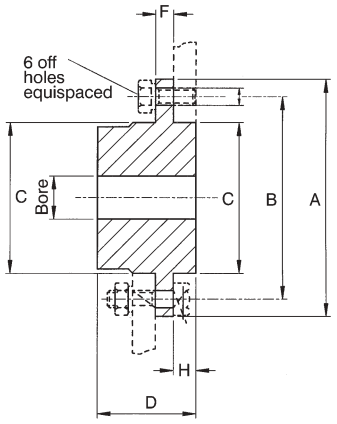
# Steel Adaptors and Idler Sprockets

## Detachable Hubs

| Hub Ref. | Min. Bore | Max. Bore | A | B | C | D | E | F | H | App. Wt. |
|---|---|---|---|---|---|---|---|---|---|---|
| D30 | 8 | 20 | 55 | 45 | 30 | 20.0 | 4.2 | 4 | 3.0 | 0.15 |
| D40 | 10 | 26 | 70 | 58 | 40 | 25.0 | 5.2 | 5 | 5.2 | 0.32 |
| D50 | 14 | 32 | 80 | 67 | 50 | 32.0 | 6.2 | 7 | 7.0 | 0.61 |
| D60 | 16 | 40 | 90 | 76 | 60 | 38.5 | 6.2 | 7 | 8.7 | 0.95 |
| D70 | 20 | 45 | 110 | 94 | 70 | 45.5 | 8.2 | 8 | 10.5 | 1.90 |
| D80 | 25 | 52 | 130 | 107 | 80 | 55.0 | 8.2 | 12 | 15.0 | 2.65 |
| D100 | 30 | 65 | 170 | 140 | 100 | 73.0 | 10.2 | 17 | 23.0 | 6.00 |
| D140 | 35 | 90 | 220 | 182 | 140 | 83.0 | 12.2 | 20 | 23.0 | 13.08 |
| D160 | 40 | 104 | 245 | 205 | 160 | 93.0 | 16.5 | 25 | 25.0 | 18.80 |

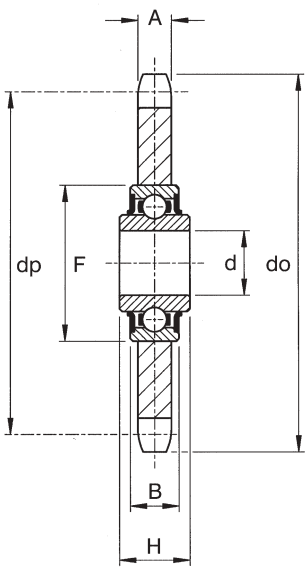



All dimensions in mm.
Hubs can be supplied bored and keywayed to customers requirements.

## Idler Sprockets

The standard Idler Sprockets in this series are supplied complete with built in fully shielded and greased for life ball bearing, providing full lifetime maintenance free operation. Two standards of bearings are offered, an economy bearing for light duty applications, and a top quality European bearing for higher loads and speeds.
The extended width inner race enables correct mounting on the shaft without the need for spacers. The sprocket is manufactured from medium carbon steel and secured to the outer race of the bearing by press fit.
Many chain drives, by virtue of their design, require a tensioning sprocket, and where fixed idlers are preferred this range of Idler Sprockets provides the ideal solution.
In addition to the standard range, Idler Sprockets can be manufactured to order to suit other sizes of B.S. Standard Chains and ANSI Series, in both Simplex and Multistrand construction, and with alternate numbers of teeth.

| Part No. | Chain Size | Sprocket Dimensions | | | | Bearing Dimensions | | | | Weight |
|---|---|---|---|---|---|---|---|---|---|---|
| | | No. Teeth Z | P.C.D. dp | Outside dia do | A | d | F | B | H | Approx. kg |
| IS06B-1 | 06B-1 | 21 | 63.90 | 68.0 | 5.3 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.16 |
| IS08118 | 081 | 18 | 73.14 | 78.9 | 3.0 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.21 |
| IS08318 | 083 | 18 | 73.14 | 78.9 | 4.5 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.20 |
| IS08B16 | 08B-1 | 16 | 65.10 | 69.5 | 7.2 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.18 |
| IS08B18 | 08B-1 | 18 | 73.14 | 77.8 | 7.2 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.23 |
| IS10B14 | 10B-1* | 14 | 71.34 | 78.0 | 9.1 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.24 |
| IS10B15 | 10B-1* | 15 | 76.36 | 83.0 | 9.1 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.27 |
| IS10B17 | 10B-1* | 17 | 86.39 | 93.0 | 9.1 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.33 |
| IS12B13 | 12B-1 | 13 | 79.59 | 87.5 | 11.1 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.36 |
| IS12B15 | 12B-1 | 15 | 91.63 | 99.8 | 11.1 | $16^{+0.26}_{+0.13}$ | 40 | 12 | 18.3 | 0.45 |
| IS16B12 | 16B-1 | 12 | 98.14 | 109.0 | 16.2 | $20^{-0.01}_{0}$ | 47 | 14 | 17.7 | 0.65 |
| IS20B13 | 20B-1 | 13 | 132.65 | 147.8 | 18.5 | $25^{-0.01}_{0}$ | 52 | 15 | 21.0 | 1.43 |




*Also suitable for ANSI 50 Chain.

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# Cross Tensioners

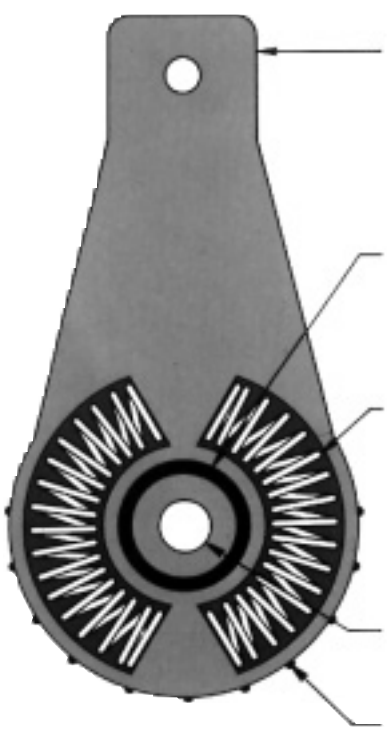
Cross Tensioners provide constant belt or chain tension. Their automatic tensioning action translates into improved performance and extended life for most types of fixed-centre drives. Additionally, the built-in spring mechanism acts as a buffer, absorbing momentary overloads and reducing vibration.
Tensioners are available in a number of sizes and mounting styles, ideally suited for drives on agricultural machinery, off-road vehicles, conveyors, packaging machinery, printing presses and many other industrial applications.
Precision construction and high-quality materials are combined for a superior product with proven durability in the toughest environments.
Tensioners can be supplied as base units for adaption by customer, or as complete assemblies with chain sprockets/ guides for roller chain applications. There are two basic designs of tensioners available; the Rotary Tensioner and the Linear Tensioner.

