100
006

BONDIOLI & PAVESI

All data and codes contained in this catalog replace and supersede any information given by previous publications. Consequently data provided in previous publications may no longer be valid. Bondioli & Pavesi reserves the right to change specifications without prior notice or obligation

Cardan Driveline Catalogue
Series 100

006

BONDIOLI & PAVESI

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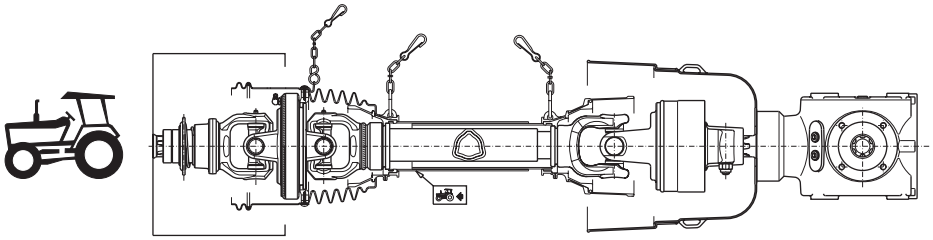


All rotating parts must be guarded.
The tractor master shield, the driveline guards, and the implement input connection shields form an interactive guarding system.

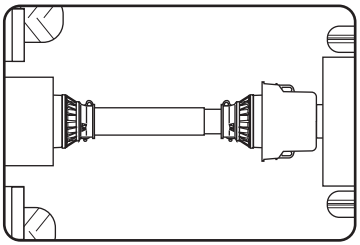
Proper use and maintenance of the driveline and shielding is of primary importance for operator safety.
A high percentage of driveline accidents occur when safety shielding is missing or does not function properly.
Bondioli & Pavesi recommends the use of proper shields and guards for the driveline, tractor, 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.

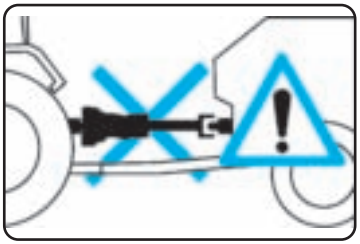
THE ABOVE INFORMATION CONCERNS YOUR SAFETY.

Safety and working conditions

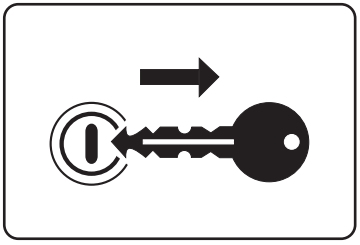
Use the implement only with the original driveline, which is compatible in length, power capacity, torque limiters, overrunning clutches, and shielding. The driveline and safety devices are designed specifically for the implement, and should be used exclusively for this purpose.
Do not exceed the speed 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.

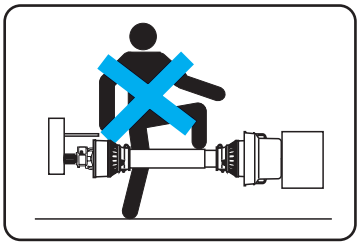


Ensure that all driveline, tractor, and implement shields are functional and in place before operation. Damaged or missing parts must be replaced with the original equipment spare parts, correctly installed, before using the driveline.

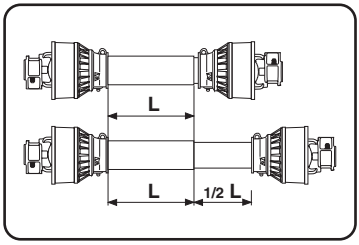


Disengage the PTO, turn off the tractor engine, remove the key, and check that all rotating parts have come to a standstill before approaching the implement or performing maintenance work.

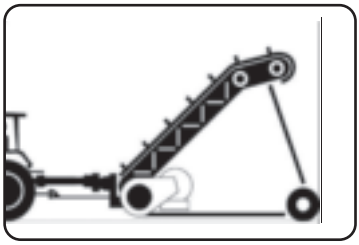
Do not approach, nor allow bystanders to come near the work zone or rotating parts. Do not wear loose clothing, jewelry, hair, or anything which could get caught in the machine.
Contact with rotating parts could cause serious injury or death.



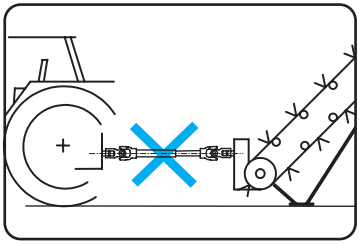
Do not stand, lean, or otherwise come in contact with the driveline. Do not step over or go under the driveline.



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.

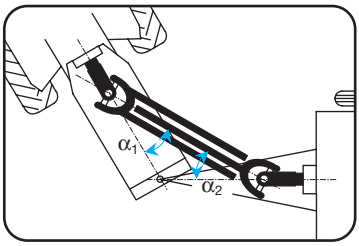


Always hitch the tractor to STATIONARY MACHINERY (pumps, hoists, generators, dryers, etc.). Chock the tractor wheels to prevent rolling and check that joint angles are small and as equal as possible.



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.

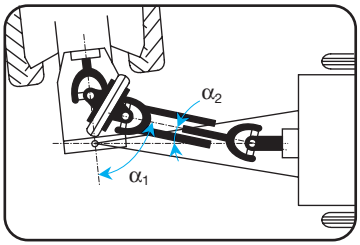
Safety and working conditions



SINGLE CARDAN J0INTS

When operating, ensure that angles $\alpha_1 = \alpha_2$ 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.

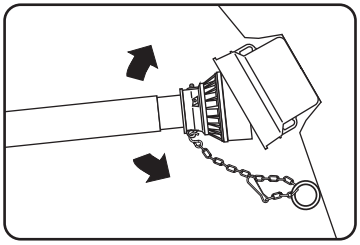
Disengage the PTO when the joint angles become excessive or too unequal. See “Driveline applications” for more information.



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.

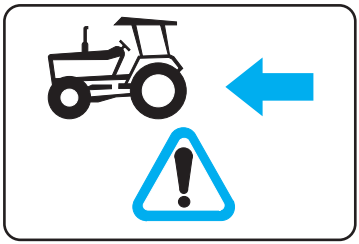
For drivelines with a constant velocity joint on the tractor side and a single cardan joint on the implement side, the maximum recommended angles of the single joint are 16° at 540 min^{-1} and 9° at 1000 min^{-1} to prevent irregular motion. See “Driveline Applications” for more information.



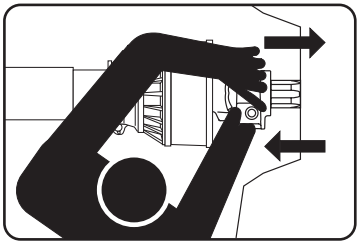
Attach the shield restraint chains, allowing sufficient slack for the driveline to move during turns and operation.

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.

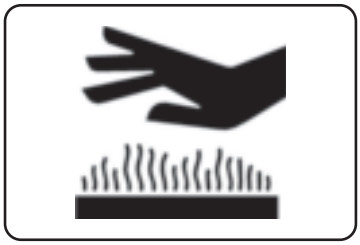
When used at night or in poor visibility, illuminate the driveline operating area.



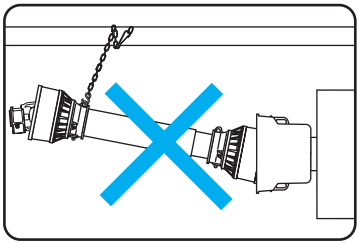
The tractor printed on the shield indicates the tractor end of the driveline.
Any torque limiter or overrunning clutch must be installed on the implement end of the driveline.



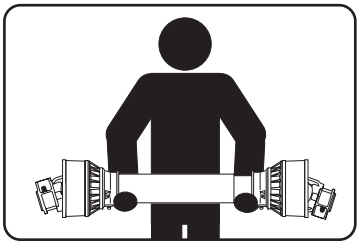
Ensure that the driveline is securely attached to the tractor and the implement before operating.
Check that all bolts or nuts are properly torqued.



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.

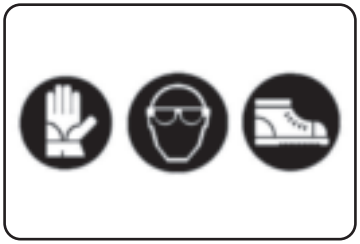


Never use the shield restraint chains to support the driveline for storage. Always use the support on the implement.



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.

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)
- Type (positions 2-3)
- Size (pos. 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).

One additional positions is used to specify Spring Link chains (see chapter 8 - *Safety shields*).
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 shafts type 652-662-672, the type of joint (single or double 70° constant velocity) is specified by positions 2 and 3 of the shaft code.
For shafts series 100 the three positions that specify tractor or implement end specify also the type of joint: single cardan, 80° or 50° constant velocity joint.
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.

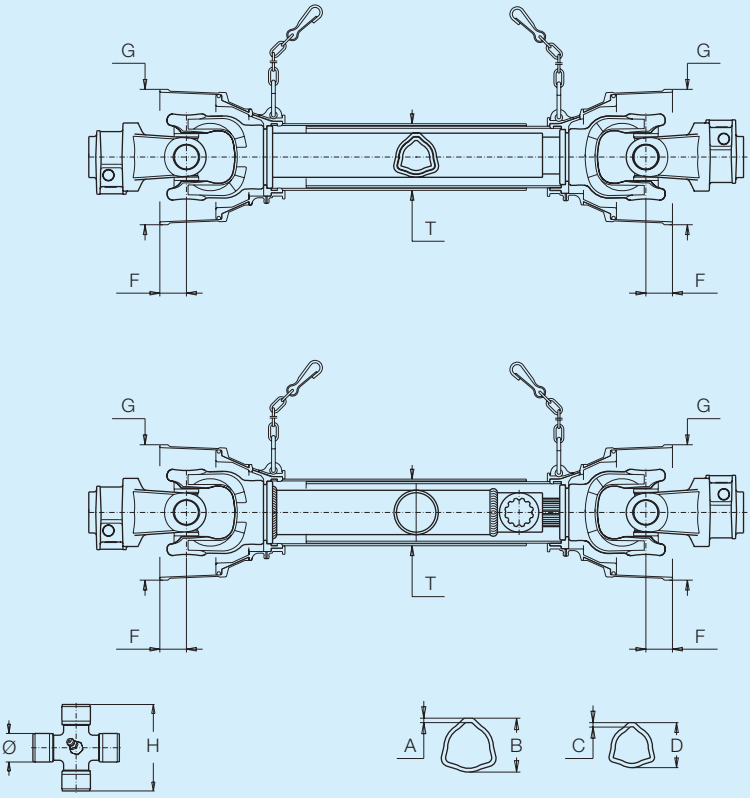
Positions 10-11-12 of the code are used for the tractor end of primary drivelines. Positions 13-14-15 are used for the implement end of primary drivelines.
For example, if an 80° constant velocity joint is required with a ball collar on the tractor end, enter code WR7 in positions 10-11-12 of the shaft 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

100 series cardan joint drivelines



	Ø mm	H mm	G mm	T mm	F mm	A mm	B mm	C mm	D mm	E mm	Z
1	22.0	54.0	131	61	24	2.6	32.5	4.0	26.5	- -	- -
2	23.8	61.3	131	61	20	3.2	36.0	4.0	29.0	- -	- -
43	27.0	74.6	140	67	31	3.4	43.5	3.2	36.0	- -	- -
4	27.0	74.6	140	67	31	3.4	43.5	4.0	36.0	30	10
5	30.2	79.4	165	81	40	3.0	51.5	3.8	45.0	35	12
6	30.2	91.4	165	81	33	4.0	54.0	4.2	45.0	35	12
7	35.0	93.5	165	81	31	4.0	54.0	5.5	45.0	40	14
8	35.0	106.0	182	96	38	4.0	63.0	4.0	54.0	40	14

Codes for cardan joint driveline

1

7

7: standard cardan joint driveline.

2 3

Telescoping members.

10 - Regular triangle profile tubes.
1R - Rilsan coated profile tubes
(not available for size 1 and on request for size 43).
1C - Heat treated triangle profile tube (available on request for size 43).
40 - Splined telescoping members (exclusively for size 4 - 5 - 6 - 7 - 8).

4

Size.

1 - 2 - 43* - 4 - 5 - 6 - 7 - 8.
See chapter 3 “Size, torque and power”.
* Use both positions 3 and 4 in the shaft code.

5 6 7

Length.

Series 100: **041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.**
Series 400: **041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081.**
See chapter 6 “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.
UC - USA and Canada with restraint chains.
JP - Japan
FX - Other countries and CEE-EFTA countries not bearing CE mark.

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

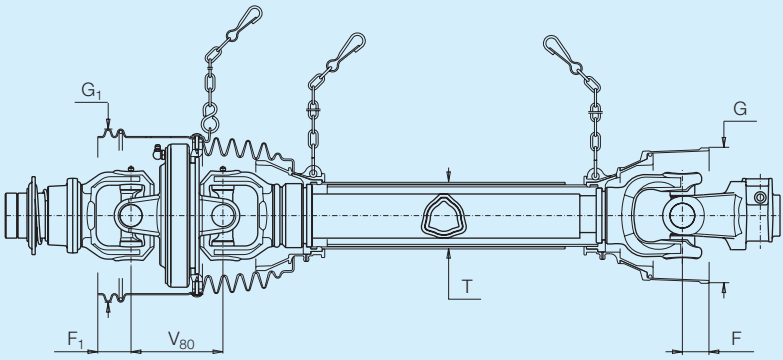
Optional position

Use this position only if requesting Spring Link connection for shield restraint chains.
See chapter 8 “Safety shields”.

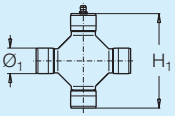
All rotating parts must be guarded. The shields on the tractor and on the implement machine work with the integral driveline guard to form an interactive guarding system.
For primary drivelines (i.e. the driveline connecting the tractor PTO to the initial power input connection on the implement), torque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

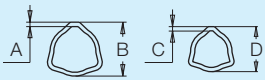
Codes and dimensions

100 series driveline with 80° constant velocity joint

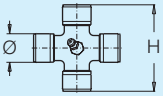


Cross for CV joint





Cross for single joint



	Ø1 mm	H1 mm	G1 mm	F1 mm	V80 mm	T mm	G mm	F mm	A mm	B mm	C mm	D mm	Ø mm	H mm
1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
43	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4	22.0	86.0	181	31	93	67	140	31	3.1	43.5	4.3	36.6	27.0	74.6
5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6	27.0	100.0	211	41	112	81	165	33	3.7	54.0	4.5	45.6	30.2	91.4
7	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8	30.2	106.2	233	52	119	96	182	38	3.7	54.0	5.8	45.6	35.0	106.0

Codes for cardan joint driveline

1 **7**

7: standard cardan joint driveline

2 3 **1** **R**

Telescoping members.
1R - Rilsan coated triangle profile tubes

4

Size.
4 - 6 - 8.
See chapter 3 “Size, torque and power”.

5 6 7

Length.
Series 100: **041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.**
See chapter 6 “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.
UC - USA and Canada with restraint chains.
JP - Japan
FX - Other countries and CEE-EFTA countries not bearing CE mark.

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.

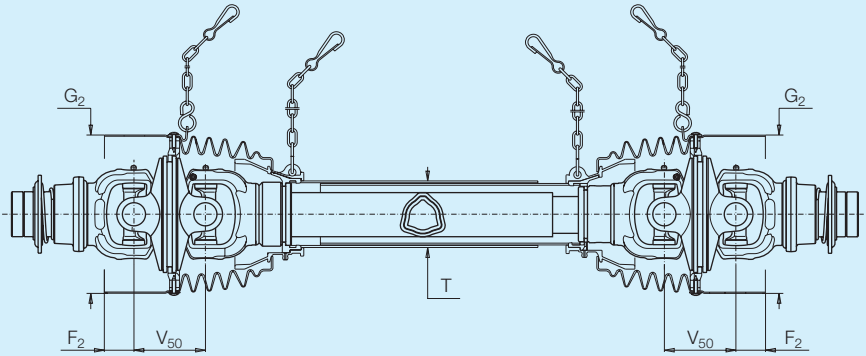
16

Optional position
Use this position only if requesting Spring Link connection for shield restraint chains.
See chapter 8 “Safety shields”.

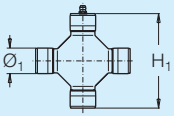
All rotating parts must be guarded. The shields on the tractor and on the implement machine work with the integral driveline guard to form an interactive guarding system.
For primary drivelines (i.e. the driveline connecting the tractor PTO to the initial power input connection on the implement), torque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

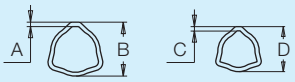
Codes and dimensions

100 series driveline with 50° constant velocity joints



Cross for CV joint





	Ø$_1$ mm	H$_1$ mm	G$_2$ mm	F$_2$ mm	V$_{50}$ mm	T mm	A mm	B mm	C mm	D mm
1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
43	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4	22.0	86.0	165	35	76	67	3.4	43.5	4.0	36.0
5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6	27.0	100.0	193	36	88	81	4.0	54.0	4.2	45.0
7	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8	30.2	106.2	193	36	88	96	4.0	54.0	5.5	45.0

Codes for cardan joint driveline

1

7

7: standard cardan joint driveline

2 3

Telescoping members.

10 - Regular triangle profile tube.
1R - Rilsan coated triangle profile tube.
1C - Heat treated triangle profile tube.

4

Size.

4 - 6 - 8.
See chapter 3 “Size, torque and power”.

5 6 7

Length.

Series 100: **041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.**
See chapter 6 “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.
UC - USA and Canada with restraint chains.
JP - Japan
FX - Other countries and CEE-EFTA countries not bearing CE mark.

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

Optional position

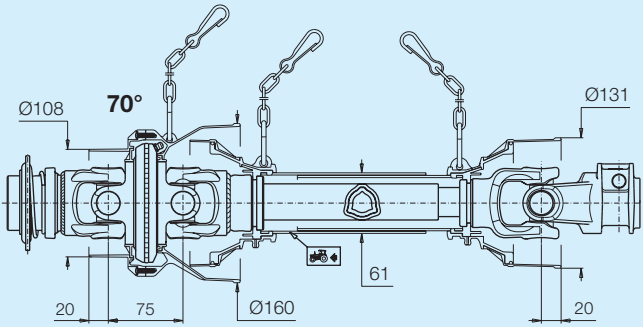
Use this position only if requesting Spring Link connection for shield restraint chains.
See chapter 8 “Safety shields”.

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.

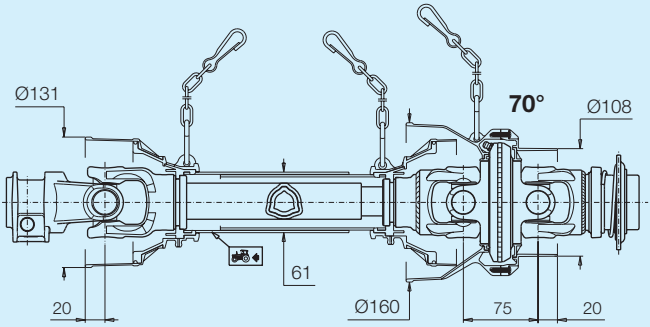
Codes and dimensions

Driveline with 70° constant velocity joints type 652 - 662 - 672

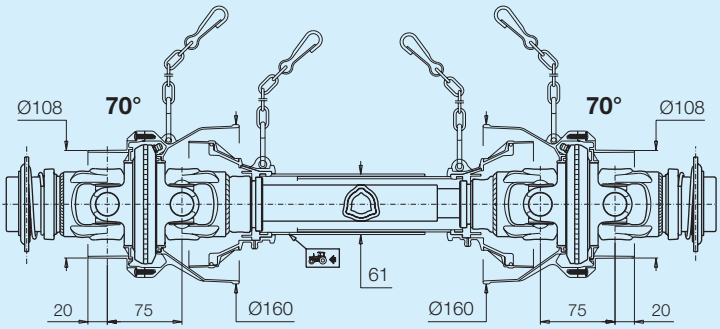
652

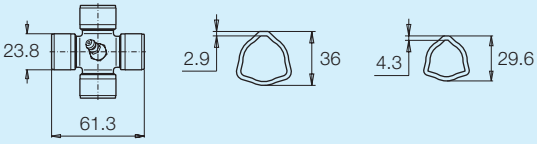


662



672





BONDIOLI & PAVESI

Codes for cardan joint driveline

1

7

7: standard cardan joint driveline

2 3 4

Driveline type.

652 - Driveline with 70° CV joint on tractor end.
662 - Driveline with 70° CV joint on implement end.
672 - Driveline with double 70° CV joint
Drivelines with 70°CV joint are available only for size 2 and with regular Rilsan coated triangle tubes.

5 6 7

Length.

Series 100: **041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.**
See chapter 6 “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.
UC - USA and Canada with restraint chains.
JP - Japan
FX - Other countries and CEE-EFTA countries not bearing CE mark.

10 11 12

Tractor (or driver) end yoke.

Specify the three-digit code for the yoke.

13 14 15

Implement (or driven) end yoke.

Specify the three-digit code for the yoke, torque limiter or overrunning clutch.

16

Optional position

Use this position only if requesting Spring Link connection for shield restraint chains.
See chapter 8 “Safety shields”.

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

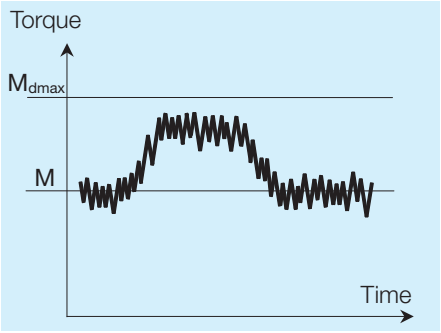
Maximum torque **Mmax**

	Nm	in.lb.	
1	750	6640	
2	1050	9290	
43	1700	15050	
4	2000	17700	
5	2500	22130	
6	2900	25670	
7	3500	30980	
8	3500	30980	with CV joints
8	3900	34520	with single cardan joints

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 **Mdmax**

	Nm	In.lb.
1	320	2830
2	450	3980
43	780	6900
4	780	6900
5	1050	9290
6	1450	12830
7	1800	15930
8	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 **4**, torque 500 Nm, velocity 540 rpm 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 rpm and torque M = 500 Nm, a size **6** cardan joint must be used.

Torque and power are related by the following formula:

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

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

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

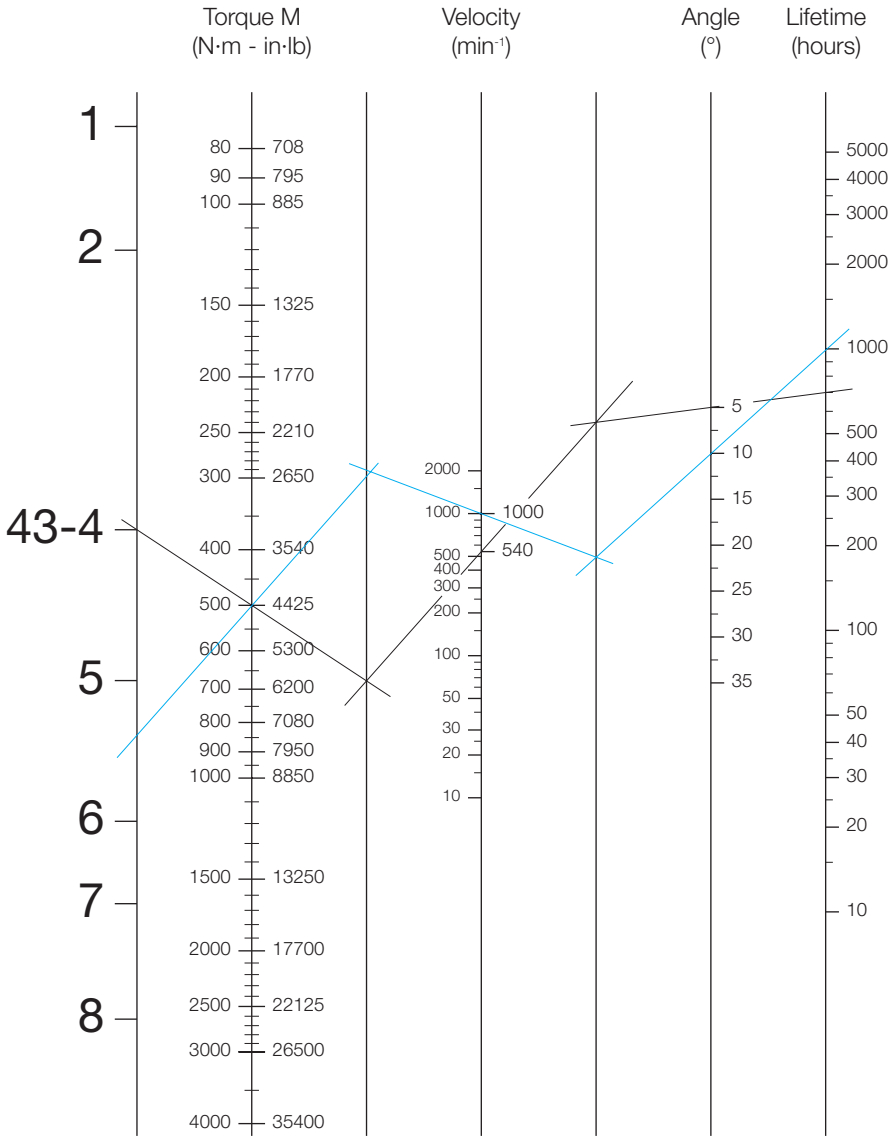
$$P\ [kW] \cdot 1{,}36 = P\ (HP)$$

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

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

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

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:

$$L_{tot} \quad \frac{1}{\sum_{i=1}^{m} \frac{X_i}{L_i}}$$

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 6 driveline with the duty cycle shown in the table below:

	Torque	Velocity	Angle	%	Lh_i
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:

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

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

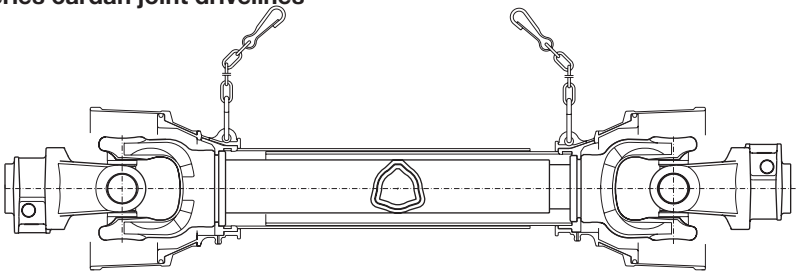
In the U.S., drivelines are often bracketed into one of the categories defined by ASAE standard S331.5. This standard classifies drivelines on the basis of dynamic and static strength.

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

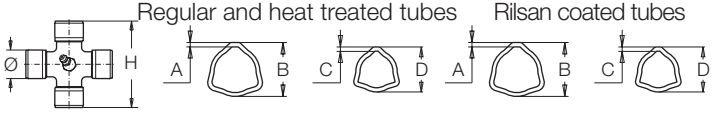
SFT drivelines can be classified in compliance with ASAE standard S331.5 according to the chart below, for each size.

Categories ASAE		
	Regular Duty	Heavy Duty
1	1	1
2	2	1
43	3	2
4	3	3
5	4	3
6	4	4
7	5	5
8	6	5

100 series cardan joint drivelines



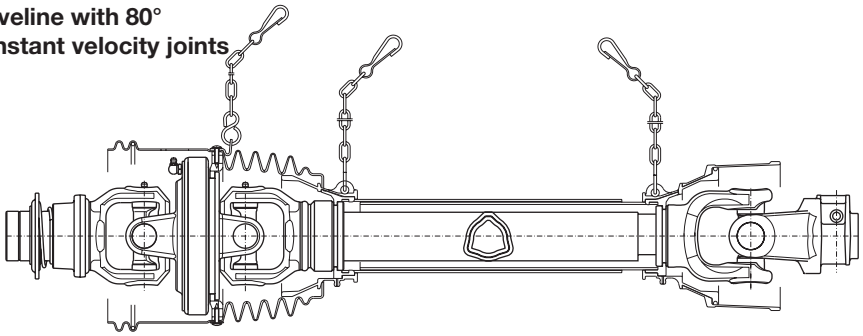
	540 rpm				1000 rpm						Categories ASAE	
	Pn		Mn		Pn		Mn		Mdmax			
	kW	CV	Nm	in lb	kW	CV	Nm	in lb	Nm	in lb	RD	HD
1	12	16	210	1850	18	25	172	1500	320	2830	1	1
2	15	21	270	2400	23	31	220	1950	450	3980	2	1
43	26	35	460	4050	40	55	380	3350	780	6900	2	2
4	26	35	460	4050	40	55	380	3350	780	6900	3	3
5	35	47	620	5500	54	74	520	4600	1050	9290	4	3
6	47	64	830	7350	74	100	710	6250	1450	12830	4	4
7	55	75	970	8600	87	118	830	7350	1800	15930	5	5
8	70	95	1240	10950	110	150	1050	9300	2250	19910	6	5



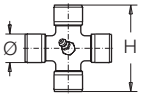
	Ø	H	A	B	C	D	A	B	C	D	Mmax	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm	in lb
1	22.0	54.0	2.6	32.5	4.0	26.5	- -	- -	- -	- -	750	6640
2	23.8	61.3	3.2	36.0	4.0	29.0	2.9	36.0	4.3	29.6	1050	9290
43	27.0	74.6	3.4	43.5	3.2	36.0	3.1	43.5	3.5	36.6	1700	15050
4	27.0	74.6	3.4	43.5	4.0	36.0	3.1	43.5	4.3	36.6	2000	17700
5	30.2	79.4	3.0	51.5	3.8	45.0	2.7	51.5	4.1	45.6	2500	22130
6	30.2	91.4	4.0	54.0	4.2	45.0	3.7	54.0	4.5	45.6	2900	25670
7	35.0	93.5	4.0	54.0	5.5	45.0	3.7	54.0	5.8	45.6	3500	30980
8	35.0	106.0	4.0	63.0	4.0	54.0	3.7	63.0	4.3	54.6	3900	34520

Size, torque and power

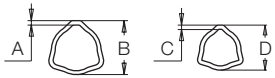
Driveline with 80° constant velocity joints



	540 rpm				1000 rpm				Categories ASAE	
	Pn		Mn		Pn		Mn			
	kW	CV	Nm	in lb	kW	CV	Nm	in lb	RD	HD
1	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
2	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
43	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
4	26	35	460	4050	40	55	380	3350	3	3
5	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
6	47	64	830	7350	74	100	710	6250	4	4
7	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
8	70	95	1240	10950	110	150	1050	9300	6	5

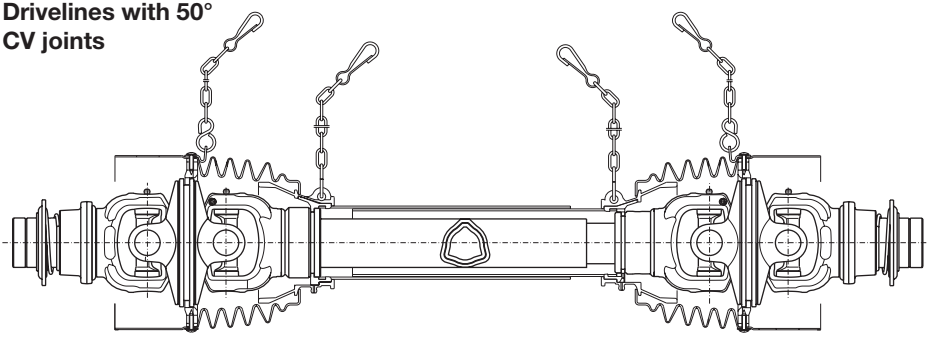


Rilsan coated tubes

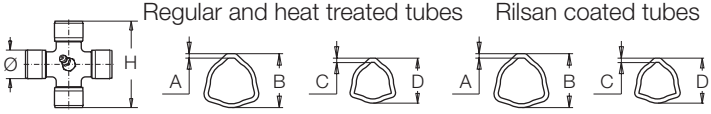


	Ø	H	A	B	C	D	Mmax	
	mm	mm	mm	mm	mm	mm	Nm	in lb
1	- -	- -	- -	- -	- -	- -	- - -	- - -
2	- -	- -	- -	- -	- -	- -	- - -	- - -
43	- -	- -	- -	- -	- -	- -	- - -	- - -
4	22.0	86.0	3.1	43.5	4.3	36.6	2000	17700
5	- -	- -	- -	- -	- -	- -	- - -	- - -
6	27.0	100.0	3.7	54.0	4.5	45.6	2900	25670
7	- -	- -	- -	- -	- -	- -	- - -	- - -
8	30.2	106.0	3.7	54.0	5.8	45.6	3500	30980

Drivelines with 50° CV joints



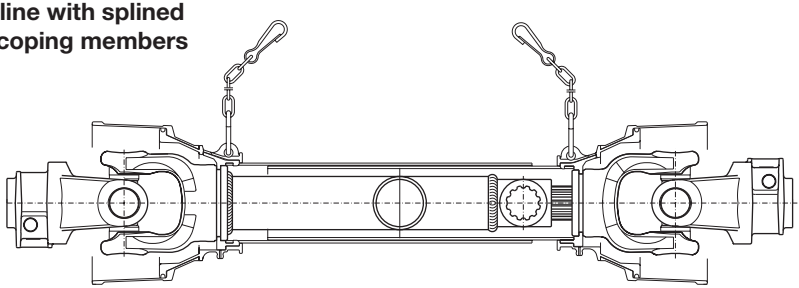
	540 rpm				1000 rpm				Categories ASAE	
	Pn		Mn		Pn		Mn			
	kW	CV	Nm	in lb	kW	CV	Nm	in lb	RD	HD
1	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
2	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
43	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
4	26	35	460	4050	40	55	380	3350	3	3
5	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
6	47	64	830	7350	74	100	710	6250	4	4
7	- -	- -	- - -	- - -	- -	- -	- - -	- - -	-	-
8	70	95	1240	10950	110	150	1050	9300	6	5



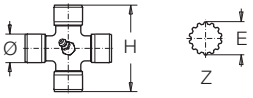
	Ø	H	A	B	C	D	A	B	C	D	Mmax	
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	Nm	in lb
1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- - -	- - -
2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- - -	- - -
43	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- - -	- - -
4	22.0	86.0	3.4	43.5	4.0	36.0	3.1	43.5	4.3	36.6	2000	17700
5	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- - -	- - -
6	27.0	100.0	4.0	54.0	4.2	45.0	3.7	54.0	4.5	45.6	2900	25670
7	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- - -	- - -
8	30.2	106.0	4.0	54.0	5.5	45.0	3.7	54.0	5.8	45.6	3500	30980

Size, torque and power

Driveline with splined telescoping members



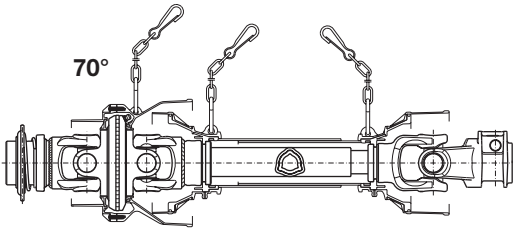
	540 rpm				1000 rpm						Categories ASAE	
	Pn		Mn		Pn		Mn		Mdmax			
	kW	CV	Nm	in lb	kW	CV	Nm	in lb	Nm	in lb	RD	HD
1	- -	- -	- - -	- - -	- -	- -	- - -	- - -	- - -	- - -	-	-
2	- -	- -	- - -	- - -	- -	- -	- - -	- - -	- - -	- - -	-	-
43	- -	- -	- - -	- - -	- -	- -	- - -	- - -	- - -	- - -	-	-
4	26	35	460	4050	40	55	380	3350	780	6900	3	3
5	35	47	620	5500	54	74	520	4600	1050	9290	4	3
6	47	64	830	7350	74	100	710	6250	1450	12830	4	4
7	55	75	970	8600	87	118	830	7350	1800	15930	5	5
8	70	95	1240	10950	110	150	1050	9300	2250	19910	6	5



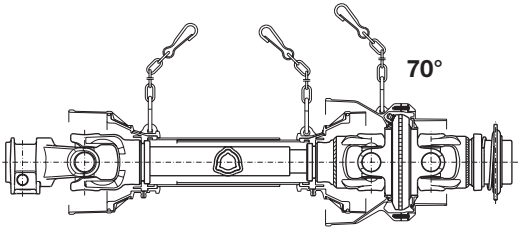
	Ø	H	E	Z	Mmax	
	mm	mm	mm		Nm	in lb
1	- -	- -	- -	- -	- -	- -
2	- -	- -	- -	- -	- -	- -
43	- -	- -	- -	- -	- -	- -
4	27.0	74.6	30	10	2000	17700
5	30.2	79.4	35	12	2500	22130
6	30.2	91.4	35	12	2900	25670
7	35.0	93.5	40	14	3500	30980
8	35.0	106.0	40	14	3900	34520

Driveline with 70° constant velocity joints type 652 - 662 - 672

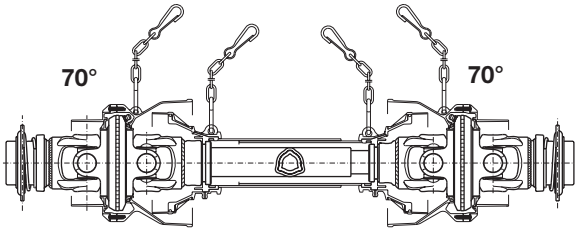
652



662

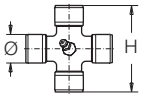


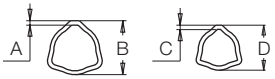
672



	540 rpm				1000 rpm				Categories ASAE	
	Pn		Mn		Pn		Mn			
	kW	CV	Nm	in lb	kW	CV	Nm	in lb	RD	HD
2	15	21	270	2400	23	31	220	1950	2	1

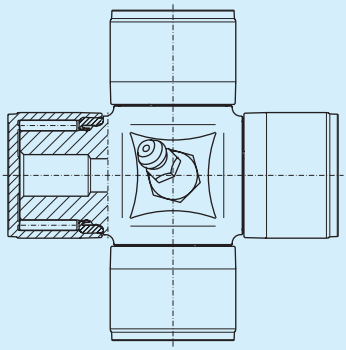
Rilsan coated tubes



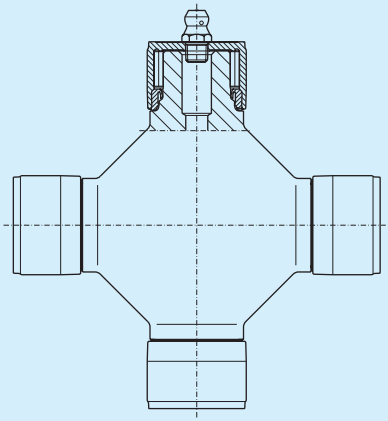


	Ø	H	A	B	C	D	Mmax	
	mm	mm	mm	mm	mm	mm	Nm	in lb
2	23.8	61.3	2.9	36.0	4.3	29.6	1050	9300

Agricultural machines are often employed in harsh working environments – dust and moisture can shorten a driveline's life span. Sealing elements of the cross kits are very important: they retain lubricants, protect the lubricants from contamination by foreign substances, and allow excess grease to purge without damage.
Bondioli & Pavesi cross kits for single cardan joint and 80° and 50° Constant velocity joints 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 to lubricate 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.



