450	125	125	130	130
G8	*1450 1800	131	131	136	136

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FK42

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**7C4**	**7C7**	**7D0**	**7D3**
1450	**7C5**	**7C8**	**7D1**	**7D4**
1800	**7C6**	**7C9**	**7D2**	**7D5**

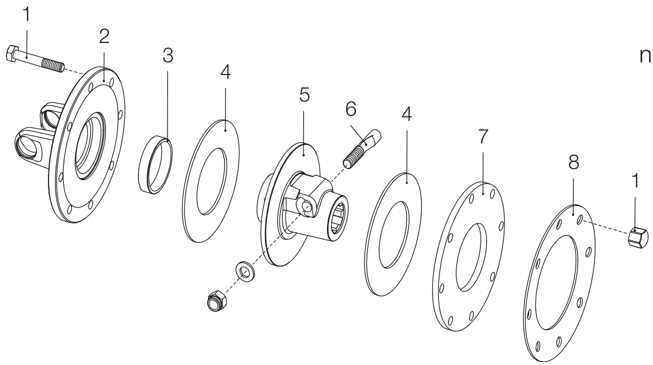
FK42 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	Bolt Code
G5	1200	60KG48403R	60KG48437R	60KG48404R	60KG48438R	432000140R08
G7	*1200	60KH48403R	60KH48437R	60KH48404R	60KH48438R	432000144R08
	1450	60KH53403R	60KH53437R	60KH53404R	60KH53438R	432000144R08
G8	*1450	60KL53403R	60KL53437R	60KL53404R	60KL53438R	432000147R08
	1800	60KL58403R	60KL58437R	60KL58404R	60KL58438R	432000147R08

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FK42

non-adjustable setting

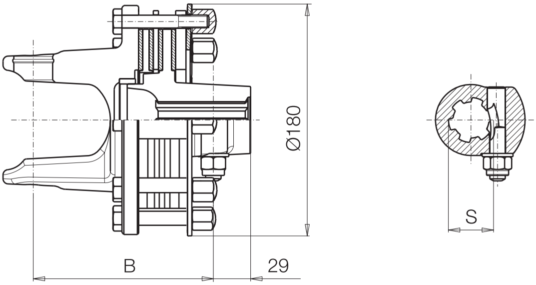


Ref.	Size	Spare part code	Description	Technical data
1		432000140R08 432000144R08 432000147R08	Bolt	M10 x 50.5 mm M10 x 52.5 mm M10 x 53.0 mm
2	**G5** **G7** **G8**	253058702R 253069002R 2530L8710R	Flange yoke	
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		515870305R 515873705R 515870405R 515873805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
6		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
7		248870005R	Pressure plate	Thickness = 8 mm
8		367FT420A 367FT420C 367FT420D	Belleville spring	1200 Nm 1450 Nm 1800 Nm

Friction torque limiters FK

FK34

non-adjustable
setting



	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	133	133	138	138
G7	*1200 1450	140	140	145	145
G8	*1450 1800	146	146	151	151
G9	*1800	148	148	153	153

*Recommended settings for a 1000 min^{-1} velocity

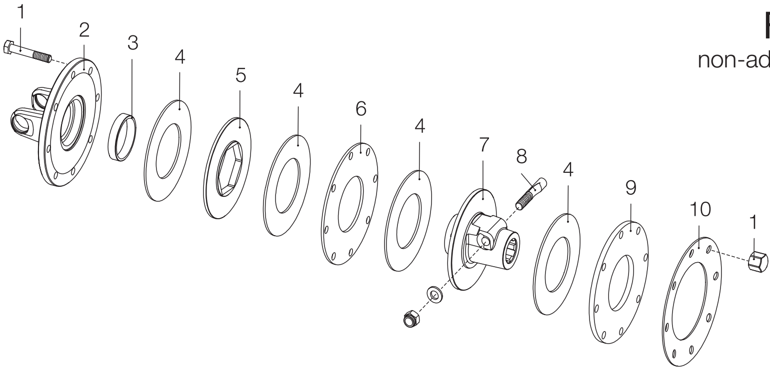
Driveline codes FK34

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**7D6**	**7D9**	**7E2**	**7E5**
1450	**7D7**	**7E0**	**7E3**	**7E6**
1800	**7D8**	**7E1**	**7E4**	**7E7**

FK34 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	Bolt Code
G5	1200	60KG48303R	60KG48337R	60KG48304R	60KG48338R	430000143R08
G7	*1200	60KH48303R	60KH48337R	60KH48304R	60KH48338R	432000142R08
	1450	60KH53303R	60KH53337R	60KH53304R	60KH53338R	432000142R08
G8	*1450	60KL53303R	60KL53337R	60KL53304R	60KL53338R	432000156R08
	1800	60KL58303R	60KL58337R	60KL58304R	60KL58338R	432000157R08
G9	*1800	60KM58303R	60KM58337R	60KM58304R	60KM58338R	432000157R08

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.



FK34

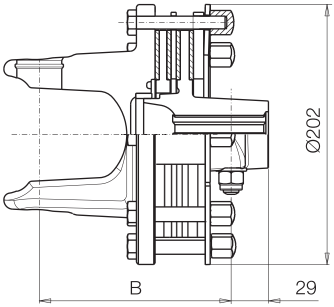
non-adjustable setting

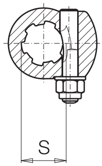
Ref.	Size	Spare part code	Description	Technical data
1		432000143R08 432000142R08 432000156R08 432000157R08	Bolt	M10 x 65.0 mm M10 x 66.5 mm M10 x 68.5 mm M10 x 69.0 mm
2	**G5** **G7** **G8** **G9**	253058902R 2530H8905R 2530L8910R 253088903R	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	D = 141 ; d = 77 mm
5		248727702R02	Driving disc	
6		248860001R02	Inner disc	Thickness = 4 mm
7		515890305R 515893705R 515890405R 515893805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
8		408000047R02 408000049R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
9		248860005R02	Pressure plate	Thickness = 8 mm
10		367FT340A 367FT340C 367FT340D	Belleville spring	1200 Nm 1450 Nm 1800 Nm

Friction torque limiters FK

FK44

non-adjustable setting





	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	147	147	152	152
G9	*1800 2200	149	149	154	154

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FK44

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	**7E8**	**7F2**	**7F6**	**7G0**
2200	**7E9**	**7F3**	**7F7**	**7G1**

FK44 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	Bolt Code
G8	1800	60KL58503R	60KL58537R	60KL58504R	60KL58538R	432000157R08
G9	*1800	60KM58503R	60KM58537R	60KM58504R	60KM58538R	432000158R08
	2200	60KM62503R	60KM62537R	60KM62504R	60KM62538R	432000158R08

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

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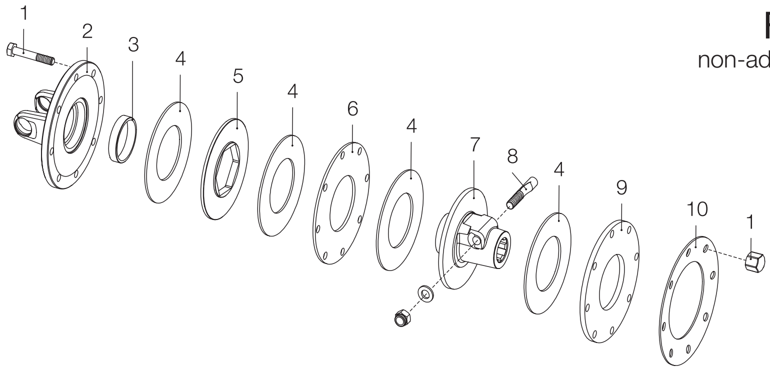


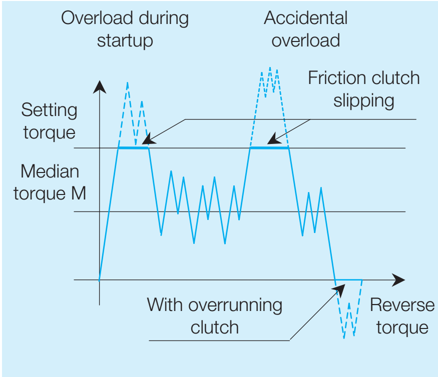
FK44
non-adjustable setting

Ref.	Size	Spare part code	Description	Technical data
1		432000157R08 432000158R08	Bolt	M10 x 69.0 mm M10 x 69.5 mm
2	**G8** **G9**	2530L8710R 2530M9010R	Flange yoke	
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		248737702R02	Driving disc	
6		248870011R02	Inner disc	Thickness = 4 mm
7		515900305R 515903705R 515900405R 515903805R	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
8		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
9		248870005R	Pressure plate	Thickness = 8 mm
10		367FT440A 367FT440C	Belleville spring	1800 Nm 2200 Nm

Combination friction torque limiters and overrunning clutches

Friction clutches combined with overrunning clutches are generally used on implements with high inertia (i.e. those with flywheels or other heavy rotating masses).
These implements include mower conditioners and square balers.
During overloads, due to abrupt starting or blockages, torque transmission can be limited by the slipping of the friction clutch. Possible reverse torques, generated during sudden deceleration or stopping, will be eliminated by the overrunning clutch.
The setting of friction torque limiters is usually 2 to 3 times the median torque M.
Three versions of combination friction torque limiter and overrunning clutch are available: FNV (adjustable), FFNV (adjustable), FNT (non-adjustable). They have two different diameters:
- 34 (D = 180 mm),
- 44 (D = 202 mm).

All versions are available with treated hubs and driving plates to reduce corrosion and help prevent seizure.
Drivelines with FFNV clutches (with coil springs) are not EU marked because the shield does not cover the entire inner yoke as required by Machinery Directive 2006/42/CE.
FNT friction clutches are available with Release System. This system permits the spring pressure to be reduced during storage, without requiring disassembly of the torque limiter.



FNV limiter,
adjustable

FFNV limiter,
adjustable,
for non-CE mark drivelines

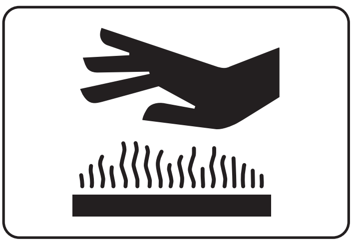
FNT limiter,
non-adjustable

Combination friction torque limiters and overrunning clutches

pv Factor

The reliable function of a friction clutch is highly dependent on many different parameters. Temperature is important. When slipped frequently and for long periods, friction clutches may become hot. This can impair the condition of the clutch, and alter the torque setting drastically.
Temperature increases rapidly with longer slipping cycles. It is recommended to select a setting suitable for each specific application, allowing only occasional and brief slipping (only a few seconds per cycle should be permitted).
After the setting has been chosen in accordance with the conditions of the application (median torque M, torque limit of driveline), one must select the proper type of friction clutch in regards to diameter and number of plates or friction linings.

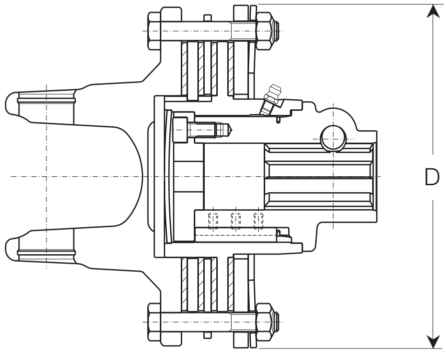
When selecting a suitable type of friction clutch, pressure p and slipping velocity v must also be taken into account.
The pressure on the friction linings is determined by the force exerted from the springs, and their surface area.
Slipping velocity is influenced by overloads (starting, stopping or blockages of the implement) and is related to the speed of rotation for the driveline.
The influence of pressure p and velocity v on the clutch is considered by factor p·v, equal to their product. The maximum value of factor p·v, suggested for reliable function of a friction clutch, is usually determined by experimentation.
Maximum recommended torque settings for 1000 min^{-1} speed are determined in accordance with this limiting value and shown on the opposite page (marked with *).



Friction clutches may become hot. **Do not touch!**
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.