## Rotary Tensioner Type RT

Rotary Tensioners provide a full 90° of useable tensioning action. This unique design conserves space and simplifies tensioning adjustment.
The fully automatic takeup action is achieved by using multiple alloy steel compression springs completely captivated within the body of of the tensioner. There are no exposed moving parts that can cause injury or jam under adverse conditions.
Both body members are high quality aluminium diecastings fitted with oil-impregnated sintered bronze bearings. They are ideally suited for use on outdoor equipment, operating reliably at both high and low temperatures.
For extremely corrosive applications, units with stainless steel springs can also be supplied.
Levels of tension can be set with aid of the adjustment marks on the rim of the rotating arm. For additional positional security a 6mm diameter locking pin hole is provided on the rear mounting face.
The basic tensioner is combined with roller chain idler sprockets for a standard range of chain tensioners, see series CRT.

## Linear Tensioner Type LT

Linear Tensioners provide fully automatic straight-line takeup for all types of drive mechanisms. Each unit consists of a rectangular aluminium diecasting which houses two hardened and ground steel reciprocating shafts which are outwardly spring-loaded. The shafts are attached to a triangular mounting block.
All components are made of metal; there are no rubber elements to stretch or cold flow when exposed to harsh operating conditions. Use of sintered bronze oil-impregnated bearings assures long trouble-free life with no need for maintenance. For extremely corrosive applications, units fitted with stainless steel shafts and springs are available.
To provide a standard series of chain tensioners, series CLT the triangular mounting block is replaced by polyethylene chain guides. Two series are available, the standard with 89mm radii guides for smooth operation, and a compact series with reduced radii guides for when space is limited.
For applications where rigid adjustment is preferred tensioners type CT can be used.



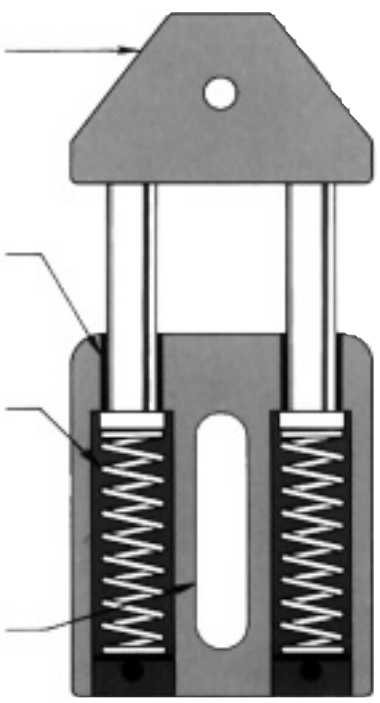
### Frames
All structural members are made of high-strength diecast aluminium material. Heavy wall sections and/or ribbing prevents deflection under eccentric loads. All mounting surfaces and bearing seats are fully machined.

### Bearings
Oil-impregnated, sintered bronze bearings are used to provide smooth, reliable movement at all wear points. Bearings are press-fitted in position and never require lubrication.

### Springs
Tensioning action is provided by the use of multiple compression springs. These springs are made from alloy steel accurately wound to tight manufacturing tolerances to provide consistent tensioning force Springs are grease-lubricated for long life and quiet operation.

### Mounting Holes
Only a single bolt is required for mounting and tension adjustment.

### Adjustment Marks
Enable easy setting of tension.



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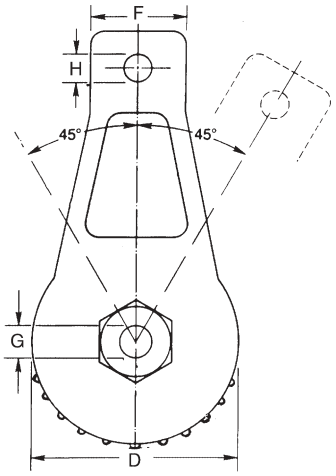
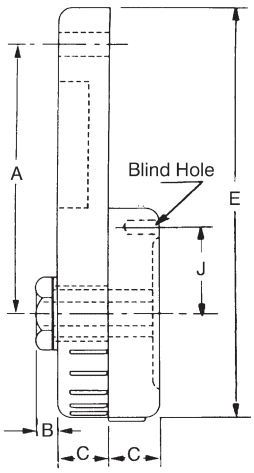
# Cross Tensioners

## Rotary Tensioner - Series RT

Provides up to 90° useable tensioning action.

A blind hole is provided in the mounting face to enable location with a pin in the framework if rapid positioning of the tensioner is required.



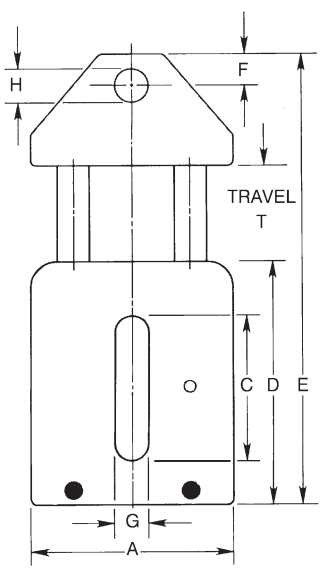

***Blind Hole 9mm deep***
6mm Ø RT 1000 Series
8mm Ø RT 2000 Series

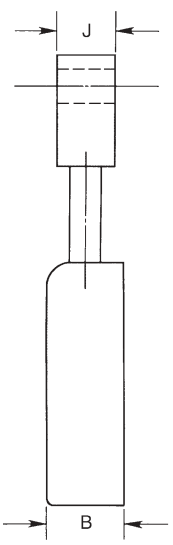
| Cat. No. | Torque Range | A | B | C | D | E | F | G | H | J |
|---|---|---|---|---|---|---|---|---|---|---|
| RT1001 | 8-18 Nm | 88.9 | 5.6 | 15.0 | 70 | 136 | 30 | 3/8" UNC | M10 | 29.5 |
| RT1002 | 8-18 Nm | 88.9 | 5.6 | 15.0 | 70 | 136 | 30 | 3/8" UNC | 10 | 29.5 |
| RT2001 | 20-34 Nm | 101.6 | 6.9 | 17.5 | 92 | 160 | 37 | 1/2" UNC | 1/2" UNC | 36.0 |
| RT2002 | 20-34 Nm | 101.6 | 6.9 | 17.5 | 92 | 160 | 37 | 1/2" UNC | 13 | 36.0 |

RT Series incorporate adjustment marks every 15 degrees to enable simple setting.

