# UNIVERSAL JOINT SHAFT

*Industrial Segment*


JAS-ANZ

**Hardy Transmission Pvt. Ltd.**
sales@hardytransmission.com

# Universal Joint Shafts


## ABOUT US

Hardy Transmission, the specialist for Universal Joint Shaft for Industrial application. Established in 2011 (Formerly as Power Transmission 1991) Hardy Transmission offers its customers the know-how & the experience in the field of the industrial design. To optimize & integrate its products, so as to increase the efficiency of the plants. We concentrate on innovating products & services. Our domestic & overseas customer support us for new development always

## OUR FOCUS

Hardy Transmission Pvt Ltd Focuses on the complete fulfillment requirements of the users. As our below guideline we could satisfied our customer's requirement always

**SCR** ***(Smooth Communication Routes)***
**R & D** ***(Research and Development)***
**FRA** ***(Fast Requirement analysis)***
**SPS** ***(Secure Problem Solution)***


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# Universal Joint Shafts

Certificate of Registration

This is to certify that

**Hardy Transmission Pvt. Ltd.**

Regd. Office: BE - 40, Hari Nagar, New Delhi -110064 India
Factory: C - 58, Phase - II, Mayapuri Industrial Area, New Delhi - 110064 India.

has been assessed by RICL and found to comply with the requirements of

**ISO 9001 : 2015**
**Quality Management System**

For the following activities:

**Design, Manufacturing and Supply of Cardan / Universal Joint Shaft & Cross Assembly Kit, Articulated Shaft, Customized Flexible Coupling , Metaflex / Disceflex Coupling & Spare Spring Plate and Chain Sprocket.**

This Certificate is Valid from 06/03/2020 Until 05/03/2021

Date of Initial Certification: 06/03/2020
1st Surveillance on or before: 05/02/2021
IInd Surveillance on or before: 05/02/2022
Certification Valid Until: 05/03/2023

Certificate No.: 20RQ03AE

Director
Royal Impact Certification Ltd.
Certificate details entered into JAS-ANZ register on 06/03/2020

IAF MEMBER OF MUTUAL RECOGNITION ARRANGEMENT

JAS-ANZ

www.jas-anz.org/register

HT

**Hardy Transmission Pvt. Ltd.**

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**Quality, Environmental, Health & Safety Policy**

We at hardy Transmission P Ltd is committed to enhance customer satisfaction through manufacturing & supply of reliable products and timely services in an eco-friendly, healthy and safe manner.

**To achieve, this we shall**

- Continually improve the process through training & motivation.
- Protect Environment, Prevent Pollution and reduce waste through improvement programs
- Prevent injury and ill health of employees by providing a safe and healthy work environment

B K Gupta
Director

## QUALITY ASSURANCE

Our team is devoted to provide clients with products that reflect quality and our commitment towards the clients cause. Our professionals have considerate industry experience and the requisite technical know-how, which allows us to satisfy the client's requirements. We believe Long term performance ensure the long terms joint hand relationship

Each product is manufactured as per the quality assurance plan derived in line with stringent quality standards and customers requirement. Our Major steps in quality control systems are:-

- Through inspection of raw materials.
- In-process inspection of components & process control during manufacturing.
- Inspection in sub-assembly and assembly stages.
- Finished product inspection.

# Universal Joint Shafts

## Forging



## Machining




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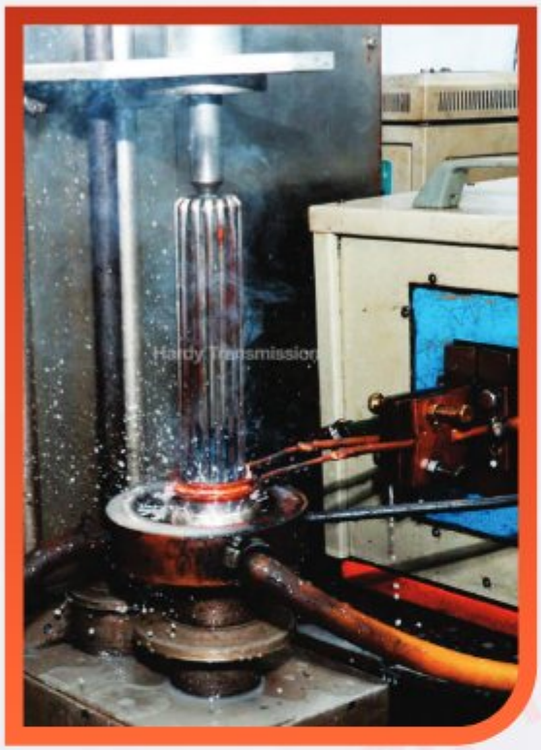
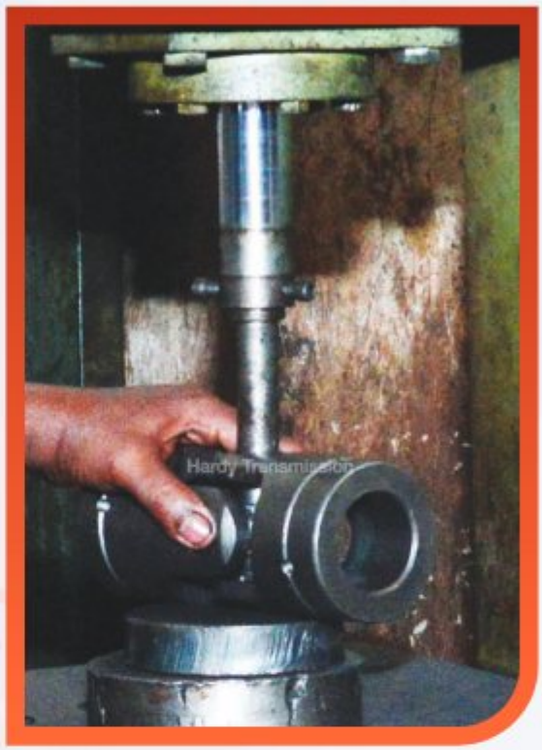
# Universal Joint Shafts