FNV clutches are equipped with special Belleville springs, designed to apply pressure that varies with the amount of compression.
Two models of FNV friction clutches are available, with different diameters and settings.
- FNV34 diameter D = 180 mm
- FNV44 diameter D = 202 mm

All versions are available with treated hubs and driving plates to reduce corrosion and help prevent seizure.
The chart below indicates the diameter D, number of linings, and the standard settings for each model, corresponding to each driveline size. Maximum settings recommended for use at 1000 min^{-1} are marked (*).



FNV34 Combination friction torque limiter and overrunning clutch, adjustable setting

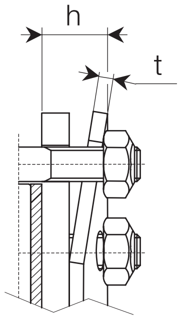
Standard settings (Nm)

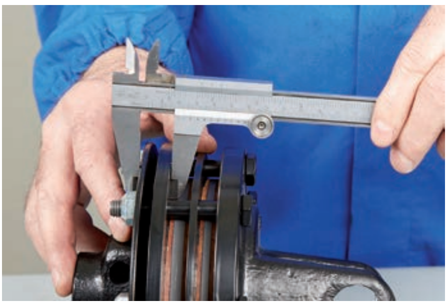
	G1	G2	G3	G4	G5	G7	G8	G9
FNV34					1200	*1200		
D = 180 mm						1350	1350	
2 plates						1450	*1450	
							1600	
							1800	*1800
								2000
FNV44							1800	*1800
D = 202 mm								2000
2 plates								2200

* Recommended settings for a 1000 min^{-1} velocity

Combination friction torque limiters and overrunning clutches FNV

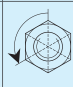
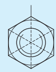
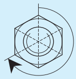
FNV friction torque limiters have an adjustable torque setting. The torque setting of FNV friction clutches varies with different compression (h) of the Belleville spring.
The compression of the Belleville springs used on FNV friction clutches must be adjusted to compensate for wear of the friction linings and to maintain the desired setting.
The tables below set out spring codes, thicknesses “t” and compression “h” measured as shown in the figure for standard settings. The height of the spring is measured next to each bolt and may be ± 0.2 mm of the listed value.
The tables also show the amount of rotation of each bolt required to achieve the next higher or lower setting, relative to the nominal setting (listed with no rotation noted on the bolt).



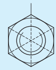
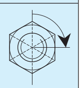


In addition to the listed settings, intermediate settings may be obtained by tightening or loosening the bolts proportionately.

FNV34 Friction clutches
4 plates, diameter 180 mm

Spring code	t mm	Setting Nm	h mm	
367008860R	3.75	1200	18.0	
		1600	17.5	
		2000	16.5	

FNV44 Friction clutches
4 plates, diameter 202 mm

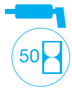
Spring code	t mm	Setting Nm	h mm	
367009870R	4.25	1800	19.0	
		2200	18.6	

⚠ Do not over-tighten the bolts; this may endanger the function of friction clutches.

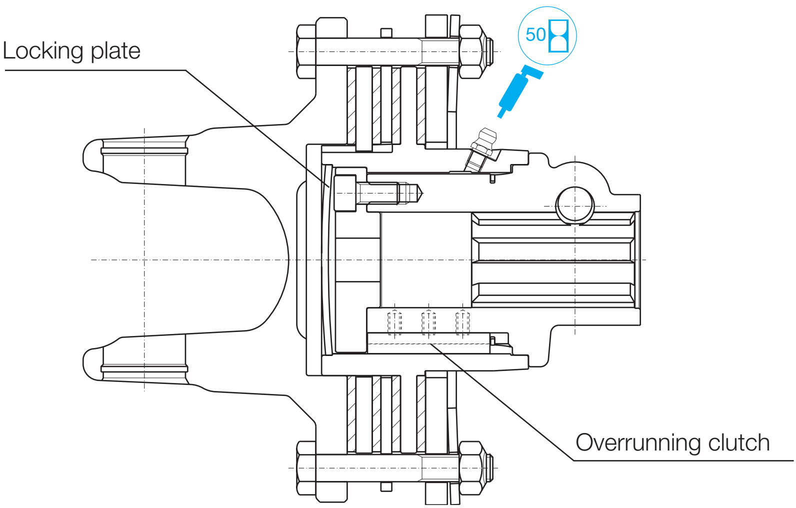
⚠ To avoid excessive wear to the implement, driveline, or tractor, Bondioli & Pavesi recommends that the defined setting not be altered.

Combination friction torque limiters and overrunning clutches FNV

Overrunning clutches mounted on FNV34 and FNV44 versions are incorporated onto the hub. A locking ring separates them from the friction clutch, so that the lubricating grease will not contaminate the friction linings.

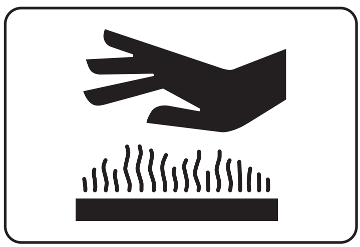


Lubricate overrunning clutches every 50 hours and after storage.



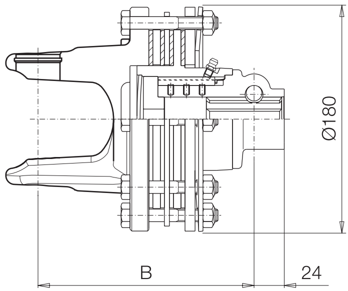
Do not approach the implement before all parts have reached a complete stop.

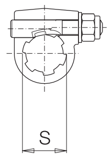
Friction clutches may become hot during use. **Do not touch!**
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.



FNV34

adjustable
setting

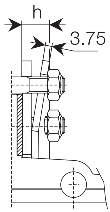




	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	158	158	- -	- -
G7	*1200	166	166	- -	- -
	1350				
	1450				
G8	1350	172	172	- -	- -
	*1450				
	1600				
	1800				
G9	*1800	174	174	- -	- -
	2000				

*Recommended settings for a 1000 min^{-1} velocity

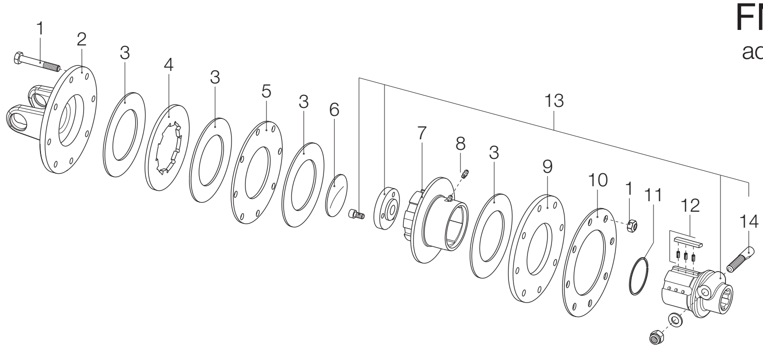
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**2A0**	**2A8**	**- -**	**- -**
1350	**2A1**	**2A9**	**- -**	**- -**
1450	**2A2**	**2B0**	**- -**	**- -**
1600	**2A3**	**2B1**	**- -**	**- -**
1800	**2A4**	**2B2**	**- -**	**- -**
2000	**2A5**	**2B3**	**- -**	**- -**



	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G5	1200	665G48103R	665G48137R	- -	- -	18.0
G7	*1200	665H48103R	665H48137R	- -	- -	18.0
	1350	665H51103R	665H51137R	- -	- -	
	1450	665H53103R	665H53137R	- -	- -	
G8	1350	665L51103R	665L51137R	- -	- -	
	*1450	665L53103R	665L53137R	- -	- -	
	1600	665L56103R	665L56137R	- -	- -	17.5
	1800	665L58103R	665L58137R	- -	- -	17.0
G9	*1800	665M58103R	665M58137R	- -	- -	
	2000	665M60103R	665M60137R	- -	- -	16.5

BONDIOLI & PAVESI

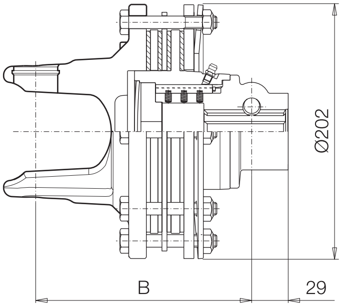
FNV34
adjustable setting

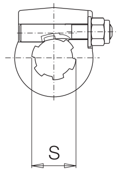


Ref.	Size	Spare part code	Description	Technical data
1		432000114R08	Bolt	M 10 x 75 mm
2	**G5** **G7** **G8** **G9**	2530G1L01R 2530H1L01R 2530L1L01R 2530M1L01R	Flange yoke	
3		247000054R08	Friction lining	D = 140 ; d = 85 mm
4		2481L0003R02	Driving plate	
5		2481L0001R02	Inner plate	Thickness = 4 mm
6		240000746R05	Locking plate	
7		4271L0101R	Overrunning clutch housing	
8		348017000R20	Grease fitting	
9		2481L0005R02	Pressure plate	Thickness = 8 mm
10		367008860R	Belleville spring	
11		339002060R20	Snap ring	
12		4211L0001R06	Pawl + springs kit	
13		5151L0351R 5151L3751R	Hub, plug and taper pin kit	1 3/8” Z6 1 3/8” Z21
14		408000047R02	Taper pin	1 3/8” Z6 - Z21

FNV44

adjustable
setting

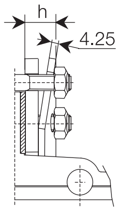




	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	175	175	175	175
G9	*1800	177	177	177	177
	2000				
	2200				

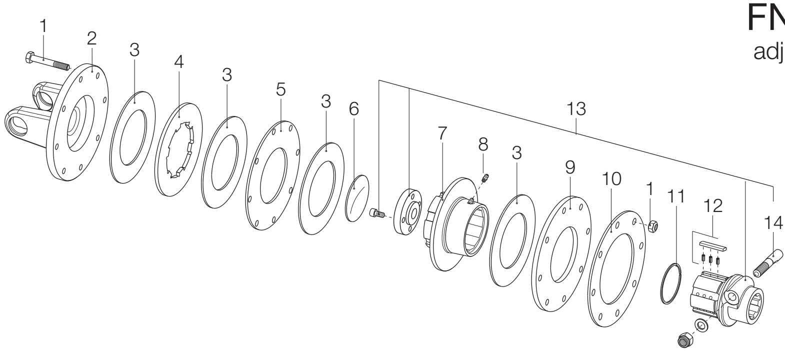
*Recommended settings for a 1000 min^{-1} velocity

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	**2B6**	**2C4**	**2D2**	**2E0**
2000	**2B7**	**2C5**	**2D3**	**2E1**
2200	**2B8**	**2C6**	**2D4**	**2E2**



	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G8	1800	665L58203R	665L58237R	665L58204R	665L58238R	19.0
G9	*1800	665M58203R	665M58237R	665M58204R	665M58238R	19.0
	2000	665M60203R	665M60237R	665M60204R	665M60238R	
	2200	665M62203R	665M62237R	665M62204R	665M62238R	18.6

FNV44
adjustable setting

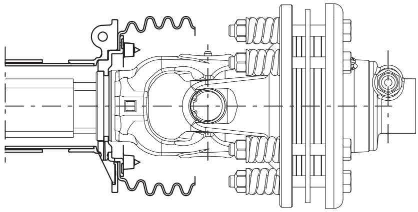


Ref.	Size	Spare part code	Description	Technical data
1		432000114R08	Bolt	M 10 x 75 mm
2	**G8** **G9**	2530L1M01R 2530M1M01R	Flange yoke	
3		247000061R08	Friction lining	D = 160 ; d = 97 mm
4		2481M0001R02	Driving plate	
5		2481M0002R02	Inner plate	Thickness = 4 mm
6		240000748R05	Locking plate	
7		4271M0101R	Overrunning clutch housing	
8		348017000R20	Grease fitting	
9		2481H0004R02	Pressure plate	Thickness = 8 mm
10		367FT420D	Belleville spring	
11		339002068R20	Snap ring	
12		4211L0001R06	Pawl + springs kit	
13		5151M0351R 5151M3751R 5151M0451R 5151M3851R	Hub, plug and taper pin kit	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
14		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20

Combination friction torque limiters and overrunning clutches FFNV

FNV friction clutches are equipped with helical (coil) springs, that apply pressure in proportion to the amount of compression.
Two models of FFNV friction clutches are available, with different diameters and standard setting.
- **FFNV34** diameter D = 180 mm
- **FFNV44** diameter D = 202 mm.