## Linear Tensioner - Series LT

Provides up to 43mm linear adjustment with accurate control.




| Cat. No. | Spring Force N | Travel T | A | B | C | D | E min | E max | F | G | H | J | T |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LT1002 | 66-178 | 29 | 60 | 25 | 48 | 75 | 111 | 140 | 10 | 10.5 | 9.9 | 20 | 29 |
| LT2002 | 89-267 | 31 | 75 | 30 | 60 | 90 | 144 | 175 | 12 | 12.5 | 13.0 | 25 | 31 |
| LT3002 | 155-400 | 43 | 90 | 35 | 75 | 108 | 167 | 210 | 14 | 14.5 | 13.0 | 30 | 43 |

All dimensions are in mm except where indicated.
LT Series can be supplied with hole 'H' tapped to 3/8" UNC (LT 1000 Series) or 1/2" UNC (LT 2000 and 3000 Series).

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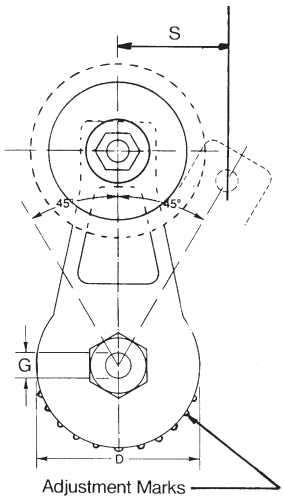
# Rotary Chain Tensioners

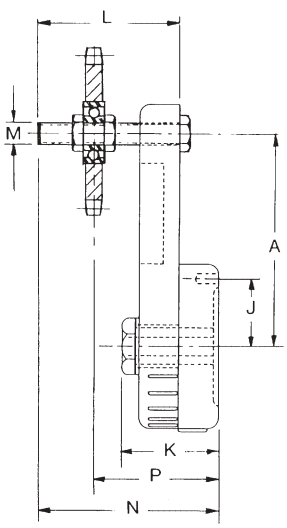
## *Suitable for Simplex, Duplex and Triplex Chain Drives for British Standard Roller Chains*

Sprung loaded chain tensioners can extend the life of roller chain on fixed centre drives by more than 30%, particularly where centre distance exceeds 40 times chain pitch. They can be used for drives operating in either direction providing a smoother drive, self tensioned and so are virtually maintenance-free. Of robust construction the chain tensioners provide an angular movement of 45°.
A blind location hole is machined on the mounting face at radius J, diametrically opposite the adjustment indicator. Although not required for normal operation of the tensioner, the location hole can be used, with a corresponding pin in the framework, for quick positioning or additional torque resistance.

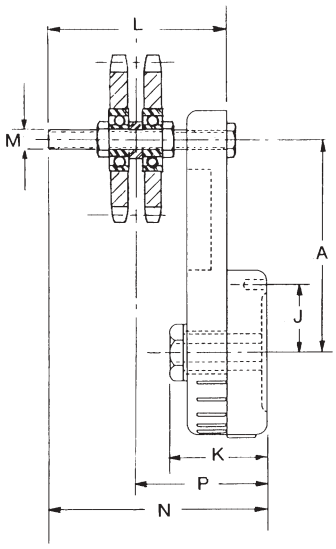



### *Blind Hole for Location*

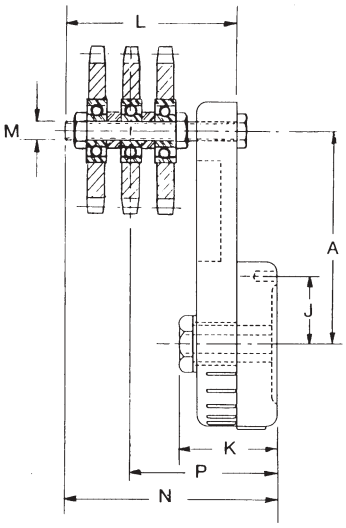
CRT 1000 Series
6mm Ø x 9mm deep
CRT 2000 Series
8mm Ø x 9mm deep




*Simplex Chain*




*Duplex Chain*




*Triplex Chain*

| Tensioner Cat. No. | Torque Range Nm | Chain Size | No. Teeth Idler Z | A | D | G | J | K | L | M | N | P | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SIMPLEX CHAIN** | | | | | | | | | | | | | |
| CRT1106 | 8-18 | 06B-1 | 15 | 88.9 | 70 | 3/8" UNC | 29.5 | 35.5 | 60 | M10 | 75 | 40-63 | 63 |
| CRT1108 | 8-18 | 08B-1 | 15 | 88.9 | 70 | 3/8" UNC | 29.5 | 35.5 | 60 | M10 | 75 | 42-63 | 63 |
| CRT1110 | 8-18 | 10B-1 | 15 | 88.9 | 70 | 3/8" UNC | 29.5 | 35.5 | 80 | M10 | 95 | 43-83 | 63 |
| CRT2112 | 20-34 | 12B-1 | 15 | 101.6 | 92 | 1/2" UNC | 36.0 | 42.0 | 76 | 1/2" UNC | 94 | 50-80 | 72 |
| CRT2116 | 20-34 | 16B-1 | 13 | 101.6 | 92 | 1/2" UNC | 36.0 | 42.0 | 102 | 1/2" UNC | 120 | 58-100 | 72 |
| CRT2120 | 20-34 | 20B-1 | 13 | 101.6 | 92 | 1/2" UNC | 36.0 | 42.0 | 102 | 1/2" UNC | 120 | 61-100 | 72 |
| **DUPLEX CHAIN** | | | | | | | | | | | | | |
| CRT1206 | 8-18 | 06B-2 | 15 | 88.9 | 70 | 3/8" UNC | 29.5 | 35.5 | 60 | M10 | 75 | 45-58 | 63 |
| CRT1208 | 8-18 | 08B-2 | 15 | 88.9 | 70 | 3/8" UNC | 29.5 | 35.5 | 60 | M10 | 75 | 49-56 | 63 |
| CRT1210 | 8-18 | 10B-2 | 15 | 88.9 | 70 | 3/8" UNC | 29.5 | 35.5 | 80 | M10 | 95 | 50-75 | 63 |
| CRT2212 | 20-34 | 12B-2 | 15 | 101.6 | 92 | 1/2" UNC | 36.0 | 42.0 | 76 | 1/2" UNC | 94 | 60-70 | 72 |
| CRT2216 | 20-34 | 16B-2 | 13 | 101.6 | 92 | 1/2" UNC | 36.0 | 42.0 | 102 | 1/2" UNC | 120 | 75-86 | 72 |
| **TRIPLEX CHAIN** | | | | | | | | | | | | | |
| CRT1306 | 8-18 | 06B-3 | 15 | 88.9 | 70 | 3/8" UNC | 29.5 | 35.5 | 60 | M10 | 75 | 50-53 | 63 |
| CRT1308 | 8-18 | 08B-3 | 15 | 88.9 | 70 | 3/8" UNC | 29.5 | 35.5 | 80 | M10 | 95 | 56-59 | 63 |
| CRT1310 | 8-18 | 10B-3 | 15 | 88.9 | 70 | 3/8" UNC | 29.5 | 35.5 | 80 | M10 | 95 | 59-66 | 63 |
| CRT2312 | 20-34 | 12B-3 | 15 | 101.6 | 92 | 1/2" UNC | 36.0 | 42.0 | 102 | 1/2" UNC | 120 | 70-85 | 72 |

All dimensions in mm except where indicated.