# Universal Joint Shafts

## BENEFITS OF BALANCING

Universal Joint Shaft has a non-uniform distribution of mas around the axis of rotation. This leads to unbalanced forces during operation which depends on the operation speed an the specific application.

- Creates smooth and regular movements.
- As exact rotation it avoids vibrations, and resulting in smooth operation.
- Helps to reduce the jerks, resulting reduces the HP loss
- Longer lifetime of the universal joint shaft impacts on the finishing of final product.

## Testing Procedures Description

- Spectro Analysis : To analyze the chemical composition of the material
- Hardness Test : To reduce the resistance of a material
- Dimensional Test : To compare the specified dimension with the observed dimension within the provide tolerance.

# Universal Joint Shafts

## FEATURES OF HARDY TRANSMISSION CARDAN SHAFTS

### Our Cardan Shafts are mainly featured with :

- MOC - En Series Close Die Forged
- Dimensional accuracy
- Heat treated alloy steel components
- Technical support and engineering services available
- High torque capacity
- Domestic manufacture & importer
- Customized size/design available


## BENEFITS FOR THE BEST DESIGN & MANUFACTURING PROCESS

The application of Cardan Shafts will result in following benefits for the user.

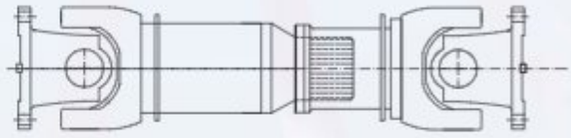
- Easy installation
- Easy regular maintenance
- Sharply reduce HP loss
- Can adjust distance short as well as long & extra long.
- Can install vertically & horizontally.
- Long bearing life
- High operating angle capability
- Eliminates unnecessary bolted connections and serrations in yokes
- Ideal loading across entire bearing length due to balanced deflection between yokes and cross
- Replaceable inner bearing race on size and large significantly reducing cross maintenance expenses

# Universal Joint Shafts

## TYPE OF STANDARD DESIGNS:-

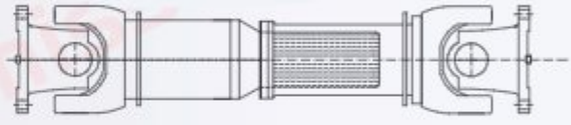
**Type A**

Cardan shafts with length compensation



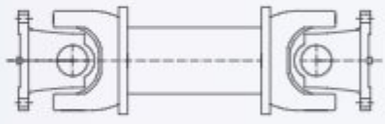
**Type B**

Cardan Shaft with large length compensation (long spline)



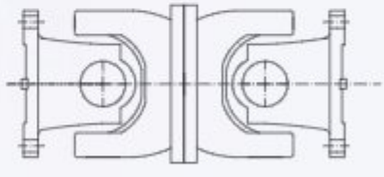
**Type C**

Cardan Shafts without length compensation



**Type D**

Extra short length double flange design



**Type E**

Super short customized design

Short compressed length with spline or without spline



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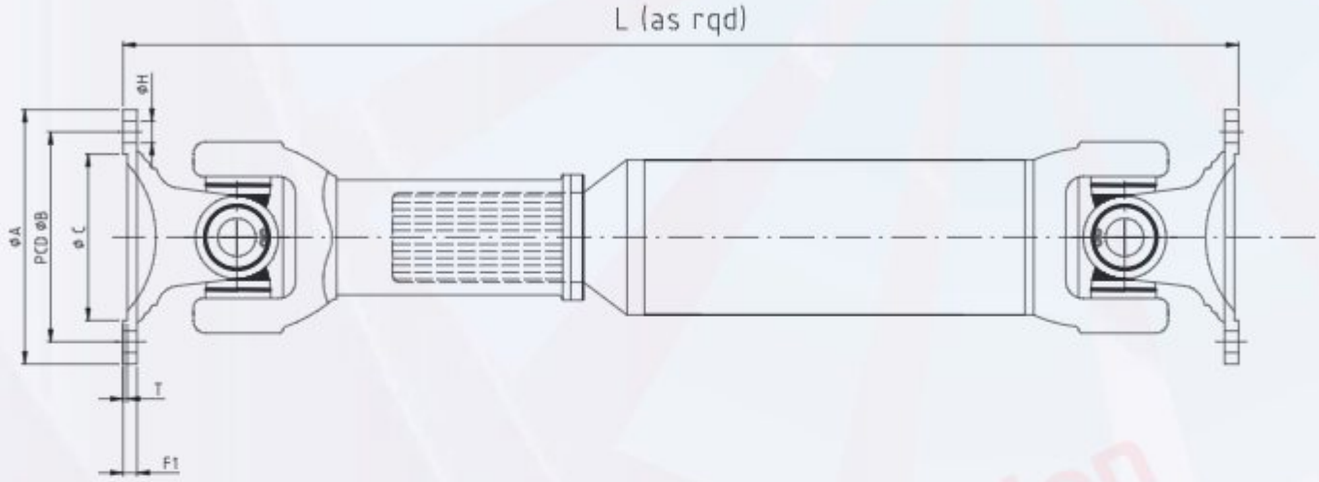
# Universal Joint Shafts