All versions are available with treated hubs and driving plates to reduce corrosion and help prevent seizure.
The chart below indicates the diameter D, number of linings, and the standard settings for each model, corresponding to each driveline size. Maximum settings recommended for use at 1000 min^{-1} are marked (*).
Drivelines with FFNV clutches are not EU marked because the shield does not cover the entire inner yoke as required by Machinery Directive 2006/42/CE.
An implement with an FFNV clutch on the primary driveline must have a shield that overlaps the driveline guard by at least 50 mm overlap as specified by UNI EN ISO 4254-1 and ANSI/ASABE S604.1.



FFNV34 Combination friction torque limiter and overrunning clutch, adjustable setting

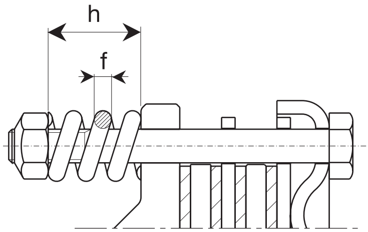
Standard settings (Nm)

	G1	G2	G3	G4	G5	G7	G8	G9
FFNV34					1200	*1200		
D = 180 mm						1350	1350	
4 plates						1450	*1450	
							1600	
							1800	*1800
								2000
FFNV44							1800	*1800
D = 202 mm								2000
4 plates								2200

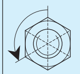
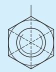
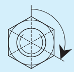
* Recommended settings for a 1000 min^{-1} velocity

Combination friction torque limiters and overrunning clutches FFNV

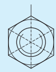
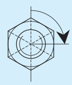
FFNV friction clutches have an adjustable torque setting. The torque setting varies with different thickness (f) and compression (h) of the springs.
The compression of the springs must be adjusted to compensate for wear of the friction linings and to maintain the desired torque setting.
The tables below show the spring code, diameter “f” and compression height “h” for standard settings.
Check the compression of each spring using a sliding caliper as shown below.
The height of the spring may be ± 0.2 mm of the “h” value shown.



FFNV34 Friction clutches
4 plates, diameter 180 mm

Spring code	f mm	Setting Nm	h mm	
351022370	6	1200	29.5	
		1450	29.0	
		1800	28.5	

FFNV44 Friction clutches
4 plates, diameter 202 mm

Spring code	f mm	Setting Nm	h mm	
351013370	7	1800	30.0	
		2200	29.6	

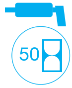
The tables also show the amount of rotation of each bolt required to achieve the next higher or lower setting, relative to the nominal setting (listed with no rotation noted on the bolt).
In addition to the listed settings, intermediate settings may be obtained by tightening or loosening the bolts proportionately.

⚠ Do not over-tighten the bolts; this may impair the function of friction clutches.

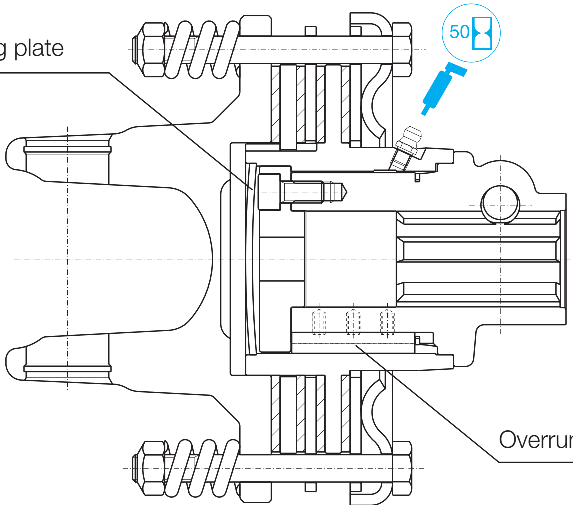
⚠ To avoid excessive wear to the implement, driveline, or tractor, Bondioli & Pavesi recommends that the defined setting not be altered.

Combination friction torque limiters and overrunning clutches FFNV

Overrunning clutches mounted on FFNV34 and FFNV44 versions are incorporated onto the hub. A locking ring separates them from the friction clutch, so that the lubricating grease will not contaminate the friction linings.

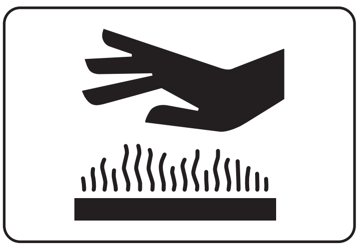


Lubricate overrunning clutches every 50 hours and after storage.



Do not approach the implement before all parts have reached a complete stop.

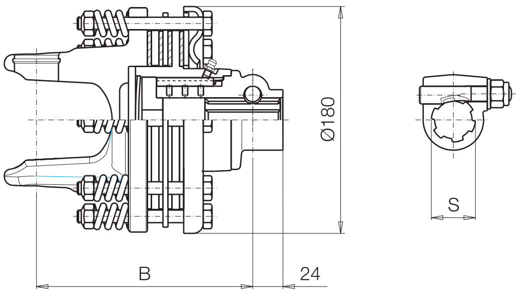
Friction clutches may become hot during use. **Do not touch!**
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.



Combination friction torque limiters and overrunning clutches FFNV

FFNV34

adjustable setting, Coil spring

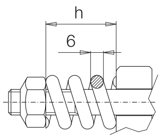


	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	158	158	- -	- -
G7	*1200	166	166	- -	- -
	1350				
	1450				
G8	1350	172	172	- -	- -
	*1450				
	1600				
	1800				
G9	*1800	174	174	- -	- -
	2000				

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FFNV34

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**2F0**	**2F8**	**- -**	**- -**
1350	**2F1**	**2F9**	**- -**	**- -**
1450	**2F2**	**2G0**	**- -**	**- -**
1600	**2F3**	**2G1**	**- -**	**- -**
1800	**2F4**	**2G2**	**- -**	**- -**
2000	**2F5**	**2G3**		

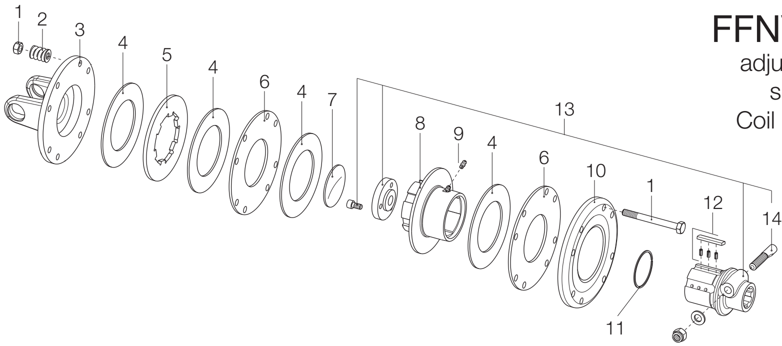


FFNV34 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G5	1200	667G48103R	667G48137R	- -	- -	29.5
G7	*1200	667H48103R	667H48137R	- -	- -	29.5
	1350	667H51103R	667H51137R	- -	- -	
	1450	667H53103R	667H53137R	- -	- -	29.0
G8	1350	667L51103R	667L51137R	- -	- -	
	*1450	667L53103R	667L53137R	- -	- -	29.0
	1600	667L56103R	667L56137R	- -	- -	
	1800	667L58103R	667L58137R	- -	- -	28.5
G9	*1800	667M58103R	667M58137R	- -	- -	28.5
	2000	667M60103R	667M60137R	- -	- -	

FFNV34

adjustable setting, Coil spring

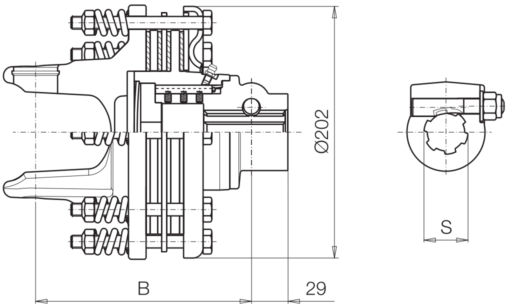


Ref.	Size	Spare part code	Description	Technical data
1		432000007R08	Bolt	M10 x 100 mm
2		351022370R08	Coil spring	f = 6 mm
3	**G5** **G7** **G8** **G9**	2530G1L05R 2530H1L05R 2530L1L05R 2530M1L05R	Flange yoke	
4		247000054R08	Friction lining	D = 140 ; d = 85 mm
5		2481L0003R02	Driving plate	
6		2481L0007R02	Inner plate	Thickness = 4 mm
7		240000746R05	Locking plate	
8		4271L0101R	Overrunning clutch housing	
9		348017000R20	Grease fitting	
10		248220007R02	Pressure plate	
11		339002060R20	Snap ring	
12		4211L0001R06	Pawl + springs kit	
13		5151L0351R 5151L3751R	Hub, plug and taper pin kit	1 3/8” Z6 1 3/8” Z21
14		408000047R02	Taper pin	1 3/8” Z6 - Z21

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FFNV44

adjustable
setting,
Coil spring

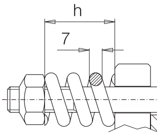


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	175	175	175	175
G9	*1800 2000 2200	177	177	177	177

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FFNV44

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	**2G6**	**2H4**	**2J2**	**2K0**
2000	**2G7**	**2H5**	**2J3**	**2K1**
2200	**2G8**	**2H6**	**2J4**	**2K2**

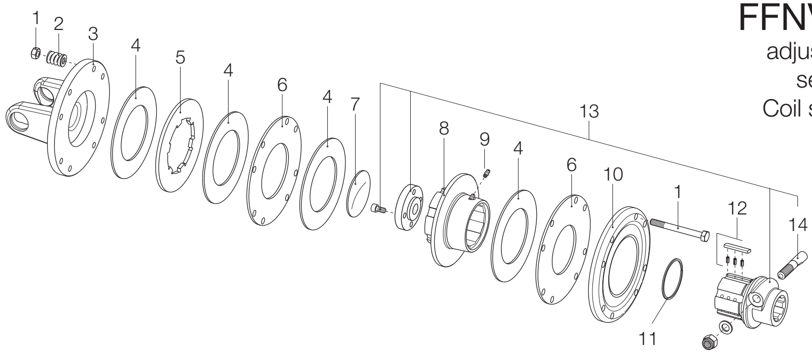


FFNV44 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
G8	1800	667L58203R	667L58237R	667L58204R	667L58238R	30.0
G9	*1800	667M58203R	667M58237R	667M58204R	667M58238R	30.0
	2000	667M60203R	667M60237R	667M60204R	667M60238R	
	2200	667M62203R	667M62237R	667M62204R	667M62238R	29.6

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

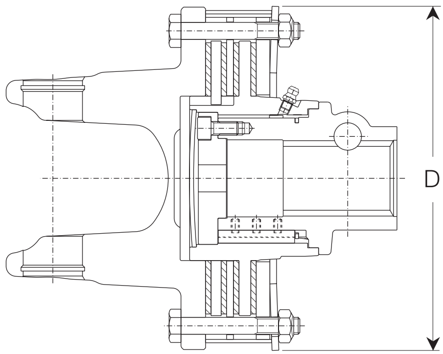
FFNV44
adjustable setting, Coil spring



Ref.	Size	Spare part code	Description	Technical data
1		432000122R08	Bolt	M10 x 105 mm
2		351013370R08	Coil spring	f = 7 mm
3	G8 G9	2530L1M05R 2530M1M05R	Flange yoke	
4		247000061R08	Friction lining	D = 160 ; d = 97 mm
5		2481M0001R02	Driving plate	
6		2481M0007R02	Inner plate	Thickness = 4 mm
7		240000748R05	Locking plate	
8		4271M0101R	Overrunning clutch housing	
9		348017000R20	Grease fitting	
10		248230006R02	Pressure plate	
11		339002068R20	Snap ring	
12		4211L0001R06	Pawl + springs kit	
13		5151M0351R 5151M3751R 5151M0451R 5151M3851R	Hub, plug and taper pin kit	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
14		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20

Friction clutches combined with overrunning clutches are generally used on implements with high inertia (i.e. those with flywheels or other heavy rotating masses). These implements include mower conditioners and square balers.
During overloads, due to abrupt starting or blockages, torque transmission can be limited by the slipping of the friction clutch. Possible reverse torques, generated during sudden deceleration or stopping, will be eliminated by the overrunning clutch.
Two versions of combination friction torque limiter and overrunning clutch are available: with different diameters:
- **FNT34** (D = 180 mm, 4 plates)
- **FNT44** (D = 202 mm, 4 plates).