### *Mounting Instructions*

The tensioner should always be mounted on the non-driving strand of chain, near to the larger sprocket and in mesh with the outside of the chain. The tensioner arm should be located so that its operating direction is opposite to that of the fixing screw. A clearance hole for the fixing screw is required in the machine framework. The mating surface on which the boss is mounted should be smooth, level and parallel to the line of drive.
The tension pressure is set by slightly loosening the fixing screw, then rotating the hexagon nut and housing to apply suitable tension to the chain, and locking in position by tightening the fixing screw. Tension pressures can be infinitely varied over the torque range indicated in the table. The adjustment marks on the torque arm body can be used for quick setting.

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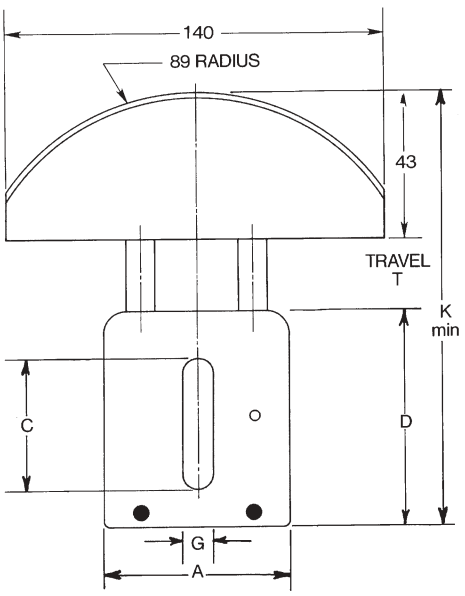
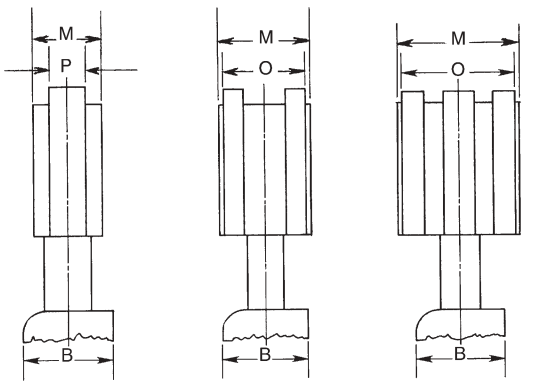
# Linear Chain Tensioners

The Linear Chain Tensioners are based on the 'LT' Series Tensioner, with the aluminium mounting block replaced by a plastic chain guide.
Mounted on the unloaded strand of the chain in compressed condition, the tensioner takes out slack in the chain drive. As the chain wears, the tensioner extends under its spring to take-up the slackness in the drive. The chain guides are manufactured from UHMW Polyethylene, selected for its inherent self lubricating properties, and are available in two series.
The standard series utilises a large radius guide in arc form to provide a smooth chain transmission for quiet operation with minimised wear.
The compact series have smaller radii circular guides, with full 180° wrap possible. These are used where space is restricted, and for tail sprockets on light loaded conveyors. Tensioners are available for simplex, duplex and triplex drives, and are also suitable for extended pitch and rollerless (bush) chains.

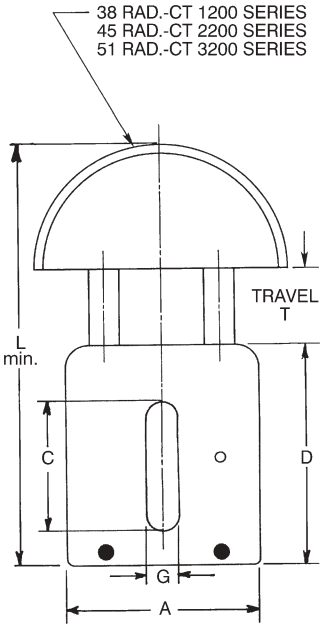



*Standard Series*




*Simplex Chain* *Duplex Chain* *Triplex Chain*

Tensioner body and chain guide width dimensions are same for both standard and compact series, only closed height K/L and guide radii differ.




*Compact Series*

| Chain Size | Catalogue No. | | Spring Force N | Dimensions - mm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Std. Series | Compact Series | | A | B | C | D | G | K* min. | L* min. | M | O | P | T |
| **SIMPLEX CHAINS** | | | | | | | | | | | | | | |
| 06B-1 | CLT 1101 | CLT 1201 | 66-178 | 60 | 25 | 48 | 75 | 10.5 | 119 | 114 | 20 | - | 5.1 | 29 |
| 08B-1 | CLT 1102 | CLT 1202 | 66-178 | 60 | 25 | 48 | 75 | 10.5 | 119 | 114 | 20 | - | 7.1 | 29 |
| 10B-1 | CLT 2101 | CLT 2201 | 89-267 | 75 | 30 | 60 | 90 | 12.5 | 134 | 135 | 22 | - | 8.9 | 31 |
| 12B-1 | CLT 2102 | CLT 2202 | 89-267 | 75 | 30 | 60 | 90 | 12.5 | 134 | 135 | 22 | - | 10.7 | 31 |
| 16B-1 | CLT 3101 | CLT 3201 | 155-400 | 90 | 35 | 75 | 108 | 14.5 | 152 | 160 | 25 | - | 15.7 | 43 |
| 20B-1 | CLT 3102 | CLT 3202 | 155-400 | 90 | 35 | 75 | 108 | 14.5 | 152 | 160 | 25 | - | 18.0 | 43 |
| **DUPLEX CHAINS** | | | | | | | | | | | | | | |
| 06B-2 | CLT 1103 | CLT 1203 | 66-178 | 60 | 25 | 48 | 75 | 10.5 | 119 | 114 | 20 | 15.3 | - | 29 |
| 08B-2 | CLT 1104 | CLT 1204 | 66-178 | 60 | 25 | 48 | 75 | 10.5 | 119 | 114 | 22 | 20.9 | - | 29 |
| 10B-2 | CLT 2103 | CLT 2203 | 89-267 | 75 | 30 | 60 | 90 | 12.5 | 134 | 135 | 25 | 25.0 | - | 31 |
| 12B-2 | CLT 2104 | CLT 2204 | 89-267 | 75 | 30 | 60 | 90 | 12.5 | 134 | 135 | 35 | 30.0 | - | 31 |
| 16B-2 | CLT 3103 | CLT 3203 | 155-400 | 90 | 35 | 75 | 108 | 14.5 | 152 | 160 | 45 | 44.5 | - | 43 |
| **TRIPLEX CHAINS** | | | | | | | | | | | | | | |
| 06B-3 | CLT 1105 | CLT 1205 | 66-178 | 60 | 25 | 48 | 75 | 10.5 | 119 | 114 | 25 | 25.0 | - | 29 |
| 08B-3 | CLT 1106 | CLT 1206 | 66-178 | 60 | 25 | 48 | 75 | 10.5 | 119 | 114 | 35 | 34.8 | - | 29 |
| 10B-3 | CLT 2105 | CLT 2205 | 89-267 | 75 | 30 | 60 | 90 | 12.5 | 134 | 135 | 45 | 39.4 | - | 31 |