## Light & Medium Duty Shaft

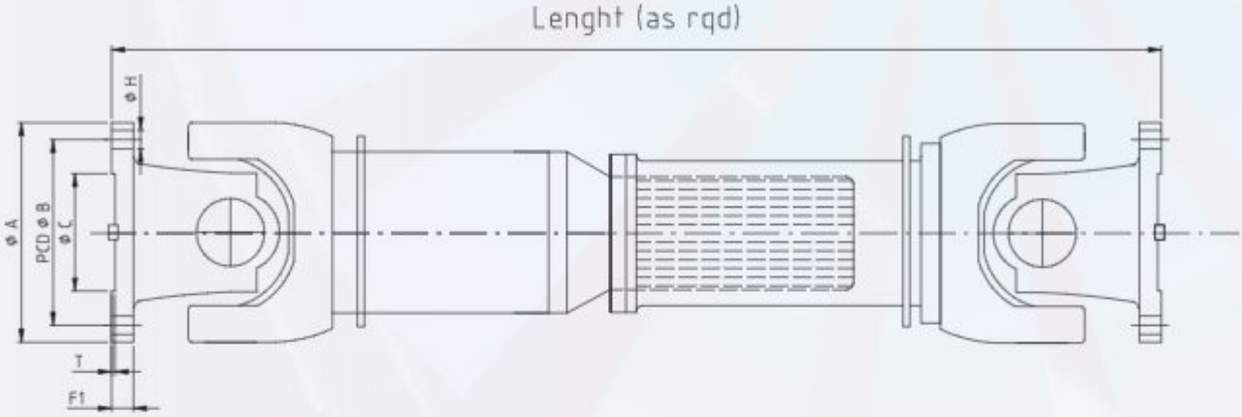



| Series | Nominal Torque (Nm) | Operating Torque (Nm) | Flange Dia (A) | PCD (B) | Spigot Dia (C) | F1 | Hole Dia (H) | No of h (N) | Angle | Telescopic Movement | Spigot Deep (T) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1140 din 58 | 150 | 75 | 58 | 47 | 30 | 5.1 | M 5 | 4 | 20 | 46 | -1.5 |
| 1140 din 70 | 400 | 200 | 70 | 58 | 42 | 6 | 4.2 | 4 | 20 | 45 | 1.6 |
| 1140 din 75 | 440 | 220 | 75 | 62 | 42 | 5.1 | M 6 | 6 | 20 | 46 | -2 |
| 1140 | 570 | 280 | 87.3 | 70 | 56.1 | 5.1 | M 8 | 4 | 20 | 46 | 1.6 |
| 1310 din 90 | 700 | 350 | 90 | 74.5 | 47 | 6.7 | M 8 | 4 | 20 | 46 | -2.5 |
| 1310 | 800 | 400 | 96.8 | 79.4 | 60.3 | 6.7 | M 8 | 4 | 20 | 46 | 1.6 |
| 28710 | 1220 | 610 | 100 | 84 | 56.9 | 7.8 | M 8 | 6 | 18 | 45 | 2 |
| 1410m | 2100 | 1050 | 120 | 95.2 | 70 | 7.5 | 7/16" | 4 | 20 | 57 | 2 |
| 2872 | 2400 | 1200 | 120 | 101.4 | 82.5 | 7.8 | M 10 | 6 | 20 | 60 | 2.5 |
| 2872-8 | 2500 | 1260 | 120 | 101.4 | 75 | 7.8 | 10.2 | 8 | 20 | 60 | -2.5 |
| 1510 | 4600 | 2300 | 146 | 120.6 | 95.2 | 9.1 | 1/2" | 4 | 20 | 51 | 2.5 |
| 1550 | 4600 | 2300 | 146 | 120.6 | 95.2 | 9.1 | 1/2" | 4 | 20 | 63.5 | -2.5 |
| 3120 din 150 | 5600 | 2800 | 150 | 130 | 90 | 8 | M 12 | 8 | 20 | 60 | -3 |
| 1600 | 9000 | 4500 | 174.6 | 155.5 | 168.3 | 9.5 | 3/8" | 8 | 22 | 70 | 1.6 |
| 1610 | 10000 | 5000 | 180 | 155.5 | 95 | 10 | M 12 | 8 | 22 | 75 | -3 |
| 1610h | 14000 | 7000 | 180 | 155.5 | 110 | 16 | 14 | 8 | 22 | 75 | -3 |
| 1700 | 15000 | 7500 | 203.2 | 184.1 | 196.9 | 9.5 | 3/8" | 8 | 35 | 75 | 1.6 |
| 1800 | 22000 | 11000 | 203.2 | 184.1 | 196.9 | 11.1 | 7/16" | 8 | 20 | 82 | 1.6 |
| 2000 | 24000 | 12000 | 225 | 196 | 140 | 15 | 10 | 8 | 25 | 110 | -3 |