All versions are available with treated hubs and driving plates to reduce rust and help prevent seizure.
FNT friction clutches are available with Release System. This system permits the spring pressure to be reduced during storage, without requiring disassembly of the torque limiter.
Letter “R” in the shaft code identifies versions with Release System.
The chart below indicates the diameter D, number of linings, and the standard settings for each model, corresponding to each driveline size. Maximum settings recommended for use at 1000 min^{-1} are marked (*).



FNT34 Combination friction torque limiter and overrunning clutch, non-adjustable setting

Standard settings (Nm)

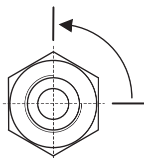
	G1	G2	G3	G4	G5	G7	G8	G9
FNT34 - FNT34R					1200	*1200		
D = 180 mm						1450	*1450	
4 plates							1800	*1800
FNT44 - FNT44R							1800	*1800
D = 202 mm								2200
4 plates								

* Recommended settings for a 1000 min^{-1} velocity

Combination friction torque limiters and overrunning clutches FNT

FNT friction clutches are equipped with Belleville springs, designed to apply nearly constant pressure, self-compensating for friction lining wear. Therefore the setting is maintained without adjustment over the life of the linings.
The torque setting of FNT friction clutches is determined by the Belleville spring. The tables below show the spring codes for each friction clutch and standard setting.
For identification, each spring is marked with a code.

FNT clutches are equipped with a metal band to be used as reference to properly compress the Belleville spring.



To do this properly, tighten the bolts until the Belleville spring contacts the metal band. Then back off each nut 1/4 turn.

Do not over-tighten bolts; this may impair the function of friction clutches.

To avoid excessive wear to the implement, driveline or tractor Bondioli & Pavesi recommends that the setting not be changed.

Friction with overrunning clutches **FNT34-FNT34R**

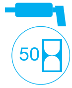
Setting Nm	Code
1200	367FT340A
1450	367FT340C
1800	367FT340D

Friction with overrunning clutches **FNT44-FNT44R**

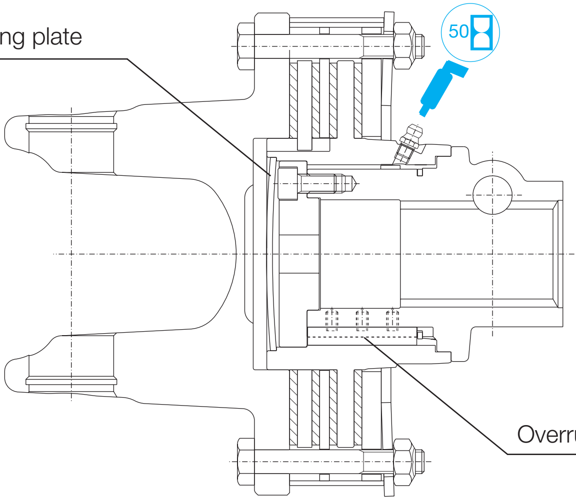
Setting Nm	Code
1800	367FT440A
2200	367FT440C

Combination friction torque limiters and overrunning clutches FNT

Overrunning clutches mounted on FNT34 and FNT44 versions are incorporated onto the hub. A locking ring separates them from the friction clutch, so that the lubricating grease will not contaminate friction linings.

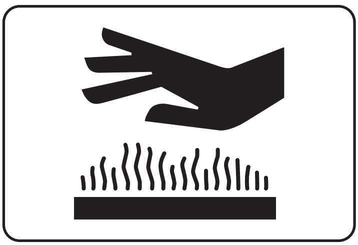


Lubricate overrunning clutches every 50 hours and after storage.



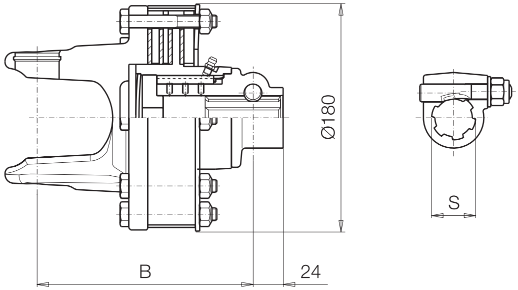
Do not approach the implement before all parts have reached a complete stop.

Friction clutches may become hot during use. **Do not touch!**
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.



Combination friction torque limiters and overrunning clutches FNT

FNT34



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	158	158	- -	- -
G7	*1200 1450	166	166	- -	- -
G8	*1450 1800	172	172	- -	- -
G9	*1800	174	174	- -	- -

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FNT34

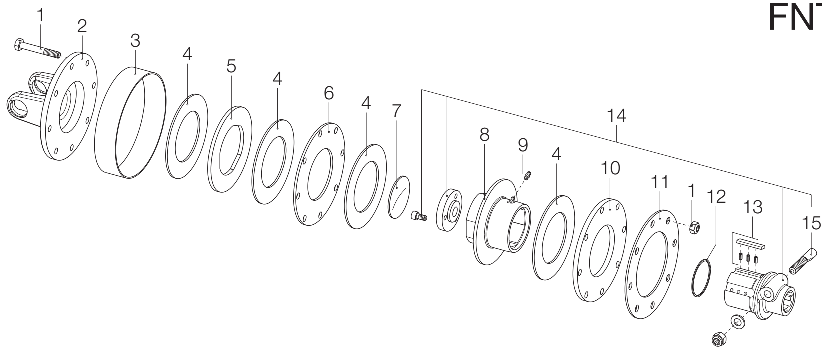
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**1A1**	**1A6**	**- -**	**- -**
1450	**1A2**	**1A7**	**- -**	**- -**
1800	**1A3**	**1A8**	**- -**	**- -**

FNT34 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	658G48103R	658G48137R	- -	- -
G7	*1200	658H48103R	658H48137R	- -	- -
	1450	658H53103R	658H53137R	- -	- -
G8	*1450	658L53103R	658L53137R	- -	- -
	1800	658L58103R	658L58137R	- -	- -
G9	*1800	658M58103R	658M58137R	- -	- -

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

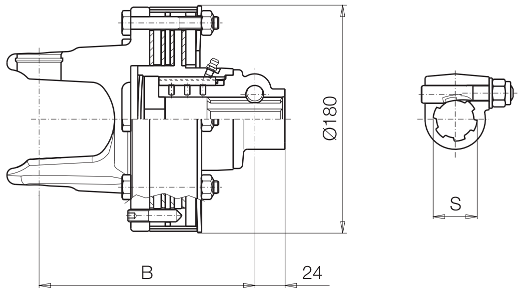
FNT34



Ref.	Size	Spare part code	Description	Technical data
1		432000045R08	Bolt	M10 x 65 mm
2	**G5** **G7** **G8** **G9**	2530G1L01R 2530H1L01R 2530L1L01R 2530M1L01R	Flange yoke	
3		240000218R02	Adjustment band	
4		247000054R08	Friction lining	D = 140 ; d = 85 mm
5		2481L0003R02	Driving plate	
6		2481L0001R02	Inner plate	Thickness = 4 mm
7		240000746R05	Locking plate	
8		4271L0101R	Overrunning clutch housing	
9		348017000R20	Grease fitting	
10		2481L0002R02	Pressure plate	Thickness = 8 mm
11		367FT341A 367FT340C 367FT340D	Belleville spring	1200 Nm 1450 Nm 1800 Nm
12		339002060R20	Snap ring	
13		4211L0001R06	Pawl + spring kit	
14		5151L0351R 5151L3751R	Hub, plug and taper pin kit	1 3/8” Z6 1 3/8” Z21
15		408000047R02	Taper pin	1 3/8” Z6 - Z21

Combination friction torque limiters and overrunning clutches FNT

FNT34R
release system



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	158	158	- -	- -
G7	*1200 1450	166	166	- -	- -
G8	*1450 1800	172	172	- -	- -
G9	*1800	174	174	- -	- -

*Recommended settings for a 1000 min^{-1} velocity

Driveline codes FNT34R

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	**1C1**	**1C6**	**- -**	**- -**
1450	**1C2**	**1C7**	**- -**	**- -**
1800	**1C3**	**1C8**	**- -**	**- -**

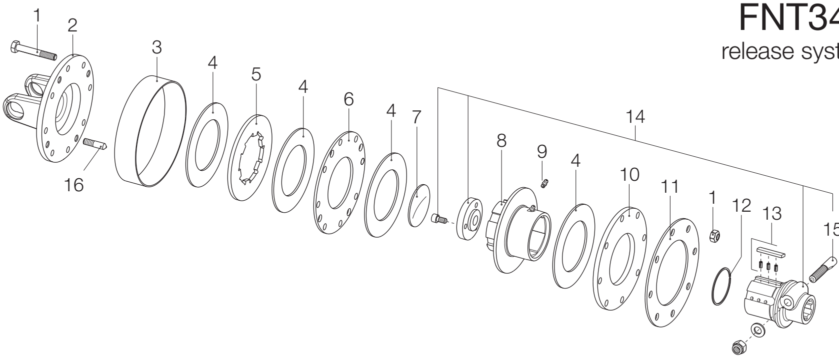
FNT34R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G5	1200	658G48203R	658G48237R	- -	- -
G7	*1200	658H48203R	658H48237R	- -	- -
	1450	658H53203R	658H53237R	- -	- -
G8	*1450	658L53203R	658L53237R	- -	- -
	1800	658L58203R	658L58237R	- -	- -
G9	*1800	658M58203R	658M58237R	- -	- -

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

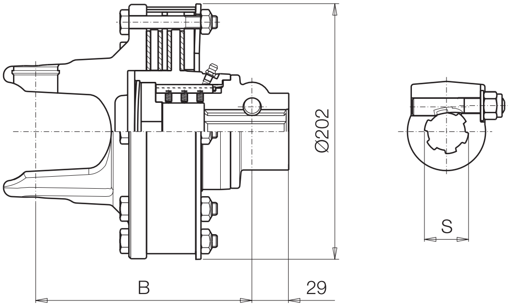
FNT34R

release system



Ref.	Size	Spare part code	Description	Technical data
1		432000045R08	Bolt	M10 x 65 mm
2	**G5** **G7** **G8** **G9**	2530G1L02R 2530H1L02R 2530L1L02R 2530M1L02R	Flange yoke	
3		240000218R02	Adjustment band	
4		247000054R08	Friction lining	D = 140 ; d = 85 mm
5		2481L0003R02	Driving plate	
6		2481L0004R02	Inner plate	Thickness = 4 mm
7		240000746R05	Locking plate	
8		4271L0101R	Overrunning clutch housing	
9		348017000R20	Grease fitting	
10		2481L0002R02	Pressure plate	Thickness = 8 mm
11		367FT341A 367FT340C 367FT340D	Belleville spring	1200 Nm 1450 Nm 1800 Nm
12		339002060R20	Snap ring	
13		4211L0001R06	Pawl + spring kit	
14		5151L0351R 5151L3751R	Hub, plug and taper pin kit	1 3/8” Z6 1 3/8” Z21
15		408000047R02	Taper pin	1 3/8” Z6 - Z21
16		310001301R04	Special socket head set screw	M 10 x 40 mm

FNT44



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	175	175	175	175
G8	*1800 2200	177	177	177	177