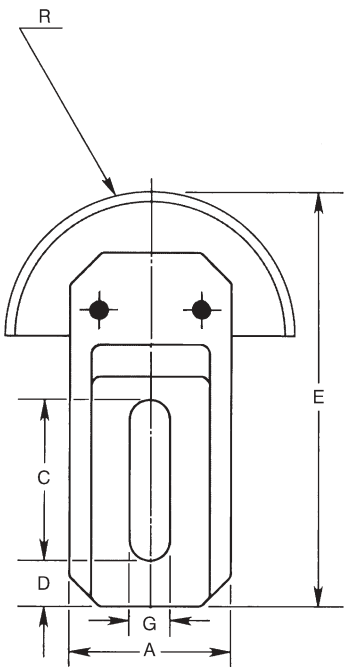
*Lmax = Lmin+T
Kmax = Kmin+T

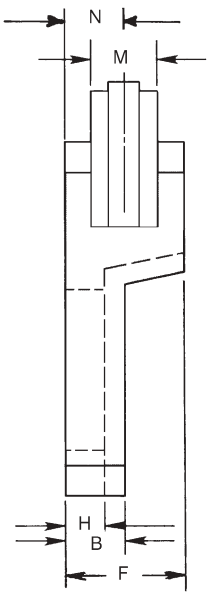
## *Mounting Instructions*

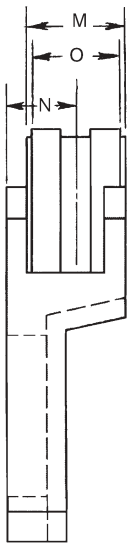
The tensioner should be positioned to operate on the outer side of the non-driving strand of chain. The surface to which the tensioner is clamped must be flat, smooth, and parallel to the line of drive. The tensioner is retained by a metric bolt with standard washer located at a minimum distance from chain centre line equal to (K - 0.7D + 1)mm or (L - 0.7D + 1)mm as applicable. On initial installation the bolt will be at the top of the slot providing automatic chain adjustment over travel distance T. If further movement is later required the unit can be advanced and reclamped with bolt lower in the slot.

# Efson Fixed Chain Tensioners

The Efson Fixed Chain Tensioner uses the UHMW polyethylene circular guides from the compact linear tensioner, mounted in a rugged die cast aluminium frame which is slotted to enable quick adjustment in any direction using a single bolt.
This economical tensioner is ideal for applications where automatic tensioning is not required and for drives subject to frequent speed changes or torque reversals. It is possible to reverse drives with this tensioner providing speeds and chain loads are low.
The tensioner should always be mounted on the outside of the non driving chain strand close to the larger sprocket.




*Simplex Chain* *Duplex Chain*

| Catalogue No. | Chain Size | Dimensions in mm | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | E | F | G | H | M | N | O | R |
| CT1401 | 06B-1 | 40 | 15 | 73 | 10 | 141 | 30 | 10.5 | 10 | 20 | 15 | | 38 |
| CT1402 | 06B-2 | 40 | 15 | 73 | 10 | 141 | 30 | 10.5 | 10 | 20 | 15 | 15.3 | 38 |
| CT1403 | 08B-1 | 40 | 15 | 73 | 10 | 141 | 30 | 10.5 | 10 | 20 | 15 | | 38 |
| CT2401 | 08B-2 | 50 | 18 | 85 | 12 | 157 | 36 | 13 | 12 | 22 | 18 | 20.9 | 38 |
| CT2402 | 10B-1 | 50 | 18 | 85 | 12 | 164 | 36 | 13 | 12 | 22 | 18 | | 45 |
| CT2403 | 12B-1 | 50 | 18 | 85 | 12 | 164 | 36 | 13 | 12 | 22 | 18 | | 45 |
| CT3401 | 10B-2 | 60 | 20 | 82 | 13 | 164 | 40 | 13 | 14 | 25 | 20 | 25.0 | 45 |
| CT3402 | 12B-2 | 60 | 20 | 82 | 13 | 164 | 40 | 13 | 14 | 35 | 25 | 30.0 | 45 |
| CT3403 | 16B-1 | 60 | 20 | 82 | 13 | 169 | 40 | 13 | 14 | 25 | 20 | | 51 |
| CT3404* | 16B-2 | 60 | 20 | 82 | 13 | 169 | 40 | 13 | 14 | 45 | 30 | 44.5 | 51 |
| CT3405* | 20B-1 | 60 | 20 | 82 | 13 | 169 | 40 | 13 | 14 | 25 | 20 | | 51 |

*On these tensioner sizes additional clearance is required beyond tensioner mounting block to provide minimum chain path clearance.

## *Mounting Instructions*

The tensioner should be positioned to operate on the outer side of the normally non-driving strand of chain. The surface to which the tensioner is clamped must be flat, smooth and parallel to the line of drive. The tensioner is retained by a single bolt with standard washer located at a minimum distance from chain centre line of 1/2E.
Adjustment is made by positioning of bolt in slot plus turning tensioner up to 45 degrees from the perpendicular to chain centre line.