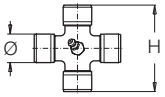
Cross kit for single cardan joint



Cross kit for 80° and 50°
Constant velocity joint

Cross kits

Cross kits for single cardan joints

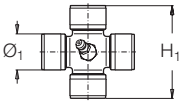


The codes below refer to the cross kit as a spare part – complete with the four snap rings required for assembly. They are supplied in single-item or multiple-item packs. The pack quantity is indicated by the numbers following the “R” in the code.

	Ø mm	H mm	Cross kit code	Multiple-item pack code	
1	22.0	54.0	4120B0011	4120B0011R50	Lubrication: 50 hours. Suitable for products manufactured since 2005.
2	23.8	61.3	4120C0011	4120C0011R30	
43	27.0	74.6	4120E0011	4120E0011R25	
4	27.0	74.6	4120E0011	4120E0011R25	
5	30.2	79.4	4120G0011	4120G0011R40	
6	30.2	91.4	4120H0011	4120H0011R30	
7	35.0	93.5	4120L0011	4120L0011R24	
8	35.0	106.0	4120M0011	4120M0011R20	

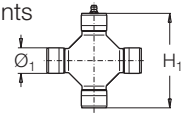
Cross kits for constant velocity joints

70° Constant velocity joint
Type 652 - 662 - 672



	$Ø_1$ mm	H_1 mm	Cross kit code	Multiple-item pack code	
2	23.8	61.3	41202	41202R30	Lubrication: 8 hours.

80° and 50° constant velocity joints



	$Ø_1$ mm	H_1 mm	Cross kit code	Multiple-item pack code	
4	22.0	86.0	4120E0051	4120E0051R40	Lubrication: 50 hours. Suitable for CV joints manufactured since 2005.
6	27.0	100.0	4120G0051	4120G0051R30	
8	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

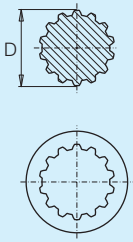
Triangle profile tubes
Triangle profile tubes are designed to provide maximum resistance and optimal telescoping. The profile will only couple so the joints are properly in phase with respect to each other.

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 80° and 70° 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 6 *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
1	- -	- -
2	- -	- -
43	- -	- -
4	30	10
5	35	12
6	35	12
7	40	14
8	40	14

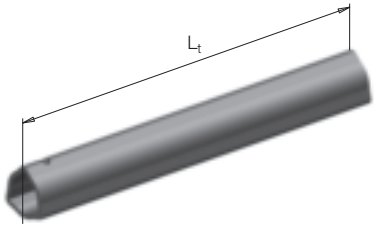
How to select telescoping member
The chart below shows codes for each telescoping member type. Add the code corresponding to the required member in position 2 and 3 in the driveshaft code.
Drivelines with 80° CV joints are equipped with Rilsan-coated tubes. The shaft code shows "1R" in the second and third position. Drivelines type 652 - 662 - 672 are equipped with Rilsan-coated tubes exclusively

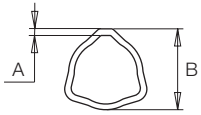
Telescoping member type	Positions 2 and 3 in shaft code
Triangle profile tubes	10
Rilsan-coated triangle tubes	1R
Heat-treated triangle tubes	1C
Splined telescoping members	40

Triangle profile tube
Add number "**10**" to position 2 and 3 in the shaft code to select regular triangle profile tubes.
Tubes as spare part are supplied either in 3-meter lengths, 1-meter lengths or cut-to-length and drilled for roll pin. Add “3000” or “1000” to the selected profile code to order 3-meter or 1-meter tubes respectively.

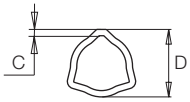
Add length L_t in mm (to the nearest 5 mm interval) to the selected profile code, to order cut-to-length tubes drilled for the roll pin.

Example:
Inner tube, S6, L_t = 800 mm.
Code of spare tube = 225160800





Outer tube



Inner tube

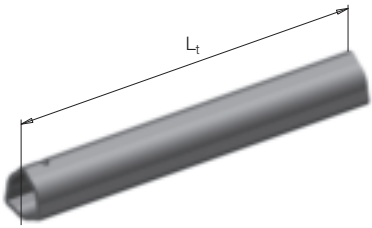
	A mm	B mm	Profile code	Cut/drilled tube code	C mm	D mm	Profile code	Cut/drilled tube code	Mmax Nm
1	2.6	32.5	12503	22502....	4.0	26.5	12502	22501....	750
2	3.2	36.0	12505	22505....	4.0	29.0	12504	22504....	1050
43	3.4	43.5	12508	22512....	3.2	36.0	12505	22505....	1700
4	3.4	43.5	12508	22512....	4.0	36.0	12507	22510....	2000
5	3.0	51.5	12510	22570....	3.8	45.0	12597	22511....	2500
6	4.0	54.0	12512	22521....	4.2	45.0	12509	22516....	2900
7	4.0	54.0	12512	22521....	5.5	45.0	12511	22518....	3500
8	4.0	63.0	12522	22573....	4.0	54.0	12512	22569....	3900
8*	4.0	54.0	12512	22565....	5.5	45.0	12511	22566....	3500

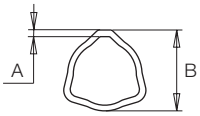
* For size 8 driveline with constant velocity joints.

Telescoping members

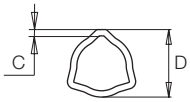
Rilsan-coated triangle profile tubes
Add "**1R**" to position 2 and 3 in the shaft code to select Rilsan-coated triangle profile tubes.
Outer tubes for spare parts are supplied either in 3-meter lengths, 1-meter lengths or cut-to-length and drilled for roll pin. Add "3000" or "1000" to the selected profile code to order 3-meter or 1-meter tubes respectively.
To select cut-to-length tubes add the required length L_t in mm (to the nearest 5 mm) to the codes listed below.

For the inner Rilsan coated tubes, add "3000" or "1000" to the code of drilled for roll pin tube to have a 3-meter lengths or 1-meter lengths respectively.
Add length L_t in mm (to the nearest 10 mm for lengths up to 1-meter, or the nearest 25mm for lengths longer than 1 meter) to the selected profile code, to order cut-to-length tubes drilled for the roll pin.
Example:
Inner tube S6, L_t = 800 mm.
Code of spare tube= 245160800





Outer tube



Inner tube

	A mm	B mm	Profile code	Cut/drilled tube code	C mm	D mm	Profile code	Cut/drilled tube code	Mmax Nm
1	- -	- -	- -	- -	- -	- -	- -	- -	750
2	2.9	36.0	12518	22534....	4.3	29.6	- -	24504....	1050
43	3.1	43.5	12516	22531....	3.5	36.6	- -	24505....	1700
4	3.1	43.5	12516	22531....	4.3	36.6	- -	24510....	2000
5	2.7	51.5	12520	22537....	4.1	45.6	- -	24511....	2500
6	3.7	54.0	12517	22527....	4.5	45.6	- -	24516....	2900
7	3.7	54.0	12517	22527....	5.8	45.6	- -	24518....	3500
8	3.7	63.0	12521	22538....	4.3	54.6	- -	24569....	3900
8*	3.7	54.0	12517	22532....	5.8	45.6	- -	24539....	3500

* For size 8 driveline with constant velocity joints.

Triangle profile tubes with heat-treated inner tube

Add "**1C**" to position 2 and 3 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 cut-to-length and drilled for roll pin. Add “3000” or “1000” to the selected profile code to order 3-meter or 1-meter tubes respectively.

To select cut-to-length tubes add the required length L_t in mm (to the nearest 5 mm) to the codes listed below.

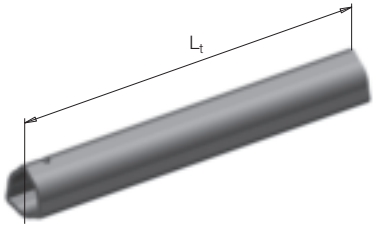
Heat-treated inner tubes are supplied for spare parts only cut-to-length and drilled to accept the roll pin.

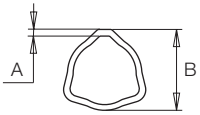
Add length L_t in mm (to the nearest 10 mm interval for lengths up to 1-meter, and to the nearest 25mm interval for lengths longer than 1 meter) to the selected profile code, to order cut-to-length heat-treated inner tubes drilled for the roll pin.

Example:

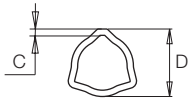
Inner tube, S6, L_t = 1000 mm.

Code of spare tube = 270161000





Outer tube



Inner tube

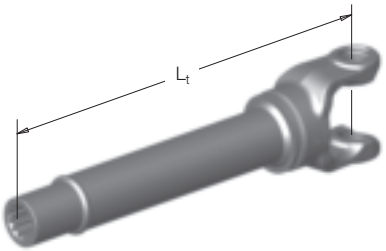
	A mm	B mm	Profile code	Cut/drilled tube code	C mm	D mm	Profile code	Cut/drilled tube code	Mmax Nm
1	2.6	32.5	12503	22502....	4.0	26.5	- -	27001....	750
2	3.2	36.0	12505	22505....	4.0	29.0	- -	27004....	1050
43	3.4	43.5	12508	22512....	3.2	36.0	- -	27005....	1700
4	3.4	43.5	12508	22512....	4.0	36.0	- -	27010....	2000
5	3.0	51.5	12510	22570....	3.8	45.0	- -	27011....	2500
6	4.0	54.0	12512	22521....	4.2	45.0	- -	27016....	2900
7	4.0	54.0	12512	22521....	5.5	45.0	- -	27018....	3500
8	4.0	63.0	12522	22573....	4.0	54.0	- -	27069....	3900
8*	4.0	54.0	12512	22565....	5.5	45.0	- -	27066....	3500

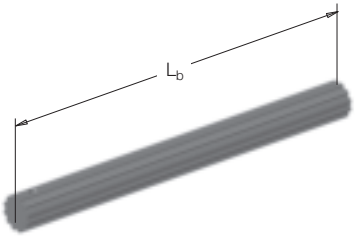
* For size 8 driveline with constant velocity joints.

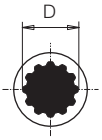
Telescoping members

Splined telescoping members
Add number "**40**" to position 2 and 3 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 (to the nearest 10 mm).

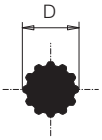
Splined bars are supplied for spare parts cut-to-length (up to 700 mm length) and drilled for the roll pin.
To select cut-to-length members add the required length L_t in mm (to nearest 10 mm) to the codes listed below.
Example:
Splined bar, S6, L_b = 400 mm.
Code of spare bar = 249260400







Outer splined sleeve

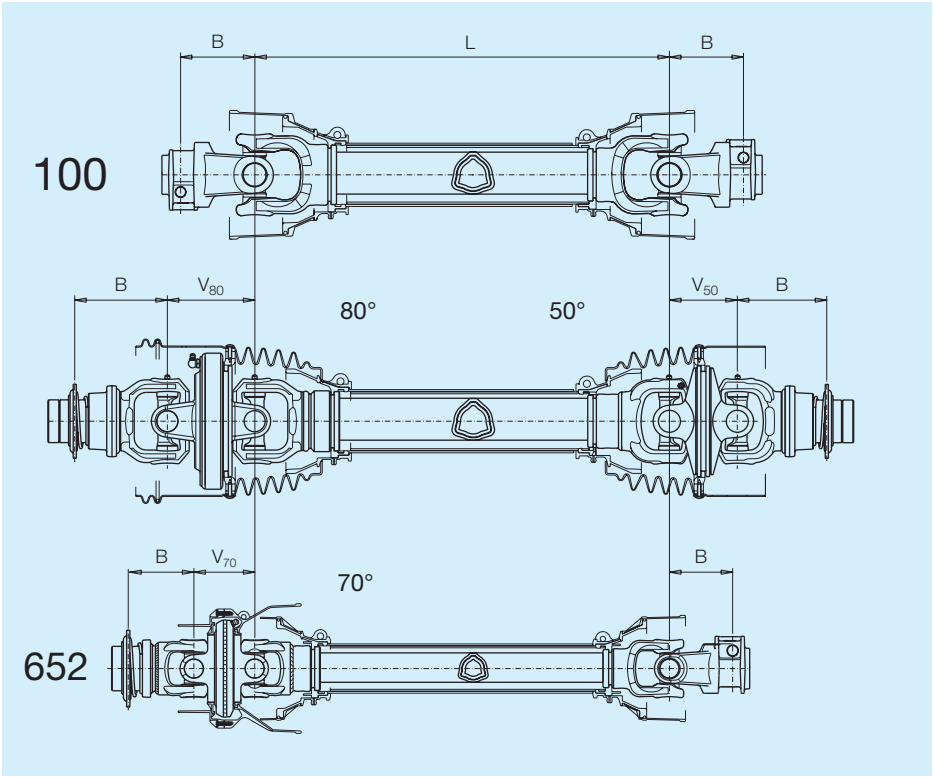


Splined bar

	E mm	z	Outer tube and sleeve assembly	Splined bar code	Mmax Nm
1	- -	- -	- -	- -	- -
2	- -	- -	- -	- -	- -
43	- -	- -	- -	- -	- -
4	30	10	569B4	24917	2000
5	35	12	569B5	24911	2500
6	35	12	569B6	24911	2900
7	40	14	569B7	24921	3500
8	40	14	569B8	24921	3900

Driveline length

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
Length L (mm)	410	460	510	560	610	660	710	760	810	860	910	1010	1110	1210

Driveline length

Triangle profile tubes

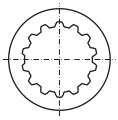
Lw is defined as the maximum allowable working length, center to center. For brief periods, such as traversing over bumps, the driveline may extend to the maximum temporary length, Lt. The maximum allowable length for non-rotating shafts is Ls.

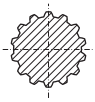
Lw and Lt refer to drivelines rotating at a maximum speed of 1000 min^{-1}, except for items marked * which refer to a maximum speed of 540 min^{-1}. For shaft lengths longer than those shown, or for speeds higher than 1000 min^{-1}, please contact Bondioli & Pavesi's Engineering Department.

Code		041	046	051	056	061	066	071	076	081	086	091	101	111	121
Length L (mm)		410	460	510	560	610	660	710	760	810	860	910	1010	1110	1210
1	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
2	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
43 - 4	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
5	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
6	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
7	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
8	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

The lengths shown refer to drivelines with single cardan joints.
Drivelines with CV joints may differ - refer to the specifications for the particular joint size.

Splined telescoping members





Lw and Lt refer to drivelines rotating at a maximum speed of 1000 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
	Length L (mm)	410	460	510	560	610	660	710	760	810
1	Lw = Lt	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Ls	- -	- -	- -	- -	- -	- -	- -	- -	- -
2	Lw = Lt	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Ls	- -	- -	- -	- -	- -	- -	- -	- -	- -
43	Lw = Lt	- -	- -	- -	- -	- -	- -	- -	- -	- -
	Ls	- -	- -	- -	- -	- -	- -	- -	- -	- -
4	Lw = Lt	510	585	675	768	860	953	1045	1138	1230
	Ls	565	665	765	865	965	1065	1165	1265	1365
5	Lw = Lt	501	576	657	750	842	935	1027	1120	1212
	Ls	547	647	747	847	947	1047	1147	1247	1347
6	Lw = Lt	494	569	644	736	828	921	1013	1106	1198
	Ls	533	633	733	833	933	1033	1133	1233	1333
7	Lw = Lt	492	567	642	732	824	917	1009	1102	1194
	Ls	529	629	729	829	929	1029	1129	1229	1329
8	Lw = Lt	475	550	625	700	790	883	975	1068	1160
	Ls	495	595	695	795	895	995	1095	1195	1295

Series 100 driveshafts are provided with safety labels and operator's manuals as prescribed by international safety standards and regulations.

Outer label

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 ASAE S441.3 and ANSI Z535 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 manuals

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

Operator’s manuals

Operator’s manuals contain explanations on the labels, information on safe and correct driveline use, and instructions for proper maintenance.

Machinery Directive 98/37/CEE specifies that drivelines between self-powered vehicles (or tractors) and implements, marketed in EU and EFTA countries, should be CE marked.

The manual 399CEE010 is provided with CE marked drivelines and includes a Declaration of Compliance with Machinery Directive 98/37/CEE

Operator’s
manual
399CEE010

Safety labels and operator's manuals

Manual 399USA010 is provided with drivelines without EC marking, i.e. for non-primary drivelines market in the EEC and EFTA countries and for drivelines for other countries.

Operator's manual 399USA010

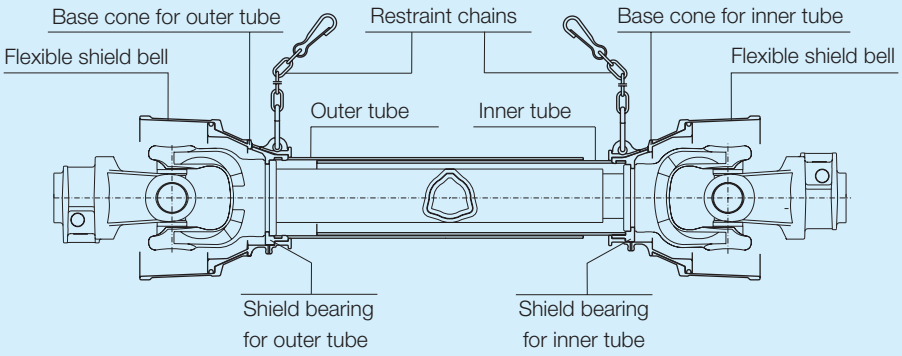
The destination of the driveline, and consequently its labels and operator's manual, is indicated by a destination code, i.e. the character in the eighth position in the driveline code number.

The table below shows the codes assigned to the labels and operator's manuals provided with Series 100 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	399CEE010
Drivelines made for North America (USA, Canada, and Mexico)	U	399143000	399141000	399USA010
Drivelines made for Japan	J	399143000	399JAP001	399USA010
Drivelines made for other countries and for CEE – EFTA countries not bearing CE mark	F	399143000	399CEE051	399USA010

Safety is always important when operating an agricultural driveline. Bondioli & Pavesi shields are designed and manufactured to meet or exceed EN1152, EN ISO5674, EN 12965 standards, and are EC certified. Safety objectives are achieved through simple and sturdy components, structured to produce a functional and durable assembly. The base cone is rigid to make the shield sturdy and robust. It is fitted with an eyelet for the restraint chain and a grease fitting for the lubrication of the shield bearing.

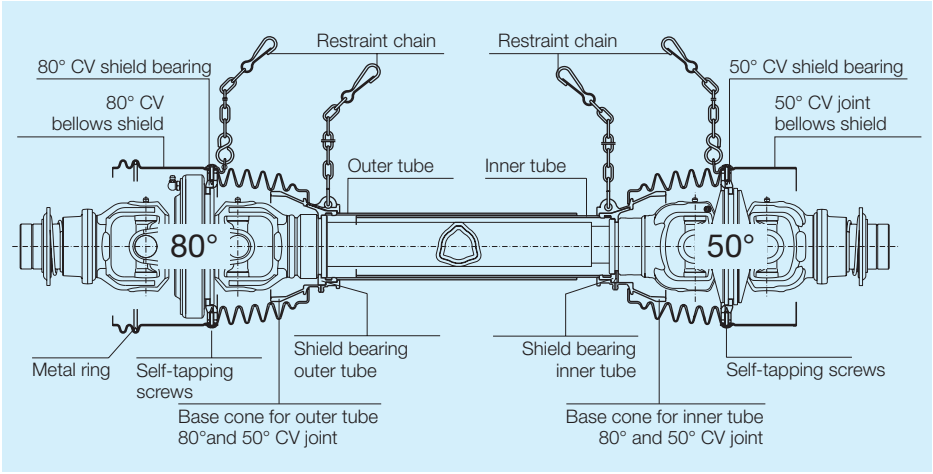
Extruded plastic shield tubes are extremely sturdy components.
The shield bearings connects the cone to the shield and to the inner yoke. A flexible bell is fitted onto the base cone to permit the outer yokes to move. Its length varies according to the end yoke, torque limiter, or clutch attached to the driveline. Installing and removing driveline shields is a simple operation that can be done with commonly available tools.



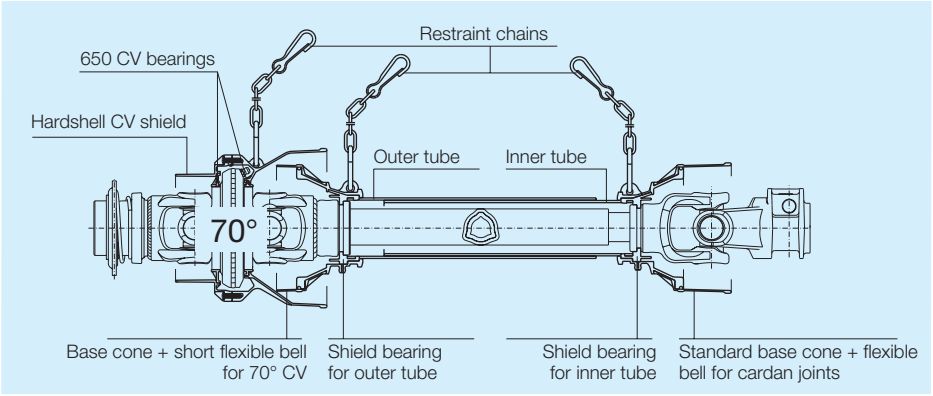
Safety shields

In compliance with international safety regulations, the outer cones of Series 100 shields cover CV joints mounted on the driveline. The shield is connected to the base cone and the standard shield bearing.

Another bearing is fitted to the center housing of the CV joint. The metal ring stiffens the end of the shield in case of 80° CV joints.



A two-piece hardshell cone covers the 70°CV joint type 652-662-672 The shardshell is connected to the driveline by two bearing rings around the center housing of the CV joint. A short flexible bell covers the CV joint to comply with international regulations.



Restraint chains

Section 3.4.7 of Annex 1 to the Machinery Directive (98/37/CEE) 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."

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.

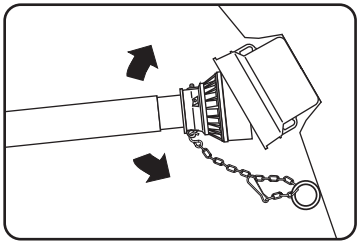
The most common way of restraining the shields is to use chains to fasten the two halves of the shield to the tractor and to the implement. Drivelines are normally supplied with the implement, which should provide a proper attachment point for the shield restraint chains.

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.

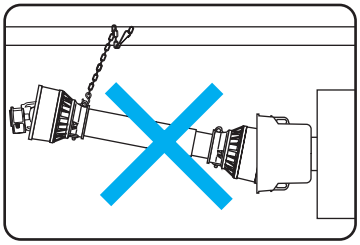
A few simple recommendations can help avoid damaging the shields and exposing the user to potential hazards.

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

EN ISO 5674 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.

ASAE S522 standards specify proper functioning at a load of 400 N and separation at the shield end.

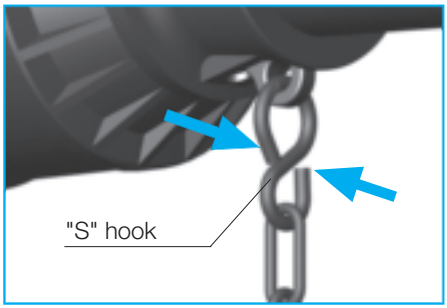
Bondioli & Pavesi driveline chains meet these detachment requirements. Chains are attached to shields by S-hooks.

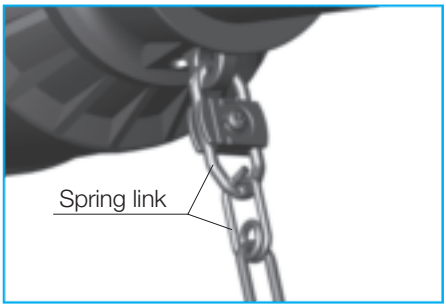
Spring Link

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 EN ISO 5674 and ASAE 522.

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 2 - *Codes and Dimensions*.

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

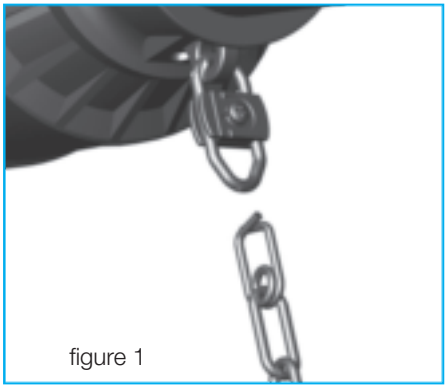


figure 1

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

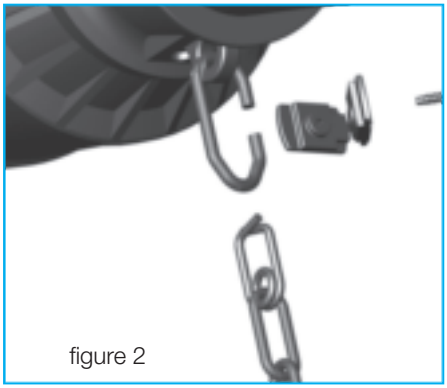


figure 2

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

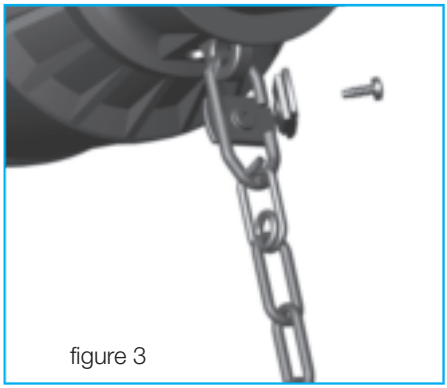


figure 3

Close clip (figure 4) and replace the screw.

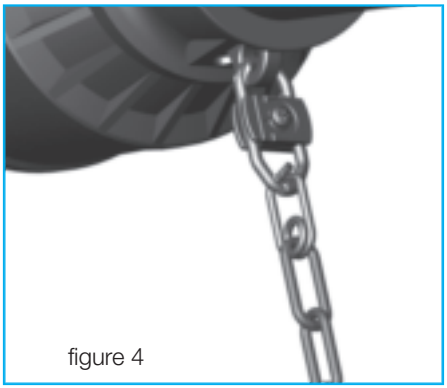


figure 4

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 North America (USA, Canada, and Mexico)	C	S
Drivelines made for Japan	P	-
Drivelines made for other countries and for CEE – EFTA countries not bearing CE mark	X	-

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 kits are available in four sizes, as described below.

Shield identification	Driveline size
1	1 - 2
2	43 - 4
3	5 - 6 - 7
4	8

The code for the shield kit length is the same code used for the driveline length.

⚠ 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.

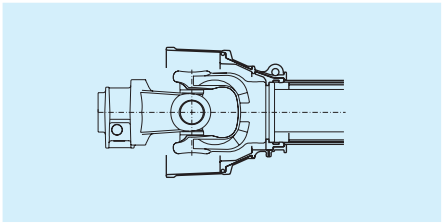
Standard chains are fitted to shields with a S-hooks. Add the letter "Z" to the optional position in the shield kit code to have your chain fitted with Spring Link.

Bondioli & Pavesi drivelines and shields are tested to comply with EN 1152, EN ISO 5674, 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.

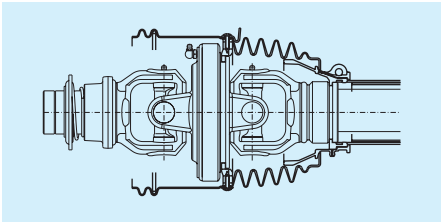
⚠ Regulations EN 1553 and ASAE S318.15 prescribe a 50 mm overlap of the driveline shield with the implement input connection shield.

Safety shields

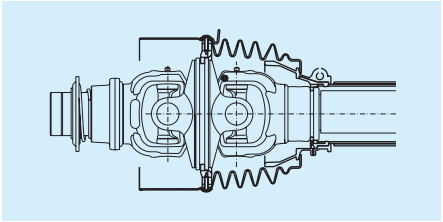
Shield cone configurations



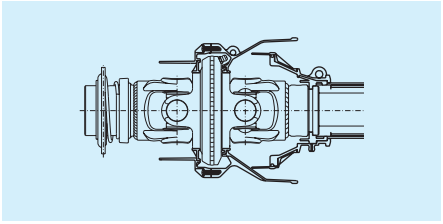
Shield cone, type 1.
Fitted on tractor/implement end for drivelines with single cardan joint.
It applies all types of yoke, torque limiter and overrunning clutch, except for FFV and FFNV friction clutch limiters.



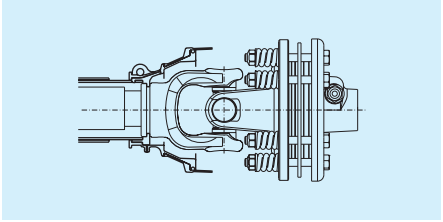
Shield cone, type W.
Fitted on tractor/implement end for drivelines with 80° constant velocity joints.



Shield cone, type K.
Fitted on tractor/implement end for drivelines with 50° constant velocity joints.



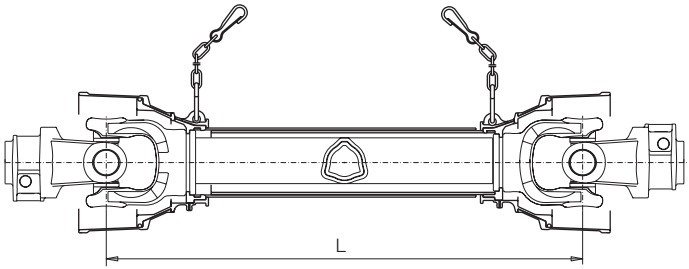
Shield cone, type 9.
Fitted on tractor/implement end for drivelines type 652 - 662 - 672 with 70° constant velocity joints.



Shield cone, type S.
Fitted on tractor/implement end for drivelines with FFV or FFNV friction clutch limiters. These drivelines are not EC marked since the shield cone does not entirely cover the inboard yoke, as specified by Machinery Directive 98/37/CEE.

⚠ 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.

Code for complete shield kit as spare part for cardan joint drivelines



1 2

5 **F**

5F: Shield kit.

3 4

Size.
01 - 02 - 43 - 04 - 05 - 06 - 07 - 08.

5 6 7

Length.
041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.
041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081.
See chapter 6 -*Driveline lengths*.

8

Tractor end shield cone.
F : Type 1.

9

Implement end shield cone.
F : Type 1.
T : Type T, for FV, FT, FNV and FNT friction clutches.
S : Type S, for FFV and FFNV friction clutches.

10 11

Warning labels, operator's manual and restraint chains.
CE - CEE-EFTA contries bearing EC mark.
US - North America (USA, Canada, and Mexico) without restraint chains.
UC - North America (USA, Canada, and Mexico) with restraint chains.
JP - Japan.
FX - Other countries and CEE-EFTA countries not bearing CE mark.

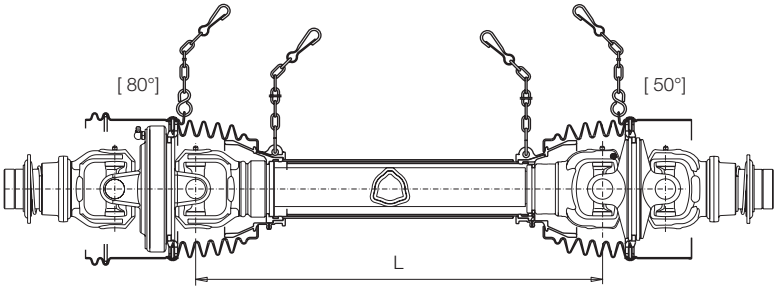
12

Optional feature
Z : Spring Link chains.

All rotating parts must be guarded. The shields on the tractor and on the implement, together with the driveline guard, form an integrated guarding system.

Safety shields

Code for complete shield kit as spare part for drivelines with 80° and 50° CV joints



1 2

5 **F**

5F: Shield kit.

3 4

Size.
04 - 06 - 08.

5 6 7

Length.
041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.
See chapter 6 -*Driveline lengths*.

8

Tractor end shield cone.
W : shield cone for 80° CV joint.
K : shield cone for 50° CV joint.

9

Implement end shield cone.
1 : type 1.
W : shield cone for 80° CV joint
K : shield cone for 50° CV joint.
T : type T, for FV, FT, FNV and FNT friction clutches.
S : type S, for FFV and FFNV friction clutches.

10 11

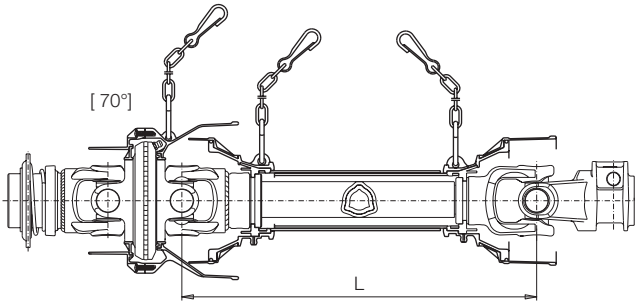
Warning labels, operator's manual and restraint chains.
CE - CEE-EFTA contries bearing EC mark.
US - North America (USA, Canada, and Mexico) without restraint chains.
UC - North America (USA, Canada, and Mexico) with restraint chains.
JP - Japan.
FX - Other countries and CEE-EFTA countries not bearing CE mark.