Driveline codes FNT44

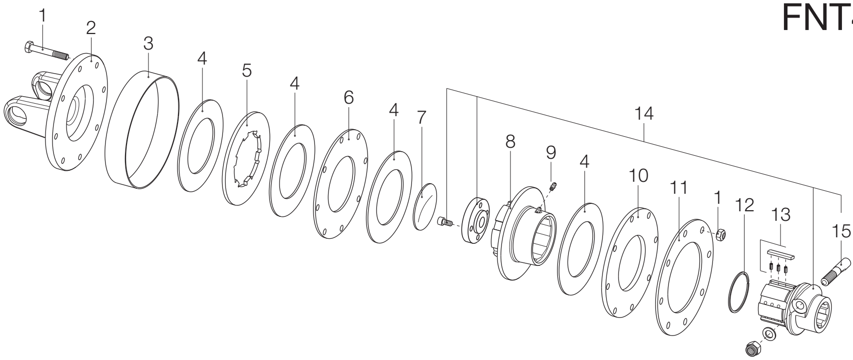
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	**1F1**	**1F7**	**1G3**	**1G9**
2200	**1F2**	**1F8**	**1G4**	**1H0**

FNT44 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	658L58303R	658L58337R	658L58304R	658L58338R
G9	*1800	658M58303R	658M58337R	658M58304R	658M58338R
	2200	658M62303R	658M62337R	658M62304R	658M62338R

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FNT44

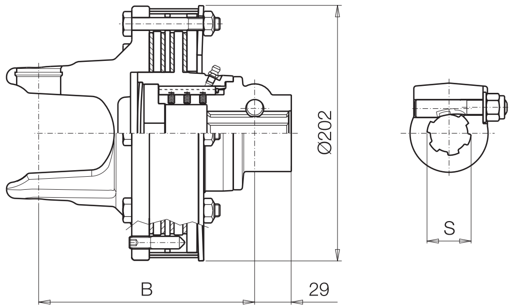


Ref.	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M10 x 70 mm
2	**G8** **G9**	2530L1M01R 2530M1M01R	Flange yoke	
3		240000219R02	Adjustment band	
4		247000061R08	Friction lining	D = 160 ; d = 97 mm
5		2481M0001R02	Driving plate	
6		2481M0002R02	Inner plate	Thickness = 4 mm
7		240000748R05	Locking plate	
8		4271M0101R	Overrunning clutch plug	
9		348017000R20	Grease fitting	
10		2481H0003R02	Pressure plate	Thickness = 8 mm
11		367FT440A 367FT440C	Belleville spring	1800 Nm 2200 Nm
12		339002068R20	Snap ring	
13		4211L0001R06	Pawl + springs kit	
14		5151M0351R 5151M3751R 5151M0451R 5151M3851R	Hub, plug and taper pin kit	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
15		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20

Combination friction torque limiters and overrunning clutches FNT

FNT44R

release system



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	175	175	175	175
G9	*1800 2200	177	177	177	177

Driveline codes FNT44R

Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	**1H5**	**1J1**	**1J7**	**1K4**
2200	**1H6**	**1J2**	**1J8**	**1K5**

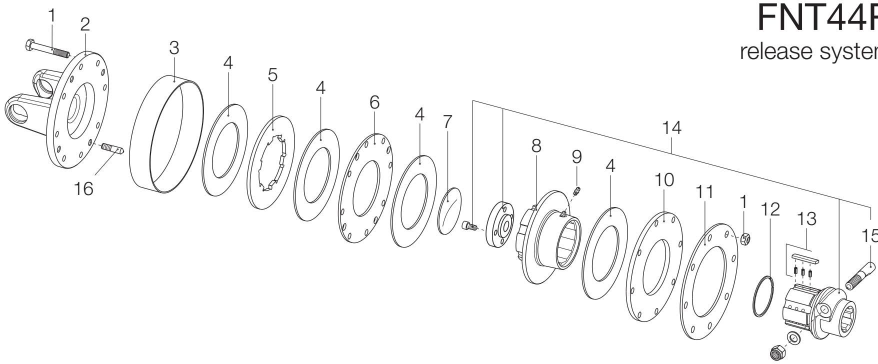
FNT44R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
G8	1800	658L58403R	658L58437R	658L58404R	658L58438R
G9	*1800	658M58403R	658M58437R	658M58404R	658M58438R
	2200	658M62403R	658M62437R	658M62404R	658M62438R

For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

FNT44R

release system



Ref.	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M10 x 70 mm
2	G8 G9	2530L1M02R 2530M1M02R	Flange yoke	
3		240000219R02	Adjustment band	
4		247000061R08	Friction lining	D = 160 ; d = 97 mm
5		2481M0001R02	Driving plate	
6		2481M0003R02	Inner plate	Thickness = 4 mm
7		240000748R05	Locking plate	
8		4271M0101R	Overrunning clutch plug	
9		348017000R20	Grease fitting	
10		2481H0003R02	Pressure plate	Thickness = 8 mm
11		367FT440A 367FT440C	Belleville spring	1800 Nm 2200 Nm
12		339002068R20	Snap ring	
13		4211L0001R06	Pawl + springs kit	
14		5151M0351R 5151M3751R 5151M0451R 5151M3851R	Hub, plug and taper pin kit	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
15		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
16		310001301R04	Special socket head set screw	M 10 x 40 mm

Proper lubrication of all rotating and sliding parts is essential for proper function, long life, and reliability. Insufficient lubrication, or contamination of the lubricant, is one of the most frequent causes of failure of cardan joint drivelines. The lubrication frequency and the type of grease used are important to the life of the driveline, as well as the shafts and bearings of the components to which they are connected.
Grease contains a soap base (lithium, calcium, or sodium based), lubricating oils, and additives (e.g. molybdenum disulphide). These additives are used for corrosion resistance, strength, adhesion at extreme pressures (EP), or other properties. The soap base can be compared to a “sponge”; it retains lubricating oils and gradually releases them to the components. Its efficiency diminishes with longer working periods and with higher pressures.
Greases are classified by the National Lubricating Grease Institute (NLGI) according to their consistency. Bondioli & Pavesi recommends NLGI #2 grease on all crosses, telescoping members and shields.
During assembly, the LR automatic torque limiters are greased with NLGI 2 molybdenum disulphide grease and do not require further lubrication throughout the normal period of use.
The standard lubrication frequency for all components of series Global cardan joint drivelines is 50 hours. This lengthens the lubrication interval from a daily chore to a weekly routine.

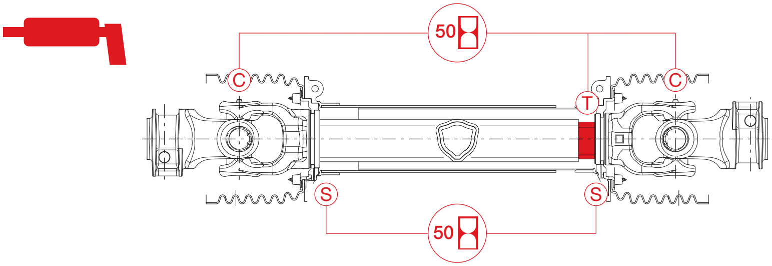
Heavy duty applications in aggressive environments may require more frequent lubrication.
The following instructions, that are also listed in the operator’s manual of the driveline, should be included in the manual provided by the implement manufacturer.

⚠ Disengage the PTO, turn off the tractor engine, remove the key, and check that all rotating parts have come to a standstill before approaching the implement or performing maintenance work.

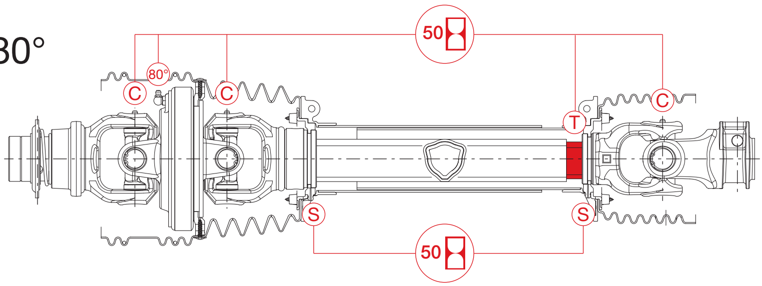
It is recommended to grease the components before their initial use.
Clean and lubricate the driveline before storage, and at the end of the season.
When greasing cross kits, lubricate generously until the grease purges from all four bearing caps. Pump grease gradually. Avoid high pressures, especially those possible from pneumatic equipment.

Lubrication

Lubrication frequency (hours) and estimated grease volumes



80°



		G1	G2	G3	G4	G5	G7	G8	G9
Crosses	C	4 g	7 g	10 g		13 g	18 g	22 g	26 g
Shields	S	6 g							
Telescoping members	T	12 g		20 g				32 g	
80° CV joint	80°		20 g		30 g	40 g		50 g	

Manually operated grease guns provide approximately 0.8 – 1.0 grams of grease per pump. One (1) ounce of grease is approximately 28.3 grams.

When lubricating cross kits, pump grease until the grease purges from all four bearing caps. Pump the grease gradually. Avoid high pressures, especially those possible from pneumatic equipment.

RA1 Overrunning clutches

3 - 4 g

50

RA2 Overrunning clutches

5 - 6 g

50

SA Ratchet torque limiters

4 - 7 g

50

LN Ratchet torque limiters

4 - 7 g

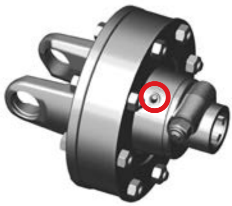
50

LB Shear bolt torque limiter

1 - 2 g

seasonal

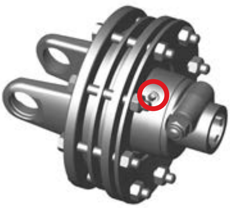
FNT Friction torque limiter and overrunning clutch



50

5 - 7 g

FNV Friction torque limiter and overrunning clutch



50

5 - 7 g

FFNV Friction torque limiter and overrunning clutch

50

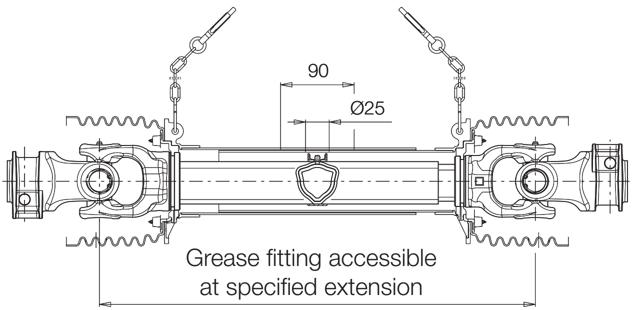
5 - 7 g

Lubrication

Direct Greasing

Direct Greasing is an optionally available system for telescoping members which facilitates lubrication with the transmission mounted to the tractor in the transport or working positions.
A grease fitting on the transmission shaft is easily accessed via a hole in the external shield tube and a slot in the internal shield tube.
To align the hole and the slot when the transmission is extended, simply rotate the shield tubes; you can now access the grease fitting.

The extension at which the grease fitting is accessible usually corresponds to the transport or working extension, and must be specified when ordering the Direct Greasing option.
The Direct Greasing system complies with international safety regulations.
The 25 mm diameter access hole is normally closed, but can easily be opened when the shaft is at the specified extension by rotating the shield tubes so that the hole is over the slot.
The standard slot length is 90 mm, but can be specified up to 120 mm.



Implement input connection shields

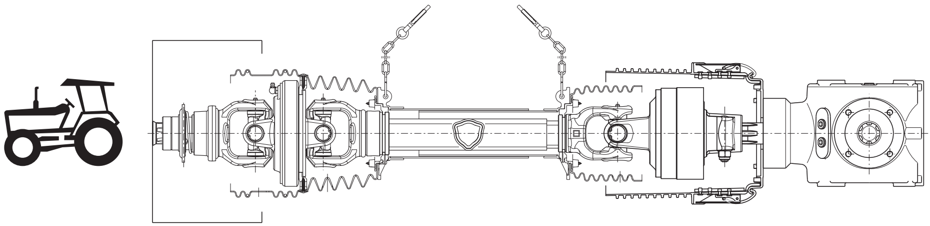
Proper use and maintenance of the driveline and shield is of primary importance for operator safety. Missing or modified safety shields may cause accidents.

All rotating parts must be guarded.