# 'HV' Inverted Tooth Chain Drives

## For High Velocity, High Horsepower and High Efficiency Drives with smooth transmission of load in a compact space.

Morse HV Drives provide the Drive Designer with a new concept in the transmission of power for high speed, high load applications. Proven in a wide range of applications from high production automobiles to custom-designed flood control pumps, HV Drives offer opportunity for flexibility, compactness, weight saving and economy.
In the late 1940's Morse Chain Engineers developed the original design of 'HV' to meet the high speed, high load requirements of Oil Well Drilling equipment. The first chain 2" Pitch x 12" Wide transmitted 1300kW at 650 r.p.m. on the slush pump of a drill rig. Success on this and similar applications led to the further development of a family of chains from 3/8" to 2" pitch which have been successfully applied to a wider variety of industrial applications including Roll Grinders, Dynamometers, Pump Drives, Gas Turbine Starters, four Square Test Rig, and many Automotive Transmissions. Further development of HV chain enables drives over 2,500kW being accommodated with standard chain widths.

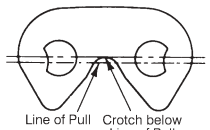
## 'HV' Chain Design

The Chain assembly consists of inverted tooth link plates, laced alternately and connected by two steel pins of the same cross sectional geometry, which form an articulating joint between the link sections.

## 'HV' Link Plate Design

The link design in the original HV pitches - 3/4", 1", 1 1/2" and 2" (Fig 1) had been tested and proven for many years. The link crotch is located slightly above the line of pull and all corners are rounded to minimise the possibility of stress risers and to ensure maximum performance on high load industrial applications.
The 3/8" and 1/2" pitch chains (Fig. 2) have a new link contour for increased speed requirements, with the link crotch below the line of pull, and this design is now extended to include 3/4" and 1" pitches. Photo-elastic studies of various link shapes and aperture positions produced the design with the lowest level of stress concentration. Improved metallurgy, and development in design and pressure angle, achieve maximum load capacity with high speed performance. Carefully controlled shot-peening of the links gives them a uniform, matt grey finish and results in an improved level of link fatigue resistance.

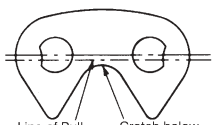
Fig. 1




Chain Pitches 11/2 and 2 inch plus 3/4 and 1 inch for replacement

Type 61-115

Fig. 2




Chain Pitches 3/8, 1/2, 3/4 and 1 inch

Type 63-139

HV Chain Link Plates

## Concentric Pin and Rocker Joint

The joint consists of a pin and rocker of identical cross section and contact radii. When chain engages the sprocket teeth the curved surfaces roll on each other eliminating sliding friction, and joint galling. The radii of the pins is selected to give almost perfect pitch compensation to minimise chordal* action. Before engagement with the sprocket the contact point of pin and rocker is below pitch line (Fig. 3). When chain engages with the sprocket teeth, the contact point moves upwards (Fig. 4) with slight elongation of the pitch to wrap the sprocket along the pitch line.

Fig. 3

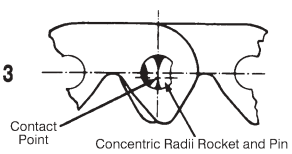



Fig. 4


## Chordal Action

The compatible design of HV links, joints and sprockets reduces the detrimental effects of chordal action to a minimum. The chordal action of conventional chain drives is the vibratory motion caused by the rise and fall of the chain as it engages sprocket teeth. This motion causes vibration and limits high speed load carrying capability. Of all types of chains, HV operates most efficiently at all speeds because chordal action is reduced to a minimum.
Fig 5. shows how HV chain enters approximately tangent to the pitch circle of the sprocket and maintains this position as it travels around the sprocket. This smooth engagement permits high speed capabilities with efficiency and quietness.

## Involute Tooth Sprocket

The third criteria for the success of HV is the mating sprockets. An involute tooth form, differing from the straight sided teeth of conventional silent chain sprockets is designed for smooth engagement of the chain with the sprocket teeth. All HV sprockets are top-hobbed and the teeth heat treated for tough wear resistant surface. Unlike the single tooth engagement of spur gears, many teeth share the load on a HV drive, resulting in low stresses, less wear, and long sprocket life.

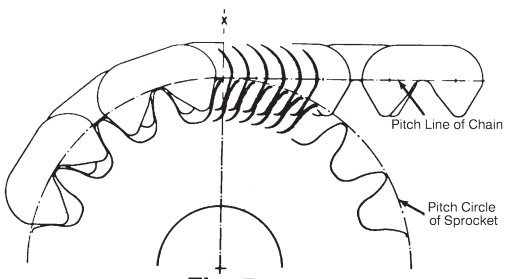



Fig. 5

## You get more with 'HV'

The features of 'HV' link design, compensating pin and rocker joint, with the involute hobbed sprockets means HV chain can transmit more power, at higher speeds, in less space than other transmission media, with smooth action and minimum of noise.

***High Speed Performance*** Operating chain speeds range from 10 to 35 metres per sec. with higher speeds (to 55m/sec) on special applications.

***High Power in Narrow Widths*** HV chain transmits more power per inch of width than any other chain or belt drive, with capacities up to 6000 kW.

***Smooth Quiet Operation*** The rolling action of the chain joints combined with smooth sprocket engagement minimise induced vibrations. This enables HV chain to provide quiet drives on high speed applications.

***High Efficiency*** Smooth operation, with minimal frictional losses, provide transmission efficiencies up to 99.7%.



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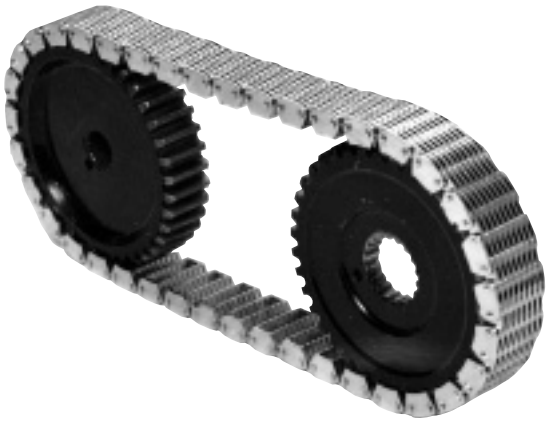
# 'HV' Chain - Selection

## *There are Seven good reasons to use HV in your design!*

HV transfer cases provide weight and cost savings because:



1. ***Fewer Shaft*** and Bearings are required.
2. ***Lighter Loads*** on Shaft Bearings.
3. ***Chain Bearing Loads*** are compressive, placing case in compression, unlike gear forces which are tensile.
4. ***HV Cases are Lighter*** as compressive loads mean thinner sections can be used.
5. ***Centre Distance is less Critical*** and more flexible than required by gear and belt drives.
6. ***Elasticity of HV Chain*** accommodates normal thermal expansion, and helps 'cushion' the drive.
7. ***Simplified Design*** results in a positive cost saving.

## *'HV' Drive Selection*

Design of a 'HV' Chain Drive involves correct selection of chain and sprockets combined with correct casing design and lubrication system. The Power Rating tables opposite, giving power ratings per inch width of chain, enable selection of chain with drives operating under ideal conditions of smooth power source and load. To use these tables for other drives involving shock loads the Actual Power must be modified by a Service Factor to obtain the Design Power which can then be related to the tables.