12

Optional feature
Z : Spring Link chains.

All rotating parts must be guarded. The shields on the tractor and on the implement, together with the driveline guard, form an integrated guarding system.

Complete shield kit for spare part for drivelines type 652 - 662 - 672



1 2

5 **F**

5F: Shield kit.

3 4

0 **2**

Size.
02.

5 6 7

Length.
041 - 046 - 051 - 056 - 061 - 066 - 071 - 076 - 081 - 086 - 091 - 101 - 111 - 121.
See chapter 6- *Driveline Lengths*.

8

Tractor end shield cone.
R : Shield for 70° CV joint.
F : type 1.

9

Implement end shield cone.
1 : type 1.
9 : Shield for 70° CV joint.
T : type T, FV, FT, FNV and FNT friction clutches.
S : type S, for FFV and FFNV friction clutches.

10 11 12

Driveline Type
652 - 662 - 672

10 11

Warning labels, operator's manual and restraint chains.
CE - CEE-EFTA contries bearing EC mark.
US - North America (USA, Canada, and Mexico) without restraint chains.
UC - North America (USA, Canada, and Mexico) with restraint chains.
JP - Japan.
FX - Other countries and CEE-EFTA countries not bearing CE mark.

12

Optional feature
Z : Spring Link chains.

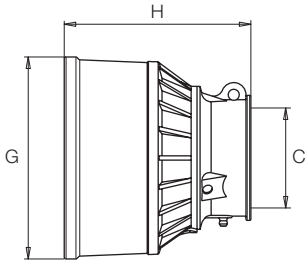
All rotating parts must be guarded. The shields on the tractor and on the implement, together with the driveline guard, form an integrated guarding system.

Safety shields

Spare parts for shields

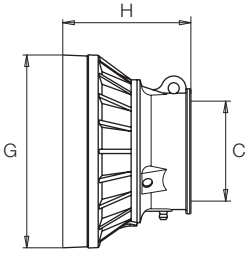
Outer base cone + flex bell for single cardan joint

	G mm	H mm	C mm	Spare part code
1-2	131	115	61.5	517010030
43-4	140	135	67.0	517040030
5-6-7	165	153	81.7	517050030
8	182	176	96.5	517080130



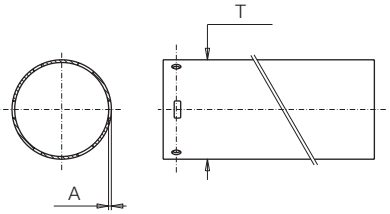
Outer base cone + flex bell for FFV and FFNV friction torque limiters

	G mm	H mm	C mm	Spare part code
1-2	126	73	61.5	517010120
43-4	136	85	67.0	517040120
5-6-7	158	105	81.7	517050036
8	175	137	96.5	517080137



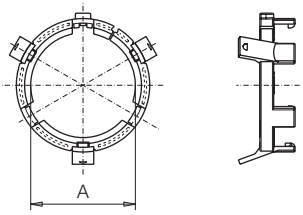
Outer shield tubes

	T mm	A mm	Spare part code
1-2	60.8	2.2	236661044
43-4	66.6	2.2	236681026
5-6-7	81.0	2.2	236831000
8	96.0	2.2	236850952



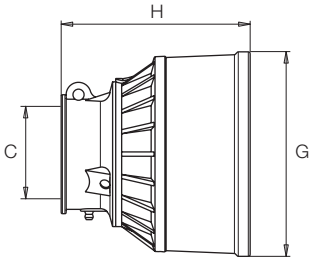
Outer shield bearings

	A mm	Spare part code
1	40.4	255010005R02
2	47.4	255020005R02
43-4	53.4	255040005R02
5	62.4	255050005R02
6-7	68.4	255060005R02
8	80.4	255080005R02



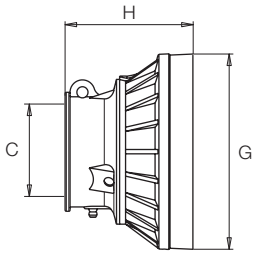
Inner base cone + flex bell for single cardan joint

	G mm	H mm	C mm	Spare part code
1-2	131	115	56.0	517010020
43-4	140	135	61.5	517040020
5 (type 1)	165	153	75.5	517050020
5 (type T)	160	147	75.5	517050103
6-7	165	153	75.5	517050020
8	182	176	90.3	517080120



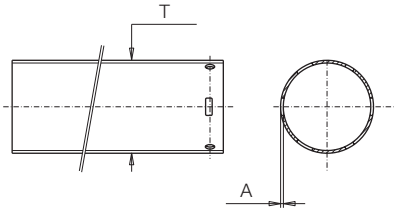
Inner base cone + flex bell for FFV and FFNV friction torque limiters

	G mm	H mm	C mm	Spare part code
1-2	126	73	61.5	517010121
43-4	136	85	67.0	517040121
5-6-7	158	105	81.7	517050026
8	175	137	96.5	517080127



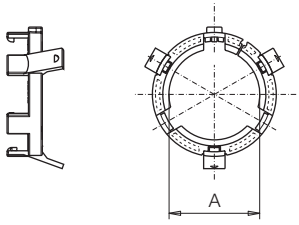
Inner shield tubes

	T mm	A mm	Spare part code
1-2	60.8	2.2	236651044
43-4	66.6	2.2	236671026
5-6-7	81.0	2.2	236821000
8	96.0	2.2	236840952



Inner shield bearings

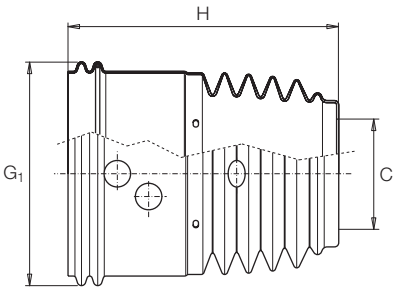
	A mm	Spare part code
1	40.4	255010006R02
2	47.4	255020006R02
43-4	53.4	255040006R02
5	62.4	255050006R02
6-7	68.4	255060006R02
8	80.4	255080006R02



Safety shields

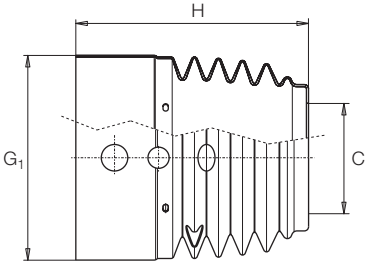
End cones for 80°CV joints

	G_1 mm	H mm	C mm	Spare part code
4	181	222	84	2190E0127
6	211	255	103	2190G0150
8	End cone for outer tube			
	233	283		517080200
	End cone for inner tube			
	233	283		517080201



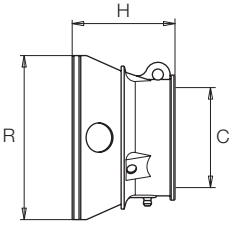
End cones for 50°CV joints

	G_1 mm	H mm	C mm	Spare part code
4	165	202	84	2190E0126
6	193	220	103	2190G0153
8	193	220	115	2190L0123



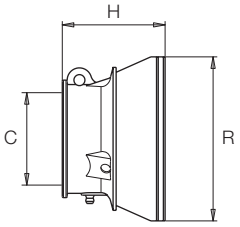
Outer base cone for 80° and 50° CV joint

	R mm	H mm	C mm	Spare part code
4	118	75	67.0	254040020
6	134	84	81.7	254060020
8	135	100	96.5	254080033



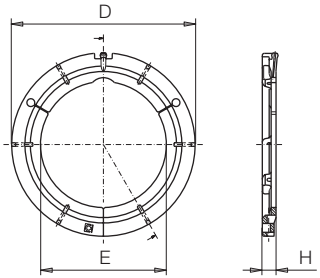
Inner base cone for 80° and 50° CV joint

	R mm	H mm	C mm	Spare part code
4	118	75	61.5	254040021
6	134	84	75.5	254060021
8	135	100	90.3	254080034



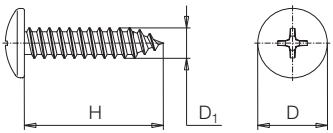
CV shield bearings for 50° and 80° CV joint

	D mm	E mm	H mm	Spare part code
4	160	101	12	2550E0005R02
6	187	128	14	2550G0024R02
8	206	147	14	2550L0023R02



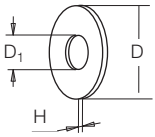
Screws

	D_1 mm	H mm	D mm	Spare part code
All sizes	4.8	22	11	310001431R30



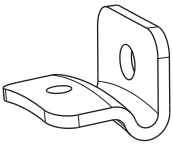
Washers for CV joint end cones

	D_1 mm	H mm	D mm	Spare part code
All sizes	5.3	1.2	15	332001020R30



Chain hook for CV shields

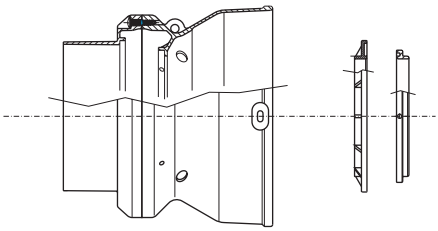
	Spare part code
All sizes	240001063R10



Safety shields

Hardshell for 70° with 2 bearing rings

	Spare part code
652-662-672	517027002

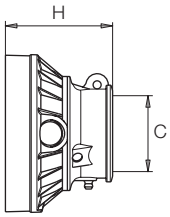


Bearing rings (pair)

	Spare part code
652-662-672	255020452

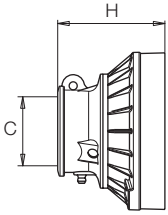
Outer base cone + flex bell for 70° CV joint

	H mm	C mm	Spare part code
652-662-672	86.7	61.5	517010041



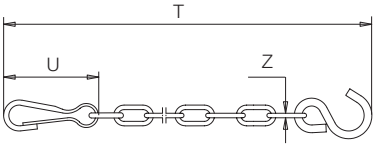
Inner base cone + flex bell for 70° CV joint

	H mm	C mm	Spare part code
652-662-672	86.7	56.0	517010042



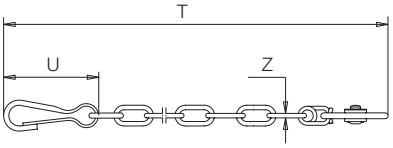
Chains with S-hook

	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



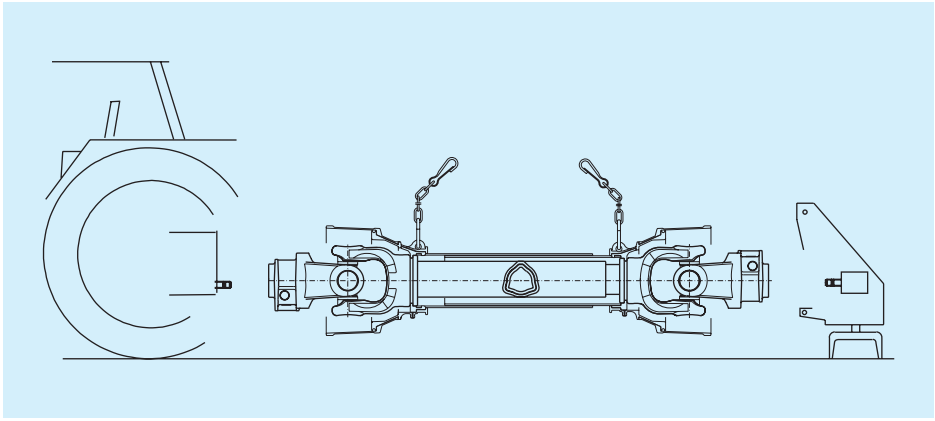
Yoke - shaft connections

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 ASAE S203.13: 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.

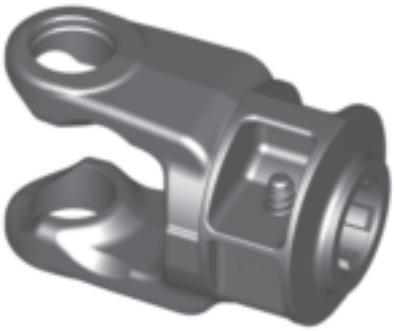


Yoke - shaft connections

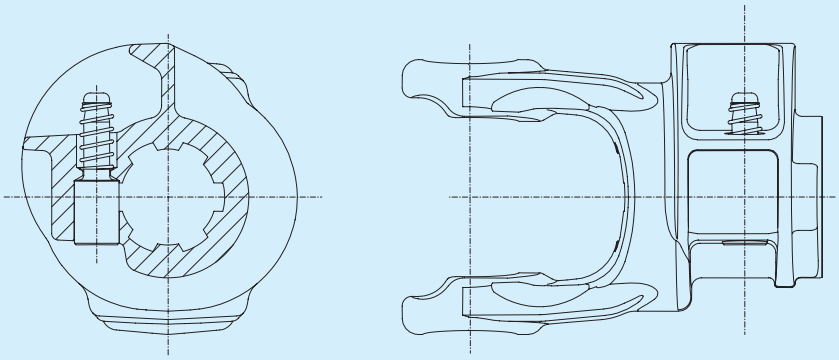
Taper pin yokes

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.

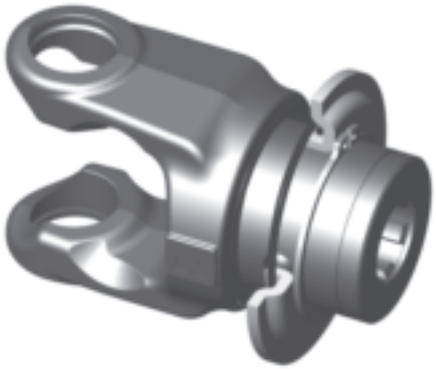


Ball collar yokes

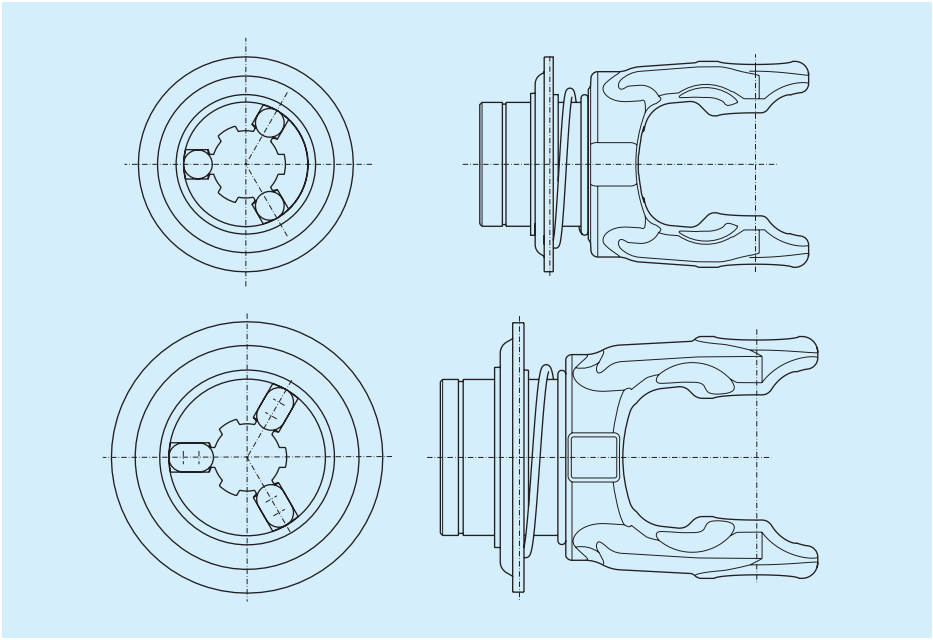
Ball collar yokes provide easy and fast connection (or disconnection) of the yoke to the PTO, with no tools required. Connection is secured by hardened steel balls or rounded pins that engage the annular groove of a splined shaft, such as a tractor's PTO.

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.

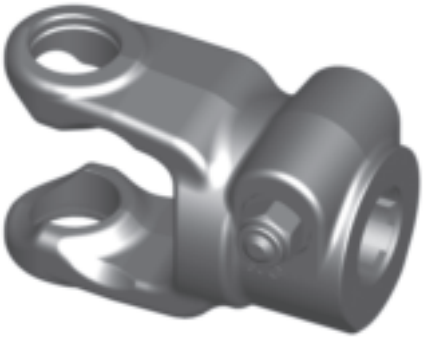


Yoke - shaft connections

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.

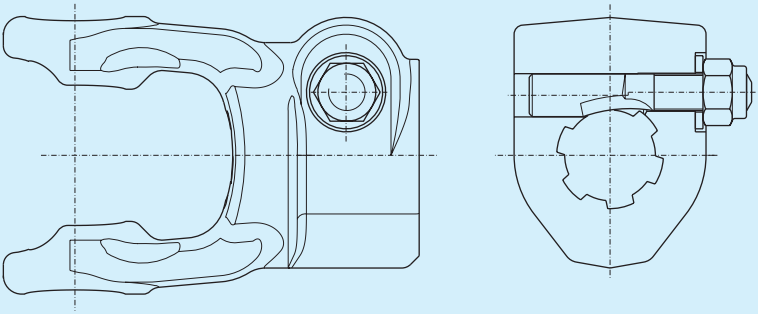
Tapered pins provide a fixed coupling between yoke and PTO. Tapered pin yokes are intended for use on the implement end of primary driveline (those that connect the tractor PTO to the first implement input shaft), or may be used on either or both ends of drivelines internal to the machine. The tapered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

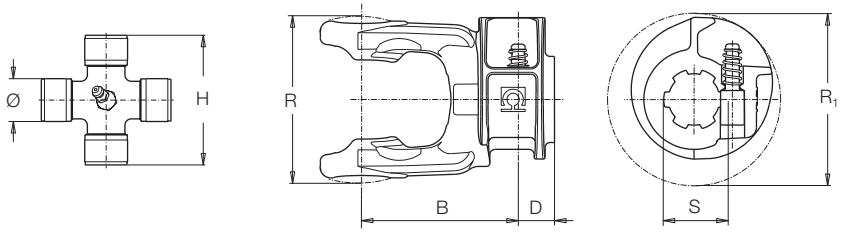
⚠ Do not replace taper pin with standard bolts- ask for the correct tapered pins from Bondioli & Pavesi.

⚠ Ensure the nut is tight before each use.



Yokes for single cardan joints

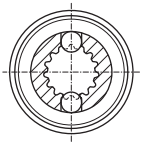
Push pin yokes

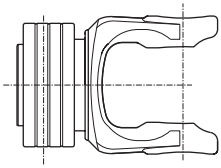


	⊠Ø mm	H mm	S	D mm	B mm	R mm	R_1 mm	Driveline code	Spare part code	
1	22.0	54.0	1 3/8" Z6	18	75	67	85	007	5070B0355	403000021R10
			1 3/8" Z21	26	67	67	85	008	5070B3755	403000021R10
			D8x32x38	18	75	67	85	093	5070B2151	403000021R10
2	23.8	61.3	1 3/8" Z6	21	78	76	85	007	5070C0355	403000021R10
			1 3/8" Z21	29	70	76	85	008	5070C3755	403000021R10
			D8x32x38	21	78	76	85	093	5070C2151	403000021R10
43-4	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
5	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	- -	- -	- -	- -	- -	- -	- -
6	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	- -	- -	- -	- -	- -	- -	- -
7	35.0	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	- -	- -	- -	- -	- -	- -	- -
8	35.0	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	- -	- -	- -	- -	- -	- -	- -

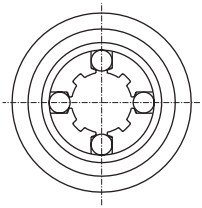
Yokes for single cardan joints

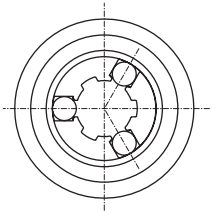
RT ball collar yokes

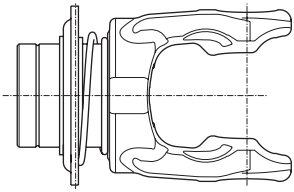




Collar 1" Z15

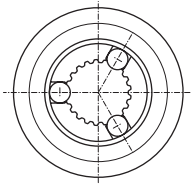


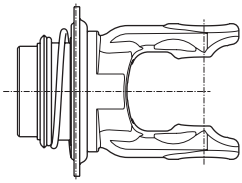




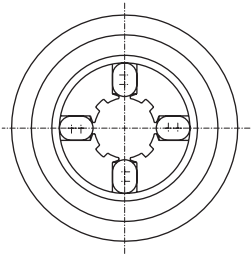
Collar type A1

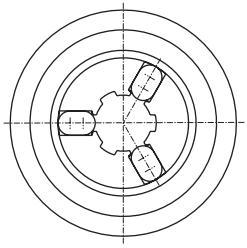
Collar type A

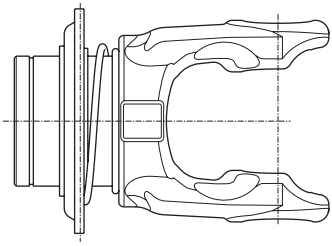




Collar type B





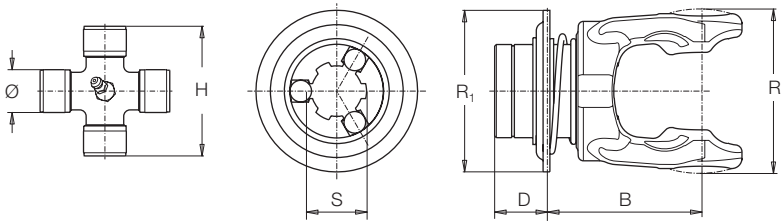


Collar type C1

Collar type C

Yokes for single cardan joints

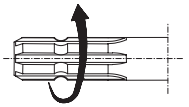
Ball collar yokes
RT

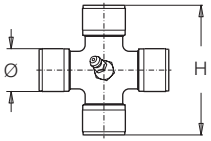


	Ø mm	H mm	S	D mm	B mm	R_1 mm	R mm	Type	Driveline code	Spare part code	
1	22.0	54.0	1" Z15	13	65	58	73	-	R12	505010651	240002021R
			1 3/8" Z6	18	75	90	67	A	R07	5720B0355	435000320R
			1 3/8" Z21	28	65	90	67	B	R08	5720B3776	435000300R
2	23.8	61.3	1 3/8" Z6	21	78	90	76	A	R07	5720C0355	435000320R
			1 3/8" Z21	31	68	90	76	B	R08	5720C3776	435000300R
43-4	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
5	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
6	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
7	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
8	35.0	106.0	1 3/8" Z6	35	109	120	124	C	R07	5720M0355	435000322R
			1 3/8" Z21	35	109	120	124	C	R08	5720M3755	435000322R
			D8x32x38	35	109	120	124	C1	R93	5720M2151	435002116R
			1 3/4" Z6	35	109	120	124	A	R09	5720M0455	435000419R
			1 3/4" Z20	35	109	120	124	A	R10	5720M3855	435000419R

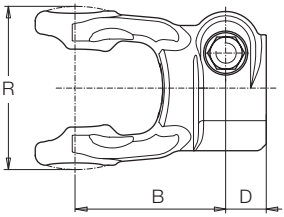
Yokes for single cardan joints

Taper pin yokes with counter-clockwise rotation

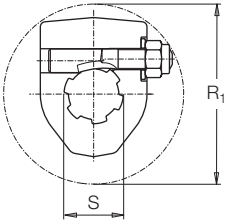




Do not use on tractor PTO (Power Take Off)



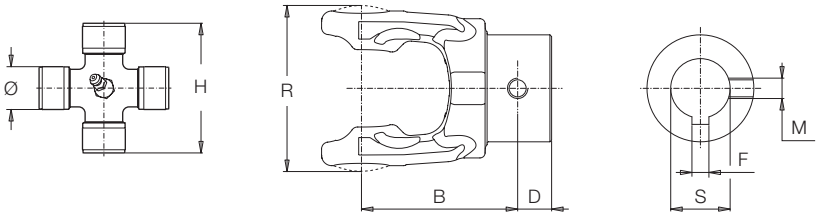
Recommended tightening torque:
150 Nm for 1 3/8" Z6 – Z21
220 Nm for 1 3/4" Z6 – Z20



	Ø mm	H mm	S	D mm	B mm	R mm	R_1 mm	Driveline code	Spare part code	
1	22.0	54.0	1 3/8" Z6	- -	- -	- -	- -	- -	- -	- -
			1 3/8" Z21	- -	- -	- -	- -	- -	- -	- -
2	23.8	61.3	1 3/8" Z6	- -	- -	- -	- -	- -	- -	- -
			1 3/8" Z21	- -	- -	- -	- -	- -	- -	- -
43-4	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
5	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
6	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
7	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
8	35.0	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

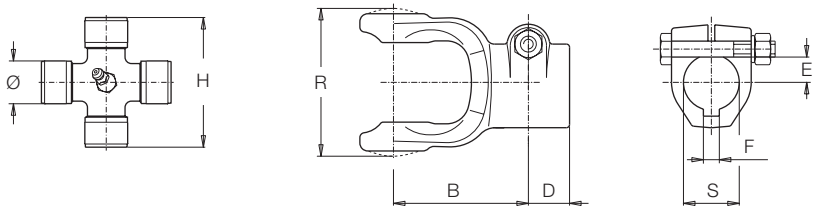
Yokes for single cardan joints

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
1	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
2	23.8	61.3	25	76	70	20	8	M10	053	2120C6155
			30	76	70	20	8	M10	054	2120C6255
43-4	27.0	74.6	30	90	80	20	8	M12	054	2120E6255
			35	90	70	20	10	M12	055	212046351

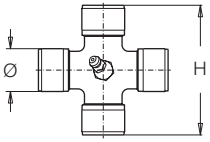
Interfering bolt yokes

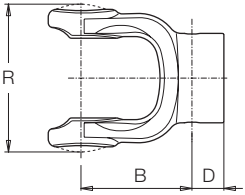


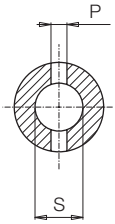
	Ø mm	H mm	S H8 mm	R mm	B mm	D mm	F Js9 mm	E mm	Driveline code	Spare part code	
1	22.0	54.0	30	73	76	14	8	13.0	035	509016252	408000003
2	23.8	61.3	30	80	80	19	8	13.0	035	509026252	408000003
43-4	27.0	74.6	30	94	88	19	8	13.0	035	509046252	408000009
			35	94	88	19	10	15.5	036	509046352	408000009
5	30.2	79.4	35	100	90	19	10	15.5	036	509056352	408000009
6	30.2	91.4	35	115	97	19	10	15.5	036	509066352	408000009

Yokes for single cardan joints

Round bore yokes



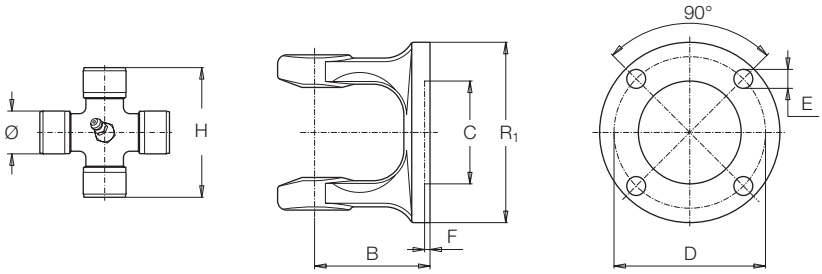




	Ø	H	S H8	R	B	D	P H12	Driveline	Spare part
	mm	mm	mm	mm	mm	mm	mm	code	code
1	22.0	54.0	20	73	63	15	6	069	211014451
			25	73	63	15	8	071	211014651
			30	73	65	15	10	072	211014851
2	23.8	61.3	20	80	67	15	6	069	211024451
			25	80	67	15	8	071	211024651
			30	80	67	15	10	072	211024851
43-4	27.0	74.6	25	94	70	20	8	071	211044651
			30	94	70	20	10	072	211044851
			35	94	79	11	13	073	211044955

Yokes for single cardan joints

Flange yoke

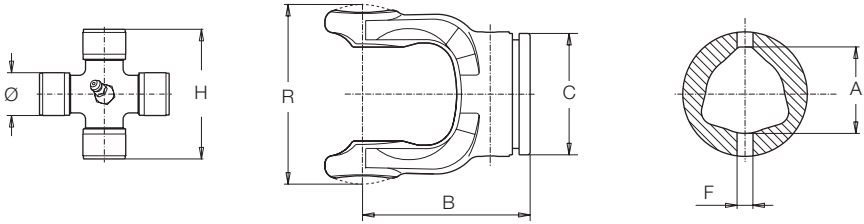


	Ø mm	H mm	B mm	F mm	C^{H8} mm	R_1 mm	D mm	E mm	Driveline code	Spare part code
1	22.0	54.0	49	2.5	47	89	74.5	8.5	090	221017153
2	23.8	61.3	54	2.5	47	89	74.5	8.5	090	221027153
43-4	27.0	74.6	64	2.5	57	100	84.0	10.5	090	221047153
5	30.2	79.4	68	2.5	57	110	94.0	10.5	090	221057153
6	30.2	91.4	77	2.5	75	130	101.5	12.5	090	221067153
7	35.0	93.5	79	3.0	85	148	120.0	15	090	221177151
8	35.0	106.0	79	3.0	85	148	120.0	15	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.



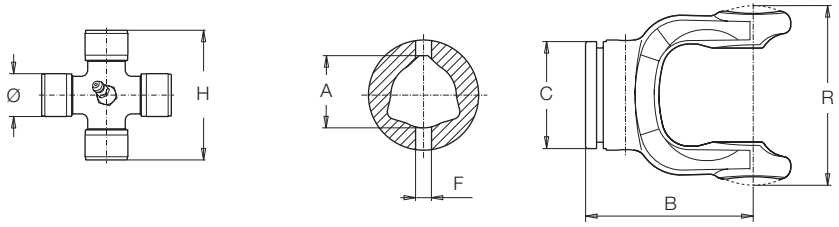
	Ø mm	H mm	R mm	B mm	C mm	F mm	A mm	Spare part code	
1	22.0	54.0	73	78	47	8	32.5	204016851	341036000R10
2	23.8	61.3	80	82	54	8	36.0	204026851	341048000R10
43	27.0	74.6	94	90	61	8	43.5	204046851	341038000R10
4	27.0	74.6	94	90	61	8	43.5	204046851	341038000R10
5	30.2	79.4	100	98	70	10	51.6	204056860	341053000R10
6	30.2	91.4	115	105	76	10	54.0	204066851	341042000R10
7	34.9	93.5	119	107	76	10	54.0	204176851	341042000R10
8	34.9	106.0	132	120	88	12	63.0	204086860	341054000R10
8*	34.9	106.0	132	120	88	12	54.0	204086889	341054000R10

* For non-CV end of drivelines with single CV joint

Yokes for single cardan joints

Yokes for inner tube

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

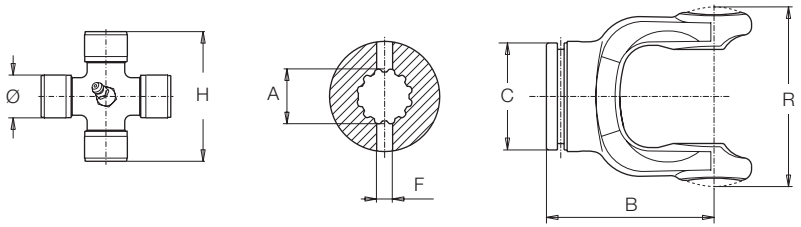


	Ø mm	H mm	A mm	F mm	C mm	B mm	R mm	Spare part code	
1	22.0	54.0	26.5	8	41	78	73	204016852	341036000R10
2	23.8	61.3	29.0	8	47	82	80	204026852	341048000R10
43	27.0	74.6	36.0	8	54	90	94	204046852	341038000R10
4	27.0	74.6	36.0	8	54	90	94	204046852	341038000R10
5	30.2	79.4	45.0	10	64	98	100	204056861	341053000R10
6	30.2	91.4	45.0	10	67	105	115	204066852	341042000R10
7	34.9	93.5	45.0	10	67	107	119	204176852	341042000R10
8	34.9	106.0	54.0	12	76	120	132	204086861	341054000R10
8*	34.9	106.0	45.0	12	76	120	132	204086888	341054000R10

* For non-CV end of drivelines with single CV joint

Yokes for single cardan joints

Yoke for splined bar.