Shields applied to the Implement Input Connection (IIC) require special attention, because they must integrate with the driveline shields, they should not interfere with other components when operating the implement, and they should not hinder driveline installation and maintenance.
Bondioli & Pavesi offers a complete range of implement input connection shields, designed with the drivelines in compliance with international safety standards.
Due to the broad range of implements and applications, the specifications contained herein should be used as a general guide to the selection of an implement input connection shield.

The implement manufacturer is responsible for selecting suitable IIC shielding according to the application, the size and articulation range of the driveline, the type and size of any torque limiters installed on the driveline, access requirements for assembly or maintenance, and any applicable standards.
Thorough testing of the IIC shield by the implement manufacturer under actual field conditions is necessary and strongly recommended by Bondioli & Pavesi.
SFT implement input connection (IIC) shields comply with international standards and are designed to complete an interactive guarding system along with the driveline guard and tractor master shield, even if the driveline is equipped with a CV joint, torque limiter, or an overrunning clutch.
These shields are practical and can be opened to easily access the joints for installation and maintenance operations. SFT shields are not designed, nor intended to be used as steps.

Implement input connection shields



All rotating parts must be guarded. Contact with a rotating driveline can cause death or serious injury. The tractor master shield, driveline guards, and the implement input connection shield form an interactive guarding system.

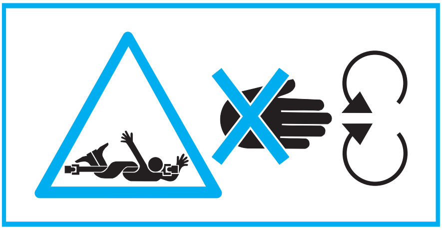
The Machinery Directive (2006/42/CE) requires that the implement be equipped with an implement input connection shield fixed to the implement.
Standard UNI EN ISO 4254-1 requires the implement input connection shield completely encircle the shaft, but allow for installation and articulation of the driveline:
Standards UNI EN ISO 4254-1 and ANSI/ASABE S604.1 requires the IIC shield provide at least 50 mm of overlap with the integral driveline guard in the straight position.
The tractor master shield, the integral driveline guard, and the implement input connection shield constitute an interactive guarding system according to ANSI/ASABE S604.1 standard.
Bondioli & Pavesi recommends the use of proper shields and guards for drivelines, tractors, and implements. Damaged or missing components must be replaced with original spare parts, correctly installed, before using the driveline.

Bondioli & Pavesi recommends the manufacturers of implements apply labels that clearly state the need to keep safety shields in place and in proper working order.
Manufacturers are also recommended to include in their operating manuals a list of the shields and safety labels, as well as their position on the machine and their code numbers for ordering replacements.
In compliance with ANSI/ASAE S493 .1 standards, the implement manufacturer shall provide safety sign(s) and instructions stating that guards must be kept in place and the machine should not be operated with guards opened or removed. Standard UNI EN ISO 4254-1 requires a label be used to draw attention to possible risks when the guard is unlocked, opened, or removed.
Basic information for safe and correct use of the driveline and shielding are shown in the catalogs and on the instruction sheet included with the implement input connection shield.

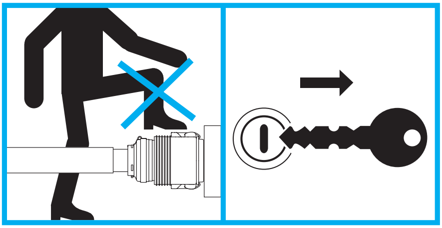
Implement input connection shields

Use the implement only with the original driveline. The implement input connection shield must be compatible with the driveline and the application.

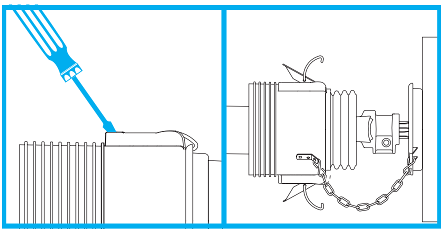
If the IIC shield is damaged by contact with other components of the implement, please consult your dealer.



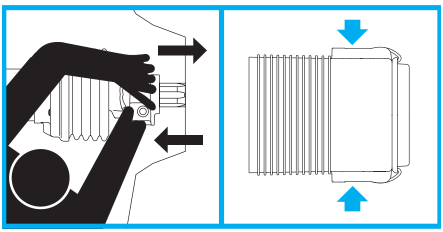
Contact with a rotating driveline can cause serious injury or death. Do not open or remove safety shields while engine is running. Make sure that all driveline, tractor and implement shields are functional and in place before operation. Damaged or missing shields must be replaced with correctly installed original equipment spare parts.



Do not step or stand on the driveline or implement input connection shield. Do not step on, step over, or go under the driveline. Disengage the PTO, turn off the tractor engine, remove the key, and allow all moving parts to come to a complete stop before approaching the implement or doing maintenance work.



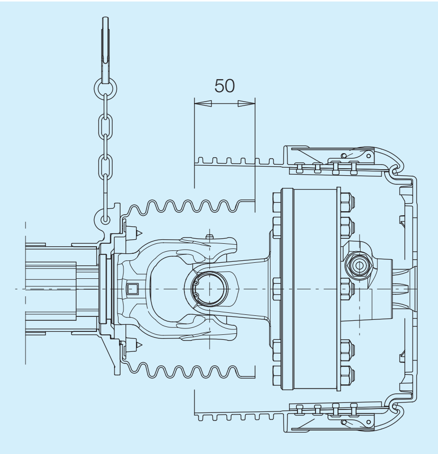
To open the SFT IIC shield, lift the lever with a screwdriver or a similar tool to release the two clips. Slide the implement input connection shield forward along the driveline to gain access to the joint, yoke, or clutch. The chain keeps the plastic shield attached to the metal plate when opened.



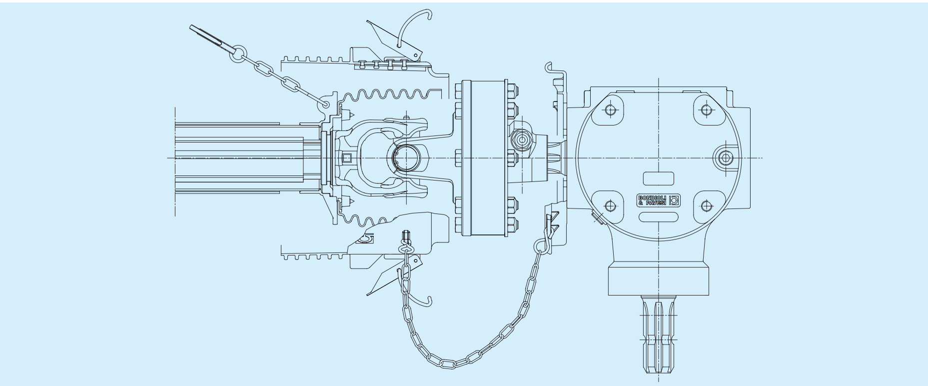
Make sure the driveline and implement input connection shields are securely attached to the implement before operating.
Make sure that the plastic shield is properly seated on the metal plate and the lever clamps are securely closed before operating the driveline.

Implement input connection shields

SFT IIC shields are composed of a metal plate and a circular plastic shield. The function of the metal plate is to support the plastic shield and provide a means for attachment to the implement. It is made of metal to provide a rigid and solid support even if attached to a surface that will become hot (such as a gear box).
The plastic shield completely encircles the implement input shaft as required by standard UNI EN ISO 4254-1, and is connected to the metal plate by two lever clamps.



SFT IIC shields comply with ANSI/ASABE S604.1 and UNI EN ISO 4254-1 standards, which require a minimum overlap of 50 mm between the IIC shield and the driveline shield, in the straight position.
To install or perform maintenance on the driveline, release the shield cone from the bottom plate and slide it along the shaft. The lever clamps are shrouded to prevent unintentional release. The clamps may be disengaged using a screwdriver or similar lever. Opening the clamps allows the plastic shield to slide along the driveline, providing easy and ample access for installation and maintenance of the joint, torque limiter or clutch.
A chain connects the metal plate to the plastic shield when it is released in accordance with standard ANSI/ASAE S493.1 and UNI EN ISO 4254-1.



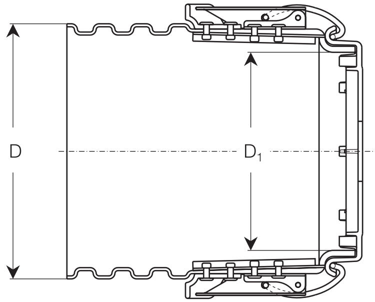
Implement input connection shields

IIC shields should be chosen depending on their intended application, the yoke, torque limiter, or clutch to be covered, their dimensions, and on normal driveline movements during implement operations and maneuvers.
IIC shields, as well as driveline shields, should allow minimal access to revolving parts, but allow unhindered driveline movements.
Standard ISO 5673-1 defines a minimum 150 mm access.

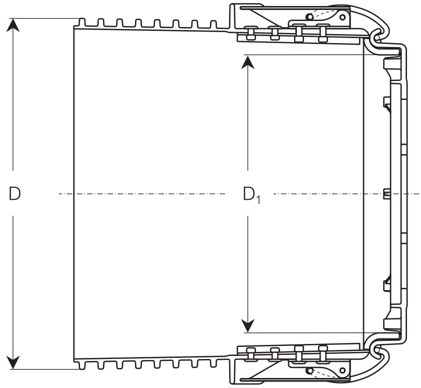
SFT IIC shields are available with two types of shield cones, **00** and **10**, which differ in shape, material and diameters. (**17**, **19**, **21**, **23** and **25**).

Type **00** cones come in five different diameters and can be applied to end yokes, overrunning clutches, torsionally resilient joints, ratchet torque limiters, shear bolt torque limiters, and automatic torque limiters.

Type **10** cones come in three diameters and are made of heat-resistant plastic. They are recommended especially for protecting friction torque limiters, which are often used in heavy-duty applications and can reach high working temperatures.



Diameters **17** and **19**
Type **00** cone



Diameters **21**, **23** and **25**
Type **00** and **10** cones

	Type 00		Type 10	
Diameter code	D mm	D_1 mm	D mm	D_1 mm
17	170	132	---	---
19	190	152	---	---
21	214	165	214	165
23	235	185	235	185
25	259	207	259	207

Implement input connection shields

The size of the IIC shields should be sufficient to allow the cone to pass over the driveline's outer cone. Diameter D_1 must therefore be larger than the diameter of the outer cone, or any type of torque limiter or clutch installed on the driveline.
The table below shows appropriate IIC shield diameter codes (i.e. the diameter D in centimeters) for various driveline attachments.
IIC shields and driveline shields should allow minimal access to revolving parts, while leaving the driveline easy to install and free to articulate.

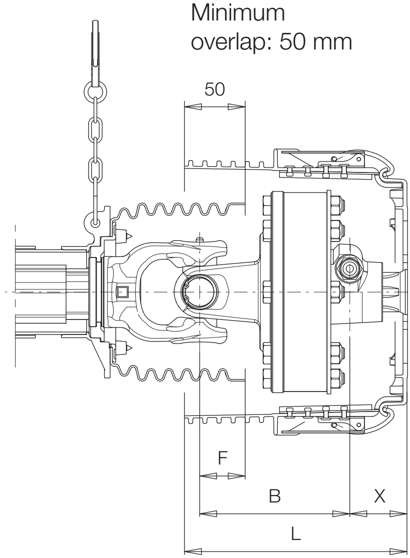
Driveline Attachment	G1	G2	G3	G4	G5	G7	G8	G9
Yokes for single cardan joints	17	19	19	19	21	21	21	21
RA	17	19	19	19	21	21	21	21
SA - LN	17	19	19	19	21	- -	- -	- -
LB	19	19	19	19	21	21	21	21
LR23 - LR24	- -	- -	- -	19	21	21	21	21
LR35	- -	- -	- -	- -	- -	- -	- -	23
FV22 - FFV22 - FT22	21	21	21	21	- -	- -	- -	- -
FV32 - FFV32 - FT32	- -	- -	- -	23	23	23	- -	- -
FT34 - FFV34 - FT34	- -	- -	- -	- -	23	23	23	23
FV42 - FFV42 - FT42	- -	- -	- -	- -	25	25	25	25
FV44 - FFV44 - FT44	- -	- -	- -	- -	- -	- -	25	25
FNV34 - FFNV34 - FNT34	- -	- -	- -	- -	23	23	23	23
FNV44 - FFNV44 - FNT44	- -	- -	- -	- -	- -	- -	25	25

Implement input connection shields

The IIC shield length **L** is measured from the face of the metal plate to the end of the plastic shield.
Standard shield lengths are shown in the table below and must be chosen to provide sufficient overlap with the driveline shield, while leaving the necessary space for shaft installation and movement.
The IIC shield length **L** can be calculated by the following formula, according to the protrusion of the implement shaft **X**, in order to achieve an overlap of 50mm as required by standards UNI EN ISO 4254-1 and ANSI/ASABE S604.1.