**Customize Available on Requirement**

# Universal Joint Shafts

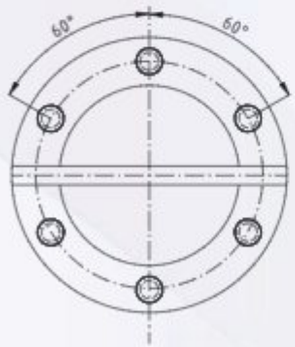
## Extra Heavy Duty Shaft




| Series | Nominal Torque (Nm) | Operating Torque (Nm) | Flange Dia (A) | PCD (B) | Spigot Dia (C) Female | F1 | Hole Dia (H) | No of h (N) | Angle | Telescopic Movement |
|---|---|---|---|---|---|---|---|---|---|---|
| HT 225 | 56000 | 28000 | 225 | 196 | 140 | 20 | 20 | 8 | 15 | 140 |
| HT 250 | 80000 | 40000 | 250 | 218 | 140 | 25 | 19 | 8 | 15 | 140 |
| HT 285 | 120000 | 60000 | 285 | 245 | 175 | 27 | 21 | 8 | 15 | 140 |
| HT 315 | 160000 | 80000 | 315 | 280 | 175 | 32 | 23 | 10 | 15 | 140 |
| HT 350 | 225000 | 112000 | 350 | 310 | 220 | 35 | 23 | 10 | 15 | 150 |
| HT 390 | 320000 | 160000 | 390 | 345 | 235 | 40 | 25 | 10 | 15 | 170 |
| HT 440 | 500000 | 250000 | 440 | 390 | 255 | 42 | 28 | 16 | 15 | 190 |
| HT 490 | 700000 | 350000 | 490 | 435 | 275 | 47 | 31 | 16 | 15 | 190 |
| HT 550 | 1000000 | 500000 | 550 | 492 | 320 | 50 | 31 | 16 | 15 | 240 |

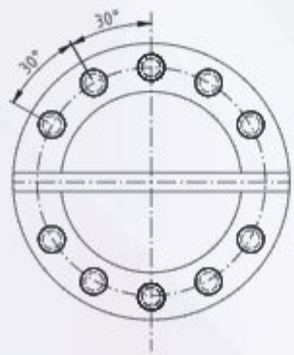
**Keyways available in Standard & Customized**

Hole = 6

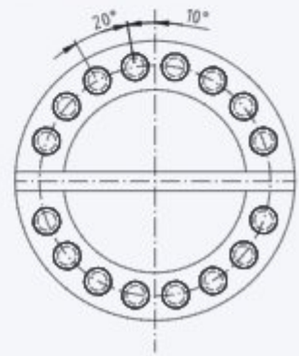



Hole = 8


Hole = 10




Hole = 16





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# Universal Joint Shafts

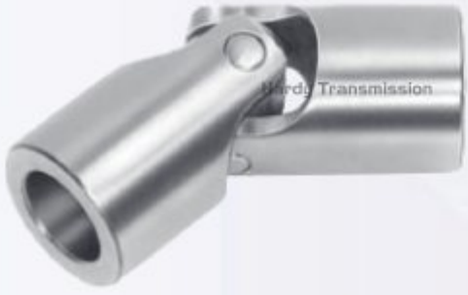
## SOME SPECIAL DEVELOPED DESIGNS

### FOR LIGHT DUTY LOW SPEED

"Here we already develop some **SPECIAL DESIGN SHAFTS** as per customer requirements/samples"

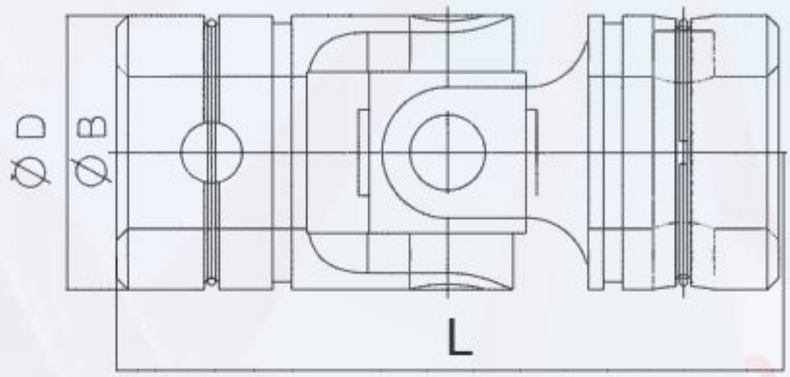

## PRECISION CARDAN SHAFTS & SPECIAL DESIGN SHAFTS

Ball & socket Joints shafts are supported by gliding bearing can only be used at low speeds maximum which depend on the deflection angle & load 500 RPM


# Universal Joint

## Customize in Range




### D Type

- Standard industrial type universal joint with pin / bearing with needles design.
- Available as required in round, hex, spline or Oval.