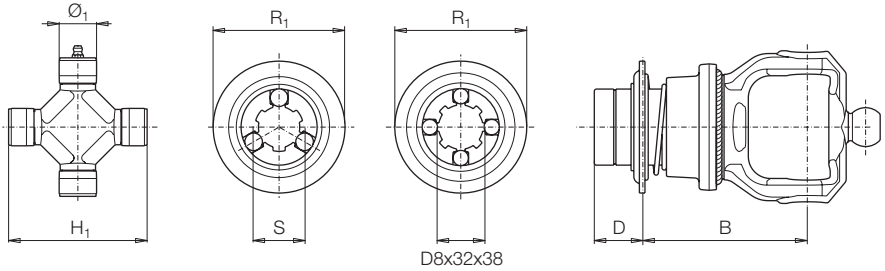


	Ø mm	H mm	A mm	Z	F mm	C mm	B mm	R mm	Spare part code	
1	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
43	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4	27.0	74.6	30	10	8	54	90	94	204043251	345013000R10
5	30.2	79.4	35	12	10	61	98	100	204053361	345012000R10
6	30.2	91.4	35	12	10	67	105	115	204063361	345001000R10
7	35.0	93.5	40	14	10	67	107	119	204173451	345001000R10
8	35.0	106.0	40	14	12	76	120	132	204083460	345002000R10

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

Ball collar yokes

RT

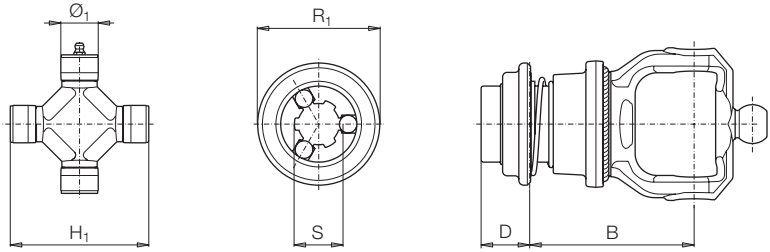


	Ø1 mm	H1 mm	S	R1 mm	D mm	B mm	Driveline code	Spare part code	
4	22.0	86.0	1 3/8" Z6	95	29	103	WR7	5730E0384	435000323R
			1 3/8" Z21	95	40	91	WR8	5730E3784	435000323R
			D8x32x38	95	29	103	WR6	5730E2184	435002115R
			1 3/4" Z6	120	40	109	WR9	5730E0484	435000420R
			1 3/4" Z20	120	40	109	WR0	5730E3884	453000420R
6	27.0	100.0	1 3/8" Z6	95	35	119	WR7	5730G0384	435000323R
			1 3/8" Z21	95	40	106	WR8	5730G3784	435000323R
			D8x32x38	95	35	119	WR6	5730G2184	435002117R
			1 3/4" Z6	120	40	120	WR9	5730G0484	435000420R
			1 3/4" Z20	120	40	120	WR0	5730G3884	435000420R
8	30.2	106.0	1 3/8" Z6	95	35	126	WR7	5730L0384	435000323R
			1 3/8" Z21	95	40	114	WR8	5730L3784	435000323R
			D8x32x38	95	35	126	WR6	5730L2184	435002117R
			1 3/4" Z6	120	40	127	WR9	5730L0484	435000420R
			1 3/4" Z20	120	40	127	WR0	5730L3884	435000420R

Yokes for 80° constant velocity joints

Automatic ball collar yokes

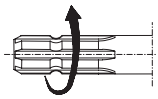
RTA



	Ø1 mm	H1 mm	S	R1 mm	B mm	D mm	Driveline code	Spare part code	
4	22.0	86.0	1 3/8" Z6	88	103	29	WQ7	5730E0391	435000311R
			1 3/8" Z21	88	91	40	WQ8	5730E3791	435000311R
			1 3/4" Z6	110	109	40	WQ9	5730E0491	435000411R
			1 3/4" Z20	110	109	40	WQ0	5730E3891	435000411R
6	27.0	100.0	1 3/8" Z6	88	119	35	WQ7	5730G0391	435000311R
			1 3/8" Z21	88	106	40	WQ8	5730G3791	435000311R
			1 3/4" Z6	110	120	40	WQ9	5730G0491	435000411R
			1 3/4" Z20	110	120	40	WQ0	5730G3891	435000411R
8	30.2	106.0	1 3/8" Z6	88	126	35	WQ7	5730L0391	435000311R
			1 3/8" Z21	88	114	40	WQ8	5730L3791	435000311R
			1 3/4" Z6	110	127	40	WQ9	5730L0491	435000411R
			1 3/4" Z20	110	127	40	WQ0	5730L3891	435000411R

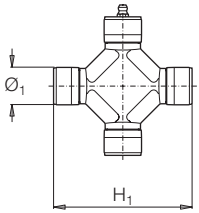
Yokes for 80° constant velocity joints

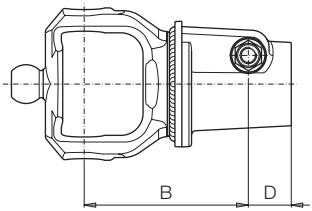
Taper pin yokes for counter-clockwise rotating drivelines

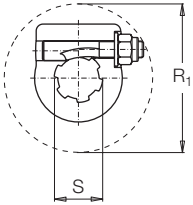


Do not use on tractor
PTO (Power Take Off)

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

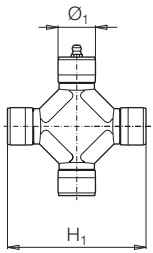


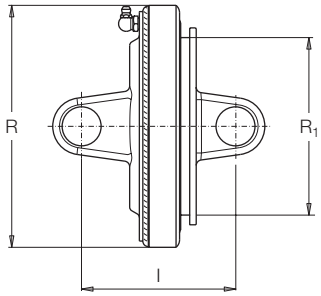




	Ø1 mm	H1 mm	S	B mm	D mm	R1 mm	Driveline code	Spare part code	
4	22.0	86.0	1 3/8" Z6	103	31	106	W14	5110E0361	408000075R
			1 3/8" Z21	91	31	106	W15	5110E3761	408000075R
6	27.0	100.0	1 3/8" Z6	119	31	106	W14	5110G0361	408000075R
			1 3/8" Z21	106	31	106	W15	5110G3761	408000075R
			1 3/4" Z6	120	31	126	W16	5110G0461	408000076R
			1 3/4" Z20	120	31	126	W17	5110G3861	408000076R
8	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

Central housing

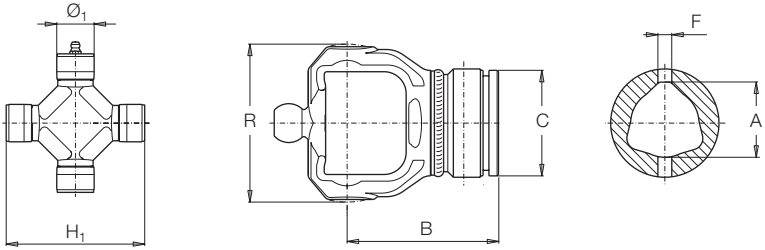




	Ø1 mm	H1 mm	I mm	R mm	R1 mm	Spare part code
4	22.0	86.0	93	140	101	5110E0052
6	27.0	100.0	112	175	128	5110G0061
8	30.2	106.0	119	190	146	5110L0063

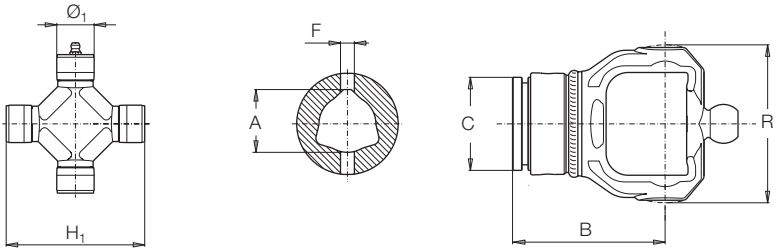
Yokes for 80° constant velocity joints

Yokes for outer tube



	Ø1 mm	H1 mm	R mm	B mm	C mm	F mm	A mm	Spare part code	
4	22.0	86.0	96	99	61	8	43.5	2150E6885	341038000R10
6	27.0	100.0	106	109	76	10	54.0	2150G6885	341042000R10
8	30.2	106.0	123	124	88	12	54.0	2150L6873	341054000R10

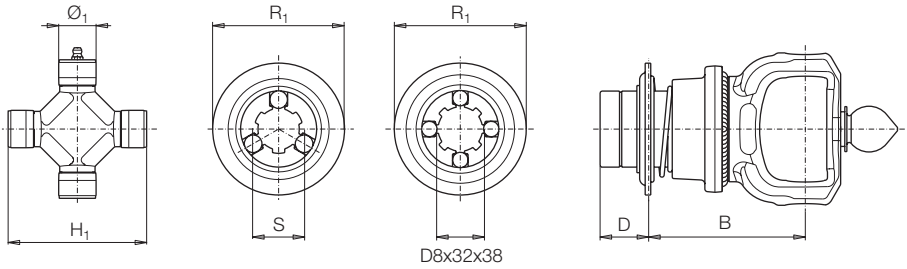
Yokes for inner tube



	Ø1 mm	H1 mm	R mm	B mm	C mm	F mm	A mm	Spare part code	
4	22.0	86.0	96	99	54	8	36.0	2150E6887	341048000R10
6	27.0	100.0	106	109	67	10	45.0	2150G6887	341053000R10
8	30.2	106.0	123	124	76	12	45.0	2150L6874	341054000R10

Ball collar yokes

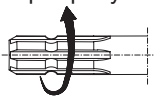
RT



	Ø1 mm	H1 mm	S	R1 mm	D mm	B mm	Driveline code	Spare part code	
4	22.0	86.0	1 3/8" Z6	95	29	95	KR7	5730E0353	435000323R
			1 3/8" Z21	95	40	82	KR8	5730E3753	435000323R
			D8x32x38	95	29	95	KR6	5730E2153	435002115R
			1 3/4" Z6	120	40	100	KR9	5730E0453	435000420R
			1 3/4" Z20	120	40	100	KR0	5730E3853	453000420R
6	27.0	100.0	1 3/8" Z6	95	35	114	KR7	5730G0353	435000323R
			1 3/8" Z21	95	40	102	KR8	5730G3753	435000323R
			D8x32x38	95	35	114	KR6	5730G2153	435002117R
			1 3/4" Z6	120	40	115	KR9	5730G0453	435000420R
			1 3/4" Z20	120	40	115	KR0	5730G3853	435000420R
8	30.2	106.0	1 3/8" Z6	95	35	114	KR7	5730L0353	435000323R
			1 3/8" Z21	95	40	102	KR8	5730L3753	435000323R
			D8x32x38	95	35	114	KR6	5730L2153	435002117R
			1 3/4" Z6	120	40	115	KR9	5730L0453	435000420R
			1 3/4" Z20	120	40	115	KR0	5730L3853	435000420R

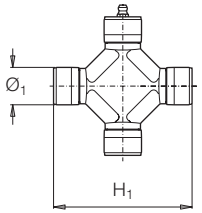
Yokes for 50° constant velocity joints

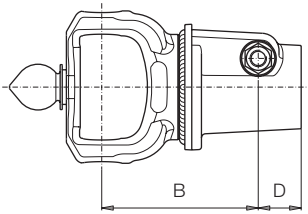
Taper pin yokes for counter-clockwise rotating drivelines

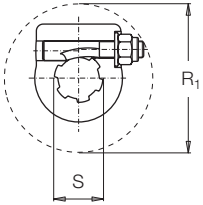


Do not use on tractor
PTO (Power Take Off)

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



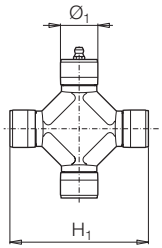


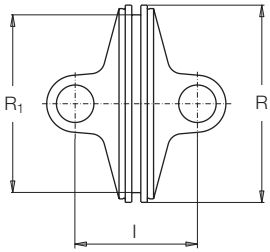


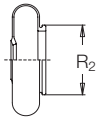
	Ø1 mm	H1 mm	S	B mm	D mm	R1 mm	Driveline code	Spare part code	
4	22.0	86.0	1 3/8" Z6	95	31	106	K14	5190E0352	408000075R
			1 3/8" Z21	82	31	106	K15	5190E3752	408000075R
6	27.0	100.0	1 3/8" Z6	114	31	106	K14	5190G0352	408000075R
			1 3/8" Z21	102	31	106	K15	5190G3752	408000075R
			1 3/4" Z6	115	31	126	K16	5190G0452	408000076R
			1 3/4" Z20	115	31	126	K17	5190G3852	408000076R
8	30.2	106.0	1 3/8" Z6	114	31	106	K14	5190L0352	408000075R
			1 3/8" Z21	102	31	106	K15	5190L3752	408000075R
			1 3/4" Z6	115	31	126	K16	5190L0452	408000076R
			1 3/4" Z20	115	31	126	K17	5190L3852	408000076R

Yokes for 50° constant velocity joints

Central housing







Rubber boot

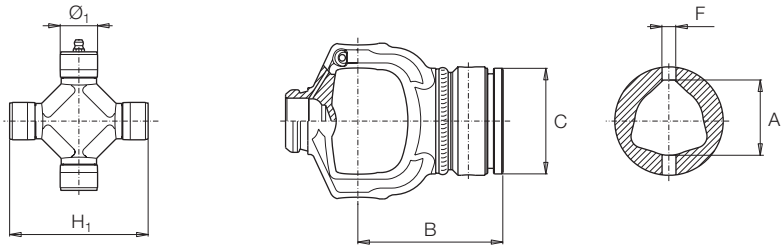
	Ø1	H1	R1	l	R	Spare part code	R2	Spare part code
	mm	mm	mm	mm	mm		mm	
4	22.0	86.0	101	76	116	2080E0055	47.0	246000101
6	27.0	100.0	128	88	142	2080G0064	51.5	*246000116
8	30.2	106.0	128	88	142	2080L0064	51.5	*246000116

*Note: Rubber boot 246000116 is fitted with bearing **339001046**

Yokes for 50° constant velocity joints

Yokes for outer tube

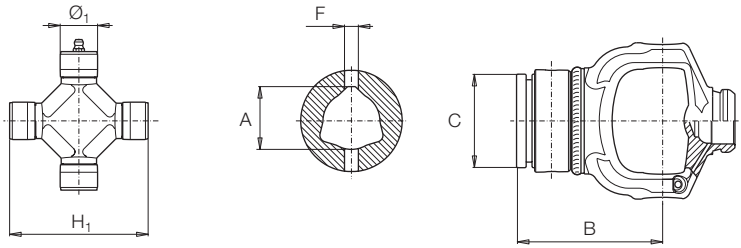
Same type of yoke is used for regular, Rilsan-coated and heat-treated tubes.



	Ø1 mm	H1 mm	B mm	C mm	F mm	A mm	Spare part code	
4	22.0	86.0	90	61	8	43.5	2080E6876	341038000R10
6	27.0	100.0	105	76	10	54.0	2080G6885	341042000R10
8	30.2	106.0	112	88	12	54.0	2080L6864	341054000R10

Yokes for outer tube

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

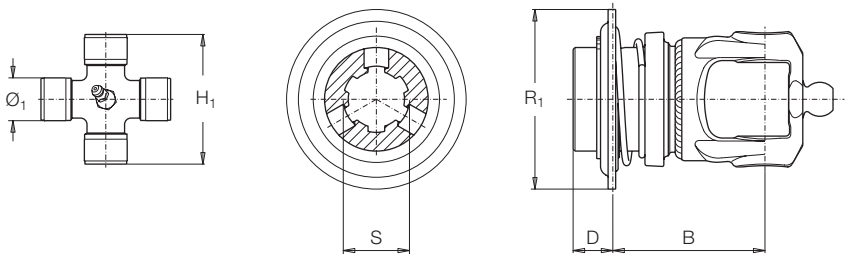


	Ø1 mm	H1 mm	B mm	C mm	F mm	A mm	Spare part code	
4	22.0	86.0	90	54	8	36.0	2080E6875	341048000R10
6	27.0	100.0	105	67	10	45.0	2080G6887	341053000R10
8	30.2	106.0	112	76	12	45.0	2080L6865	341054000R10

Yokes for 70° constant velocity joints

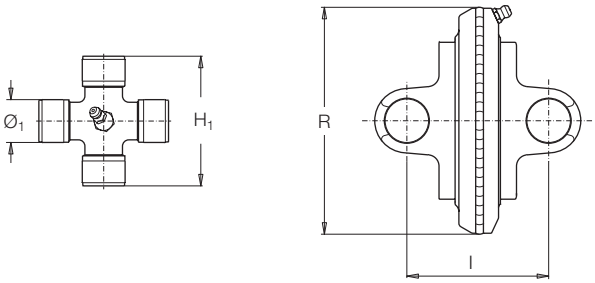
Ball collar yoke

RT



	Ø1 mm	H1 mm	S	R1 mm	D mm	B mm	Driveline code	Spare part code	
652-662-672	23.8	61.3	1 3/8" Z6	95	21	81	R07	573020379	435000323R
			1 3/8" Z21	95	27	75	R08	573023764	435000323R

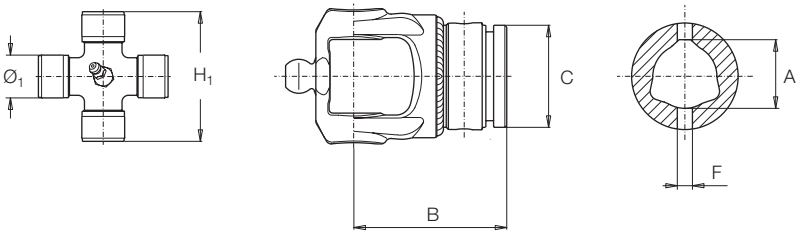
Central housing



	Ø1 mm	H1 mm	l mm	R mm	Spare part code
652-662-672	23.8	61.3	75	120	512020051

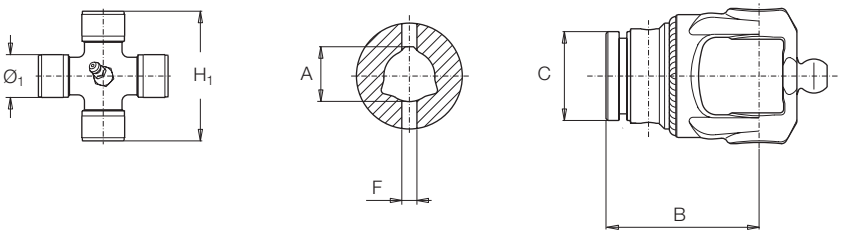
Yokes for 70° constant velocity joints

Yokes for outer tube



	Ø1 mm	H1 mm	B mm	C mm	F mm	A mm	Spare part code	
652-662-672	23.8	61.3	81	54	8	36.0	208026873	341048000R10

Yokes for inner tube



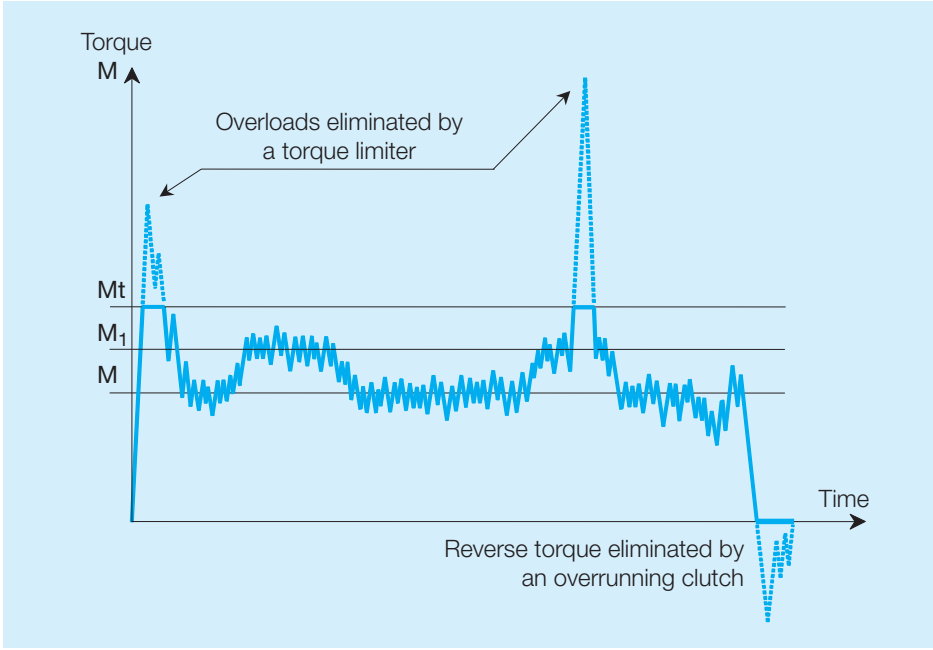
	Ø1 mm	H1 mm	A mm	F mm	C mm	B mm	Spare part code	
652-662-672	23.8	61.3	29.0	8	47	81	208026874	341048000R10

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.

Standard settings

	1	2	43	4	5	6	7	8
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 1200	1000 1200	1000 1200	1200			
SA4			1400 1600	1400 1600	1400 1600	1400 1600		
Ratchet torque limiters, symmetrical, weekly lubrication LN								
LN1	300							
LN2	460 600	600						
LN3		800 900						
LN4		1000 1200	1000 1200	1000 1200	1200			
Shear bolt torque limiters								
LB	650 700							
		950 1050						
			1400 1700	1400 1700 2000				
					2100 2400	2400 2700	2700 3200	3000 3500
Automatic torque limiters								
LR23				*1200 1500 1700	*1500 1700 1900 2100	*2100		
LR24						2600	*2500 3000	*2500 3000
LR35								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

Standard settings for friction torque limiters

	1	2	43	4	5	6	7	8
Mmax (Nm) :	750	1050	1700	2000	2500	2900	3500	3900
Adjustable friction torque limiters								
FV22 - FFV22	*400 500	*500 600	*600 800	800				
FV32 - FFV32				*900 1000	900 1000 *1100			
FV42 - FFV42					1200	*1200 1350 1450	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	*400 500	*500 600	*600 800	800				
FT32				*900 1000	900 1000 *1100			
FT42					1200	*1200 1450	*1450 1800	
FT34					1200	*1200 1450	*1450 1800	
FT44							1800	*1800 2200

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

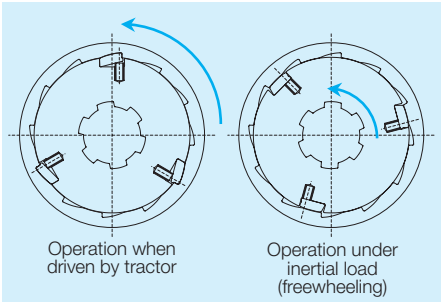
Standard settings for friction torque limiters with overrunning clutches

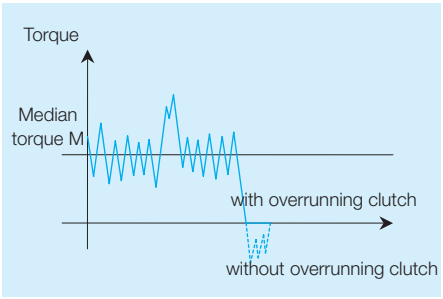
	1	2	43	4	5	6	7	8
Mmax (Nm) :	750	1050	1700	2000	2500	2900	3500	3900
Adjustable friction torque limiters with overrunning clutch								
FNV34 - FFNV34					1200	*1200 1350 1450	1350 *1450 1600 1800	 *1800 2000
FNV44 - FFNV44							1800	*1800 2000 2200
Adjustable friction torque limiters with overrunning clutch								
FNT34					1200	*1200 1450	 *1450 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.





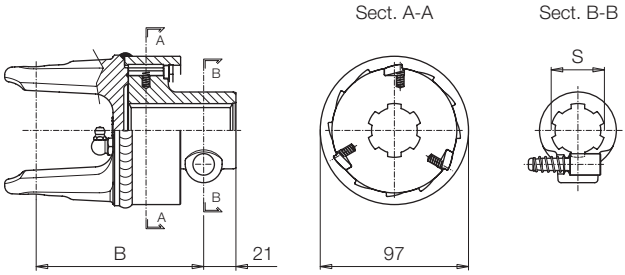
Three sizes of overrunning clutches are available, with different length of pawls and attachment to PTO: RA1, RA2 and RL3.
- RA1: Push-pin attachment. for size 1, 2, 43, 4 and 5.
- RA2: Taper pin attachment. for for size 5, 6 and 7.
- RL3: Taper pin attachment. for size 8.

Version RA1 and RA2 are equipped with a grease fitting and lubrication is recommended every 50 hours of use with NLGI grade 2 grease.

Version RL has a special seal ring and locking plate located within the hub, to help prevent loss or contamination of the grease. RL overrunning clutches are lubricated with NLGI grade 2 molybdenum disulfide grease during assembly. No further lubrication is required for normal use, therefore no grease fitting is provided.

Overrunning clutches

RA1



Maximum torque 2400 Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1	94	94	- -	- -
2	100	100	- -	- -
43-4	109	109	- -	- -
5	112	112	- -	- -

Driveline codes RA1

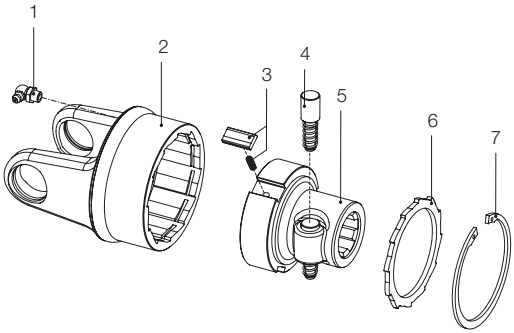
	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
	096	631	- -	- -

Spare parts codes RA1

	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1	601101701R	601101702R	- -	- -
2	601102701R	601102702R	- -	- -
43-4	601104701R	601104702R	- -	- -
5	601105704R	601105702R	- -	- -

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

RA1

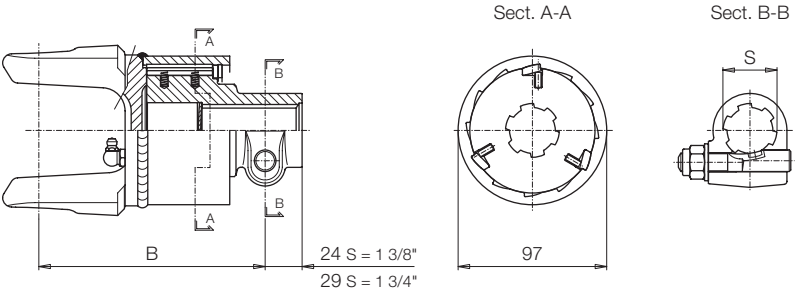


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	1 2 43-4 5	418011201 418021201 418041201 418051201	Outer housing + yoke	
3		4210C0001R03	Pawl + spring kit	
4		403000001R10	Push-pin kit	
5		5130C0301 5130C3701	Hub with push-pin	1 3/8" Z6 1 3/8" Z21
6		246000132R02	Locking plate	
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

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

Overrunning clutches

RA2



Maximum torque	B (mm)			
3800 Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	140	140	142	142
6	147	147	149	149
7	160	160	162	162

Driveline codes RA2

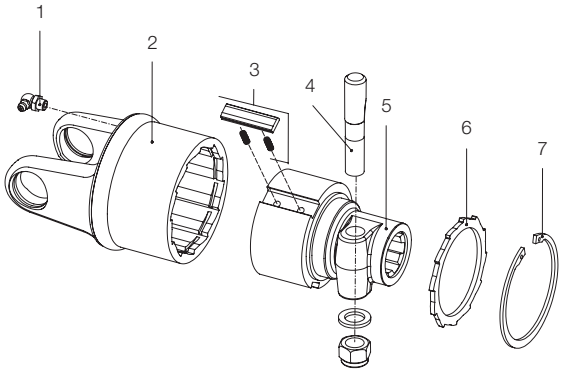
	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
	A50	A51	A52	A53

Spare parts codes RA2

	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	601205601R	601205602R	601205603R	601205604R
6	601206601R	601206602R	601206603R	601206604R
7	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

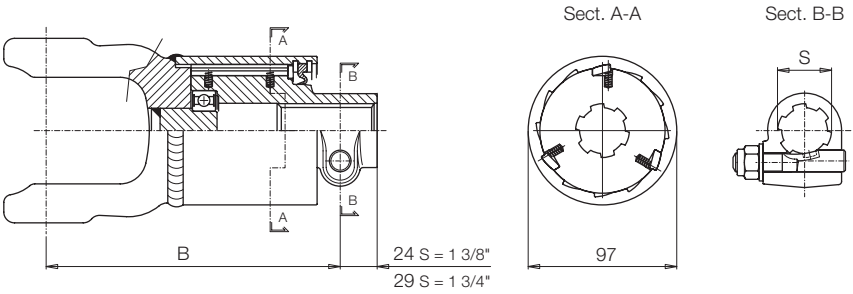


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	5 6 7	418052203 418062203 418172203	Outer housing + yoke	
3		4210E0001R03	Pawl + spring kit	
4		408000047R02 408000046R02	Taper pin	1 3/8" Z6 - Z21 1 3/4" Z6 - Z20
5		5150E0301 5150E3701 5150E0401 5150E3801	Hub with 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

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

Overrunning clutches

RL3 (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
8	191	191	193	193

Driveline codes RL3

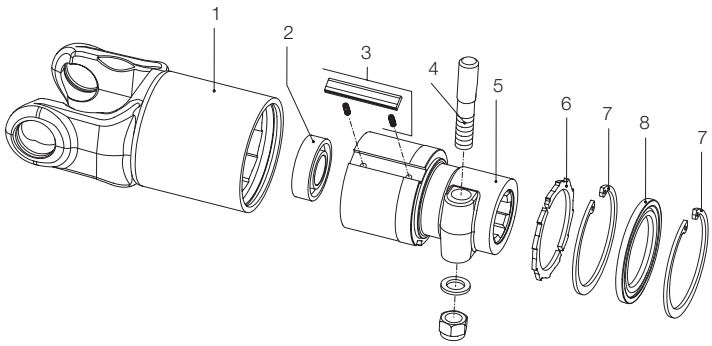
S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
0A6	0A7	0A8	0A9

Spare parts codes RL3

	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
8	60170M501R	60170M502R	60170M503R	60170M504R

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

RL3



Ref.	Size	Spare part code	Description	Technical data
1		4180M7001	Outer housing + yoke	
2		354110025	Bearing	6205 (25 x 52 x 15)
3		4210G0001R03	Pawl + spring kit	
4		408000047R02 408000046R02	Taper pin	1 3/8" Z6 - Z21 1 3/4" Z6 - Z20
5		5150G0306 5150G3706 5150G0406 5150G3806	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		338046000R20	Snap ring	88 x 3 DIN 472/1
8		359005900R02	Retaining ring	

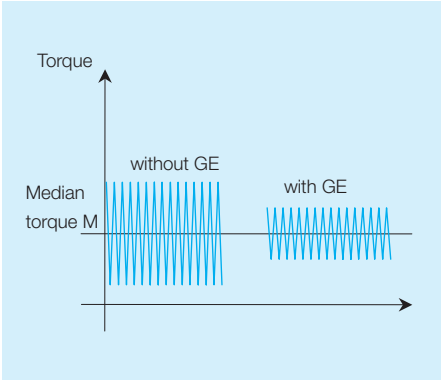
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side. All rotating parts must be guarded.

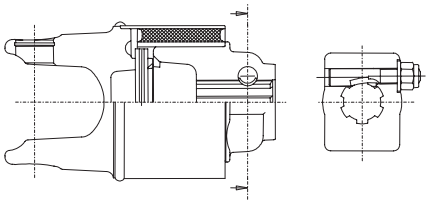
The GE torsionally resilient joint is used on drivelines for different functions depending upon the specific application

- 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.

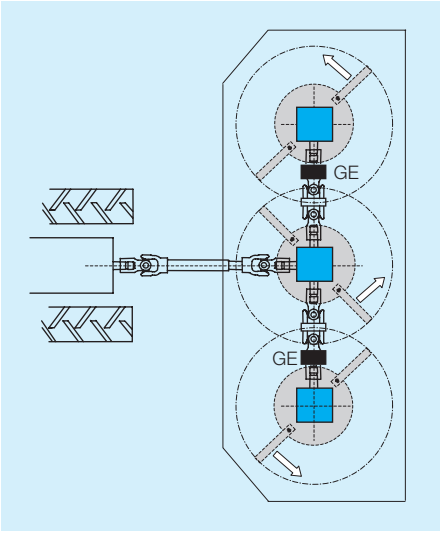
Torsionally resilient joints

GE torsionally resilient joint is supplied in three models:
- GE4 for sizes 4 and 5
- GE6 for size 6
- GE8 for sizes 7 and 8

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.

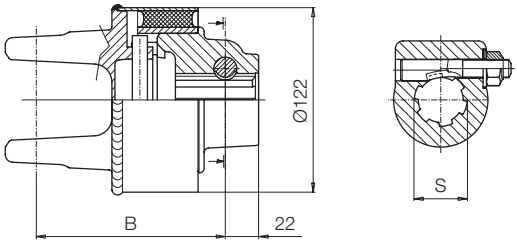
	Shore hardness	R Nm/(°)	M20° Nm
GE4	65 Sh	50	1700
GE6	55 Sh	50	1700
	65 Sh	100	3000
GE8	65 Sh	250	5000

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
4	123	123	- -	- -
5	134	134	- -	- -

Driveline codes GE4

Max. torque	Shore hardness	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1700 Nm	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
4	608E46501R	608E46502R	- -	- -
5	608G46501R	608G46502R	- -	- -

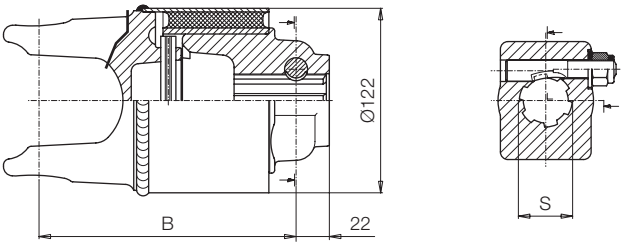
Codes for taper pins

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
6	170	170	170	170

Driveline codes GE6

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

GE6 spare parts codes

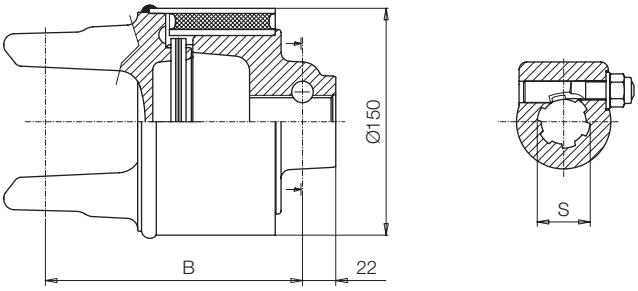
		S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
6	55 Sh	608H65501R	608H65502R	608H65503R	608H65504R
	65 Sh	608H66501R	608H66502R	608H66503R	608H66504R

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
7	169	169	169	169
8	170	170	170	170

Driveline codes GE8

Max. torque	Shore hardness	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5000 Nm	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
7	608L86501R	608L86502R	608L86503R	608L86504R
8	608M86501R	608M86502R	608M86503R	608M86504R

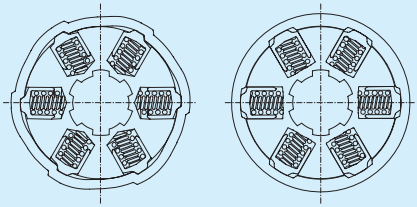
Codes for taper pins

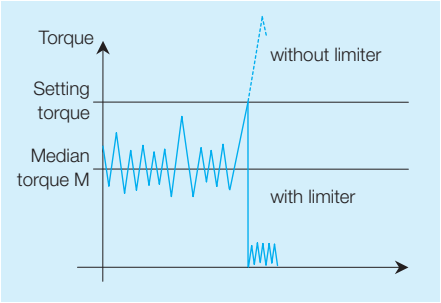
S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
408000047R02	408000047R02	408000046R02	408000046R02

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

Ratchet torque limiters

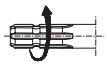
A ratchet torque limiter is a device able to interrupt the transmission of power in the event of a torque peak or overload that exceeds the setting. The torque limiter is automatically re-engaged after the cause of the overload is removed. Ratchet torque limiters are generally employed to protect implements 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
1	400	650	-	-
2	-	650 800	900 1000 1200	-
43-4	-	-	1000 1200	1400 1600
5	-	-	1200	1400 1600
6	-	-	-	1400 1600

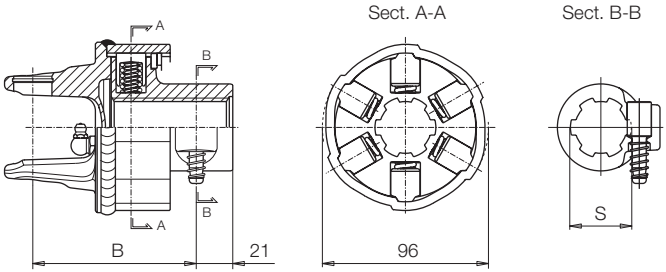
Standard settings (Nm)				
	LN1	LN2	LN3	LN4
1	300	460 600	-	-
2	-	600	800 900	1000 1200
43-4	-	-	-	1000 1200
5	-	-	-	1200



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
1	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	- -	- -	- -

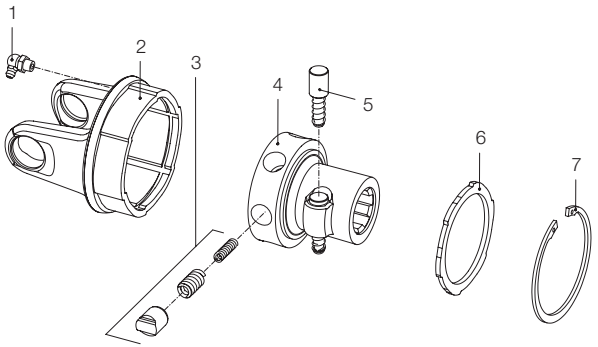
SA1 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
1	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

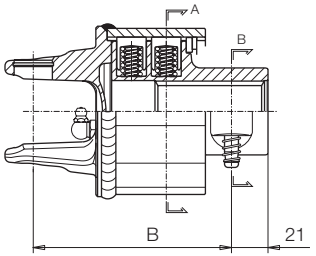


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	1	422011020	Outer housing + yoke	
3		421340001R06	Ratchet + spring kit	
4		513340302	Hub with push-pin	1 3/8" Z6
5		403000001R10	Push-pin kit	
6		240000033R02	Locking plate	
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

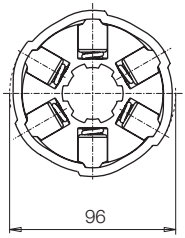
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side. All rotating parts must be guarded.

Ratchet torque limiters

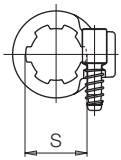
SA2 (one-way)



Sect. A-A



Sect. B-B



	Setting	B (mm)			
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1	650	114	- -	- -	- -
2	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	- -	- -	- -

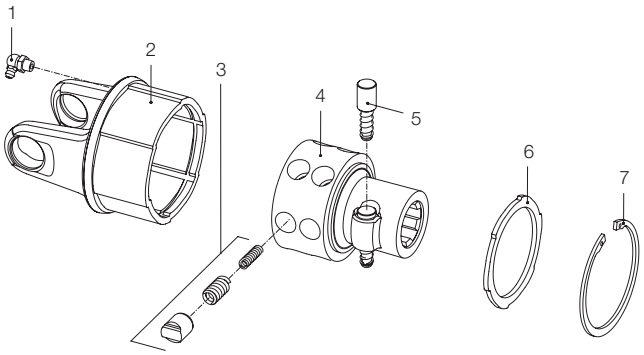
SA2 codes as spare parts

	Setting						
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
1	650	610234001R	- -	- -	- -	12	3
2	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

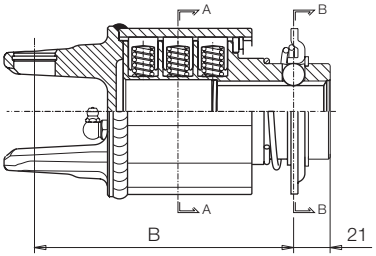


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	1	422012020	Outer housing + yoke	
	2	422022020		
3		421340001R06	Ratchet + spring kit	
4		513350302	Hub with push-pin	1 3/8" Z6
5		403000001R10	Push-pin kit	
6		240000033R02	Locking plate	
7		338005000R20	Snap ring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

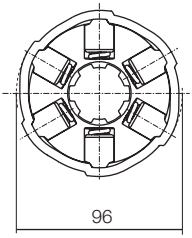
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side. All rotating parts must be guarded.