## *Service Factors - S.F.*

| Type of Load | Int. Comb. Eng. Hydraulic Drive | Electric Motor | Int. Comb. Eng. Mechanical Drive |
|---|---|---|---|
| Smooth | 1.0 | 1.0 | 1.2 |
| Moderate Shock | 1.2 | 1.3 | 1.4 |
| Heavy Shock | 1.4 | 1.5 | 1.7 |

## *'HV' Drive Selection*

1. Determine the R.P.M. and diameter of the high speed shaft.
2. Determine the total power to be transmitted.
3. From application detail determine proper service factor from table. Refer page 7 in Roller Chain Selection for machine types.
4. Establish Design Power by multiplying total Power to be transmitted by the service factor.

   Design Power kW = Motor Power × S.F.
5. Select the chain pitch and width and number of teeth in the small sprocket from the Power Rating Tables.
   a. For quiet and smooth drives use sprockets 25 teeth or more.
   b. Be sure the small sprocket will accommodate the high speed shaft diameter. As a guide with steel sprockets Pitch Circle Diameter should be minimum twice shaft diameter PCD $\triangleq \frac{Zp}{\pi}$
   c. If the high speed shaft diameter exceeds the maximum bore in the selected small sprocket it will be necessary either to increase the number of teeth in the sprocket or select the next larger pitch chain.
6. Determine the required drive ratio:

   $\frac{\text{RPM high speed shaft:}}{\text{RPM slow speed shaft:}}$ = Ratio
7. Multiply the number of teeth in the small sprocket by the ratio to obtain the number of teeth in the large sprocket.
8. To determine chain length and centre distance refer to page 9. Centre distance and sprocket combination must always provide an even number of pitches of chain. For fixed centre drives it is recommended to use Centre Distance tables. HV drives should always be installed with a slight preload, and to provide this the actual centre distance is obtained by increasing the theoretical by 0.07%. Manufacturing tolerances should always be on the plus side. Further advice on centre distance requirements can be obtained from Cross+Morse Engineering.
9. As more than one pitch of chain could be selected for most applications consideration should be given that the shaft centre distance should never exceed 60 times pitch, and that large pitch, narrow width selections are better for shock loading and commercial considerations; however, small pitch chains operating on sprockets with high numbers of teeth give smoothest drives with minimum noise level. Whilst preliminary drive selection can be made from the tables it is recommended that all 'HV' Drives be referred to Cross+Morse Engineering Department for final approval.
10. The design and manufacture of the sprockets is critical for correct drive operation. General dimensional details are provided on page 75. Sprockets with 35 teeth or less are best manufactured from low carbon alloy steels with teeth carburised and hardened. Larger sprockets can be manufactured from medium carbon steels or mechanite castings and induction or flame hardened. Teeth must be generated to the special involute form for smooth drive operation.
    For 1:1 drives it is preferable to use even tooth sprockets for smooth drive, but on all reduction drives it is best to use odd number teeth in small sprocket for maximum drive life. Idler sprockets should never be used. Cross+Morse can offer the full range of 'HV' sprockets - manufactured to meet customers requirements. If not specified, through bore length, hub diameter and all manufacturing tolerances will be Morse Standards. Materials and Tooth hardness will always be to Morse Specification.



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# HV Chain - Selection Tables (kW)

The tables below provide power ratings in kW for chains of 1″ width. To obtain capacity of other widths multiply width (inches) by rating obtained from table. Whilst tables cover sprockets from 21 teeth, it is recommended to use a minimum of 25 teeth for maximum chain performance and life. Preliminary selection can be made with these tables, but it is recommended that all selections should be confirmed with Cross & Morse Engineering prior to implementation. For applications with powers and/or speeds outside tables, consult Cross+Morse Engineering.

## 3/8" Pitch - HV3
## Chain Type 63-139

Stock Widths:
3/4″, 1″, 1 1/2″, 2″, 3″

| No. Teeth | RPM | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1500 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 5500 | 6000 | 6500 | 7000 | 7500 | 8000 | 9000 |
| 21 | 19 | 25 | 31 | 37 | 42 | 48 | 53 | 58 | 62 | 66 | 70 | 73 | 76 | 78 | 80 |
| 23 | 21 | 27 | 34 | 40 | 46 | 52 | 57 | 62 | 66 | 70 | 74 | 77 | 79 | 80 | 81 |
| 25 | 22 | 29 | 36 | 43 | 50 | 56 | 61 | 66 | 70 | 74 | 77 | 79 | 80 | 81 | |
| 27 | 24 | 32 | 39 | 47 | 53 | 59 | 65 | 69 | 74 | 77 | 79 | 80 | 81 | | |
| 29 | 26 | 34 | 42 | 50 | 56 | 62 | 68 | 72 | 76 | 79 | 80 | 81 | | | |
| 31 | 28 | 36 | 45 | 52 | 59 | 65 | 71 | 75 | 78 | 80 | 81 | | | | |
| 35 | 31 | 41 | 50 | 58 | 65 | 71 | 76 | 79 | 80 | 81 | | | | | |
| 39 | 34 | 45 | 54 | 63 | 70 | 75 | 79 | 80 | | | | | | | |
| 45 | 39 | 51 | 61 | 69 | 76 | 80 | 81 | | | | | | | | |

## 1/2" Pitch - HV4
## Chain Type 63-139

Stock Widths:
1″, 1 1/2″, 2″, 3″, 4″

| No. Teeth | RPM | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1000 | 1250 | 1500 | 1750 | 2000 | 2500 | 3000 | 3500 | 4000 | 4500 | 5000 | 5500 | 6000 | 6500 | 7000 |
| 21 | 26 | 32 | 39 | 45 | 51 | 63 | 74 | 85 | 95 | 104 | 112 | 119 | 125 | 129 | 132 |
| 23 | 28 | 35 | 42 | 49 | 56 | 68 | 80 | 92 | 102 | 111 | 118 | 125 | 129 | 132 | 133 |
| 25 | 30 | 38 | 46 | 53 | 60 | 74 | 86 | 98 | 109 | 117 | 125 | 129 | 132 | 133 | |
| 27 | 33 | 41 | 49 | 57 | 65 | 79 | 92 | 104 | 114 | 122 | 128 | 132 | 133 | | |
| 29 | 35 | 44 | 53 | 61 | 69 | 84 | 97 | 109 | 119 | 126 | 131 | 133 | | | |
| 31 | 38 | 47 | 56 | 65 | 74 | 89 | 103 | 115 | 124 | 130 | 133 | | | | |
| 35 | 43 | 53 | 63 | 72 | 82 | 98 | 112 | 123 | 130 | 133 | | | | | |
| 39 | 48 | 59 | 70 | 80 | 89 | 106 | 120 | 129 | 133 | | | | | | |
| 45 | 54 | 67 | 79 | 89 | 100 | 117 | 128 | 133 | | | | | | | |