MOC - Alloy Steel / Stainless Steel.

| Size | D | L | Maximum Bore | Breaking Torque (Nm) |
|---|---|---|---|---|
| HT - 7 | 22.5 | 76 | 14 | 135 |
| HT - 8 | 25.5 | 86 | 16 | 193 |
| HT - 9 | 29.0 | 90 | 18 | 331 |
| HT - 10 | 32.0 | 95 | 20/22 | 600 |
| HT - 12 | 38.5 | 108 | 25 | 910 |
| HT - 14 | 44.5 | 127 | 30 | 1230 |
| HT - 16 | 51.0 | 140 | 35 | 1790 |
| HT - 18 | 57.5 | 165 | 40 | 3810 |
| HT - 20 | 63.5 | 178 | 45 | 3810 |
| HT - 24 | 76.5 | 222 | 50 | 7510 |
| HT - 28 | 89.0 | 254 | 65 | 11010 |
| HT - 32 | 102.0 | 292 | 70 | 15850 |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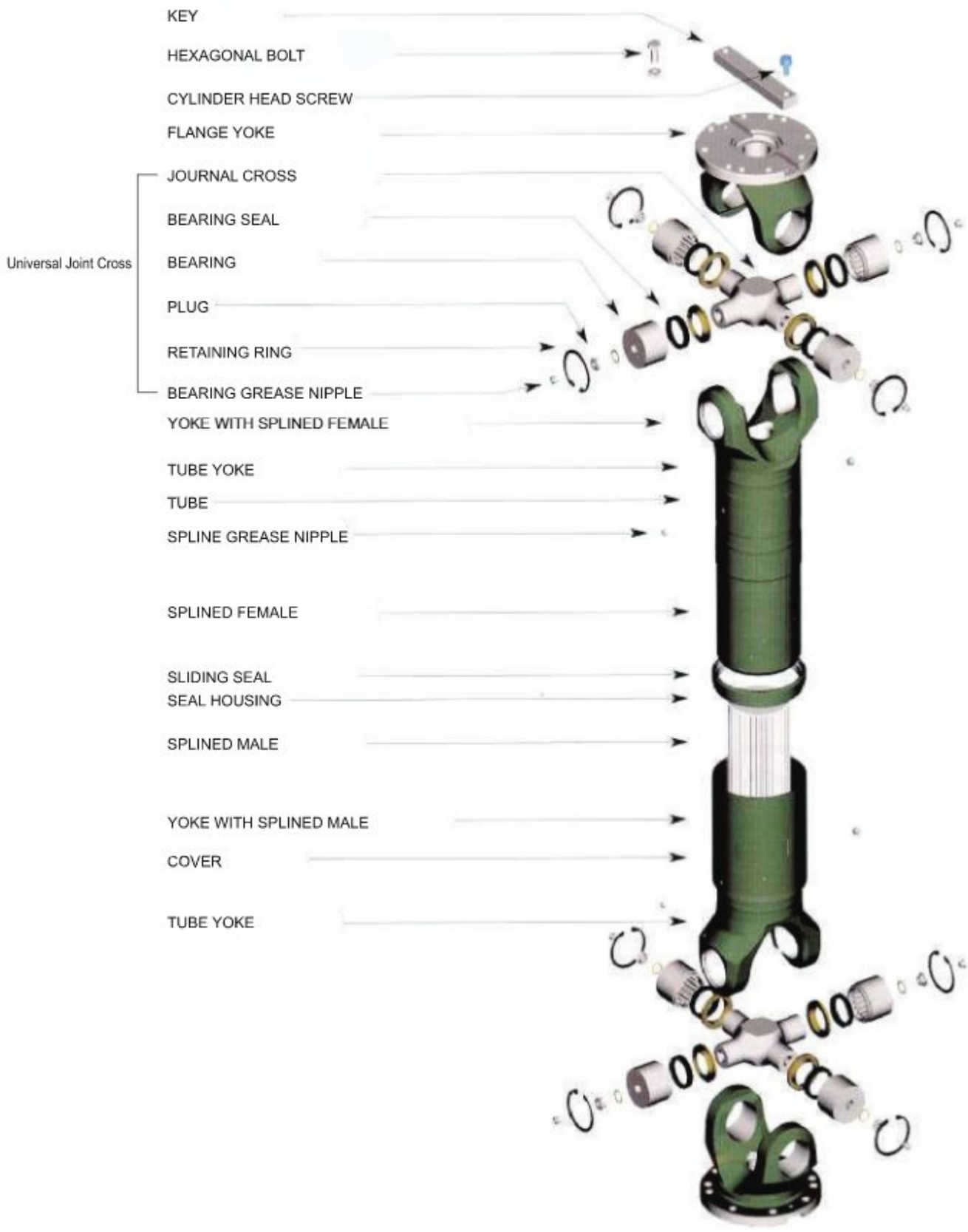
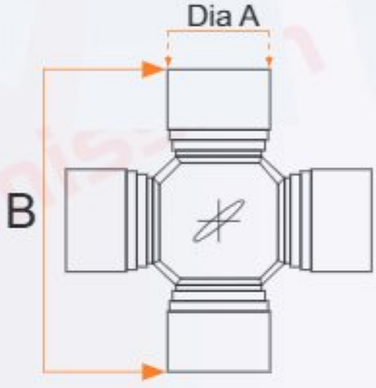
# Universal Joint Shafts