Ratchet torque limiters

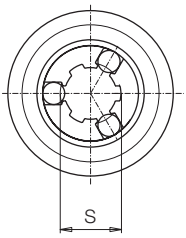
SA3 (one-way)



Sect. A-A



Sect. B-B



	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
2	900	149	- -	- -	- -
	1000				
	1200				
43-4	1000	158	- -	- -	- -
	1200				
5	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			

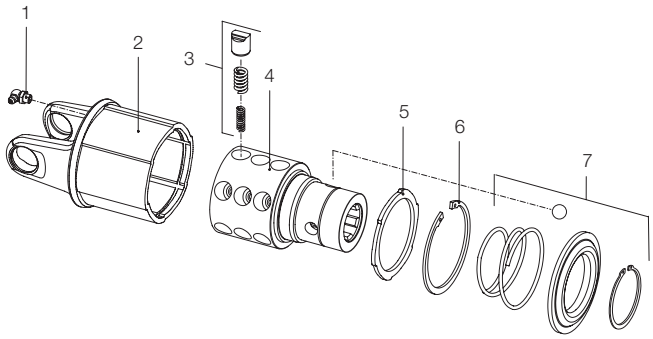
To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

SA3 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
2	900	611341501R	- -	- -	- -	18	0
	1000	611344501R	- -	- -	- -	18	6
	1200	611348501R	- -	- -	- -	18	18
43-4	1000	613344501R	- -	- -	- -	18	6
	1200	613348501R	- -	- -	- -	18	18
5	1200	614348501R	- -	- -	- -	18	18

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

SA3

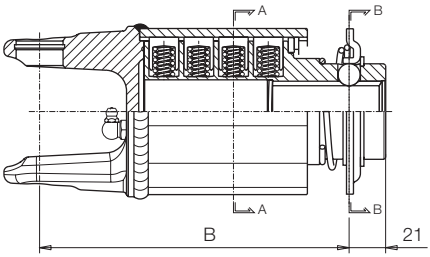


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	2 43-4 5	422023020 422043020 422053020	Outer housing + yoke	
3		421340001R06	Ratchet + spring kit	
4		2270Q0303	Hub	1 3/8" Z6
5		240000033R02	Locking plate	
6		338005000R20	Snap ring	82 x 2.5 DIN 472/1
7		435000321R	Ball collar kit	

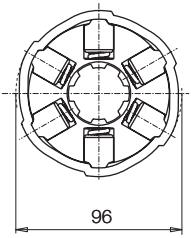
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side. All rotating parts must be guarded.

Ratchet torque limiters

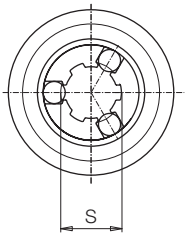
SA4 (one-way)



Sect. A-A



Sect. B-B



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
43-4	1400	178	- -	- -	- -
	1600				
5	1400	181	- -	- -	- -
	1600				
6	1400	188	- -	- -	- -
	1600				

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	- -	- -	- -

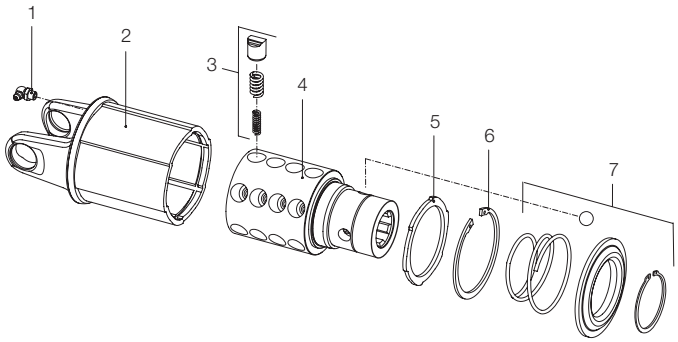
To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

SA4 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
43-4	1400	613452501R	- -	- -	- -	24	11
	1600	613456501R	- -	- -	- -	24	24
5	1400	614452501R	- -	- -	- -	24	11
	1600	614456501R	- -	- -	- -	24	24
6	1400	615452501R	- -	- -	- -	24	11
	1600	615456501R	- -	- -	- -	24	24

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

SA4

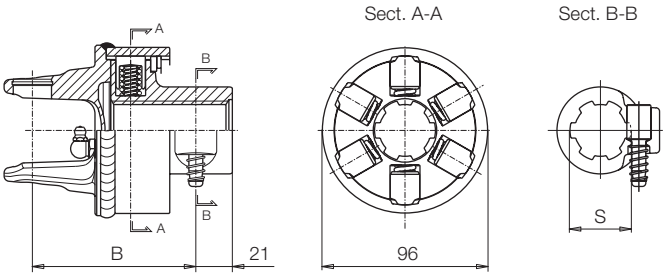


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	43-4 5 6	422044020 422054020 422064020	Outer housing + yoke	
3		421340001R06	Ratchet + spring kit	
4		2270R0302	Hub	1 3/8" Z6
5		240000033R02	Locking plate	
6		338005000R20	Snap ring	82 x 2.5 DIN 472/1
7		435000321R	Ball collar kit	

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

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
1	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	- -	- -	- -

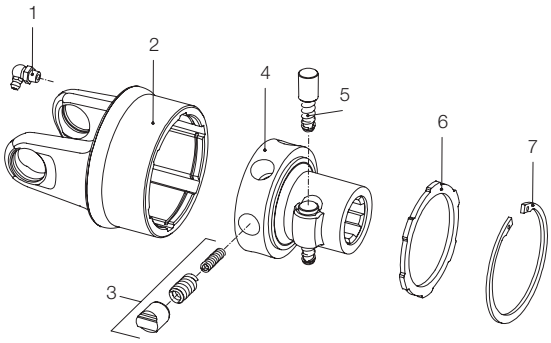
LN1 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
1	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

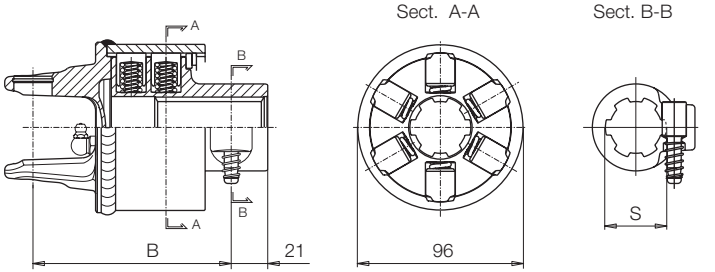


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	1	422B0S301	Outer housing + yoke	
3		421340007R06	Ratchet + spring kit	
4		513340302	Hub with push-pin	1 3/8" Z6
5		403000001R10	Push-pin kit	
6		240000294R02	Locking plate	
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

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

Ratchet torque limiters

LN2 (symmetrical)



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1	460	114	- -	- -	- -
	600				
2	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	- -	- -	- -

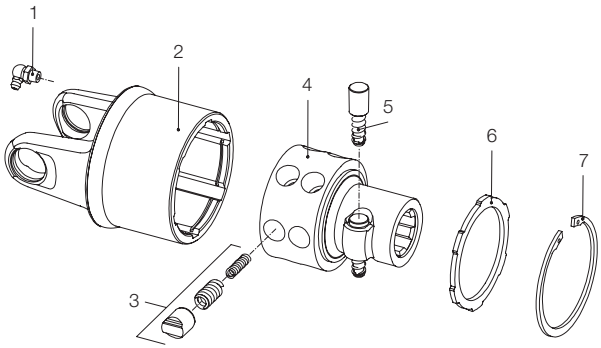
LN2 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
1	460	60A2B2603R	- -	- -	- -	12	0
	600	60A2B3203R	- -	- -	- -	12	12
2	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

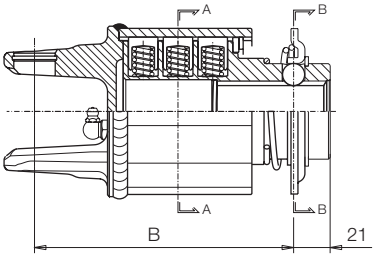


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	1	422B0T301	Outer housing + yoke	
	2	422C0T301		
3		421340007R06	Ratchet + spring kit	
4		513350302	Hub with push-pin	1 3/8" Z6
5		403000001R10	Push-pin kit	
6		240000294R02	Locking plate	
7		338005000R20	Snap ring	82 x 2.5 DIN 472/1

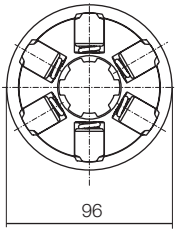
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side. All rotating parts must be guarded.

Ratchet torque limiters

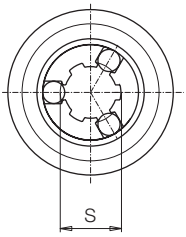
LN3 (symmetrical)



Sect. A-A



Sect. B-B



	Setting	B (mm)			
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
2	800	149	- -	- -	- -
	900				

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			

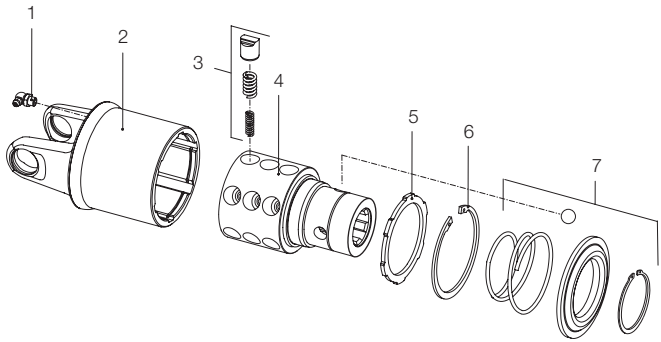
LN3 codes as spare parts

	Setting						
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
2	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

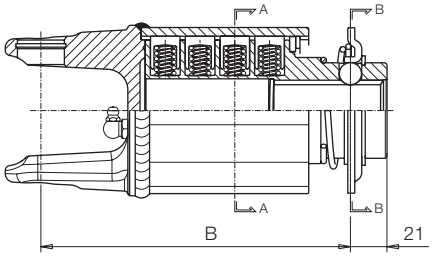


Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	2	422C0U301	Outer housing + yoke	
3		421340007R06	Ratchet + spring kit	
4		2270Q0303	Hub	1 3/8" Z6
5		240000294R02	Locking plate	
6		338005000R20	Snap ring	82 x 2.5 DIN 472/1
7		435000321R	Ball collar kit	

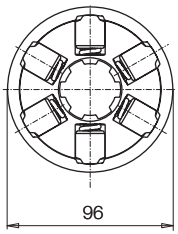
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side. All rotating parts must be guarded.

Ratchet torque limiters

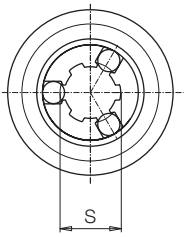
LN4 (symmetrical)



Sect. A-A



Sect B-B



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
2	1000	169	- -	- -	- - - -
	1200				
43-4	1000	178	- -	- -	- -
	1200				
5	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	- -	- -	- -

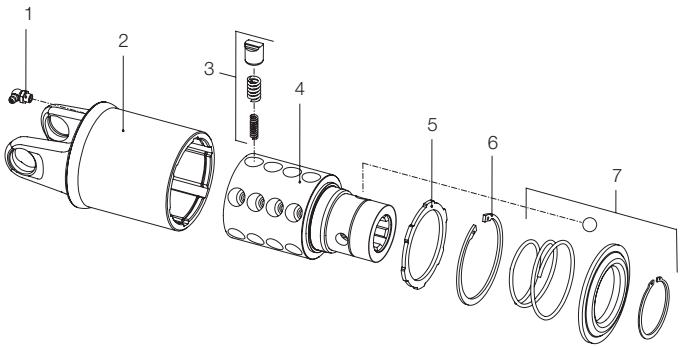
To establish more accurate torque settings, a clutch may contain a different number of springs than what is listed in these tables.

LN4 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20		
2	1000	60B4C4403R	- -	- -	- -	24	9
	1200	60B4C4803R	- -	- -	- -	24	24
43-4	1000	60B4E4403R	- -	- -	- -	24	9
	1200	60B4E4803R	- -	- -	- -	24	24
5	1200	60B4G4803R	- -	- -	- -	24	24

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

LN4



Ref.	Size	Spare part code	Description	Technical data
1		348014000R20	Grease fitting	
2	2 43-4 5	422C0V301 422E0V301 422G0V301	Outer housing + yoke	
3		421340007R06	Ratchet + spring kit	
4		2270R0302	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	

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

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.

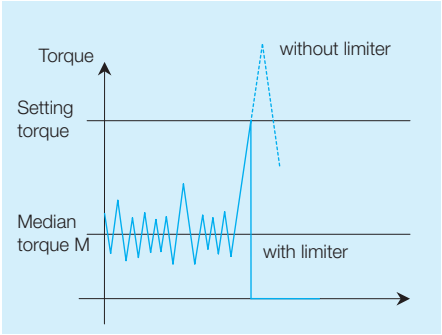
Use of shear bolt torque limiters is recommended to avoid damage to drivelines mounted on implements subject to accidental overloads or torque peaks. The torque setting for shear bolt torque limiters is usually two or three times the median torque M and must never exceed maximum torque of the driveline (Mmax). Standard settings for each size of SFT 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 1 and 2 drivelines, therefore no grease fitting is provided.

For other sizes it is recommended to lubricate at least once in a season.

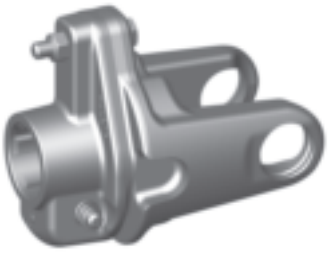
The grease is necessary to lubricate the surfaces of the hub and yoke that rotate independently after the bolt has sheared.



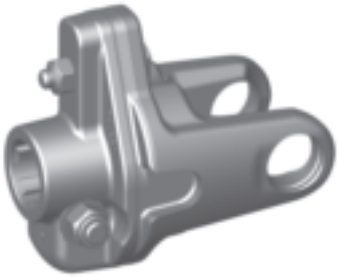
Maximum settings LB

	Nm	in·lb
1	700	6200
2	1050	9300
43	1700	15060
4	2000	17700
5	2400	21240
6	2700	23900
7	3200	28340
8	3500	31000

LB torque limiters sizes S1 to S4 have push-pin attachment to the PTO. Larger sizes use a taper-pin attachment.



LB with push pin for sizes 1 - 2 - 43 - 4



LB with taper-pin for sizes 5 - 6 - 7 - 8

Shear bolt torque limiters LB

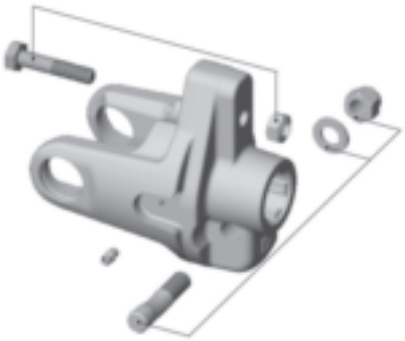
LB shear bolt limiters are integrated devices that cannot be separated after assembly. Components supplied as spare parts include the complete torque limiter, shear bolts (packaged in quantities of five pieces, including the nuts), push-pins or taper pins, and grease fittings.

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 (R_m) 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.

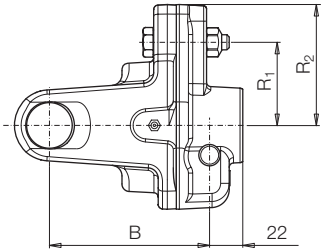
Recommended tightening torques		
	Nm	in.lb.
M6	10.4	92
M8	25.0	221
M10	50.0	443
M12	86.0	761

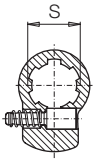
⚠ For the safety of the operator and reliable function of the driveline, replace the bolt only with one equal in length, diameter, and grade as the original.



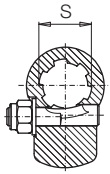
ISO standard	Class	Rm minimum
	**5.6**	500 N/mm^2
	**8.8**	800 N/mm^2
	**10.9**	1000 N/mm^2
SAE standard	Grade	Rm minimum
	**2**	74000 psi 510 N/mm^2
	**5**	120000 psi 827 N/mm^2
	**8**	150000 psi 1034 N/mm^2

LB





Push-pin for sizes
1 - 2 - 43 - 4



Taper pin for sizes
5 - 6 - 7 - 8

	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
1	650	80	1R0	1S0	- -	- -	37	68
	700		098	161	- -	- -	40	
2	950	87	098	161	- -	- -	55	68
	1050		1R1	1S1	- -	- -	60	
43	1400	93	1R0	1S0	- -	- -	45	68
	1700		098	161	- -	- -	55	
4	1400	93	1R0	1S0	- -	- -	45	68
	1700		098	161	- -	- -	55	
	2000		1R2	1S2	- -	- -	43	
5	2100	106	1R0	1S0	1R4	1S4	67	80
	2400		1R1	1S1	1R5	1S5	50	
6	2400	112	1R0	1S0	1R4	1S4	50	80
	2700		098	161	099	162	55	
7	2700	115	1R0	1S0	1R4	1S4	55	80
	3200		1R1	1S1	1R5	1S5	66	
8	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.

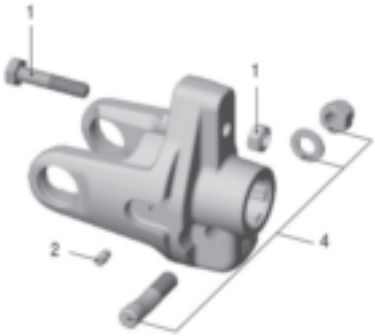
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side. All rotating parts must be guarded.

Shear bolt torque limiters LB

LB codes as spare parts

	Setting	S				
	Nm	1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	
1	650	6060B0304R	6060B3703R	- -	- -	M6x40 Cl. 8.8
	700	6060B0302R	6060B3702R	- -	- -	M6x40 Cl. 8.8
2	950	6060C0302R	6060C3702R	- -	- -	M6x40 Cl. 8.8
	1050	6060C0308R	6060C3704R	- -	- -	M8x45 Cl. 8.8
43	1400	6060E0303R	6060E3704R	- -	- -	M8x45 Cl. 8.8
	1700	6060E0302R	6060E3702R	- -	- -	M8x45 Cl. 8.8
4	1400	6060E0303R	6060E3704R	- -	- -	M8x45 Cl. 8.8
	1700	6060E0302R	6060E3702R	- -	- -	M8x45 Cl. 8.8
	2000	6060E0309R	6060E3711R	- -	- -	M10x50 Cl. 8.8
5	2100	6060G0319R	6060G3710R	6060G0408R	6060G3803R	M8x45 Cl 8.8
	2400	6060G0304R	6060G3704R	6060G0404R	6060G3804R	M10x50 Cl. 8.8
6	2400	6060H0306R	6060H3707R	6060H0404R	6060H3807R	M10x50 Cl. 8.8
	2700	6060H0302R	6060H3702R	6060H0402R	6060H3802R	M10x50 Cl. 8.8
7	2700	6060L0303R	6060L3703R	6060L0404R	6060L3807R	M10x50 Cl. 8.8
	3200	6060L0305R	6060L3704R	6060L0407R	6060L3808R	M10x50 Cl. 8.8
8	3000	6060M0306R	6060M3705R	6060M0405R	6060M3811R	M10x50 Cl. 8.8
	3500	6060M0307R	6060M3703R	6060M0407R	6060M3809R	M12x55 Cl. 8.8

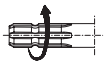
Spare part code



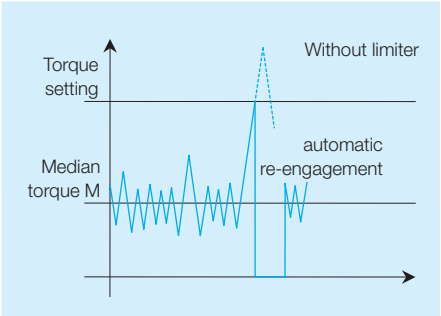
Ref.	Size	Spare part code	Description	Technical data
1		432000002R05 432000047R05 432000053R05 432000124R05	Bolt	M6x40 Cl. 8.8 M8x45 Cl. 8.8 M10x50 Cl. 8.8 M12x55 Cl. 8.8
2		348017000R20	Grease fitting	
3		403000001R10	Push-pin kit	1 3/8" Z6 - Z21
4		408000048R02 408000052R02	Taper pin	1 3/8" Z6 - Z21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

Automatic torque limiter LR

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.



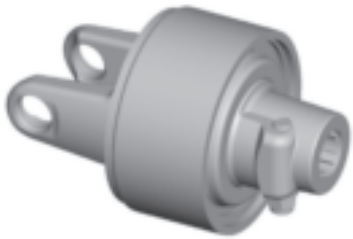
Special versions with the opposite direction of rotation can be supplied upon request.
LR torque limiters are lubricated with NLGI #2 molybdenum disulphide grease during assembly. No additional lubrication is required for the service life of the unit.
The torque setting can be easily reset by substitution of different spring pack.



LR torque limiters have taper pin attachment to the PTO.

⚠ 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



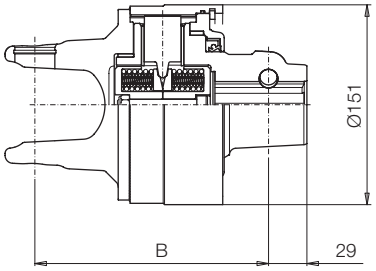
Standard settings (Nm)

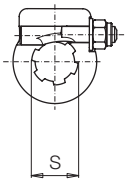
	1	2	43	4	5	6	7	8
LR23 D=151 mm 3 cams				*1200 1500 1700	*1500 1700 1900 2100	*2100		
LR24 D=151 mm 4 cams						2600 2900	*2500 3000	*2500 3000
LR35 D=176 mm 5 cams								3500

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

Automatic torque limiter LR

LR23





	Setting	B (mm)			
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
4	*1200	172	172	- -	- -
	1500				
	1700				
5	*1500	177	177	- -	- -
	1700				
	1900				
	2100				
6	*2100	184	184	- -	- -

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

Driveline codes LR23

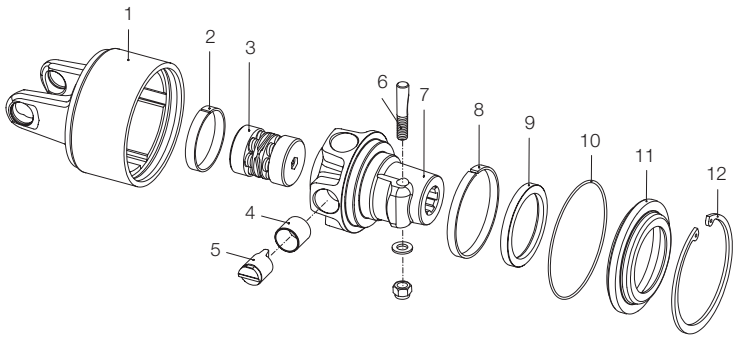
	Setting				
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
	1200	00B	06B	- -	- -
	1500	02B	08B	- -	- -
	1700	17A	22A	- -	- -
	1900	03B	09B	- -	- -
	2100	19A	24A	- -	- -

LR23 codes as spare parts

	Setting				
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
4	*1200	6WE148003R	6WE148037R	- -	- -
	1500	6WE154003R	6WE154037R	- -	- -
	1700	6WE157003R	6WE157037R	- -	- -
5	*1500	6WG154003R	6WG154037R	- -	- -
	1700	6WG157003R	6WG157037R	- -	- -
	1900	6WG159003R	6WG159037R	- -	- -
	2100	6WG161003R	6WG161037R	- -	- -
6	*2100	6WH161003R	6WH161037R	- -	- -

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

LR23

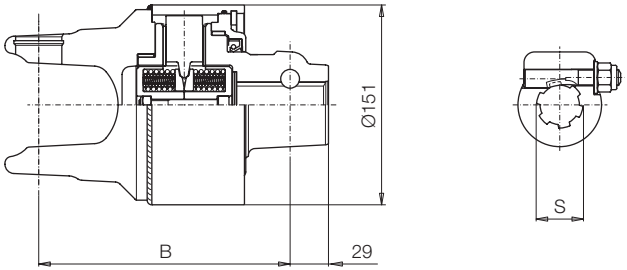


Ref.	Size	Spare part code	Description	Technical data
1	4 5 6	4310E1151 4310G1151 431061151	Outer housing + yoke	
2		240000205R02	Bushing	
3		421154801R 421155401R 421155701R 421155901R 421156101R	Spring pack	1200 Nm 1500 Nm 1700 Nm 1900 Nm 2100 Nm
4		258000100R05	Bushing	
5		250000101R05	Cam	
6		408000047R02	Taper pin	1 3/8" Z6 - Z21
7		515150301 515153701	Hub with taper pin and bushings	1 3/8" Z6 1 3/8" Z21
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

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



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
6	2600 2900	184	184	184	184
7	*2500 3000	184	184	184	184
8	*2500 3000	192	192	192	192

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

Driveline codes LR24

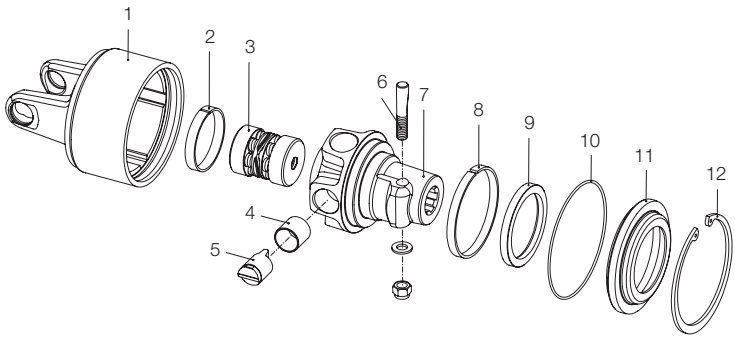
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
2500	26A	30A	34A	38A
2600	27A	31A	35A	39A
2900	28A	32A	36A	40A
3000	29A	33A	37A	41A

LR24 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
6	2600 2900	6WH266003R 6WH269003R	6WH266037R 6WH269037R	6WH266004R 6WH269004R	6WH266038R 6WH269038R
7	*2500 3000	6WL265003R 6WL270003R	6WL265037R 6WL270037R	6WL265004R 6WL270004R	6WL265038R 6WL270038R
8	*2500 3000	6WM265003R 6WM270003R	6WM265037R 6WM270037R	6WM265004R 6WM270004R	6WM265038R 6WM270038R

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

LR24

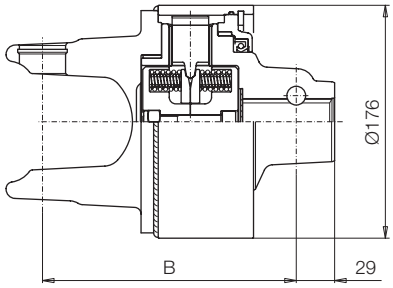


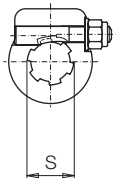
Ref.	Size	Spare part code	Description	Technical data
1	6 7 8	431062152 4310L2152 431082152	Outer housing + yoke	
2		240000205R02	Bushing	
3		421166502R 421166601R 421166902R 421167001R	Spring pack	2500 Nm 2600 Nm 2900 Nm 3000 Nm
4		258000100R05	Bushing	
5		250000108R05	Cam	
6		408000047R02 408000052R02	Taper pin	1 3/8" Z6 - Z21 1 3/4" Z6 - Z20
7		515160301 515163701 515160401 515163801	Hub with taper pin and bushing	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

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

LR35





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

Driveline codes LR35

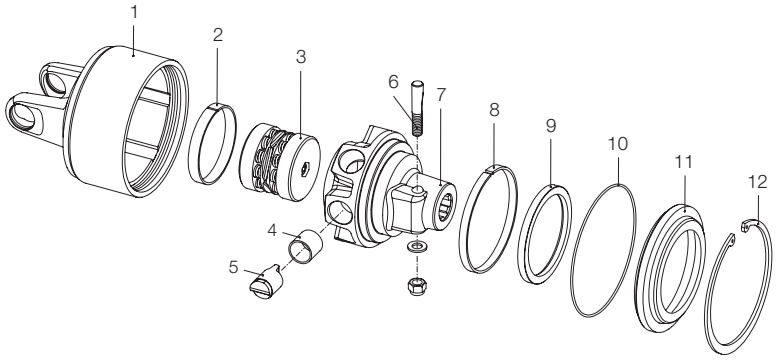
	Setting				
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
	3500	43A	48A	53A	58A

LR35 codes as spare parts

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

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

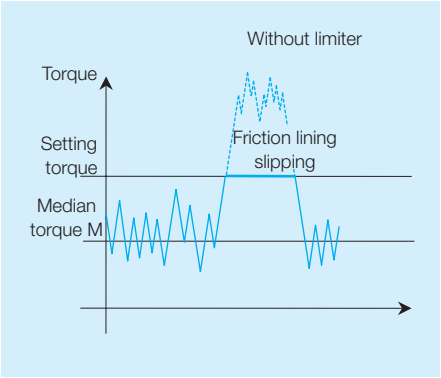
LR35



Ref.	Size	Spare part code	Description	Technical data
1	8	431084151	Outer housing + yoke	
2		240000711R02	Bushing	
3		421188101R	Spring pack	3500 Nm
4		258000100R05	Bushing	
5		250000101R05	Cam	
6		408000047R02 408000052R02	Taper pin	1 3/8" Z6 - Z21 1 3/4" Z6 - Z20
7		515180301 515183701 515180401 515183801	Hub with taper pin and bushing	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

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

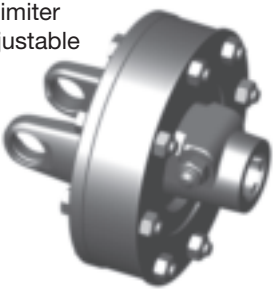
Friction torque limiters, commonly referred to as friction clutches, are devices used to limit torque during overloads.
During operation, the plates of the torque limiter slip against friction linings, transmitting torque at the clutch setting.
The friction clutch is effective in limiting possible overloads 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).
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

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).

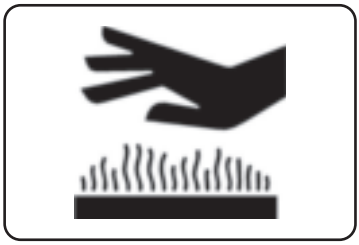
After the setting has been chosen in accordance with the conditions of the application (median torque M, torque limit of driveline), one must select the proper type of friction clutch in regards to diameter and number of plates or friction linings.

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.

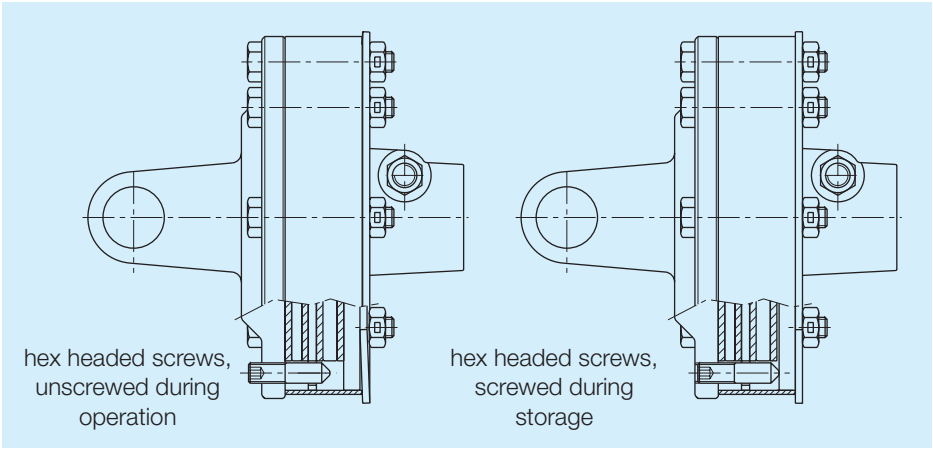
The screws are only threaded on a portion of their body, so they are captured in the clutch and can be removed only upon disassembly of the clutch.

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.

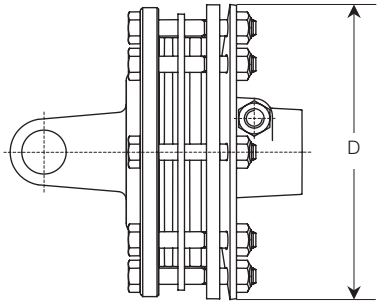
To check proper function of a friction clutch with the Release System, the four socket screws are turned all the way in. Start the PTO at low sped so the clutch will slip for two or three seconds (longer slipping may cause damage). If the clutch will not slip after two or three attempts, disassemble 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.



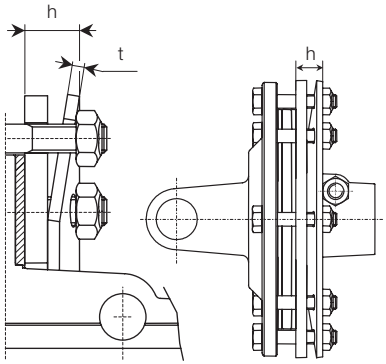
FV friction clutches are equipped with special Belleville springs, designed to apply pressure that varies with the amount of compression. Five models of FV friction clutches are available, with different diameters and number of friction linings.
All versions are available with treated hubs and driving 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)	1	2	43	4	5	6	7	8
FV22 D = 155 mm 2 plates	*400 500	*500 600	*600 800	800				
FV32 D = 180 mm 2 plates				*900 1000	900 1000 *1100			
FV42 D = 202 mm 2 plates					1200	*1200 1350 1450	1350 *1450 1600 1800	
FV34 D = 180 mm 4 plates					1200	*1200 1350 1450	1350 *1450 1600 1800	*1800 2000
FV44 D = 202 mm 4 plates							1800	*1800 2000 2200

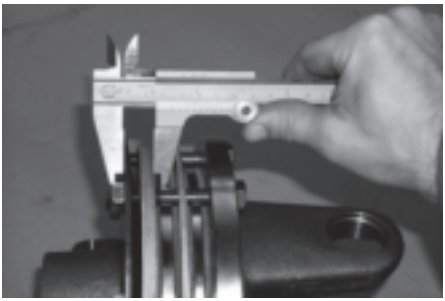
Friction torque limiters FV

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 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.

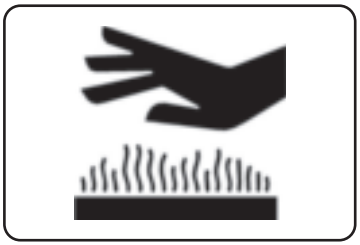
The compression of the Belleville springs used on FV friction clutches must be adjusted to compensate for wear of the friction linings and to maintain the desired setting.



⚠ 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.



