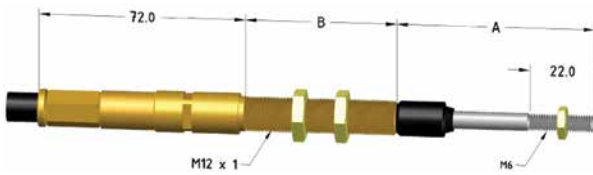


Push Pull Cable Systems

In This Section

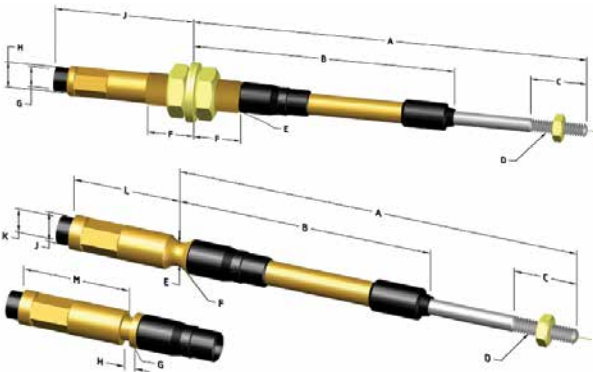
Hi-Lex Overview

Hi-Lex product range & features, application guidelines, information about how to select the correct cable size, how to order Hi-Lex cables & the Hi-Lex cross reference chart.



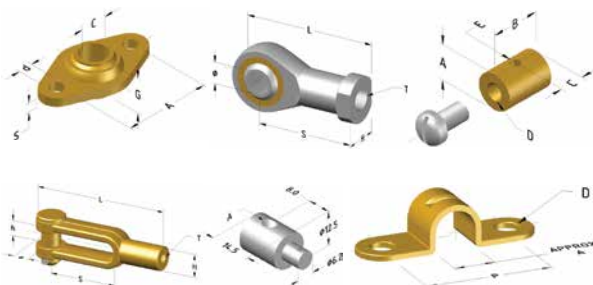
Hi-Lex Cable Ends & Control Cables

Detailed information on cable end types, Vernier control cables & marine grade control cables.



Accessories

A Selection of accessories including ball stud ends, swivels, rod ends, clevises, eye ends, adjustable stops & cable casing clamps.



Contents

| | |
|--------------------------------------|-----|
| Hi-Lex Product Range & Features..... | 163 |
| How To Order Hilex Cables..... | 165 |
| Hi-Lex Cross Reference Chart..... | 166 |
| Cable Ends..... | 167 |
| Vernier Control..... | 173 |
| Control Cables..... | 174 |
| Marine Grade Control Cables..... | 176 |
| Accessories..... | 177 |

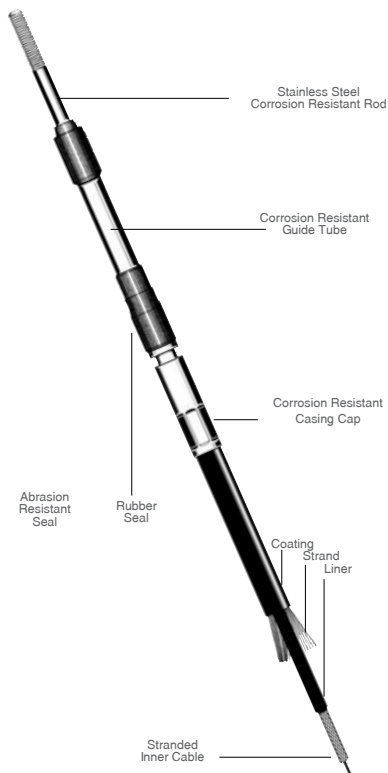


**FLEXIBLE DRIVE
AGENCIES**



Hi-Lex Product Range & Features

HI-LEX



General

1. FDA Hi-Lex control cables are available in four basic load capacities and two basic materials. The standard grade control is made utilising carbon steel termination components adequately plated to resist corrosion for normal industrial and automotive applications. All controls feature stainless steel rod ends and deluxe grade controls with stainless steel or a combination of stainless steel and brass fittings making them suitable for most corrosive environments. Each size is available in a variety of mounting patterns and stroke lengths.

Efficiency

2. FDA Hi-Lex control cables offer an exceptionally high level of efficiency brought about by the use of specially compounded plastic component materials including a patented "oil inclusion" process to provide lifetime lubrication of the sliding. Careful sealing of the finished assembly combined with the self-lubricating properties of the plastic material ensure life long service free of maintenance.