# Complete Cross Kit Assembly

| Model No. | Bearing Dia 'A' | Length - 'B' |
|---|---|---|
| HTU 15 | 15 | 40 |
| HTU 18 | 18.01 | 42.4 |
| HTU 23 | 23.8 | 61.2 |
| HTU 30 | 30.2 | 106.3 |
| HTU 35 | 35 | 96 |
| HTU 42 | 42 | 104 |
| HTU " | 42 | 119 |
| HTU 48 | 48 | 126 |
| HTU 52 | 52 | 133 |
| HTU " | 52 | 146 |
| HTU 57 | 57 | 144 |
| HTU 65 | 65 | 172 |
| HTU 72 | 72 | 185 |
| HTU 74 | 74 | 196 |
| HTU " | 74 | 216 |
| HTU 89 | 89 | 192 |
| HTU 95 | 95 | 190 |
| HTU " | 95 | 218 |
| HTU " | 95 | 240 |
| HTU 110 | 110 | 245 |
| HTU " | 110 | 271 |
| HTU 115 | 115 | 240 |
| HTU " | 115 | 248 |
| HTU " | 115 | 271 |
| HTU 130 | 130 | 268 |
| HTU 145 | 145 | 295 |
| HTU 160 | 160 | 297 |
| HTU 165 | 165 | 297 |
| HTU 185 | 185 | 365 |
| HTU 210 | 210 | 395 |
| HTU " | 210 | 438 |
| HTU 245 | 245 | 520 |




## Caller Type-Close Eye Type

| Model No. | Bearing Dia 'A' | Length - 'B' |
|---|---|---|
| HTC 65 | 65 | 218 |
| HTC 65 | 65 | 220 |
| HTC 74 | 74 | 220 |
| HTC 74 | 74 | 245 |
| HTC 74 | 74 | 280 |
| HTC 83 | 83 | 280 |
| HTC 83 | 83 | 275 |
| HTC 91 | 91 | 242 |
| HTC 95 | 95 | 310 |
| HTC 110 | 110 | 330 |

***Customize design & size in our manufacturing range...***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# Universal Joint Shafts

## THE SELECTION

The following data is presented as a preliminary selection overview to enhance the understanding of the appropriate procedure.
There are two major factors utilized in the selection of industrial universal joints.

- Comparison of Universal Joint torque of industrial universal joint
- Calculating expected B-10 bearing life

**Length Abbreviation**
**Cardan Shaft with Length Compensation**

Lo Operating Length
Lz Compressed Length of Cardan Shaft
Lz Available length compensation (stroke)

The distance between the driving and driven machines, together with any length changes during operation, determines the operating length.

Optimum operating length: $Lo/opt = Lz + \frac{La}{3}$

Optimum operating length: $Lo/max = Lz + La$

| Service factor type | Driven equipment | K |
|---|---|---|
| Light shock load | Generators Centrifugal purpose Ventilators Wood handling machines Belt conveyors | 1.1 to 1.3 |
| Medium shock load | Compressors (multi-cyl.) Pumps (multi-cyl.) Small section mills Continuous wire mills Conveyor primary drives | 1.3 to 1.8 |
| Heavy shock load | Marine transmissions Transport roller tables Continuous working roller tables Compressors (single-cyl.) Pumps (single-cyl.) | 2 to 3 |
| Extra heavy shock load | Crane accessory drives Crushers Reversing working roller tables Reeling drives Scale breakers | 3 to 5 |
| Extreme shock load | Feed roller drives Plate shears | 6 to 15 |

Selection Step No. 1

A. Calculated Torque (CT):

$$CT = \frac{HP \times 9550}{RPM}$$

If the application is without torque overload, this calculated torque number must be less than the peak torque rating (TS) for the universal joint selected.

B. Equivalent Torque(ET):

ET = Calculated Torque x Service Factor (Tabled)

If the application exhibits torque spikes, multiply the calculated torque by the appropriate service factor found in table 1. Typical application are steel rolling mill, crane drives, shredders etc.

Peak Static Torque (TS)

Maximum permissible torque for infrequently occurring torque spikes. above this torque the bearing may brinnel their running surface. This will severely decrease the life of the universal joint.

Reversing Fatigue Torque (TR)

For reversing applications, the equivalent torque must be less than the universal joint reversing fatigue torque value listed with each u-joint series in the dimensional data pages that follow. This will insure maximum u-joint life.

Pulsating Fatigue Torque (TP)

For uni-directional applications, the equivalent torque must be less than the universal joint pulsating fatigue value (TP) to maximize universal joint life.