FV22 Friction clutches
2 plates, diameter 155 mm

Spring code	t mm	Setting Nm	h mm	
367005850	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	
367008860	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	
367008860	3.75	1200	18.0	
		1600	17.5	
		2000	16.5	

FV42 Friction clutches
2 plates, diameter 202 mm

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

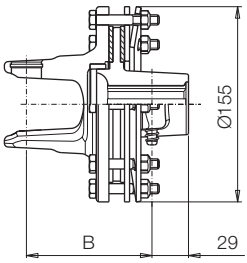
FV44 Friction clutches
4 plates, diameter 202 mm

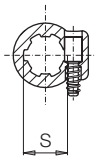
Spring code	t mm	Setting Nm	h mm	
367009870	4.25	1800	19.0	
		2200	18.6	

Friction torque limiters FV

FV22

adjustable
setting



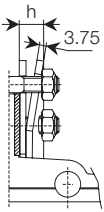


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1	*400	92	92	- -	- -
	500				
2	*500	100	100	- -	- -
	600				
43	*600	101	101	- -	- -
	800				
4	800	101	101	- -	- -

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FV22

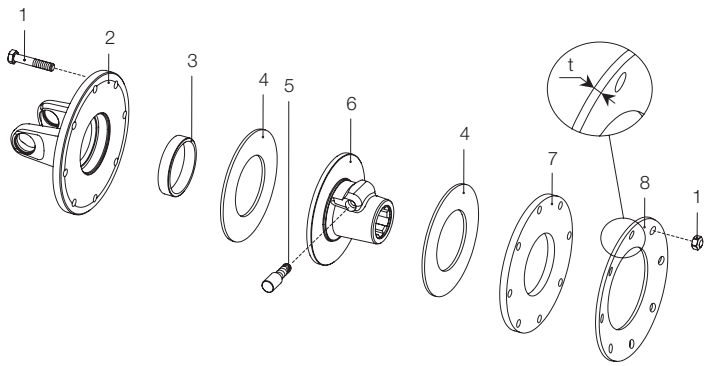
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
400	N06	N09	- -	- -
500	N00	N03	- -	- -
600	N07	N10	- -	- -
800	N08	N11	- -	- -



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
1	*400	661B24103R	661B24137R	- -	- -	13.5
	500	661B28103R	661B28137R	- -	- -	
2	*500	661C28103R	661C28137R	- -	- -	
	600	661C32103R	661C32137R	- -	- -	13.0
43	*600	661E32103R	661E32137R	- -	- -	13.0
	800	661E39103R	661E39137R	- -	- -	12.5
4	800	661E39103R	661E39137R	- -	- -	12.5

FV22
adjustable setting



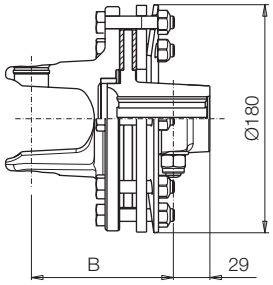
Ref.	Size	Spare part code	Description	Technical data
1		432000003R08	Bolt	M8 x 50 mm
2	1 2 43-4	2530B8503 2530C8503 2530E8503	Flange yoke	
3		258005320R02	Bushing	
4		247006151R08	Friction lining	D = 124 ; d = 67 mm
5		403000001R10	Push-pin kit	1 3/8” Z6 - Z21
6		513850307 513853707	Hub with push pin	1 3/8” Z6 1 3/8” Z21
7		2481A0001	Pressure plate	Sp. = 4 mm
8		367005850	Belleville spring	t = 3.75 mm

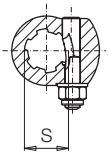
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

Friction torque limiters FV

FV32

adjustable setting



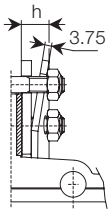


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
4	*900	113	113	- -	- -
	1000				
5	900	117	117	- -	- -
	1000				
	*1100				

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FV32

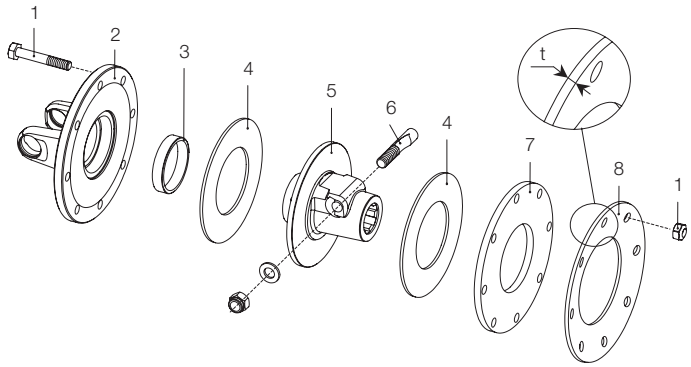
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
900	N14	N17	- -	- -
1000	N31	N33	- -	- -
1100	N12	N15	- -	- -



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
4	*900	661E41203R	661E41237R	- -	- -	17.5
	1000	661E44203R	661E44237R	- -	- -	17.0
5	900	661G41203R	661G41237R	- -	- -	17.5
	1000	661G44203R	661G44237R	- -	- -	17.0
	*1100	661G46203R	661G46237R	- -	- -	16.5

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



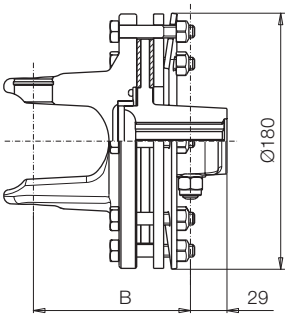
FV32
adjustable setting

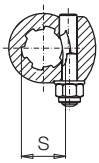
Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 55 mm
2	4 5	253048602 253058901	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	D = 141 ; d = 77 mm
5		515860305 515863705	Hub with push pin	1 3/8” Z6 1 3/8” Z21
6		408000047R02	Taper pin	1 3/8” Z6 -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

FV42
adjustable
setting

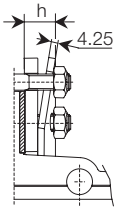




	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	117	117	122	122
6	*1200	125	125	130	130
	1350				
	1450				
7	1350	131	131	136	136
	*1450				
	1600				
	1800				

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FV42

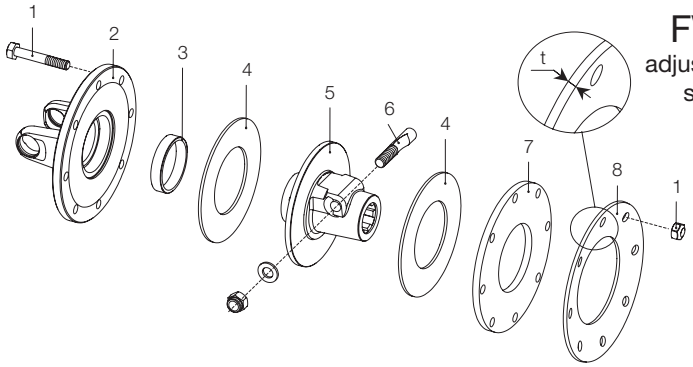


Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	N20	N23	N26	N29
1350	N35	N37	N0A	N0D
1450	N18	N21	N24	N27
1600	N36	N38	N0C	N0E
1800	N19	N22	N25	N28

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
5	1200	661G48403R	661G48437R	661G48404R	661G48438R	18.5
6	*1200	661H48403R	661H48437R	661H48404R	661H48438R	18.5
	1350	661H51403R	661H51437R	661H51404R	661H51438R	
	1450	661H53403R	661H53437R	661H53404R	661H53438R	18.0
7	1350	661L51403R	661L51437R	661L51404R	661L51438R	
	*1450	661L53403R	661L53437R	661L53404R	661L53438R	18.0
	1600	661L56403R	661L56437R	661L56404R	661L56438R	
	1800	661L58403R	661L58437R	661L58404R	661L58438R	17.0

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



FV42
adjustable setting

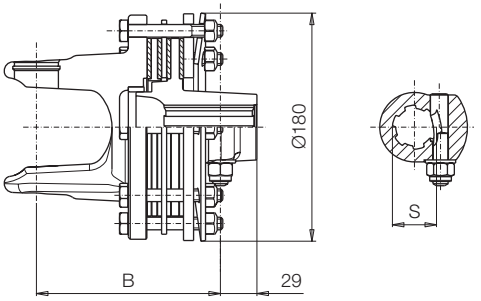
Ref.	Size	Spare part code	Description	Technical data
1		432000008R08	Bolt	M10 x 60 mm
2	5 6 7	253058701 253069001 253078702	Flange yoke	
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		515870305 515873705 515870405 515873805	Hub with push pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
6		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
7		248870007	Pressure plate	Sp. = 8 mm
8		367009870	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

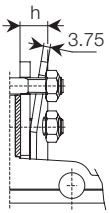


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	133	133	138	138
6	*1200	140	140	145	145
	1350				
	1450				
7	1350	146	146	151	151
	*1450				
	1600				
	1800				
8	*1800	148	148	153	153
	2000				

*Maximum recommended settings for 1000 min^{-1} velocity.

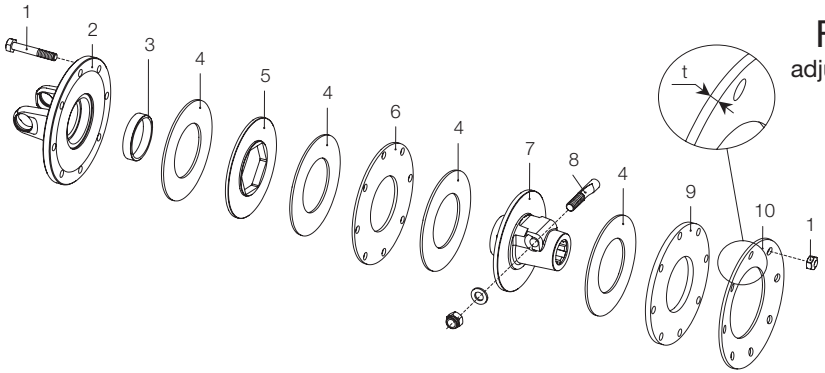
Driveline codes FV34

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
5	1200	661G48303R	661G48337R	661G48304R	661G48338R	18.0
6	*1200	661H48303R	661H48337R	661H48304R	661H48338R	
	1350	661H51303R	661H51337R	661H51304R	661H51338R	
	1450	661H53303R	661H53337R	661H53304R	661H53338R	
7	1350	661L51303R	661L51337R	661L51304R	661L51338R	
	*1450	661L53303R	661L53337R	661L53304R	661L53338R	
	1600	661L56303R	661L56337R	661L56304R	661L56338R	17.5
	1800	661L58303R	661L58337R	661L58304R	661L58338R	
8	*1800	661M58303R	661M58337R	661M58304R	661M58338R	
	2000	661M60303R	661M60337R	661M60304R	661M60338R	16.5



FV34
adjustable setting

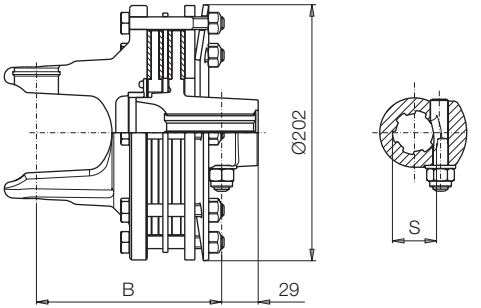
Ref.	Size	Spare part code	Description	Technical data
1		432000114R08	Bolt	M10 x 75 mm
2	5 6 7 8	253058901 253068903 253078601 253088903	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	
5		248727702	Driving plate	D = 141 ; d = 77 mm
6		248860001	Inner plate	
7		515890305 515893705 515890405 515893805	Hub with push pin	Sp. = 4 mm 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		248860007	Pressure plate	Sp. = 8 mm
10		367008860	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

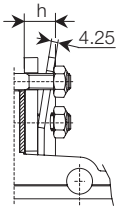
adjustable setting



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	147	147	152	152
8	*1800	149	149	154	154
	2000				
	2200				

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FV44

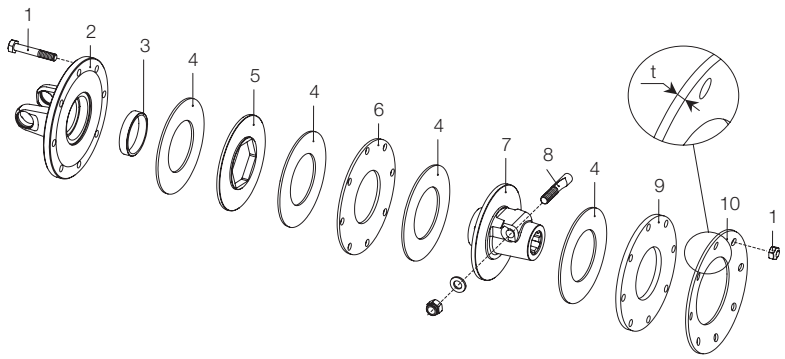


Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	N39	N72	N77	N82
2000	N71	N76	N81	N86
2200	N40	N73	N78	N83

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
7	1800	661L58503R	661L58537R	661L58504R	661L58538R	19.0
8	*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

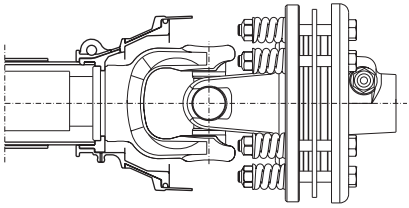
Ref.	Size	Spare part code	Description	Technical data
1		432000114R08	Bolt	M10 x 75 mm
2	7 8	253078702 253089001	Flange yoke	
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		248737702	Driving plate	
6		248870011	Inner plate	Sp. = 4 mm
7		515900305 515903705 515900405 515903805	Hub with push 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		248870007	Pressure plate	Sp. = 8 mm
10		367009870	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 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 (*).

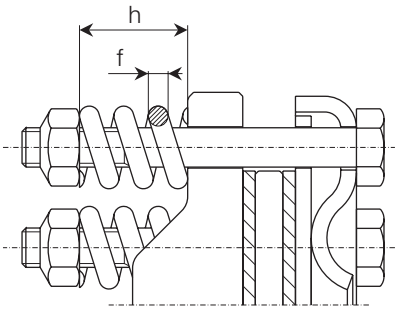
Drivelines with FFV clutches are not EU marked because the shield does not cover the entire inner yoke as required by Machinery Directive 98/37/CEE. An implement with an FFV clutch on the primary driveline must have a shield that overlaps the driveline guard by at least 50 mm overlap as specified by EN regulation 1553 and ANSI/ASAE standard S318.15.



Standard settings (Nm)	1	2	43	4	5	6	7	8
FFV22 D = 155 mm 2 plates	*400 500	*500 600	*600 800	800				
FFV32 D = 180 mm 2 plates				*900 1000	900 1000 *1100			
FFV42 D = 202 mm 2 plates					1200	*1200 1350 1450	1350 *1450 1600 1800	
FFV34 D = 180 mm 4 plates					1200	*1200 1350 1450	1350 *1450 1600 1800	*1800 2000
FFV44 D = 202 mm 4 plates							1800	*1800 2000 2200

Friction torque limiters FFV

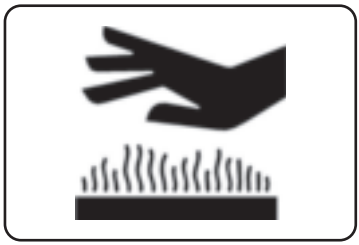
FFV friction clutches have an adjustable torque setting. The torque setting varies with different compression (h) of the springs.



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.

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	

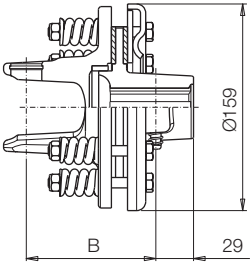
FFV44 Friction clutches
4 plates, diameter 202 mm

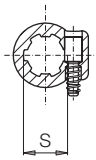
Spring code	f mm	Setting Nm	h mm	
351013370	7	1800	30.0	
		2200	29.6	

Friction torque limiters FFV

FFV22

adjustable
setting



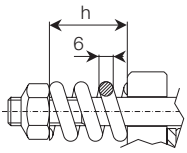


	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1	*400	92	92	- -	- -
	500				
2	*500	100	100	- -	- -
	600				
43	*600	101	101		
	800				
4	800	101	101		

*Maximum recommended settings for 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	- -	- -

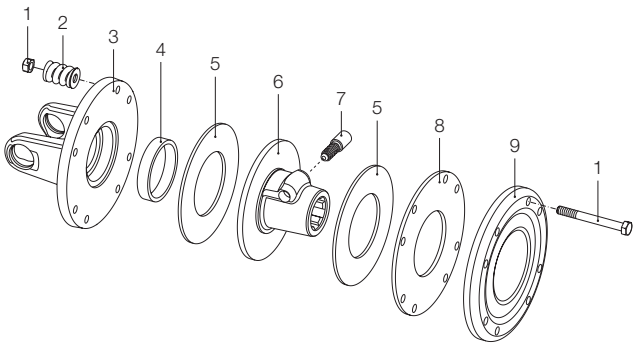


FFV22 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
1	*400	635B24103R	635B24137R	- -	- -	30.0
	500	635B28103R	635B28137R	- -	- -	
2	*500	635C28103R	635C28137R	- -	- -	
	600	635C32103R	635C32137R	- -	- -	29.5
43	*600	635E32103R	635E32137R	- -	- -	29.5
	800	635E39103R	635E39137R	- -	- -	29.0
4	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

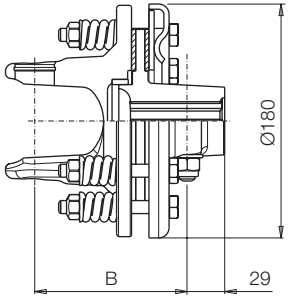


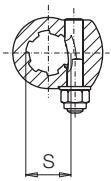
Ref.	Size	Spare part code	Description	Technical data
1		432000031R08	Bolt	M8 x 75 mm
2		351015001R08	Coil springs	f = 6 mm
3	1 2 43-4	2530B1A05 2530C1A05 2530E1A05	Flange yoke	
4		258005320R02	Bushing	D = 124 ; d = 67 mm
5		247006151R08	Friction linings	1 3/8” Z6 - Z21
6		403000001R10	Push-pin kit	1 3/8” Z6 1 3/8” Z21
7		513850307 513853707	Hub with push pin	Sp. = 4 mm
8		2481A0007	Inner plate	
9		2481A0006	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

FFV32
adjustable
setting



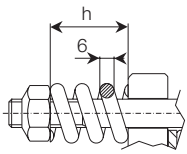


	Setting Nm	S = 1 3/8" Z6	B (mm) 1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
4	*900	113	113	- -	- -
	1000				
5	900				
	1000	117	117	- -	- -
	*1100				

*Maximum recommended settings for 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	- -	- -

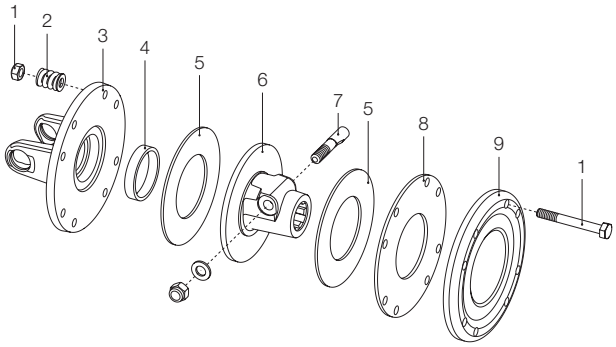


FFV32 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
4	*900	635E41203R	635E41237R	- -	- -	28.8
	1000	635E44203R	635E44237R	- -	- -	28.2
5	900	635G41203R	635G41237R	- -	- -	28.8
	1000	635G44203R	635G44237R	- -	- -	28.5
	*1100	635G46203R	635G46237R	- -	- -	28.2

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

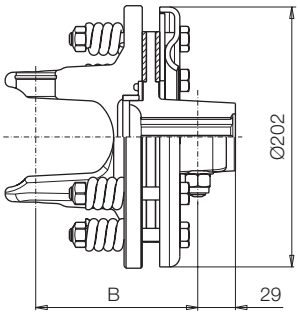
FFV32
adjustable setting

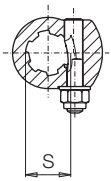


Ref.	Size	Spare part code	Description	Technical data
1		432000006R08	Bolt	M10 x 85 mm
2		351022370R08	Coil springs	f = 6 mm
3	4 5	2530E1C05 2530G1C05	Flange yoke	
4		258005320R02	Bushing	
5		247006251R08	Friction lining	D = 141 ; d = 77 mm
6		515860305 515863705	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
7		408000047R02	Taper pin	1 3/8” Z6 - Z21
8		2481C0007	Inner plate	Sp. = 4 mm
9		248220007	Pressure plate	

Friction torque limiters FFV

FFV42
adjustable
setting



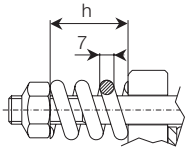


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	117	117	122	122
6	*1200	125	125	130	130
	1350				
	1450				
7	1350	131	131	136	136
	*1450				
	1600				
	1800				

*Maximum recommended settings for 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

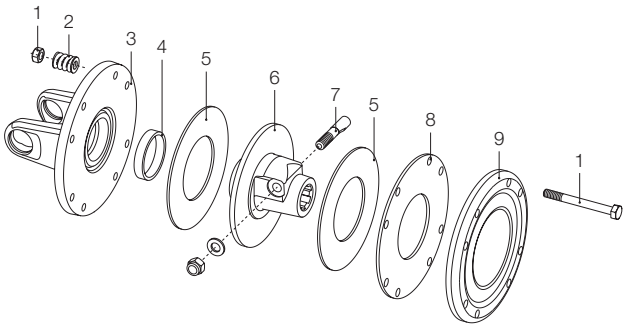


FFV42 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
5	1200	635G48403R	635G48437R	635G48404R	635G48438R	29.5
6	*1200	635H48403R	635H48437R	635H48404R	635H48438R	29.5
	1350	635H51403R	635H51437R	635H51404R	635H51438R	
	1450	635H53403R	635H53437R	635H53404R	635H53438R	29.2
7	1350	635L51403R	635L51437R	635L51404R	635L51438R	
	*1450	635L53403R	635L53437R	635L53404R	635L53438R	29.2
	1600	635L56403R	635L56437R	635L56404R	635L56438R	
	1800	635L58403R	635L58437R	635L58404R	635L58438R	28.8

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

FFV42
adjustable setting

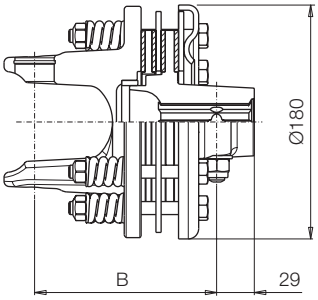


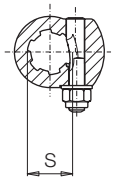
Ref.	Size	Spare part code	Description	Technical data
1		432000006R08	Bolt	M10 x 85 mm
2		351013370R08	Coil springs	f = 7 mm
3	5 6 7	2530G1E05 2530H1E05 2530L1E05	Flange yoke	
4		258005320R02	Bushing	
5		247006351R08	Friction lining	D = 162 ; d = 85 mm
6		515870305 515873705 515870405 515873805	Hub with 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		2481E0007	Inner plate	Sp. = 4 mm
9		248230006	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



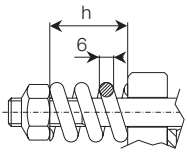


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	133	133	138	138
6	*1200	140	140	145	145
	1350				
	1450				
7	1350	146	146	151	151
	*1450				
	1600				
	1800				
8	*1800	148	148	153	153
	2000				

*Maximum recommended settings for 1000 min^{-1} velocity

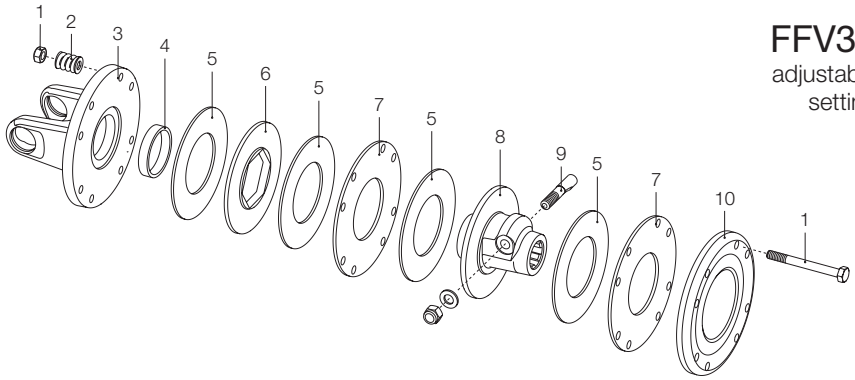
Driveline codes FFV34

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
5	1200	635G48303R	635G48337R	635G48304R	635G48338R	29.5
6	*1200	635H48303R	635H48337R	635H48304R	635H48338R	29.5
	1350	635H51303R	635H51337R	635H51304R	635H51338R	
	1450	635H53303R	635H53337R	635H53304R	635H53338R	29.0
7	1350	635L51303R	635L51337R	635L51304R	635L51338R	
	*1450	635L53303R	635L53337R	635L53304R	635L53338R	29.0
	1600	635L56303R	635L56337R	635L56304R	635L56338R	
	1800	635L58303R	635L58337R	635L58304R	635L58338R	28.5
8	*1800	635M58303R	635M58337R	635M58304R	635M58338R	28.5
	2000	635M60303R	635M60337R	635M60304R	635M60338R	



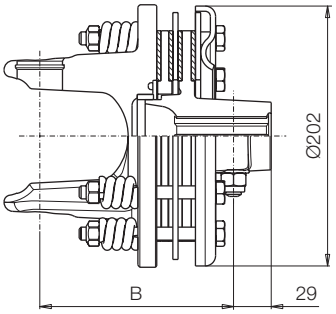
FFV34
adjustable setting

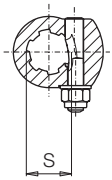
Ref.	Size	Spare part code	Description	Technical data
1		432000007R08	Bolt	M10 x 100 mm
2		351022370R08	Coil springs	f = 6 mm
3	5 6 7 8	2530G1C05 2530H1C05 2530L1C05 2530M1C05	Flange yoke	
4		258005320R02	Bushing	
5		247006251R08	Friction lining	D = 141 ; d = 77 mm
6		248727702	Driving disc	
7		2481C0007	Inner plate	Sp. = 4 mm
8		515890305 515893705 515890405 515893805	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		248220007	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



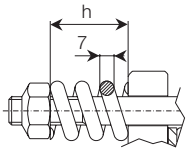


	Setting	B (mm)			
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	147	147	152	152
8	*1800	149	149	154	154
	2000				
	2200				

*Maximum recommended settings for 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

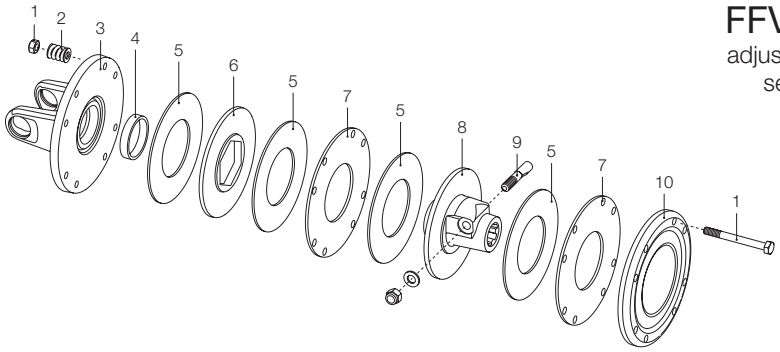


FFV44 codes as spare parts

	Setting					h
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	mm
7	1800	635L58503R	635L58537R	635L58504R	635L58538R	30.0
8	*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.

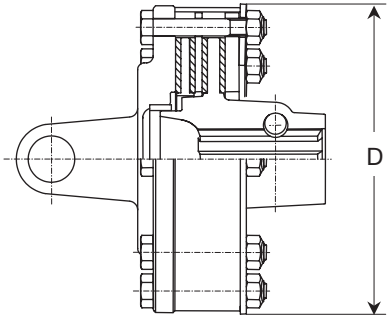
FFV44
adjustable setting



Ref.	Size	Spare part code	Description	Technical data
1		432000122R08	Bolt	M10 x 105 mm
2		351013370R08	Coil springs	f = 7 mm
3	7 8	2530L1E05 2530M1E05	Flange yoke	
4		258005320R02	Bushing	
5		247006351R08	Friction lining	D = 162 ; d = 85 mm
6		248737702	Driving disc	
7		2481E0007	Inner plate	Sp. = 4 mm
8		515900305 515903705 515900405 515903805	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		248230006	Pressure plate	

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

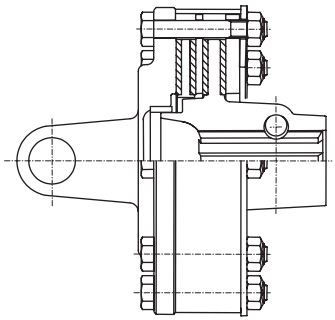
FT friction clutches are equipped with Belleville springs, designed to apply nearly constant pressure, self-compensating for friction lining wear. Therefore the setting is maintained without adjustment over the life of the linings.
FT friction clutches are non-adjustable. Torque is determined by the 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)	1	2	43	4	5	6	7	8
FT22 D = 155 mm 2 plates	*400 500	*500 600	*600 800	800				
FT32 D = 180 mm 2 plates				*900 1000	900 1000 *1100			
FT42 D = 202 mm 2 plates					1200	*1200 1450	*1450 1800	
FT34 D = 180 mm 4 plates					1200	*1200 1450	*1450 1800	*1800
FT44 D = 202 mm 4 plates							1800	*1800 2200

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

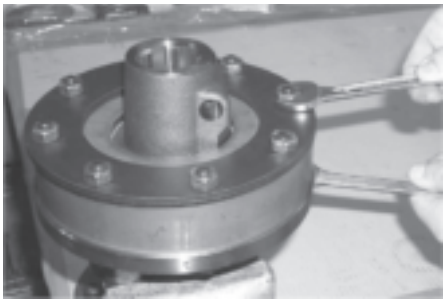
FT34 - FT34R friction clutches

Setting Nm	Spring code
1200	367FT340A
1450	367FT340C
1800	367FT340D

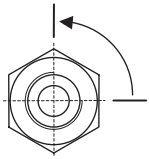
FT44 - FT44R friction clutches

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.

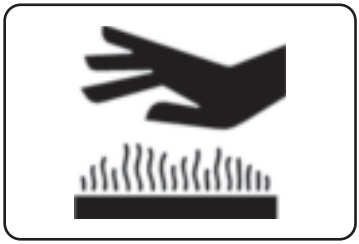


To do this properly, tighten the bolts until the Belleville spring contacts the metal band. Then back off each nut 1/4 turn.

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

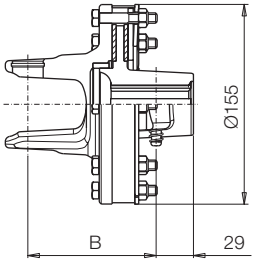
⚠ To avoid excessive wear to the implement, driveline or tractor Bondioli & Pavesi recommends that the setting not be changed.

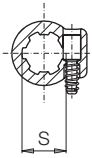
⚠ Friction clutches may become hot during use. **Do not touch!**
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.



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
1	*400	92	92	- -	- -
	500				
2	*500	100	100	- -	- -
	600				
43	*600	101	101	- -	- -
	800				
4	800	101	101	- -	- -

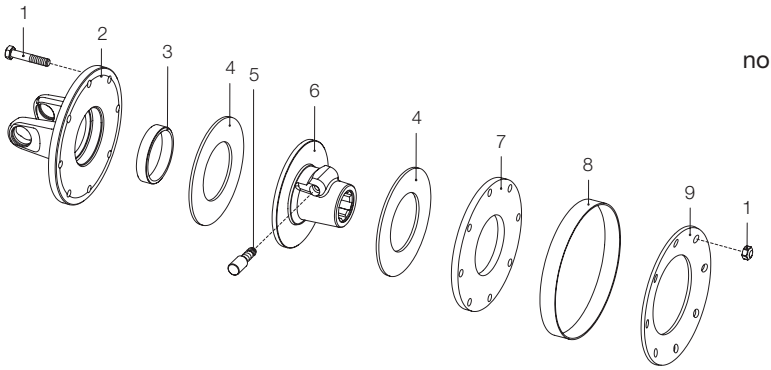
*Maximum recommended settings for 1000 min^{-1} velocity.

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
1	*400	663B24103R	663B24137R	- -	- -
	500	663B28103R	663B28137R	- -	- -
2	*500	663C28103R	663C28137R	- -	- -
	600	663C32103R	663C32137R	- -	- -
43	*600	663E32103R	663E32137R	- -	- -
	800	663E39103R	663E39137R	- -	- -
4	800	663E39103R	663E39137R	- -	- -



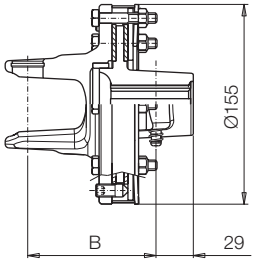
FT22
non-adjustable setting

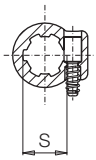
Ref.	Size	Spare part code	Description	Technical data
1		432000047R08	Bolt	M8 x 45 mm
2	1 2 43-4	2530B8503 2530C8503 2530E8503	Flange yoke	
3		258005320R02	Bushing	
4		247006151R08	Friction lining	D = 124 ; d = 67 mm
5		403000001R10	Push-pin kit	1 3/8” Z6 - Z21
6		513850307 513853707	Hub with push pin	1 3/8” Z6 1 3/8” Z21
7		2481A0002	Pressure plate	Sp. = 4 mm
8		240001059	Adjustment band	
9		367FT220A 367FT220C 367FT220D 367FT220E	Belleville spring	400 Nm 500 Nm 600 Nm 800 Nm

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

Friction torque limiters FT

FT22R
non-adjustable setting





	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1	*400	92	92	- -	- -
	500				
2	*500	100	100	- -	- -
	600				
43	*600	101	101	- -	- -
	800				
4	800	101	101	- -	- -

*Maximum recommended settings for 1000 min^{-1} velocity.

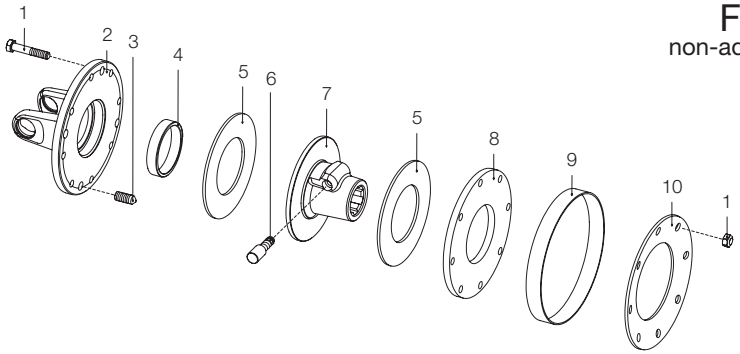
Driveline codes FT22R

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
1	*400	663B24A03R	663B24A37R	- -	- -
	500	663B28A03R	663B28A37R	- -	- -
2	*500	663C28A03R	663C28A37R	- -	- -
	600	663C32A03R	663C32A37R	- -	- -
43	*600	663E32A03R	663E32A37R	- -	- -
	800	663E39A03R	663E39A37R	- -	- -
4	800	663E39A03R	663E39A37R	- -	- -

FT22R
non-adjustable setting

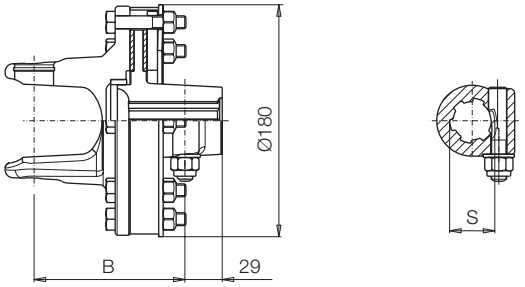


Ref.	Size	Spare part code	Description	Technical data
1		432000047R08	Bolt	M8 x 45 mm
2	1 2 43-4	2530B8504 2530C8504 2530E8504	Flange yoke	
3		310001300R04	Special socket head set screw	M10 x 25 mm
4		258005320R02	Bushing	
5		247006151R08	Friction lining	D = 124 ; d = 67 mm
6		403000001R10	Push-pin kit	1 3/8" Z6 - Z21
7		513850307 513853707	Hub with push pin	1 3/8" Z6 1 3/8" Z21
8		2481A0002	Pressure plate	Sp. = 4 mm
9		240001059	Adjustment band	
10		367FT220A 367FT220C 367FT220D 367FT220E	Belleville spring	400 Nm 500 Nm 600 Nm 800 Nm

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

Friction torque limiters FT

FT32
non-adjustable setting



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
4	*900	113	113	- -	- -
	1000				
5	900	117	117	- -	- -
	1000				
	*1100				

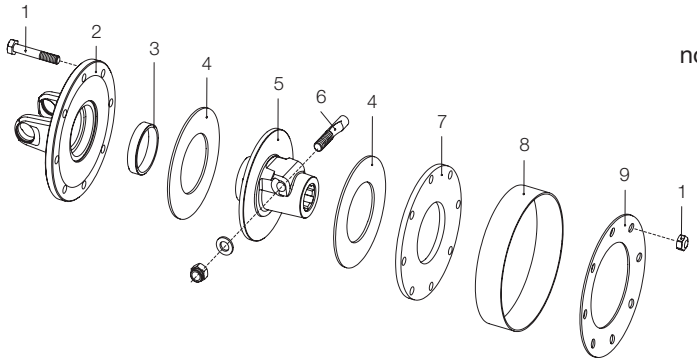
*Maximum recommended settings for 1000 min^{-1} velocity.