Accuracy

3. FDA Hi-Lex control cable materials are manufactured to exacting standards and assembled under stringent quality control. These requirements, together with the high strength factors of the long lay spring steel casing and core, minimise the lost motion effect and sponginess common to some other control cable designs.

Flexibility

4. FDA Hi-Lex control cables provide a flexible means of transmitting motion and permit the by-passing of obstructions, together with flexibility of pivot points such as those used on tilt cabs as well as the ability to absorb vibrations.

Durability

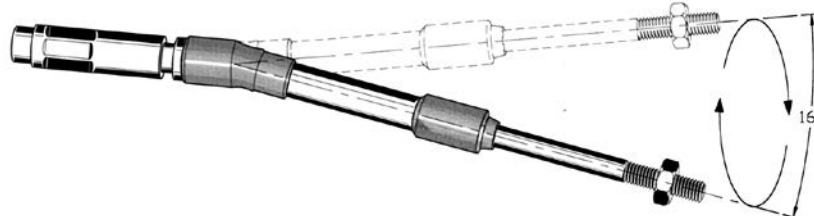
5. Careful attention has been given to the assembly design of FDA Hi-Lex controls to ensure the exclusion of moisture, dust and other abrasive elements. This, coupled with the special lubrication materials, ensures dependability throughout the long life of the control cable. Particular attention has been given to the sealing of the rods and guide pipe.

Swivel End

6. FDA Hi-Lex control cables feature, as a standard design with both the bulk head and clamp type end fittings, a swivel joint which will provide an 8 deg. deflection in any direction. This feature offsets the effects of angular misalignment resulting from lever arc movement.

Corrosion Protection

7. Standard grade Hilex cables feature stainless steel rods and zinc plated mild steel fittings. Deluxe grade Hilex cables feature stainless steel or brass fittings making them suitable for many corrosive environments.



Hi-Lex Application Guidelines (continued over page)

HI-LEX

Figure 1

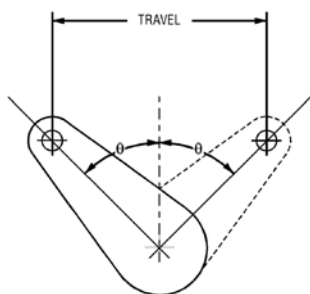
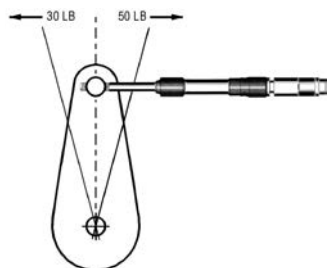


Figure 2



Travel = 2 (sin θ) (Lever Length) (see Figure 1)

Hi-Lex Application Guidelines (continued over page)

Output Loads

1. Measure the force required to operate the object to be controlled (valve, throttle, PTO, etc)
2. Using the following formula, approximate the required input load.

$$if = of \times tdb \times ff + of$$

if = input force refers to the operator end of the cable
 of = output force (newton or pound)
 tdb = total degrees of bend (e.g. 180° + 90° + 90° = 360)
 ff = FRICTION FACTOR (see below)

Where operating levers used to determine the required travel including an allowance for backlash, then select an appropriate series of cable that matches the required load and travel.

NOTE: Load capacities relative to travel for push loads.

Friction Factor

| | |
|--------------------------------|--------|
| Series 80, 100, 120 Cable..... | 0.0013 |
| Series 140 Cable..... | 0.0015 |

Direction Of Travel

1. The output motion of the workend of the cable is essentially the same as the input motion. For example, a 75mm(3") pushing movement at the input end will result in a 75mm(3") pushing movement (less backlash - see page 164) at the output end. If a differential between input and output, and/or direction of movement is desired, it must be accommodated in the design of the lever attachment point at the workend.

2. For the best efficiency and longest operating life, install the cables so that it encounters the heaviest load in the "Pull" mode of operation (see Figure 2).