NOTE:- Occasional torque spikes exceeding these limits (TR & TP) on an infrequent basis are acceptable providing they do not exceed the (TS) Peak Static Torque Value.

NOTE:- The torque capacities are based on material strength. When approaching these limits. This is particularly important on flanges utilizing a friction connection

**Step No. 2 - Selection based upon bearing life**

Bearing life formula:-

$$B\text{-}10 = \frac{1.5 \times 10^7}{RPM \times Angle} \times \left\{ \frac{\text{Bearing Life Factor}}{\text{Adjusted Normal Torque}} \right\}^{10/3}$$

RPM - Universal Joint Operating RPM
Angle - Operating Angle in Degrees.
The minimum angle for calculation purposes is 3 degrees.

Bearing life factors (BF) - Value can be found in Torque Rating Section for each u-joint series.

**Selection Step No. 3 - Speed to angle ratio**

Due to the kinematic condition of universal joints, the joint operating angle must be limited in relation to rotational speed.

**Multiply speed (RPM) x Joint Angle**
This calculation must be less than the table II value for the selected universal joint, under all operating conditions. Each series also has a maximum permissible operating speed that must not be exceeded.

**Selection Step No. 4 - Critical Speed**
All shaft assemblies have a critical speed (natural frequency). To avoid potentially damaging vibration, shafting must be designed to operate sufficiently below this critical speed. Other areas of resonance vs natural frequency must also be avoided.

**Selection Step No. 5 - Torsional Analysis**
In certain application (i.e. wastewater pumping) it is also necessary to analyze the system torsionally to avoid potential damaging resonance conditions.

**Further Selection Steps - (Apply if appropriate)**

- Diameter restrictions due to equipment configuration
- Verify that u-joint series selected has angular capacity greater than maximum operating angle
- Determine required shaft length and length compensation
- Verify bore size and any special flange requirement
- Verify correct kinematics

***Hardy transmission team always ready for suggestion in torque calculation & design***

# Universal Joint Shafts

## STORAGE

- Cardan/universal shaft is placed in dry place to control the humanity and cleanliness
- Wooden shelf or pallet is needed to place the shaft. Wood block is used to fix universal shaft to avoid its rolling and support the spline shaft as well.
- In case that universal shaft is placing in vertical conditions, it should be fixed well to avoid inclination.

## General assembly Rules

Make sure angular location of Yokes is correct . The Yokes should be in same line .Check for Arrow Marks/match marks.

Take care of cleaning the surfaces that will come in contact , most of all that concerns lubricants , rust , paint & dirt. Remove any safeties that may have been set against accidental coming out during transportation. During assembly do not force with levers or other tools specially in Universal Joint Area. Make sure that bolts are tightened by torque wrench to recommended tightening torque. In case of painting make sure area where sealing slides shall not be painted.

## Maintenance

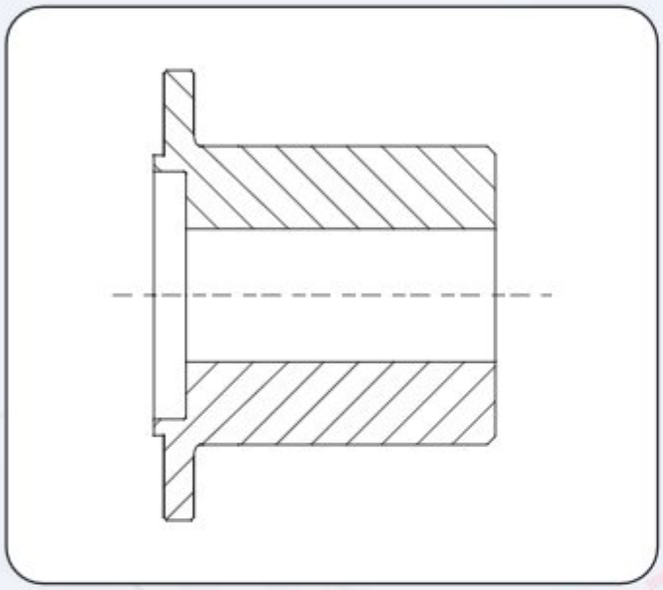
Maintenance Interval will depend on environmental and working conditions. However we suggest that you carry out regularly , planning with maintenance of other components - but without extending them over six months. The controls to be made concern correct tightening of bolts & control of play in Spiders ( U Joints) and of sliding action. For washing drive shafts do not use steam or pressure water. Do not use aggressive chemical detergents. In case of washing an accurate re greasing must be provided