Length **B** is measured from the annular groove of the splined shaft to the center of the cross. These dimensions are listed within this catalog for each yoke, torque limiter, or clutch (see section for relevant size driveline).
Length **F** is measured from the protrusion of the shield to the cross center. This dimension is also listed in the tables related to driveline sizes.
The table below shows the length codes for each IIC shield. Always choose the next longer standard length above the calculated length to maintain a 50 mm overlap with the driveline shield.

$$L = X + B + 50 - F$$

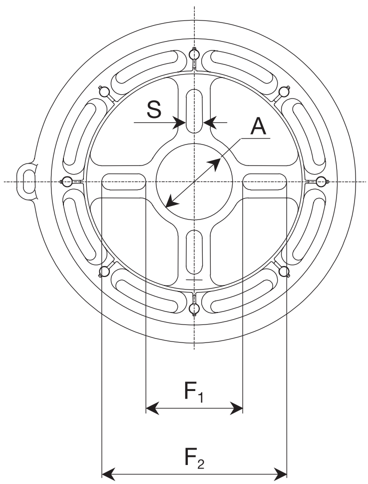


Length code	L (mm) D=170 mm	D=190 mm	D=210 mm	D=230 mm	D=250 mm
05	122	122	122	122	122
10	135	135	135	135	135
15	147	147	147	147	147
20	160	160	160	160	160
25	172	172	172	172	172
30	185	185	185	185	185
35	197	197	197	197	197
40	210	210	210	210	210
45	222	222	222	222	222
50	- - -	235	235	235	235
55	- - -	247	247	247	247
60	- - -	- - -	260	260	260
65	- - -	- - -	- - -	272	272
70	- - -	- - -	- - -	285	285
75	- - -	- - -	- - -	- - -	300

Implement input connection shields

SFT implement input connection shields can be easily installed on the implement. The metal plate has four slots positioned at 90° to allow attachment with bolts to the implement frame.
Bondioli & Pavesi recommends the implement manufacturer provide a solid and sturdy mounting, and advise the end user to periodically check that the shield is in place, undamaged, and properly secured.

The implement input connection shield is attached to, and becomes a part of the implement. Consequently, the implement manufacturer is responsible for selecting the proper shield according to applicable standards and, if required, obtaining CE certification for the machine.
SFT IIC shields are provided of CE mark and instruction sheet (code 399CEE2CF) including the Conformity Statement required by the Machinery Directive. Instruction sheet 399CEE2CF is valid for all countries of destination.



Instruction sheet 399CEE2CF

Diameter code	A mm	S mm	F_1 mm	F_2 mm
17	40	9	56	98
19	40	9	56	98
21	52	11	66	126
23	52	11	66	126
25	52	11	66	126

Codes for SFT IIC shields

1	2	3	
3	**9**	**5**	SFT IIC shield

4	5	
		IIC shield type **00**: for yokes, ratchet torque limiters, shear bolt limiters, automatic limiters **10**: Zytel® material, recommended for friction torque limiters

6	7	
		IIC shield diameter **17, 19, 21, 23, 25** for type 00 cones **21, 23, 25** for type 10 cones

8	9	
		IIC Shield length **05, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70,75**

10	11
C	**E**

Example: **395 00 23 30 CE**
is the code for ordering a SFT IIC Shield with 00 cone, diameter D = 230 mm (code 23), length L = 185 mm (code 30), with an instruction sheet valid for all countries of destination.

Bondioli & Pavesi offers a wide range of shields for PTO's, specifically designed for drivelines and fully compliant with international standards.
Due to the broad range of implements and applications, the specifications contained herein should be used as a general guide to the selection of an implement input connection shield.

The implement manufacturer is responsible for selecting suitable IIC shielding according to the application, the size and the articulation range of the driveline, the standards applicable for the country of destination.
Thorough testing of the IIC shield by the implement manufacturer under actual field conditions is necessary and strongly recommended by Bondioli & Pavesi.

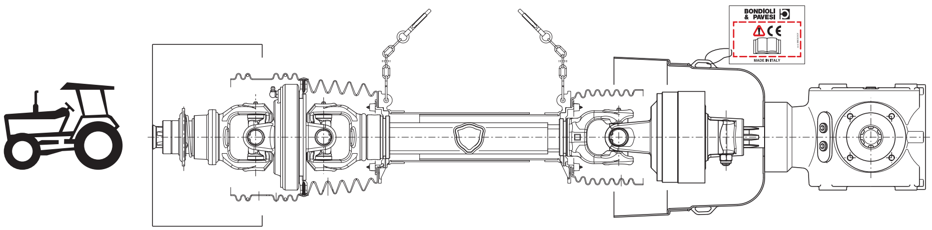
All rotating parts must be guarded. The shields on the tractor and on the implement machine must form an integrated guarding system with the driveline guard.

Implement input connection shields CF

The Machinery Directive (2006/42/CE) requires that the implement be equipped with an implement input connection shield fixed to the implement.
Standard UNI EN ISO 4254-1 requires the implement input connection shield completely encircle the shaft, but allow for installation and articulation of the driveline. Standards UNI EN ISO 4254-1 and ANSI/ASABE S604.1 requires the IIC shield provide at least 50 mm of overlap with the integral driveline guard in the straight position.
The tractor master shield, the integral driveline guard, and the implement input connection shield constitute an interactive guarding system according to ANSI/ASABE S604.1 standard.
Bondioli & Pavesi recommends the use of proper shields and guards for drivelines, tractors, and implements. Damaged or missing components must be replaced with original spare parts, correctly installed, before using the driveline.

Damaged or missing components must be replaced with original spare parts, correctly installed, before using the driveline.
Bondioli & Pavesi recommends the manufacturers of implements apply labels that clearly state the need to keep safety shields in place and in proper working order.

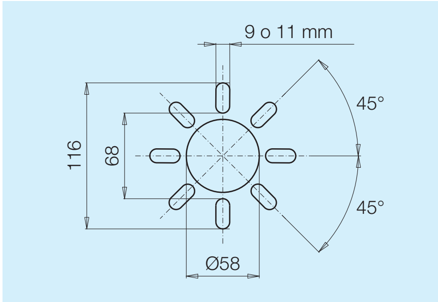
Manufacturers are also recommended to include in their operating manuals a list of the shields and safety labels, as well as their position on the machine and their code numbers for ordering replacements.
In compliance with ASAE S493.1 standards, the implement manufacturer shall provide safety sign(s) and instructions stating that guards must be kept in place and the machine should not be operated with guards opened or removed.
Standard UNI EN ISO 4254-1 requires a label be used to draw attention to possible risks when the guard is unlocked, opened, or removed.

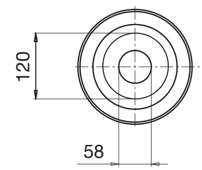


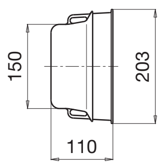
Implement input connection shields CF

Circular shape implement input connection shields

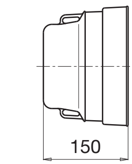
CF implement input connection shields with circular shape are available in tree different sizes with or without fixing slots. The flat fixing surface has a diameter of 120 mm, the slots are 24 mm long and 9 or 11 mm large. It's recommendable that the implement manufacturer provide for a solid and sturdy mounting by screws and washers on the flat bottom surface. Flexible extensions, available in two different lengths, can be attached to the rigid body to increase the overlap with the driveline guard and allow joint articulation.



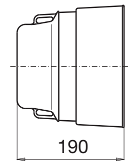




Rigid cone

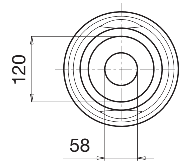


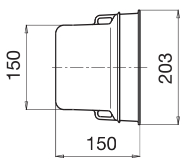
Cone with medium band



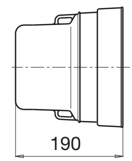
Cone with long band

Code		Rigid cone	Cone with medium band	Cone with long band
without slots		21901CE	41701CE	41711CE
with slots	9x24	219000F09CE	517000F01CE	517000F02CE
with slots	11x24	219000F11CE	517000F03CE	517000F04CE

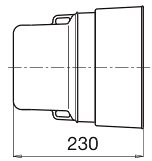




Rigid cone

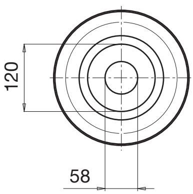


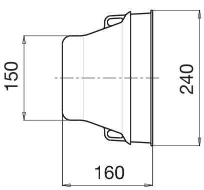
Cone with medium band



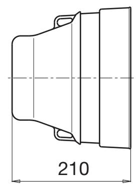
Cone with long band

Code		Rigid cone	Cone with medium band	Cone with long band
without slots		21902CE	41702CE	41712CE
with slots	9x24	219000G09CE	517000G01CE	517000G02CE
with slots	11x24	219000G11CE	517000G03CE	517000G04CE

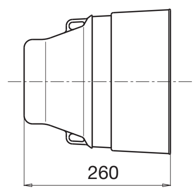




Rigid cone



Cone with medium band



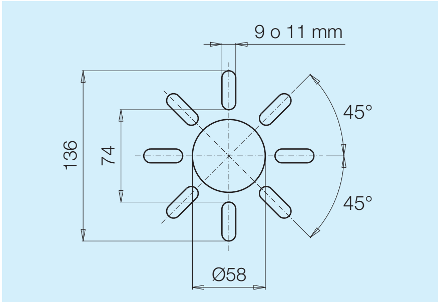
Cone with long band

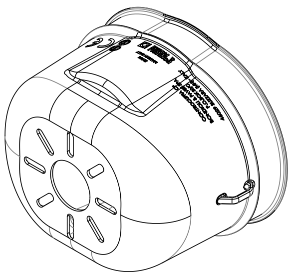
Code		Rigid cone	Cone with medium band	Cone with long band
without slots		21903CE	41703CE	41713CE
with slots	9x24	219000H09CE	517000H01CE	517000H02CE
with slots	11x24	219000H11CE	517000H03CE	517000H04CE

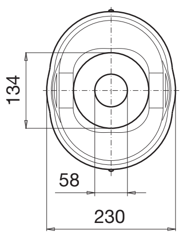
Implement input connection shields CF

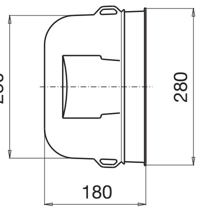
Oval shape implement input connection shields

CF IIC shields with oval shape are available in only one size with or without fixing slots. The flat fixing surface has a diameter of 134 mm, the slots are 31 mm long and 9 or 11 mm large.
It's recommendable that the implement manufacturer provide for a solid and sturdy mounting by screws and washers on the flat bottom surface.
Flexible extensions, available in two different lengths, can be attached to the rigid body to increase the overlap with the driveline guard and allow joint articulation.
Oval shape IIC shields can be supplied with one or two windows that give access for the installation of the driveline or checking that is properly secured.