## 3/4" Pitch - HV6
## Chain Type 63-139

Stock Widths:
1 1/2″, 2″, 3″, 4″, 5″

| No. Teeth | RPM | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 600 | 900 | 1200 | 1500 | 1800 | 2100 | 2400 | 2700 | 3000 | 3300 | 3600 | 3900 | 4200 | 4500 | 4800 |
| 21 | 33 | 48 | 64 | 79 | 94 | 107 | 120 | 132 | 143 | 153 | 161 | 168 | 172 | 176 | 177 |
| 23 | 36 | 53 | 70 | 86 | 101 | 116 | 129 | 142 | 152 | 161 | 168 | 174 | 177 | 177 | 176 |
| 25 | 39 | 57 | 75 | 93 | 110 | 125 | 138 | 150 | 160 | 168 | 174 | 177 | 177 | 175 | 170 |
| 27 | 42 | 62 | 81 | 100 | 117 | 132 | 146 | 157 | 166 | 173 | 176 | 177 | 175 | | |
| 29 | 45 | 66 | 86 | 106 | 124 | 139 | 153 | 164 | 171 | 177 | 177 | 175 | | | |
| 31 | 48 | 71 | 92 | 113 | 130 | 146 | 160 | 169 | 175 | 177 | 175 | | | | |
| 35 | 54 | 79 | 103 | 124 | 143 | 158 | 169 | 176 | 177 | 173 | | | | | |
| 39 | 60 | 87 | 113 | 136 | 154 | 168 | 176 | 177 | 172 | | | | | | |
| 45 | 69 | 99 | 127 | 150 | 166 | 177 | 175 | | | | | | | | |

## 1" Pitch - HV8
## Chain Type 63-139

Stock Widths:
2″, 3″, 4″, 5″, 6″

| No. Teeth | RPM | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 600 | 800 | 1000 | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 | 3300 | 3600 |
| 21 | 54 | 72 | 89 | 105 | 121 | 136 | 150 | 163 | 174 | 185 | 195 | 202 | 208 | 214 | 215 |
| 23 | 59 | 78 | 96 | 114 | 130 | 146 | 161 | 174 | 186 | 195 | 203 | 210 | 214 | 215 | 212 |
| 25 | 64 | 84 | 104 | 123 | 140 | 156 | 171 | 184 | 195 | 204 | 210 | 214 | 215 | 212 | 200 |
| 27 | 69 | 91 | 112 | 131 | 150 | 166 | 180 | 193 | 203 | 210 | 214 | 215 | 213 | 203 | |
| 29 | 74 | 97 | 119 | 139 | 159 | 175 | 189 | 200 | 209 | 214 | 215 | 213 | 206 | | |
| 31 | 79 | 104 | 127 | 148 | 167 | 183 | 197 | 207 | 213 | 215 | 213 | 206 | | | |
| 35 | 89 | 116 | 140 | 163 | 182 | 197 | 208 | 214 | 215 | 210 | | | | | |
| 39 | 98 | 127 | 154 | 176 | 195 | 207 | 214 | 215 | 208 | | | | | | |
| 45 | 112 | 145 | 171 | 193 | 208 | 215 | 213 | 200 | | | | | | | |

## 1 1/2" Pitch - HV12
## Chain Type 61-115

Stock Widths:
3″, 4″, 5″, 6″

| No. Teeth | RPM | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 200 | 400 | 600 | 800 | 1000 | 1200 | 1400 | 1500 | 1600 | 1800 | 2000 | 2100 | 2200 | 2400 | 2500 |
| 21 | 29 | 58 | 85 | 111 | 135 | 155 | 172 | 179 | 185 | 193 | 196 | 195 | 195 | 184 | 142 |
| 23 | 32 | 63 | 93 | 121 | 144 | 165 | 181 | 187 | 191 | 196 | 194 | 190 | 183 | 151 | |
| 25 | 35 | 68 | 100 | 129 | 154 | 174 | 188 | 192 | 195 | 194 | 186 | 172 | | | |
| 27 | 37 | 73 | 107 | 138 | 162 | 182 | 193 | 195 | 196 | 189 | | | | | |
| 29 | 40 | 79 | 115 | 146 | 171 | 188 | 196 | 195 | 193 | 173 | | | | | |
| 31 | 43 | 84 | 121 | 153 | 177 | 193 | 196 | 192 | 186 | | | | | | |
| 35 | 48 | 94 | 135 | 167 | 188 | 196 | 188 | 172 | | | | | | | |
| 39 | 53 | 104 | 147 | 178 | 195 | 192 | | | | | | | | | |
| 45 | 62 | 117 | 163 | 191 | 194 | | | | | | | | | | |

## 2" Pitch - HV16
## Chain Type 61-115

Stock Widths:
3″, 4″, 5″, 6″

| No. Teeth | RPM | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 | 1100 | 1200 | 1300 | 1500 | 1700 | 1800 |
| 21 | 47 | 70 | 92 | 114 | 134 | 153 | 170 | 186 | 199 | 210 | 219 | 224 | 226 | 215 | 203 |
| 23 | 51 | 77 | 101 | 124 | 145 | 165 | 181 | 197 | 210 | 219 | 225 | 227 | 219 | 194 | |
| 25 | 56 | 83 | 109 | 134 | 155 | 175 | 193 | 207 | 218 | 225 | 227 | 225 | 205 | | |
| 27 | 60 | 90 | 117 | 143 | 166 | 186 | 202 | 215 | 224 | 227 | 225 | 217 | 182 | | |
| 29 | 65 | 95 | 124 | 151 | 175 | 195 | 210 | 222 | 227 | 226 | 219 | 204 | | | |
| 31 | 69 | 102 | 132 | 160 | 183 | 203 | 217 | 225 | 227 | 221 | 207 | | | | |
| 35 | 78 | 114 | 147 | 175 | 199 | 216 | 225 | 227 | 218 | 198 | | | | | |
| 39 | 86 | 125 | 160 | 189 | 211 | 224 | 227 | 217 | 195 | | | | | | |
| 45 | 98 | 142 | 179 | 207 | 224 | 227 | 213 | 182 | | | | | | | |

It is essential that drives selected in the area right of the tinted area are fitted with a pressure fed spray lubrication system. Other drives can operate in oil bath lubrication.

*Note:* Other widths of chain up to 8 times pitch can be supplied to order.

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