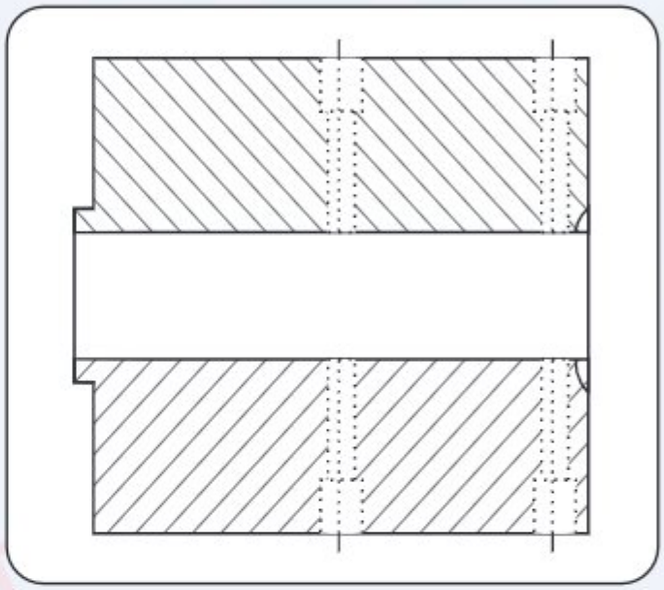
## Lubrication

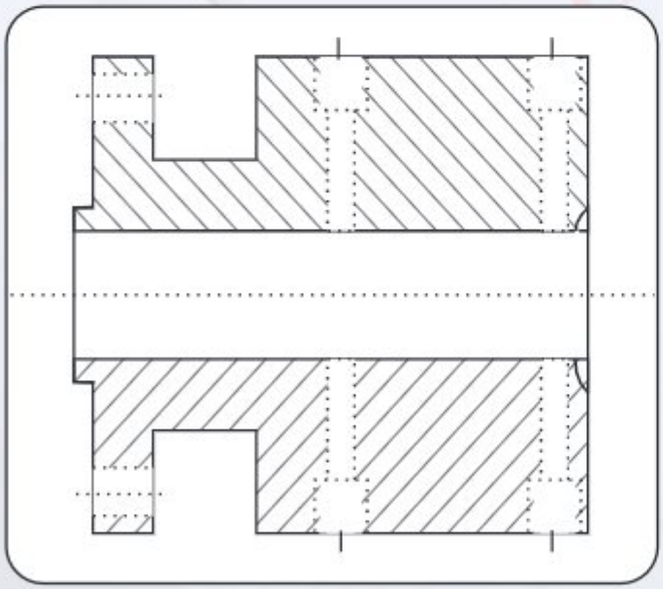
After drive shafts have been installed always check correct filling with grease of the Universal Joints. The pumping of grease should be continued until grease comes out from sealing. Lubrication of Universal Joints should be done after every 2000 Hours of running or 12 months whichever is earlier. In order to re grease always use Lithium Base Grease such as :

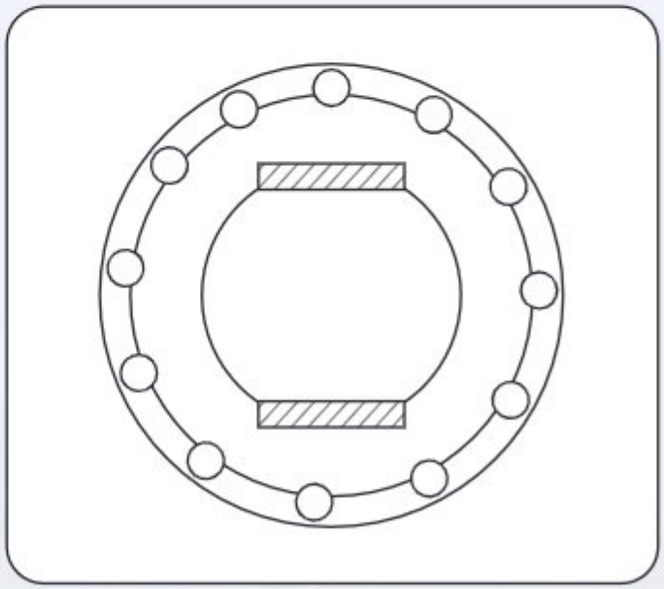
Servo Multipurpose of IOC , Multipurpose Grease of Indrol , Multipurpose Grease MP II of Bharat

# TYPE OF COMPANION HUBS









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# Universal Joint Shafts





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# Universal Joint Shafts

## HARDY TRANSMISSION QUESTIONNAIRE

***AVAILABLE INFORMATION ONLY***

1) Type of Machine _____
2) Driving Power (HP) or (KW)/Tq _____
3) Type of load _____
   a) Regular _____
   b) Frequently Stop _____
   c) Reverse direction _____
4) Shock factor if any _____
5) Speed
   a) Maximum speed (RPM) _____
   b) Minimum speed _____
6) Assembly Length
   a) Shortest (Minimum) _____
   b) Longest (Maximum) _____
   c) Fixed _____
7) Joint Angles Approximately _____
8) End Fitment Dimension
   a) Dia _____
   b) PCD _____
   c) No. of Holes & Size _____
   d) Groove _____
   e) Keyed _____
   f) Cross Bearing Dia (Approximately) _____
9) Any special requirement _____

Name _____ Mob : _____

Organization Name _____

# After Sales Service

## Ensuring Customer Satisfaction

## SALES - SERVICE

Our marketing engineers across India controlled by head office are available for observe your technical issue & convey to head office for technical support during the design, the installation, apart from this - after installation the maintenance & the evaluation of the performance. Replacement spare are readily available for "Hardy Transmission Products".

Remarks : _____

_____

_____

_____

**Hardy Transmission Pvt. Ltd.**

An ISO 9001 : 2015

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sales@hardytranmission.com / jointshaft@gmail.com