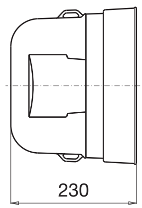




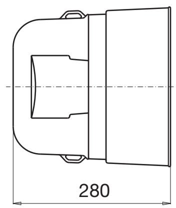




Rigid shield



with short flexible band



with long flexible band

Oval implement input connection shields without access windows

Code			Rigid shield	with short flexible band	with long flexible band
	without slots		21904CE	41704CE	41714CE
	with slots	9x31	219000A09CE	517000A01CE	517000A02CE
	with slots	11x31	219000A11CE	517000A03CE	517000A04CE

Oval implement input connection shields with one access window

Code			Rigid shield	with short flexible band	with long flexible band
	without slots		2190401CE	4170401CE	4171401CE
	with slots	9x31	219000C19CE	517000C01CE	517000C02CE
	with slots	11x31	219000C21CE	517000C03CE	517000C04CE

Oval implement input connection shields with two access windows

Code			Rigid shield	with short flexible band	with long flexible band
	without slots		2190402CE	4170402CE	4171402CE
	with slots	9x31	219000E19CE	517000E01CE	517000E02CE
	with slots	11x31	219000E21CE	517000E03CE	517000E04CE

Implement input connection shields CF

Specific applications may require different shielding. The implement manufacturer should verify the suitability of the shielding according to the characteristics of the application and an applicable standards of the country where the machine is used.
Bondioli & Pavesi supplies drivelines, gearboxes and implement input connection shields in many different configurations.
Due to the broad range of implements and applications, the specifications container herein should be used as a general guide to the selection of an implement input connection shield.
The implement manufacturer is responsible for selecting suitable implement input connection shielding according to the application, the size and articulation range of the driveline, the type and size of any torque limiters attached to the driveline, access requirements for assembly or maintenance, and any applicable standard.

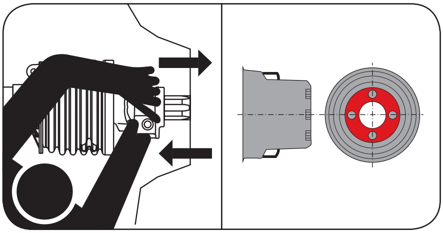
Thorough testing of the implement input connection shields by the implement manufacturer under actual field conditions is necessary and strongly recommended by Bondioli & Pavesi.

Do not step or stand on the implement input connection shield. Do not step on, step over, or go under the driveline.

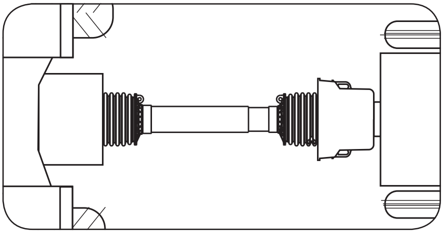
The oval shape Implement input connection shields can be supplied in Zytel® upon customer request. This material maintains its strength at elevated temperatures. Shields made of Zytel® can be used to guard devices operating at temperatures higher than normal, such as friction torque limiters working in heavy duty conditions.
Basic information for safe and correct use of the driveline and shielding are shown in the catalogues and on the instruction sheet included with the implement input connection shield.
Bondioli & Pavesi shaft cones come with a CE marking and an instruction sheet which includes a Declaration of Conformity in accordance with the Machinery Directive (2006/42/EC).

Implement input connection shields CF

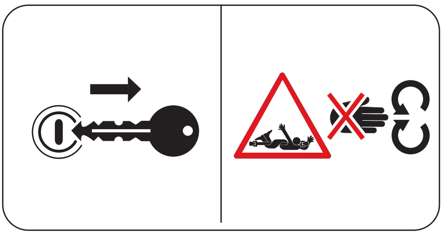
Use the machine only with its original driveline. The IIC shield must suit the application. If the IIC shield is damaged due to contact with machine parts, contact the dealer.



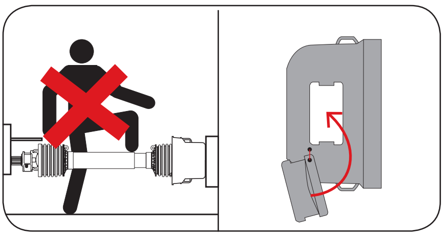
Before operation, make sure that the driveline and the IIC shield are correctly fitted.
The screw heads and washers must be within the flat portion of the cone for secure attachment.



Before operation, make sure that all the guards are in place and work properly. Damaged or missing components must be replaced with original spare parts and correctly installed.

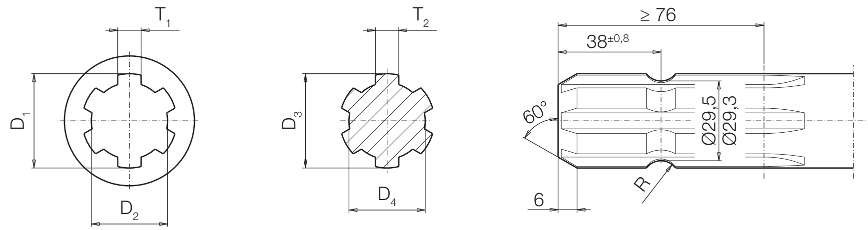


Turn off the tractor engine and remove the key before performing any type of maintenance.
Contact with rotating parts can cause serious injury or death.



Do not use the IIC shield as a step.
Before operation, close any IIC shield doors.

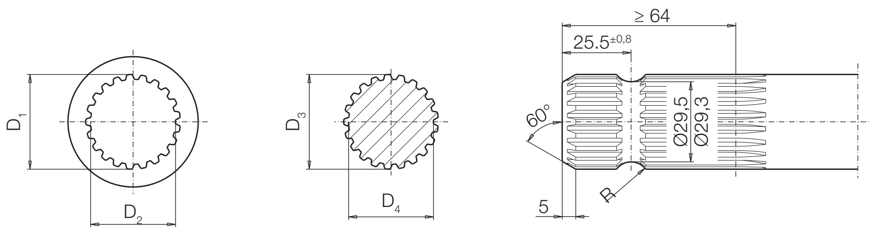
1 3/8" – Z6



Standard	D1 mm	D2 mm	T1 mm	D3 mm	D4 mm	T2 mm	R mm
DIN 9611*	34.96 34.90	29.8 29.6	8.74 8.71	34.85 34.73	28.96 28.86	8.60 8.53	6.95 6.45
ISO 500 ANSI/ASABE AD500	34.95 34.90	29.80 29.65	8.76 8.69	34.87 34.75	29.00 28.90	8.64 8.51	7.05 6.55

*DIN 9611 standard has been revoked and never replaced.

1 3/8" – Z21

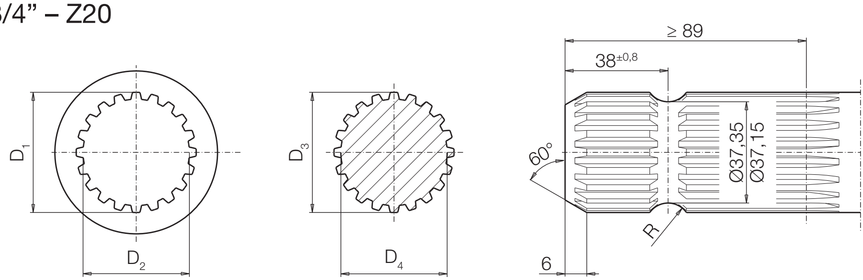


Standard	D1 mm	D2 mm		D3 mm	D4 mm		R mm
DIN 9611*	35.66 35.40	31.900 31.750		34.87 34.47	31.10		7.15 6.65
ISO 500 ANSI/ASABE AD500	34.961 34.925	31.900 31.750		34.874 34.849	31.10 30.85		7.05 6.55

*DIN 9611 standard has been revoked and never replaced.

Power take offs (PTO's)

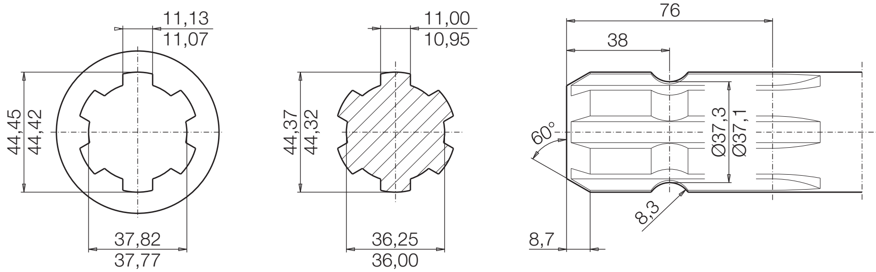
1 3/4" – Z20



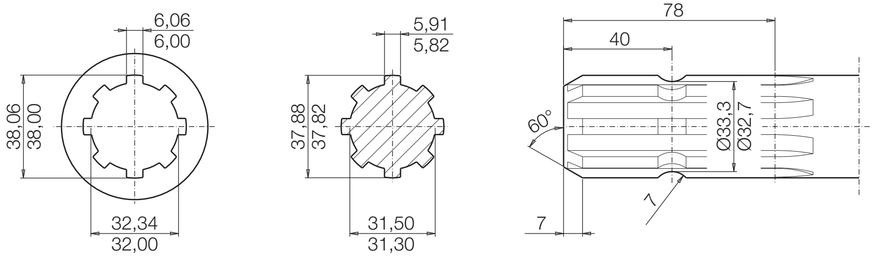
Standard	D1 mm	D2 mm		D3 mm	D4 mm		R mm
DIN 9611*	45.26 45.03	40.280 40.130		44.53 44.13	39.21		8.65 8.15
ISO 500 ANSI/ASABE AD500	44.488 44.450	40.350 40.200		44.425 44.400	39.21 38.96		8.65 8.15

*DIN 9611 standard has been revoked and never replaced.

1 3/4" – Z6



D8x32x38



LENGTH

International unit of length	m	metre
Unit of measurement	*Symbol*	*Conversion*
millimetre	mm	1 mm = 0.001 m
centimetre	cm	1 cm = 0.01 m
inch	in o “	1 in = 0.0254 m = 25.4 mm
foot	ft	1 ft = 0.3048 m = 304.8 mm
yard	yd	1 yd = 0.9144 m

ANGLE

International unit of angle	rad	radiant
Unit of measurement	*Symbol*	*Conversion*
degree	°	1 ° = 0.017453 rad 1 rad = 57.296 °

AREA

International unit of area	m^2	square metre
Unit of measurement	*Symbol*	*Conversion*
square millimeter	mm^2	1 mm^2 = 0.000001 m^2
square centimeter	cm^2	1 cm^2 = 0.0001 m^2
hectar	hectar	1 hectar = 10000 m^2
acre	acre	1 acre = 4046.856 m^2

FORCE

International unit of force	N	newton
Unit of measurement	*Symbol*	*Conversion*
kilogram-force or kilopond	kgf or kp	1 kp = 9.81 N
gram-force	g	1 g = 0.001 kp
quintal	q	1 q = 100 kp
ounce	oz	1 oz = 0.2780 N 1 oz = 0.02835 kp
pound	lb	1 lb = 4.4482 N 1 lb = 0.45359 kp

Units of measurement

PRESSURE

International unit of pressure	Pa o N/m^2	Pascal
Unit of measurement	*Symbol*	*Conversion*
atmosphere	atm	1 atm = 101325 Pa
bar	bar	1 bar = 10^5 Pa
kilopond per square millimeter	kp/mm^2	1kp/mm^2 = 9.8066 N/mm^2
millimeter of mercury- mm Hg	Torr	1 Torr = 133.322 Pa

TORQUE

International unit of torque	N·m	Newton per meter
Unit of measurement	*Symbol*	*Conversion*
inch x pound	in·lb	1 in · lb = 0.1129 N·m
foot x pound	ft·lb	1 ft · lb = 1.3563 N·m
kilopond-meter	kp·m	1 kp · m = 9.8066 N·m

SPEED

International unit of speed	m/s	meter per second
Unit of measurement	*Symbol*	*Conversion*
kilometer per hour	km/h	1 km/h = 3.6 m/s
feet per minute	fpm	1 fpm = 0.00508 m/s

ROTATION OR ANGULAR VELOCITY

International unit of rotation	ω=rad/s	radiant per second
Unit of measurement	*Symbol*	*Conversion*
revolutions per minute	giri/min o min^{-1}	1 min^{-1} = 2 · π/60 rad/s

POWER

International unit of power	W	watt
Unit of measurement	*Symbol*	*Conversion*
kilowatt	kW	1 kW = 1000 W
cavalli-vapore	CV	1 CV = 0.7355 kW
horsepower	HP	1 HP = 0.7457 kW

BONDIOLI
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Professionals in motion