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
4	*900	663E41203R	663E41237R	- -	- -
	1000	663E44203R	663E44237R	- -	- -
5	900	663G41203R	663G41237R	- -	- -
	1000	663G44203R	663G44237R	- -	- -
	*1100	663G46203R	663G46237R	- -	- -



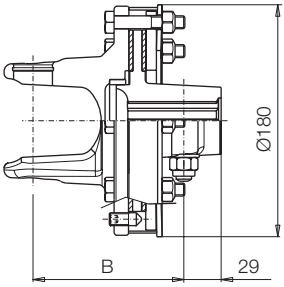
FT32
non-adjustable setting

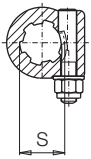
Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 55 mm
2	4 5	253048602 253058901	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	D = 141 ; d = 77 mm
5		515860305 515863705	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
6		408000047R02	Taper pin	1 3/8” Z6 - Z21
7		248860005	Pressure plate	Sp. = 8 mm
8		240000213	Adjustment band	
9		367FT320A 367FT320C 367FT320D	Belleville spring	900 Nm 1000 Nm 1100 Nm

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

Friction torque limiters FT

FT32R
non-adjustable setting





	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
4	*900	113	113	- -	- -
	1000				
5	900	117	117	- -	- -
	1000				
	*1100				

*Maximum recommended settings for 1000 min^{-1} velocity.

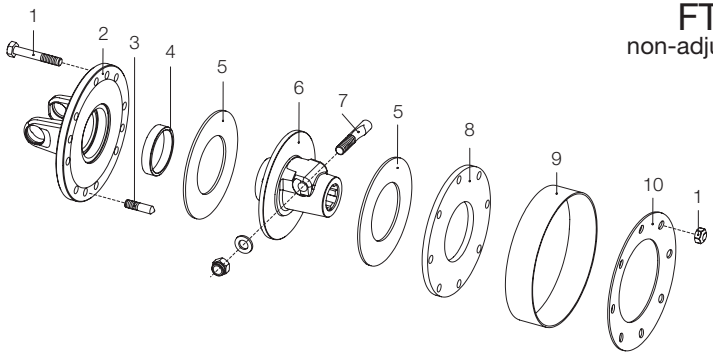
Driveline codes FT32R

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
4	*900	663E41C03R	663E41C37R	- -	- -
	1000	663E44C03R	663E44C37R	- -	- -
5	900	663G41C03R	663G41C37R	- -	- -
	1000	663G44C03R	663G44C37R	- -	- -
	*1100	663G46C03R	663G46C37R	- -	- -

FT32R
non-adjustable setting

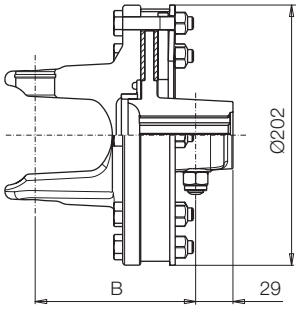


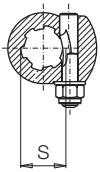
Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 55 mm
2	4 5	2530E8605 2530G8605	Flange yoke	
3		310001300R04	Special socket head set screw	M10 x 25 mm
4		258005320R02	Bushing	
5		247006251R08	Friction lining	D = 141 ; d = 77 mm
6		515860305 515863705	Hub with taper pin	1 3/8" Z6 1 3/8" Z21
7		408000047R02	Taper pin	1 3/8" Z6 - Z21
8		248860005	Pressure plate	Sp. = 8 mm
9		240000213	Adjustment band	
10		367FT320A 367FT320C 367FT320D	Belleville spring	900 Nm 1000 Nm 1100 Nm

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

Friction torque limiters FT

FT42
non-adjustable setting





	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	117	117	122	122
6	*1200 1450	125	125	130	130
7	*1450 1800	131	131	136	136

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FT42

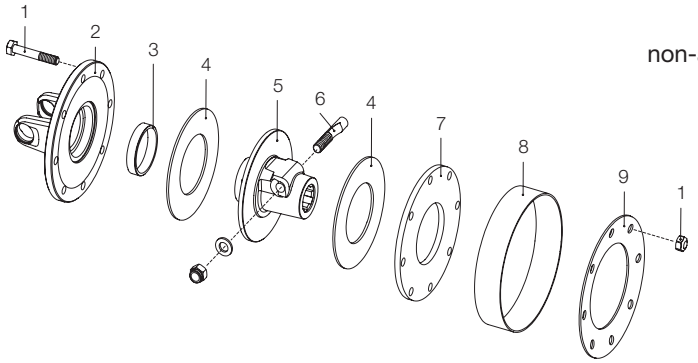
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	Q22	Q26	Q30	Q34
1450	Q23	Q27	Q31	Q35
1800	Q21	Q25	Q29	Q33

FT42 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	663G48403R	663G48437R	663G48404R	663G48438R
6	*1200	663H48403R	663H48437R	663H48404R	663H48438R
	1450	663H53403R	663H53437R	663H53404R	663H53438R
7	*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

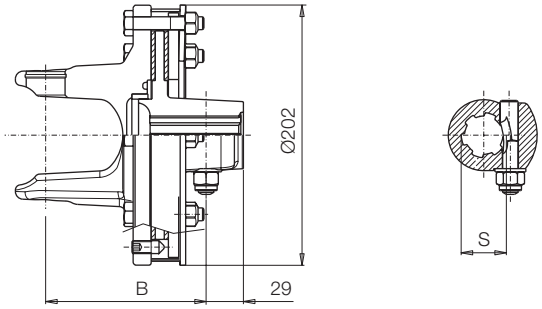


Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 55 mm
2	5 6 7	253058701 253069001 253078702	Flange yoke	
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		515870305 515873705 515870405 515873805	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4”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

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

Friction torque limiters FT

FT42R
non-adjustable setting



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	117	117	122	122
6	*1200 1450	125	125	130	130
7	*1450 1800	131	131	136	136

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FT42R

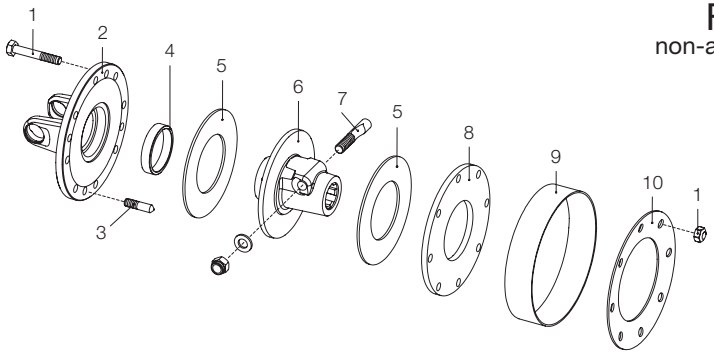
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	H22	H26	H30	H34
1450	H23	H27	H31	H35
1800	H21	H25	H29	H33

FT42R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	663G48F03R	663G48F37R	663G48F04R	663G48F38R
6	*1200	663H48F03R	663H48F37R	663H48F04R	663H48F38R
	1450	663H53F03R	663H53F37R	663H53F04R	663H53F38R
7	*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

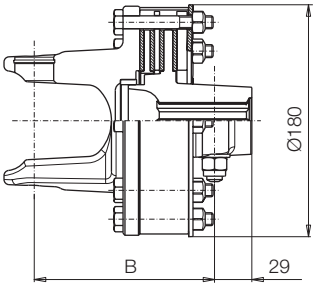


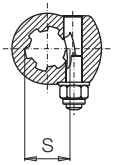
Ref.	Size	Spare part code	Description	Technical data
1		432000054R08	Bolt	M10 x 55 mm
2	5 6 7	2530G8705 2530H8705 2530L8705	Flange yoke	
3		310001300R04	Special socket head set screw	M10 x 25 mm
4		258005320R02	Bushing	
5		247006351R08	Friction lining	D = 162 ; d = 85 mm
6		515870305 515873705 515870405 515873805	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		248870005	Pressure plate	Sp. = 8 mm
9		240000214	Adjustment band	
10		367FT420A 367FT420C 367FT420D	Belleville spring	1200 Nm 1450 Nm 1800 Nm

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

Friction torque limiters FT

FT34
non-adjustable setting





	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	133	133	138	138
6	*1200 1450	140	140	145	145
7	*1450 1800	146	146	151	151

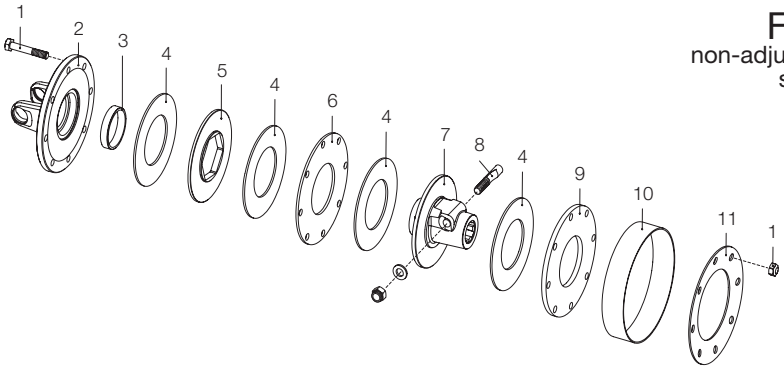
*Maximum recommended settings for 1000 min^{-1} velocity.

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
5	1200	663G48303R	663G48337R	663G48304R	663G48338R
6	*1200	663H48303R	663H48337R	663H48304R	663H48338R
	1450	663H53303R	663H53337R	663H53304R	663H53338R
7	*1450	663L53303R	663L53337R	663L53304R	663L53338R
	1800	663L58303R	663L58337R	663L58304R	663L58338R



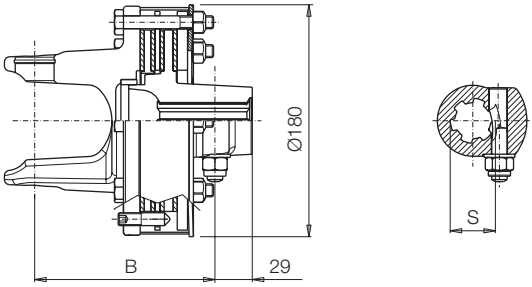
FT34
non-adjustable setting

Ref	Size	Spare part code	Description	Technical data
1		432000045R08	Bolt	M10 x 65 mm
2	5 6 7	253058901 253068903 253078601	Flange yoke	
3		258005320R02	Bushing	
4		247006251R08	Friction lining	D = 141 ; d = 77 mm
5		248727702	Driving disc	
6		248860001	Inner disc	Sp. = 4 mm
7		515890305 515893705 515890405 515893805	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		248860005	Pressure plate	Sp. = 8 mm
10		240000218	Adjustment band	
11		367FT340A 367FT340C 367FT340D	Belleville spring	1200 Nm 1450 Nm 1800 Nm

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

Friction torque limiters FT

FT34R
non-adjustable setting



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	133	133	138	138
6	*1200 1450	140	140	145	145
7	*1450 1800	146	146	151	151

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FT34R

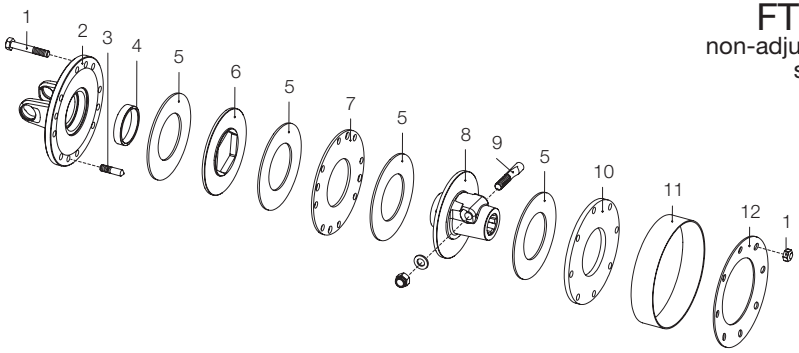
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	H51	H58	H65	H72
1450	H52	H59	H66	H73
1800	H54	H61	H68	H75

FT34R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	663G48E03R	663G48E37R	663G48E04R	663G48E38R
6	1200	663H48E03R	663H48E37R	663H48E04R	663H48E38R
	1450	663H53E03R	663H53E37R	663H53E04R	663H53E38R
7	1450	663L53E03R	663L53E37R	663L53E04R	663L53E38R
	1800	663L58E03R	663L58E37R	663L58E04R	663L58E38R

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

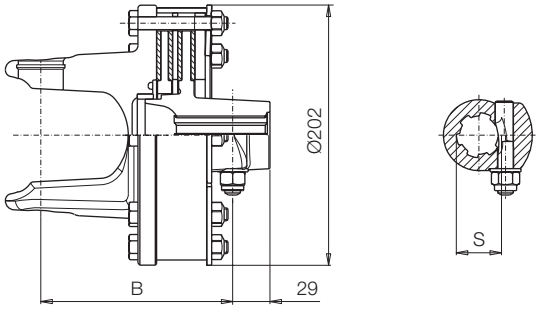


Ref	Size	Spare part code	Description	Technical data
1		432000045R08	Bolt	M10 x 65 mm
2	5 6 7	2530G8605 2530H8605 2530L8605	Flange yoke	
3		310001301R04	Special socket head set screw	M10 x 40 mm
4		258005320R02	Bushing	
5		247006251R08	Friction lining	D = 141 ; d = 77 mm
6		248727702	Driving disc	
7		248860006	Inner disc	Sp. = 4 mm
8		515890305 515893705 515890405 515893805	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		248860005	Pressure plate	Sp. = 8 mm
11		240000218	Adjustment band	
12		367FT340A 367FT340C 367FT340D	Belleville spring	1200 Nm 1450 Nm 1800 Nm

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

Friction torque limiters FT

FT44
non-adjustable setting



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	147	147	152	152
8	*1800 2200	149	149	154	154

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FT44

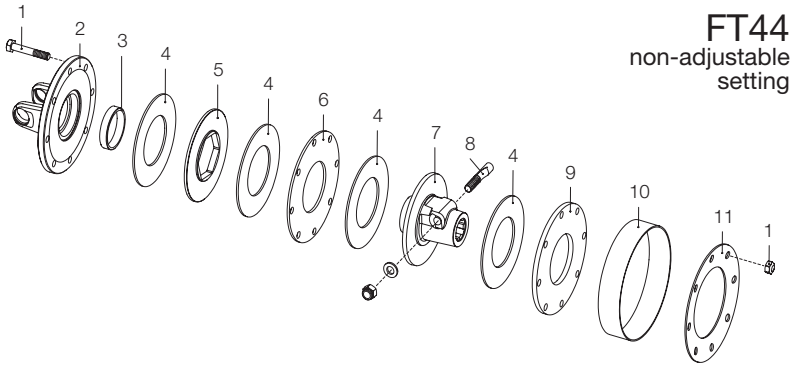
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	Q37	Q39	Q41	Q43
2200	Q38	Q40	Q42	Q44
2400	Q80	Q86	Q92	Q98
2600	Q76	Q82	Q88	Q94

FT44 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	663L58503R	663L58537R	663L58504R	663L58538R
8	*1800 2200	663M58503R 663M62503R	663M58537R 663M62537R	663M58504R 663M62504R	663M58538R 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

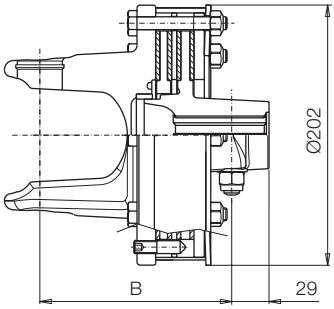


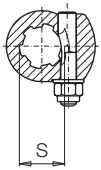
Ref	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M10 x 55 mm
2	7 8	253078702 253089001	Flange yoke	
3		258005320R02	Bushing	
4		247006351R08	Friction lining	D = 162 ; d = 85 mm
5		248737702	Driving disc	
6		248870011	Inner disc	Sp. = 4 mm
7		515900305 515903705 515900405 515903805	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		248870005	Pressure plate	Sp. = 8 mm
10		240000219	Adjustment band	
11		367FT440A 367FT440C 367FT440D 367FT440E	Belleville spring	1800 Nm 2200 Nm 2400 Nm 2600 Nm

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

Friction torque limiters FT

FT44R
non-adjustable setting





	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	147	147	152	152
8	*1800 2200	149	149	154	154

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FT44R

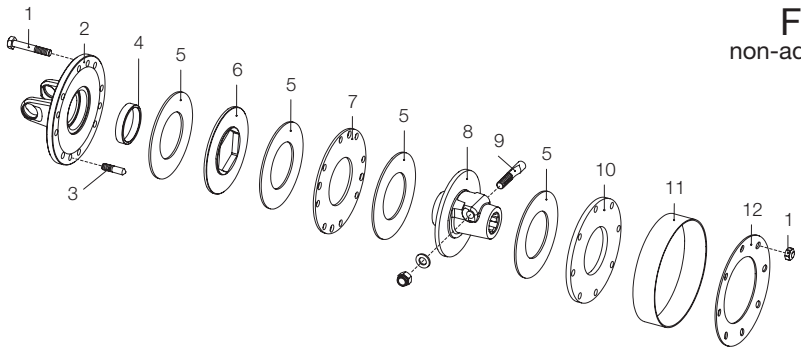
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	H37	H39	H41	H43
2200	H38	H40	H42	H44
2400	H80	H86	H92	H98
2600	H76	H82	H88	H94

FT44R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	663L58G03R	663L58G37R	663L58G04R	663L58G38R
8	*1800 2200	663M58G03R 663M62G03R	663M58G37R 663M62G37R	663M58G04R 663M62G04R	663M58G38R 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



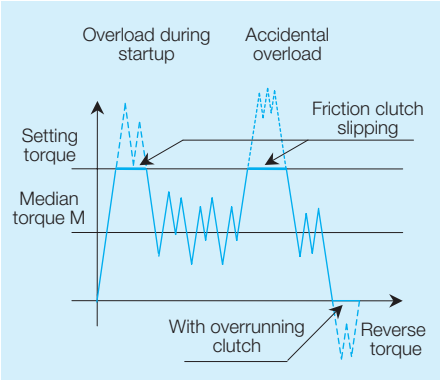
Ref	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M10 x 70 mm
2	7 8	2530L8705 2530M8705	Flange yoke	
3		310001301R04	Special socket head set screw	M10 x 40 mm
4		258005320R02	Bushing	
5		247006351R08	Friction lining	D = 162 ; d = 85 mm
6		248737702	Driving plate	
7		248870013	Inner plate	Sp. = 4 mm
8		515900305 515903705 515900405 515903805	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		248870005	Pressure plate	Sp. = 8 mm
11		240000219	Adjustment band	
12		367FT440A 367FT440C 367FT440D 367FT440E	Belleville spring	1800 Nm 2200 Nm 2400 Nm 2600 Nm

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

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 98/37/CEE.
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 very 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).

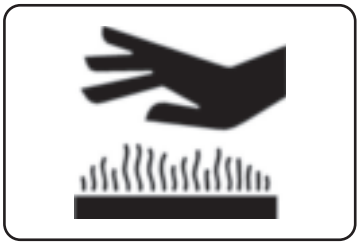
After the setting has been chosen in accordance with the conditions of the application (median torque M, torque limit of driveline), one must select the proper type of friction clutch in regards to diameter and number of plates or friction linings.

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.

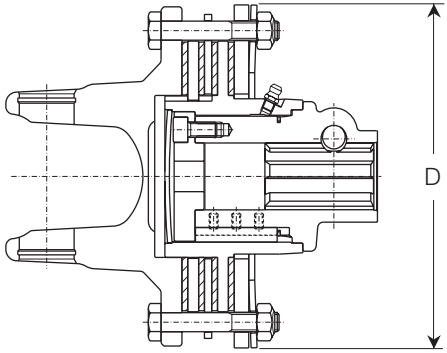
Combination friction torque limiters and overrunning clutches FNV

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

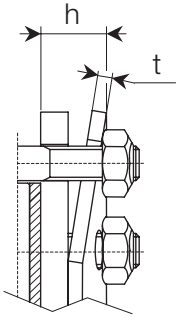
Standard settings (Nm)	1	2	43	4	5	6	7	8
FNV34 D = 180 mm 4 plates					1200	*1200 1350 1450	1350 *1450 1600 1800	*1800 2000
FNV44 D = 202 mm 4 plates							1800	*1800 2000 2200

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).

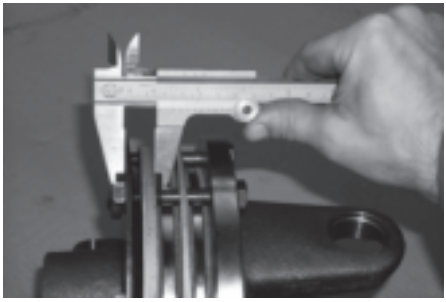


FNV34 Friction clutches
4 plates, diameter 180 mm

Spring code	t mm	Setting Nm	h mm	
367008860	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	
367009870	4.25	1800	19.0	
		2200	18.6	



In addition to the listed settings, intermediate settings may be obtained by tightening or loosening the bolts proportionately.

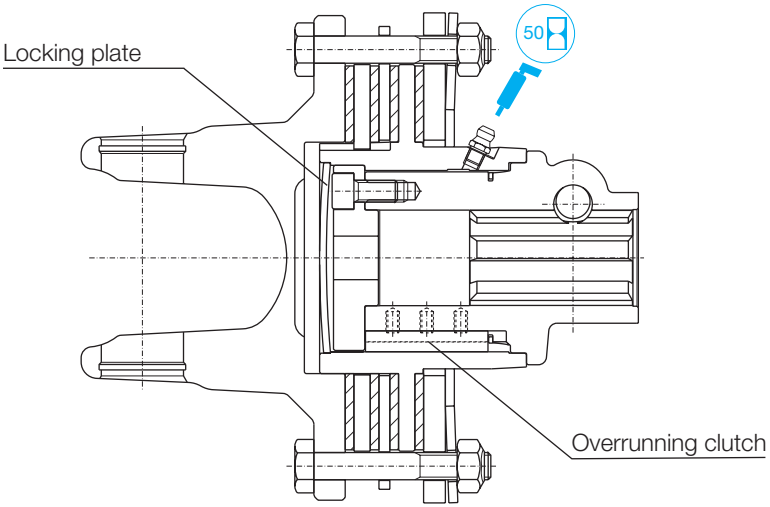
⚠ Do not over-tighten the bolts; this may endanger the function of friction clutches.

⚠ 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.

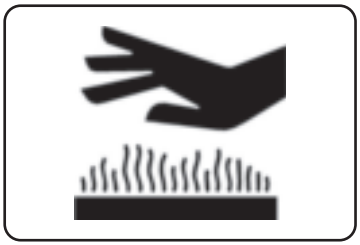
Lubricate overrunning clutches every 50 hours and after storage.



Do not approach the implement before all parts have reached a complete stop.

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

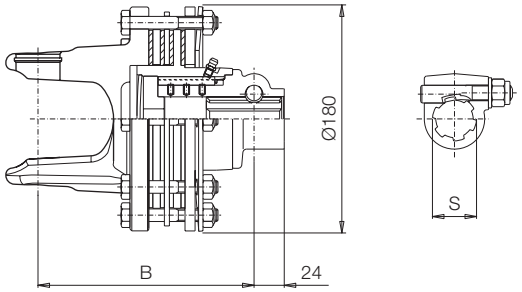
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.



Combination friction torque limiters and overrunning clutches FNV

FNV34

adjustable setting

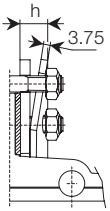


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	158	158	- -	- -
6	*1200	166	166	- -	- -
	1350				
	1450				
7	1350	172	172	- -	- -
	*1450				
	1600				
	1800				
8	*1800	174	174	- -	- -
	2000				

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FNV34

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	- -	- -

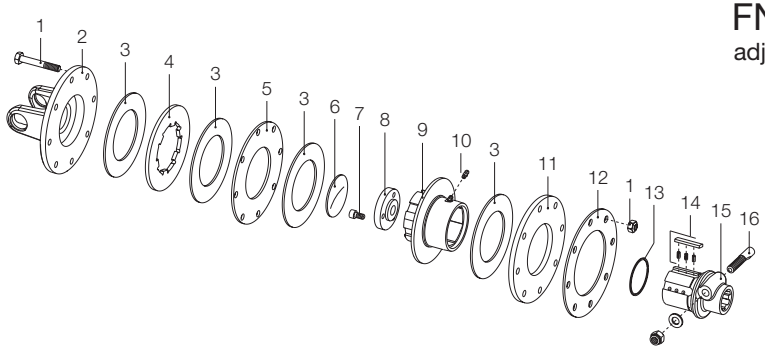


FNV34 codes as spare parts

	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
5	1200	665G48103R	665G48137R	- -	- -	18.0
6	*1200	665H48103R	665H48137R	- -	- -	18.0
	1350	665H51103R	665H51137R			
	1450	665H53103R	665H53137R			
7	1350	665L51103R	665L51137R	- -	- -	
	*1450	665L53103R	665L53137R			
	1600	665L56103R	665L56137R			17.5
	1800	665L58103R	665L58137R			
8	*1800	665M58103R	665M58137R	- -	- -	
	2000	665M60103R	665M60137R			16.5

Combination friction torque limiters and overrunning clutches FNV

FNV34
adjustable setting

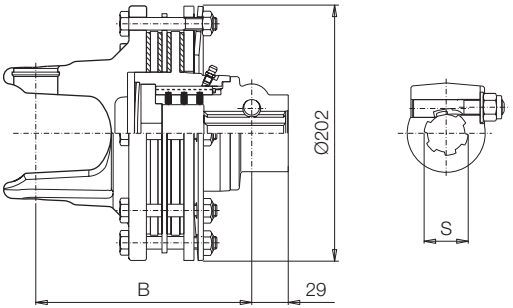


Ref.	Size	Spare part code	Description	Technical data
1		432000114R08	Bolt	M 10 x 75 mm
2	5 6 7 8	2530G1L01 2530H1L01 2530L1L01 2530M1L01	Flange yoke	
3		247000054R08	Friction lining	D = 140 ; d = 85 mm
4		2481L0003	Driving plate	
5		2481L0001	Inner plate	Sp. = 4 mm
6		240000737	Locking plate	
7		303008001R03	Screw	M8 x 16
8		240000736	Overrunning clutch plug	
9		4271L0101	Overrunning clutch housing	
10		348017000R20	Grease fitting	
11		2481L0005	Pressure plate	Sp. = 8 mm
12		367008860	Belleville spring	1200 Nm
13		339002060R20	Snap ring	
14		4211L0001R06	Pawl + springs kit	
15		5151L0301 5151L3701	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
16		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.

Combination friction torque limiters and overrunning clutches FNV

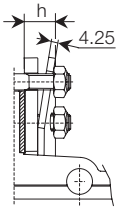
FNV44
adjustable setting



	Setting	B (mm)			
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	172	172	172	172
8	*1800	174	174	174	174
	2000				
	2200				

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FNV44



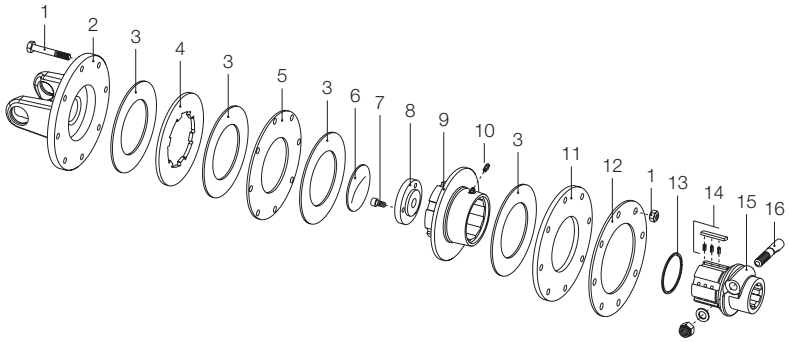
Setting					
Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1800	2B6	2C4	2D2	2E0
2000	2B7	2C5	2D3	2E1
2200	2B8	2C6	2D4	2E2

FNV44 codes as spare parts

	Setting					h
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	mm
7	1800	665L58203R	665L58237R	665L58204R	665L58238R	19.0
8	*1800	665M58203R	665M58237R	665M58204R	665M58238R	19.0
	2000	665M60203R	665M60237R	665M60204R	665M60238R	
	2200	665M62203R	665M62237R	665M62204R	665M62238R	18.6

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

FNV44
adjustable
setting



Ref.	Size	Spare part code	Description	Technical data
1		432000114R08	Bolt	M 10 x 75 mm
2	7 8	2530L1M01 2530M1M01	Flange yoke	
3		247000061R08	Friction lining	D = 160 ; d = 97 mm
4		2481M0001	Driving plate	
5		2481M0002	Inner plate	Sp. = 4 mm
6		240000735	Locking plate	
7		303008001R03	Screw	M8 x 16
8		240000734	Overrunning clutch plug	
9		4271M0101	Overrunning clutch housing	
10		348017000R20	Grease fitting	
11		2481H0004	Pressure plate	Sp. = 8 mm
12		367009870	Belleville spring	
13		339002068R20	Snap ring	
14		4211L0001R06	Pawl + springs kit	
15		5151M0301 5151M3701 5151M0401 5151M3801	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
16		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20

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

Combination friction torque limiters and overrunning clutches FFNV

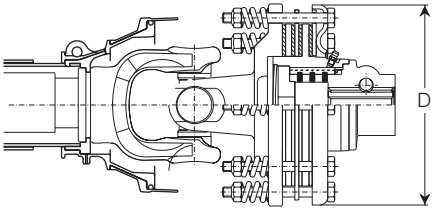
FNV friction clutches are equipped with helical (coil) springs, that apply pressure in proportion to the amount of compression. Two models of FFNV friction clutches are available, with different diameters and standard setting.

- 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 98/37/CEE. 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 EN regulation 1553 and ANSI/ASAE standard S318.15.

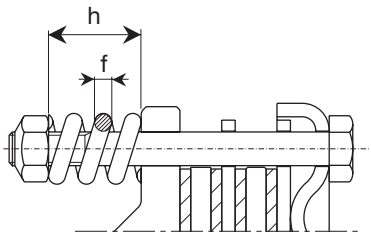


FFNV34 Combination friction torque limiter and overrunning clutch, adjustable setting

Standard settings (Nm)	1	2	43	4	5	6	7	8
FFNV34 D = 180 mm 4 plates					1200	*1200 1350 1450	1350 *1450 1600 1800	*1800 2000
FFNV44 D = 202 mm 4 plates							1800	*1800 2000 2200

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.

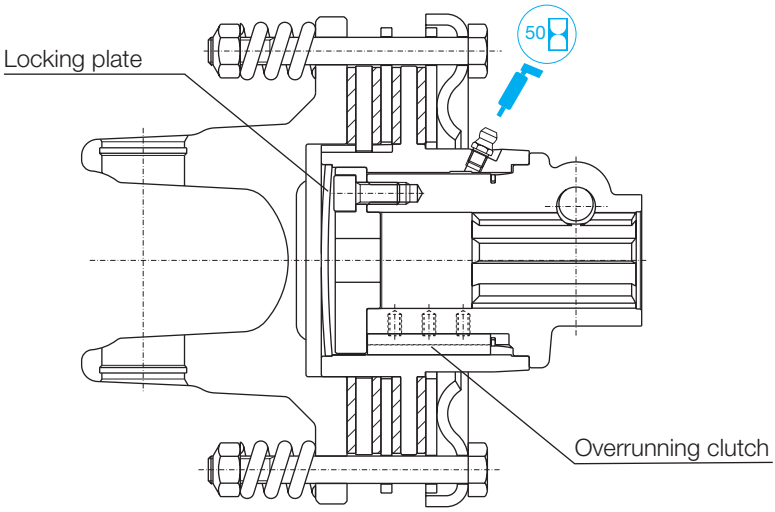
⚠ Do not over-tighten the bolts; this may impair the function of friction clutches.

⚠ 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.

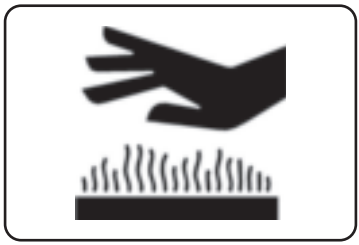
Lubricate overrunning clutches every 50 hours and after storage.



Do not approach the implement before all parts have reached a complete stop.

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

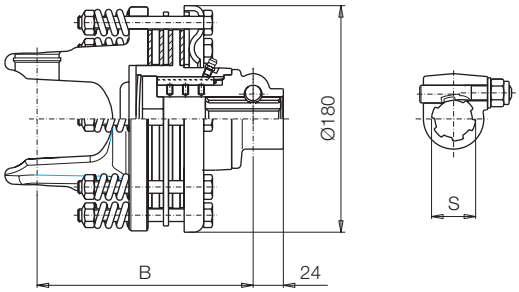
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.



Combination friction torque limiters and overrunning clutches FFNV

FFNV34

adjustable setting

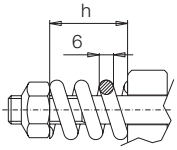


	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	158	158	- -	- -
6	*1200	166	166	- -	- -
	1350				
	1450				
7	1350	172	172	- -	- -
	*1450				
	1600				
	1800				
8	*1800	174	174	- -	- -
	2000				

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FNV34

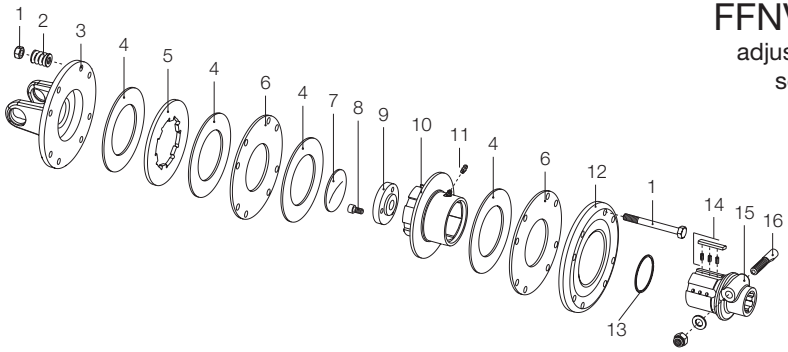
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	2F0	2F8	- -	- -
1350	2F1	2F9	- -	- -
1450	2F2	2G0	- -	- -
1600	2F3	2G1	- -	- -
1800	2F4	2G2	- -	- -
2000	2F5	2G3	- -	- -



FFNV34 codes as spare parts

	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	h mm
5	1200	667G48103R	667G48137R	- -	- -	29.5
6	*1200	667H48103R	667H48137R	- -	- -	29.5
	1350	667H51103R	667H51137R	- -	- -	
	1450	667H53103R	667H53137R	- -	- -	29.0
7	1350	667L51103R	667L51137R	- -	- -	
	*1450	667L53103R	667L53137R	- -	- -	29.0
	1600	667L56103R	667L56137R	- -	- -	
	1800	667L58103R	667L58137R	- -	- -	28.5
8	*1800	667M58103R	667M58137R	- -	- -	28.5
	2000	667M60103R	667M60137R	- -	- -	

FFNV34
adjustable
setting



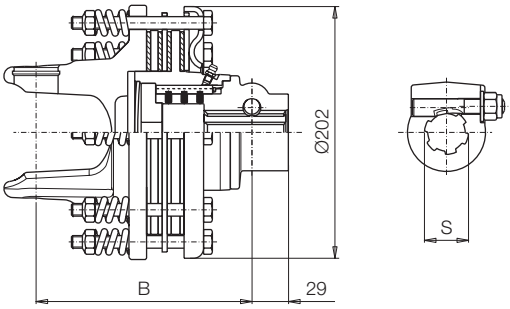
Ref.	Size	Spare part code	Description	Technical data
1		432000007R08	Bolt	M10 x 100 mm
2		351022370R08	Coil spring	f = 6 mm
3	5 6 7 8	2530G1L05 2530H1L05 2530L1L05 2530M1L05	Flange yoke	
4		247000054R08	Friction lining	D = 140 ; d = 85 mm
5		2481L0003	Driving plate	
6		2481L0007	Inner plate	Sp. = 4 mm
7		240000737	Locking plate	
8		303008001R03	Screw	M8 x 16
9		240000736	Overrunning clutch plug	
10		4271L0101	Overrunning clutch housing	
11		348017000R20	Grease fitting	
12		248220007	Pressure plate	
13		339002060R20	Snap ring	
14		4211L0001R06	Pawl + springs kit	
15		5151L0301 5151L3701	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
16		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.

Combination friction torque limiters and overrunning clutches FFNV

FFNV44

adjustable setting

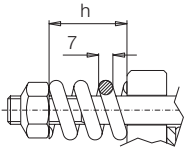


	Setting	B (mm)			
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	172	172	172	172
8	*1800	174	174	174	174
	2000				
	2200				

*Maximum recommended settings for 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

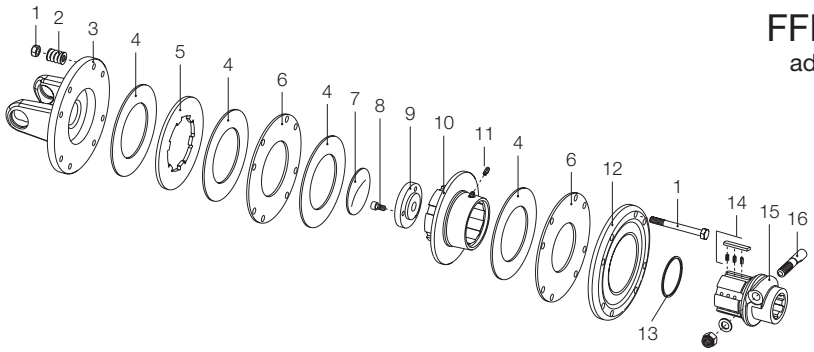


FFNV44 codes as spare parts

	Setting					h
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20	mm
7	1800	667L58203R	667L58237R	667L58204R	667L58238R	30.0
8	*1800	667M58203R	667M58237R	667M58204R	667M58238R	30.0
	2000	667M60203R	667M60237R	667M60204R	667M60238R	
	2200	667M62203R	667M62237R	667M62204R	667M62238R	

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

FFNV44
adjustable
setting



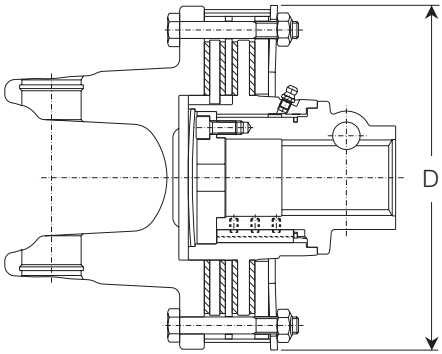
Ref.	Size	Spare part code	Description	Technical data
1		432000122R08	Bolt	M10 x 105 mm
2		351013370R08	Coil spring	f = 7 mm
3	7 8	2530L1M05 2530M1M05	Flange yoke	
4		247000061R08	Friction lining	D = 160 ; d = 97 mm
5		2481M0001	Driving plate	
6		2481M0007	Inner plate	Sp. = 4 mm
7		240000735	Locking plate	
8		303008001R03	Screw	M8 x 16
9		240000734	Overrunning clutch plug	
10		4271M0101	Overrunning clutch housing	
11		348017000R20	Grease fitting	
12		248230006	Pressure plate	
13		339002068R20	Snap ring	
14		4211L0001R06	Pawl + springs kit	
15		5151M0301 5151M3701 5151M0401 5151M3801	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
16		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20

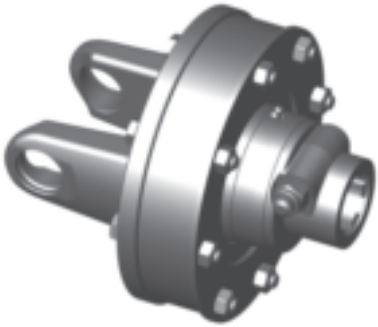
For primary drivelines, always install any torque limiter or overrunning clutch on the implement side.
All rotating parts must be guarded.

Combination friction torque limiters and overrunning clutches FNT

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 (*).





FNV34 Combination friction torque limiter and overrunning clutch, non-adjustable setting

Standard settings (Nm)	1	2	43	4	5	6	7	8
FFNV34 D = 180 mm 4 plates					1200	*1200 1450	*1450 1800	*1800
FFNV44 D = 202 mm 4 plates							1800	*1800 2200

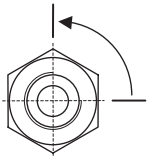
Combination friction torque limiters and overrunning clutches FNT

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.

FNT34 - FNT34R	
setting Nm	spring code
1200	367FT340A
1450	367FT340C
1800	367FT340D

FNT44 - FNT44R	
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.



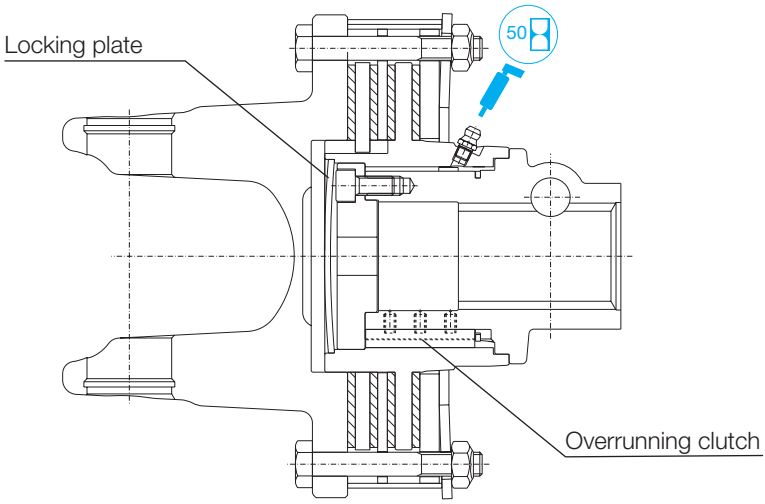
To do this properly, tighten the bolts until the Belleville spring contacts the metal band. Then back off each nut 1/4 turn.

⚠ 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.

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.

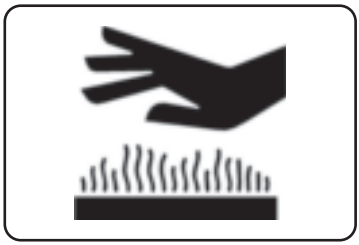
Lubricate overrunning clutches every 50 hours and after storage.



Do not approach the implement before all parts have come to a complete stop.

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

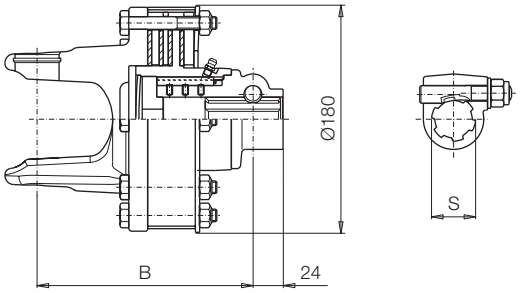
Keep the area around the friction clutch clear of any material that could catch fire, and avoid prolonged slipping that will generate excess heat and wear.



Combination friction torque limiters and overrunning clutches FNT

FNT34

adjustable setting



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	158	158	- -	- -
6	*1200	166	166	- -	- -
	1450				
7	*1450	172	172	- -	- -
	1800				
8	*1800	174	174	- -	- -

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FNT34

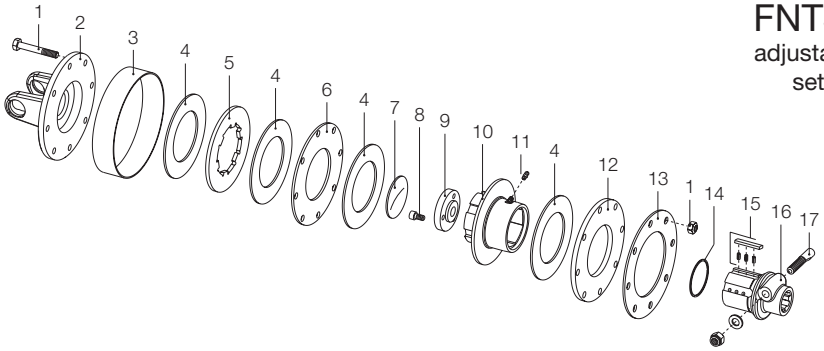
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	1A1	1A6	- -	- -
1450	1A2	1A7	- -	- -
1800	1A3	1A8	- -	- -

FNT34 codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	658G48103R	658G48137R	- -	- -
6	*1200	658H48103R	658H48137R	- -	- -
	1450	658H53103R	658H53137R	- -	- -
7	*1450	658L53103R	658L53137R	- -	- -
	1800	658L58103R	658L58137R	- -	- -
8	*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
adjustable
setting



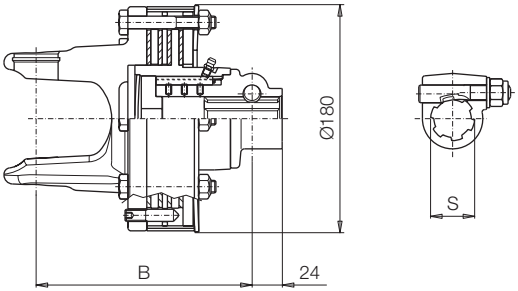
Ref.	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M10 x 70 mm
2	5 6 7 8	2530G1L01 2530H1L01 2530L1L01 2530M1L01	Flange yoke	
3		240000218	Adjustment band	
4		247000054R08	Friction lining	D = 140 ; d = 85 mm
5		2481L0003	Driving plate	
6		2481L0001	Inner plate	Sp. = 4 mm
7		2400000737	Locking plate	
8		303008001R03	Screw	M8 x 16
9		240000736	Overrunning clutch plug	
10		4271L0101	Overrunning clutch housing	
11		348017000R20	Grease fitting	
12		2481L0002	Pressure plate	Sp. = 8 mm
13		367FT340A 367FT340C 367FT340D	Belleville spring	1200 Nm 1450 Nm 1800 Nm
14		339002060R20	Snap ring	
15		4211L0001R06	Pawl + spring kit	
16		5151L0301 5151L3701	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
17		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.

Combination friction torque limiters and overrunning clutches FNT

FNT34R

adjustable setting



	Setting Nm	B (mm) S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	158	158	- -	- -
6	*1200	166	166	- -	- -
	1450				
7	*1450	172	172	- -	- -
	1800				
8	*1800	174	174	- -	- -

*Maximum recommended settings for 1000 min^{-1} velocity.

Driveline codes FNT34R

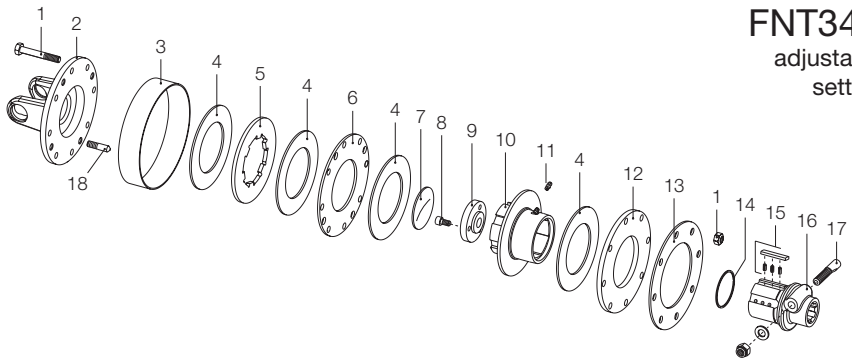
Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
1200	1C1	1C6	- -	- -
1450	1C2	1C7	- -	- -
1800	1C3	1C8	- -	- -

FNT34R codes as spare parts

	Setting Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
5	1200	658G48203R	658G48237R	- -	- -
6	*1200	658H48203R	658H48237R	- -	- -
	1450	658H53203R	658H53237R	- -	- -
7	*1450	658L53203R	658L53237R	- -	- -
	1800	658L58203R	658L58237R	- -	- -
8	*1800	658M58203R	658M58237R	- -	- -

Combination friction torque limiters and overrunning clutches FNT

FNT34R
adjustable setting

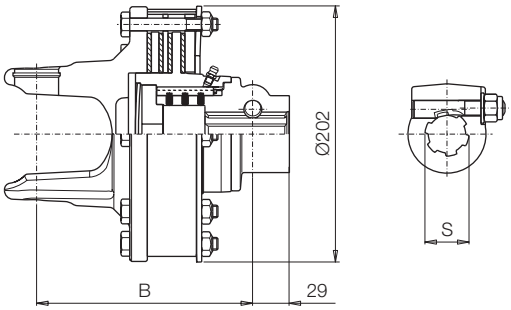


Ref.	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M10 x 70 mm
2	5 6 7 8	2530G1L02 2530H1L02 2530L1L02 2530M1L02	Flange yoke	
3		240000218	Adjustment band	
4		247000054R08	Friction lining	D = 140 ; d = 85 mm
5		2481L0003	Driving plate	
6		2481L0004	Inner plate	Sp. = 4 mm
7		240000737	Locking plate	
8		303008001R03	Screw	M8 x 16
9		240000736	Overrunning clutch plug	
10		4271L0101	Overrunning clutch housing	
11		348017000R20	Grease fitting	
12		2481L0002	Pressure plate	Sp. = 8 mm
13		367FT340A 367FT340C 367FT340D	Belleville spring	1200 Nm 1450 Nm 1800 Nm
14		339002060R20	Snap ring	
15		4211L0001R06	Pawl + spring kit	
16		5151L0301 5151L3701	Hub with taper pin	1 3/8” Z6 1 3/8” Z21
17		408000047R02	Taper pin	1 3/8” Z6 - Z21
18		310001301R04	Special socket head set screw	M 10 x 40 mm

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

Combination friction torque limiters and overrunning clutches FNT

FNT44
adjustable setting



	Setting	B (mm)			
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	172	172	172	172
8	*1800 2200	174	174	174	174

*Maximum recommended settings for 1000 min^{-1} velocity .

Driveline codes FNT44

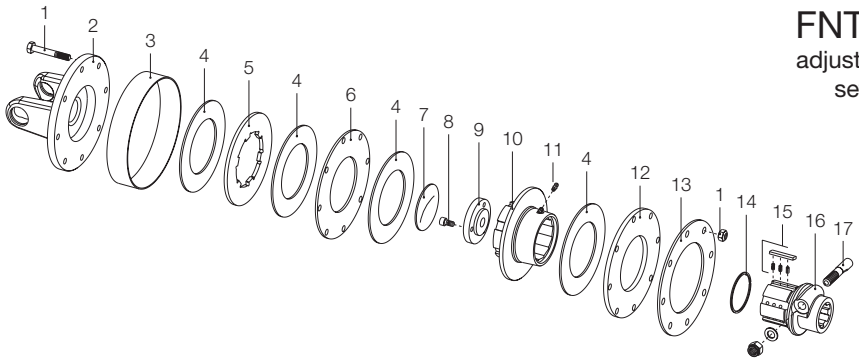
	Setting				
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
	1800	1F1	1F7	1G3	1G9
	2200	1F2	1F8	1G4	1H0

FNT44 codes as spare parts

	Setting				
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	658L58303R	658L58337R	658L58304R	658L58338R
8	*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
adjustable
setting



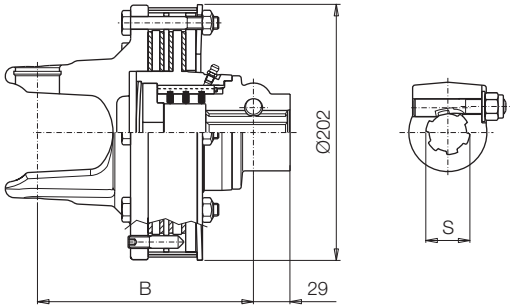
Ref.	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M 10 x 70 mm
2	7 8	2530L1M01 2530M1M01	Flange yoke	
3		240000219	Adjustment band	
4		247000061R08	Friction lining	D = 160 ; d = 97 mm
5		2481M0001	Driving plate	
6		2481M0002	Inner plate	Sp. = 4 mm
7		240000735	Locking plate	
8		303008001R03	Screw	M8 x 16
9		240000734	Overrunning clutch plug	
10		4271M0101	Overrunning clutch plug	
11		348017000R20	Grease fitting	
12		2481H0003	Pressure plate	Sp. = 8 mm
13		367FT440A 367FT440C 367FT440D 367FT440E	Belleville spring	1800 Nm 2200 Nm 2400 Nm 2600 Nm
14		339002068R20	Snap ring	
15		4211L0001R06	Pawl + springs kit	
16		5151M0301 5151M3701 5151M0401 5151M3801	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
17		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20

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

Combination friction torque limiters and overrunning clutches FNT

FNT44R

adjustable setting



	Setting	B (mm)			
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	172	172	172	172
8	*1800 2200	174	174	174	174

*Maximum recommended settings for 1000 min^{-1} velocity .

Driveline codes FNT44R

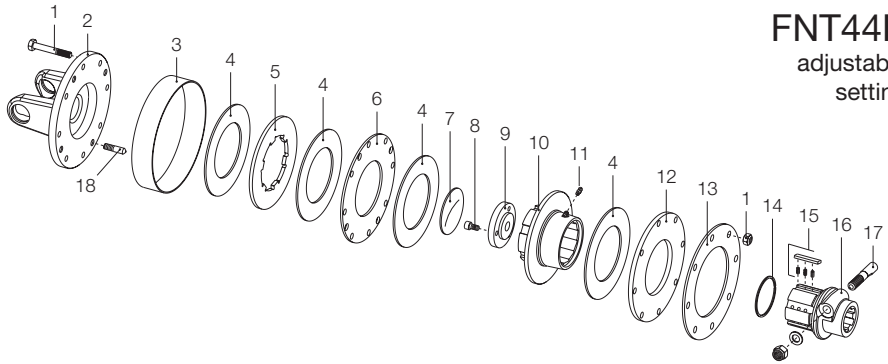
	Setting				
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
	1800	1H5	1J1	1J7	1K4
	2200	1H6	1J2	1J8	1K5

FNT44R codes as spare parts

	Setting				
	Nm	S = 1 3/8" Z6	1 3/8" Z21	1 3/4" Z6	1 3/4" Z20
7	1800	658L58403R	658L58437R	658L58404R	658L58438R
8	*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
adjustable
setting



Ref.	Size	Spare part code	Description	Technical data
1		432000100R08	Bolt	M 10 x 70 mm
2	7 8	2530L1M02 2530M1M02	Flange yoke	
3		240000219	Adjustment band	
4		247000061R08	Friction lining	D = 160 ; d = 97 mm
5		2481M0001	Driving plate	
6		2481M0003	Inner plate	Sp. = 4 mm
7		240000735	Locking plate	
8		303008001R03	Screw	M8 x 16
9		240000734	Overrunning clutch plug	
10		4271M0101	Overrunning clutch housing	
11		348017000R20	Grease fitting	
12		2481H0003	Pressure plate	Sp. = 8 mm
13		367FT440A 367FT440C 367FT440D 367FT440E	Belleville spring	1800 Nm 2200 Nm 2400 Nm 2600 Nm
14		339002068R20	Snap ring	
15		4211L0001R06	Pawl + springs kit	
16		5151M0301 5151M3701 5151M0401 5151M3801	Hub with taper pin	1 3/8” Z6 1 3/8” Z21 1 3/4” Z6 1 3/4” Z20
17		408000047R02 408000046R02	Taper pin	1 3/8” Z6 - Z21 1 3/4” Z6 - Z20
18		310001301R04	Special socket head set screw	M 10 x 40 mm

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

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. NLGI #2 molybdenum disulphide grease is recommended for devices that are lubricated only once (e.g. during assembly) in their entire service life, such as RL3 overrunning clutches and LR automatic torque limiters

The standard lubrication frequency for all components of series 100 cardan joint drivelines is 50 hours. This lengthens the lubrication interval from a daily chore to a weekly routine.

Constant velocity joints type 652-662-672 should be lubricated every 8 hours.

Heavy duty applications in aggressive environments may require more frequent lubrication.

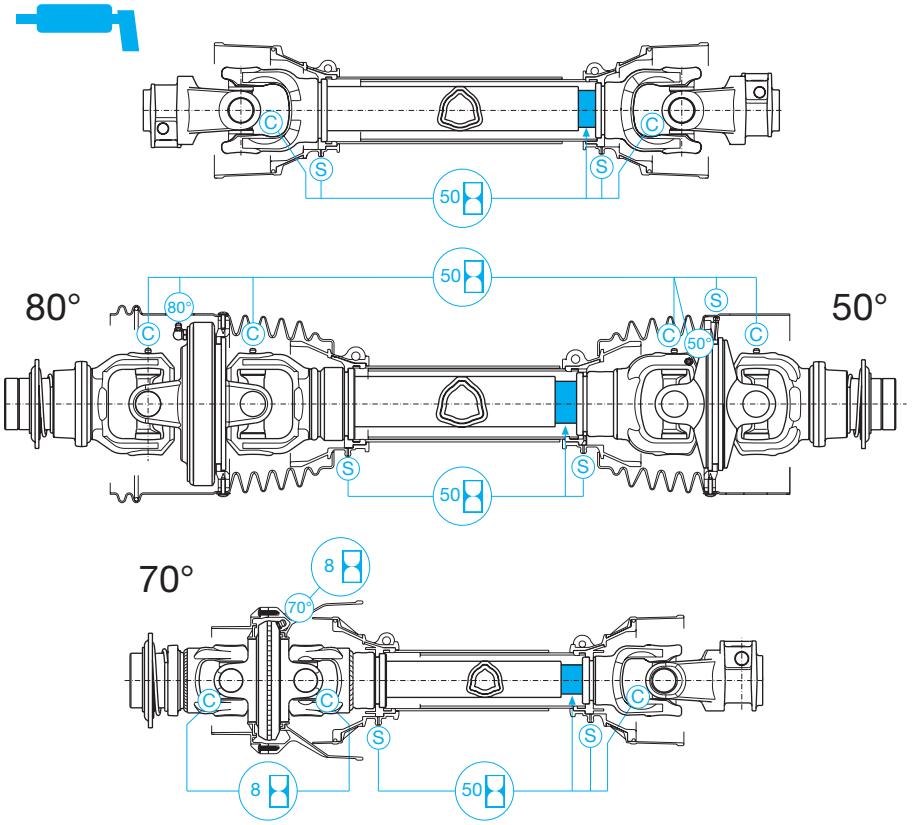
The following instructions, that are also listed in the operator’s manual of the driveline, should be included in the manual provided by the implement manufacturer.

⚠ 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



	1	2	43	4	5	6	7	8
Crosses (C)	2 gr.				4 gr.		5 gr.	
Shields (S)	1 gr.							
80° and 70° CV joint (80°) (70°)		20 gr.		20 gr.		30 gr.		40 gr.
50° CV joint (70°)				3 gr.		4 gr.		4 gr.

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 gr

RA2 Overrunning clutches

5 - 6 gr

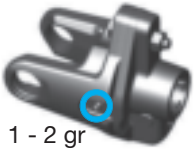
SA Ratchet torque limiters

4 - 7 gr

LN Ratchet torque limiters

4 - 7 gr

Shear bolt torque limiter LB



1 - 2 gr

seasonal

FNT Friction torque limiter
and overrunning clutch

5 - 7 gr

FNV Friction torque limiter
and overrunning clutch

5 - 7 gr

FFNV Friction torque limiter
and overrunning clutch

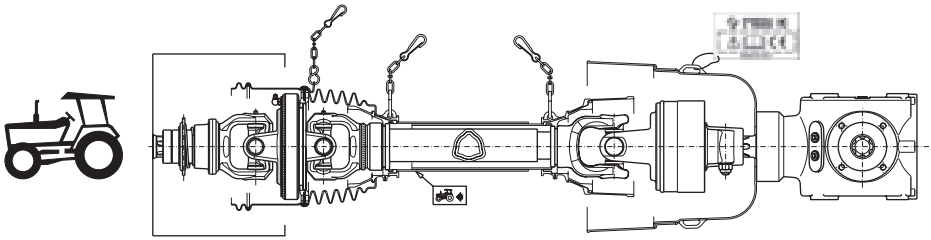
5 - 7 gr

Implement input connection shields CF

The Machinery Directive (98/37/CEE) requires that the implement be equipped with an implement input connection shield fixed to the implement.
Standard EN1553 requires the implement input connection shield completely encircle the shaft, but allow for installation and articulation of the driveline. Standards EN 1553 and ASAE 318.15 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 ASAE S318.15 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.

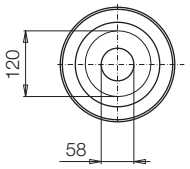
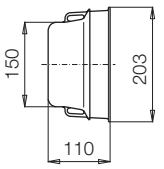
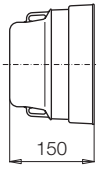
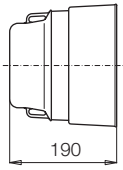
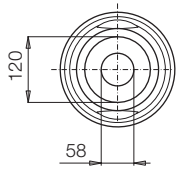
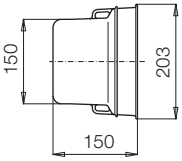
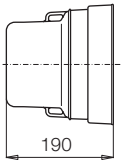
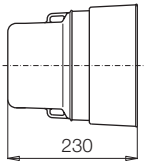
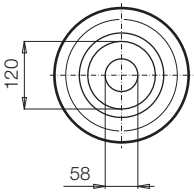
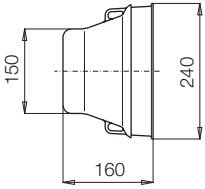
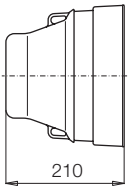
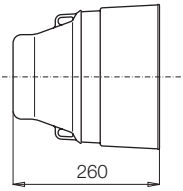
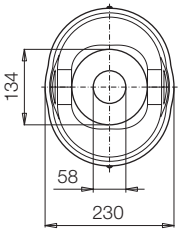
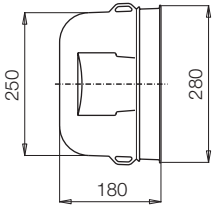
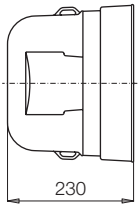
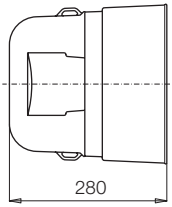
Manufacturers are also recommended to include in their operating manuals a list of the shields and safety labels, as well as their position on the machine and their code numbers for ordering replacements. In compliance with ASAE S493 standards, the implement manufacturer shall provide safety sign(s) and instructions stating that guards must be kept in place and the machine should not be operated with guards opened or removed.
Standard EN 1553 requires a label be used to draw attention to possible risks when the guard is unlocked, opened, or removed.



Implement input connection shields CF

The CF implement input connection (IIC) shields consist of a round or oval hard plastic cone, to which a flexible band may be applied to extend the driveline covering and allow its articulation.

The CF IIC shield comes in four sizes: the first three are round; the fourth is oval. All sizes feature a central hole measuring 58 mm to allow passage of the implement shaft.

			
	Rigid cone	Cone with medium band	Cone with long band
Code	21901	41701	41711
			
	Rigid cone	Cone with medium band	Cone with long band
Code	21902	41702	41712
			
	Rigid cone	Cone with medium band	Cone with long band
Code	21903	41703	41713
			
	Rigid cone	Cone with medium band	Cone with long band
Code	21904	41704	41714

Implement input connection shields CF

The CF IIC shield code numbers are listed in the table below. They are listed according to the size of the driveline, and for each type of yoke, torque limiter, or clutch that may be installed on the driveline.
The indicated IIC shield must comply with the specifications and standards of the country in which the components will be used.
Bondioli & Pavesi offers a complete range of drivelines and IIC shields.
Due to the broad range of machines and applications, the specifications contained herein should be used as a general guide to the selection of a IIC shield.
The implement manufacturer is responsible for selecting suitable IIC shields according to application, the size of the joint, and the regulations applied in the country in which the machine will be used.

Thorough testing of the IIC shield under actual field conditions is necessary and strongly recommended by Bondioli & Pavesi.

<table>
<tr><th></th><th>Yokes for single joint</th><th>RA</th><th>GE</th><th>SA1-2
LN1-2</th><th>SA3-4
LN3-4</th><th>LB</th><th>LR</th><th>FV-FNV
FFV-FFNV
FT-FNT</th><th>50° and 70° CV joint</th></tr>
<tr><td>1</td><td rowspan="2">21902</td><td rowspan="3">41702</td><td></td><td rowspan="2">41702</td><td></td><td rowspan="3">21902</td><td></td><td rowspan="3">41704</td><td></td></tr>
<tr><td>2</td><td></td><td rowspan="2">41712</td><td></td><td>21904</td></tr>
<tr><td>43</td><td rowspan="2">41701</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>4</td><td rowspan="4">4171401
4171402</td><td></td><td rowspan="3">41713</td><td rowspan="4">4171401
4171402</td><td rowspan="4">4171401
4171402</td><td rowspan="4">4171401
4171402</td><td>21913</td></tr>
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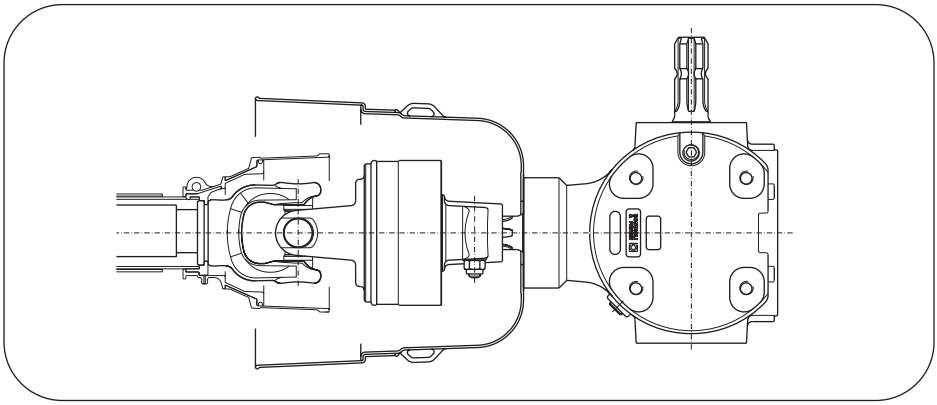
4171402</td><td></td><td></td></tr>
<tr><td>6</td><td></td><td>21913</td></tr>
<tr><td>7</td><td rowspan="2">41703</td><td></td><td></td><td></td></tr>
<tr><td>8</td><td></td><td></td><td></td><td>21913</td></tr>
</table>

Implement input connection shields CF

The bottom of the CF IIC shields features a mounting surface measuring 120 mm (4.7") in diameter for the round versions and 134 mm (5.3") for the oval one.
The standard versions do not feature holes for attachment, which can be provided upon request.

Bondioli & Pavesi recommends the implement manufacturer provide a solid and secure mounting for the IIC shield and an operator's manual advising to periodically check that the shields are in place and properly secured.

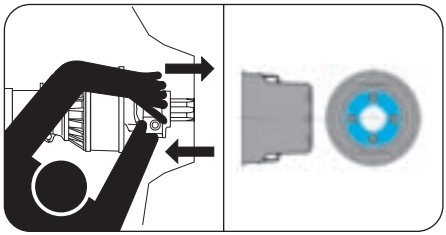


The Bondioli & Pavesi CF IIC shields are not designed for use as steps.
The connection shields 21904, 41704 and 41714 can be equipped with one or two doors for access during driveline installation and when checking for secure mounting. Cones 1904, 41704, and 41714 may be specified with one door (add 01 to the end of the code) or two doors (add 02 to the code).

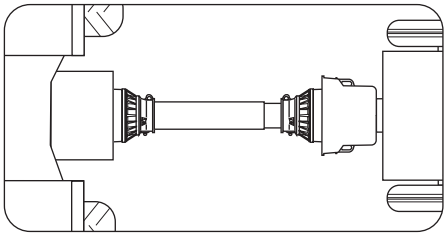
The IIC shields 21904, 41704 and 41714 can also be made of Zytel®, if requested. This material is capable of resisting higher temperatures. Zytel® IIC shields can be used to protect devices that operate at temperatures above normal, e.g. friction torque limiters used in particularly severe conditions.
The IIC shields made for EEC-EFTA countries come with an instruction sheet which also includes the Conformity Statement required by the Machinery Directive (98/37/CEE). To order a connection shield supplied with an instruction sheet including the Conformity Statement, complete the code number by adding the suffix **CE**.

Implement input connection shields CF

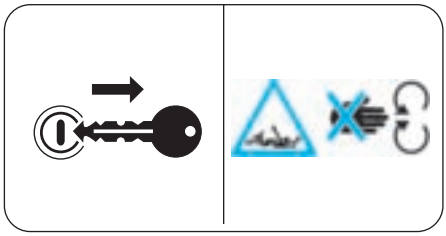
Use the machine only with its original driveline. The IIC shield must suit the application. If the IIC shield is damaged due to contact with machine parts, contact the dealer.



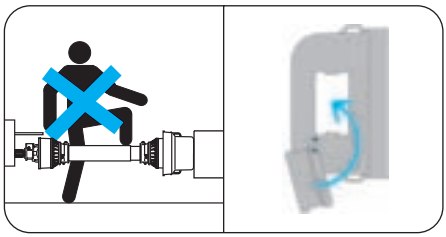
Before operation, make sure that the driveline and the IIC shield are correctly fitted. The screw heads and washers must be within the flat portion of the cone for secure attachment.



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.

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 cm^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	gf	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	rad/s	radiant per second
Unit of measurement	*Symbol*	*Conversion*
revolutions per minute	rpm or 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

Agencies

• ARGENTINA	E.T.M.A. S.A.C.I.F.e.I. Luis Fanti, 724 – 2300 RAFAELA (Santa Fè) - C. Correo 167 Tel. (492) 32301/30401/30294/30295 – telefax (492) 28466 E-mail etma@arnet.com.ar
• AUSTRALIA	BYPY AUSTRALIA P/L 16, Dingley Avenue – DANDENONG, Vic. 3175 Tel. (03) 9794 5889 – Telefax (03) 9794 0272 E-mail bypy@ozemail.com.au
• BELARUS	JOINT-STOCK COMPANY PROMMEDINVEST 181, Nezavisimosti Av. – 220125 MINSK Tel. 017 2029457 - 017 2029458 - Telefax 017 2029459 E-mail prommed@pmi.by
• BELGIQUE WALLONNE	TRACPIECES SPRL 36, Rue J. Delhalle – 5203 WANZE Tel. (085) 214831
FLAEMISCH	DANI-TECH BV Energieweg 39 A – 2382 NC ZOETERWOUDE (NEDERLAND) Tel. (071) 5417704 – Telefax (071) 5419106 E-mail infonl@dani-tech.com
• BRAZIL	BPN TRANSMISSÕES Ltda. Estrada dos Romeiros, 42.501, Partão B- SANTANA DE PARNAIBA / SP Cep. 06500-970 – C.P.031 Tel. 11 41541115 – Telefax 11 41549013 E-mail bpntrans@uol.com.br BP COMPONENTES HIDRÁULICOS E MECÃNICOS Ltda. Rua Domenico Martins Mezzomo , 184 CEP – 95030 230 CAXIAS DO SUL-RS Tel. 054 32116484 – Telefax 054 32011275 E-mail vendas@bypy.com.br
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