Hi-Lex Application Guidelines (continued)

Maximum Load - Minimum Bend Radius

TABLE 1

| Cable Series | Min. Bend Radius Recommended | | Max. Pull Load | | Max. Recommended Push Load by Stroke | | | | | |
|--------------|------------------------------|-------|----------------|--------|--------------------------------------|--------|--------|--------|--------|--------|
| | | | | | 2" | | 3" | | 4" | |
| | Inch | mm | Lbs | N | Lbs | N | Lbs | N | Lbs | N |
| 80 | 6.50" | 165mm | 220lbs | 978 N | 88lbs | 391 N | 77lbs | 342 N | 66lbs | 293 N |
| 100 | 7.87" | 200mm | 330lbs | 1467 N | 154lbs | 685 N | 132lbs | 587 N | 110lbs | 489 N |
| 120 | 9.44" | 240mm | 440lbs | 1957 N | 198lbs | 880 N | 176lbs | 782 N | 154lbs | 685 N |
| 140 | 11.41" | 290mm | 880lbs | 3915 N | 440lbs | 1957 N | 363lbs | 1614 N | 264lbs | 1174 N |



Selecting The Correct Cable Size



General Notes

From the four basic capacity ranges available in FDA TSK Hi-Lex push-pull controls it will be possible to select a cable suitable for almost any requirement. The following basic elements should be established when specifying the correct Hi-Lex control cable for each application.

- The output load
- The required stroke
- The total number of degrees of bend angle assumed in the routing of the cable
- The operating environment
- The method of actuation
- Mounting detail

The operating loads within the system, together with the total bend angle and stroke largely determine the size of cable that will be required, and influence the frictional characteristics of the assembly. It is the frictional factor which dictates the resultant input load in relation to the working load, and forms the basis of selecting the size of control cable required.

The Following Steps Will Ensure That The Correct Cable Is Specified

1. Determine the maximum force that will be required to both push and pull the load at the work end of the control cable (output end). Care should be taken to anticipate any abnormal or intermittent loads to which the control may be subjected. If there is a likelihood that this situation may arise then an allowance should be made for these forces when selecting the cable size.

2. Estimate the total number of degrees of bend the control cable will be subjected to in the course of installation routing. It is usually wise to prepare a sketch of the proposed installation in order to calculate the number of degrees of bend involved. The bend radius nominated in the technical section is that at which the cable will perform most efficiently, but care should be taken not to decrease the bend radius specified. Refer example illustrated.

3. Determine the maximum travel through which the load is to be moved.

NOTE: All push pull cable designs have some lost motion referred to as "backlash" and is a product of the inner core member to casing clearance. The Hi-Lex design of control keeps this to an absolute minimum. The total amount of lost motion is dependent upon several factors including the cable design clearances, the degrees of bend in the cable installation, and to a lesser extent travel and load. The following formula provides a means of calculating the lost travel as a result of the total bend angle in the system and this is normally adequate for calculating the stroke loss from compression to tension conditions.

$$\text{BACKLASH} = 0.005\text{mm} \times \text{TOTAL BEND ANGLE}$$

Applications which demand that a cable be operated near the extreme upper limit of the design load capacity or installations which require ultra sensitivity may be affected by the small additional losses of load and travel. These should be referred to Flexible Drive Agencies Pty. Ltd. Engineering Department.

4. After establishing the details of items 1-3 inclusive, turn to the formula shown on the page 163, and determine the approximate input force required to move the work load. By plotting across the chart, determine the recommended cable size relative to the required stroke, for the input load previously determined from Table 1 shown above.

5. FDA Hi-Lex controls using normal materials will operate satisfactorily in ambient temperature environments of - 40°C to + 95°C. Installations where local short term "Hot Spots" are likely, require the application of a heat shield. FDA can assist with heat sleeves. For long term exposure to high temperature contact FDA for recommendation on alternative materials.

6. From the installation mounting requirements, determine the type of end fittings required for each end. Details of these are shown on Page 165.

7. Establish the required length of the control from the previously prepared sketch or by assuming the installation conditions, following as accurately as possible the path which the cable will take. The length is to be established as an overall length, that is, over the extreme ends of the inner core end fittings. For knob controls, measure from the upper securing nut or cap.

The Part Number Code

HI-LEX The Part Number coding system of specifying your FDA TSK-Hi-Lex control cable provides a convenient and accurate means for ordering your cable requirements and is particularly suitable for communication by telephone, email or facsimile.

The code is made from the following alphabetical and numerical symbols and if followed carefully will ensure that your order is fulfilled exactly to your requirements.

I S -10 -3 -BC -0.9

| I | Thread Series |
|---|---------------|
| I | Imperial |
| M | Metric |

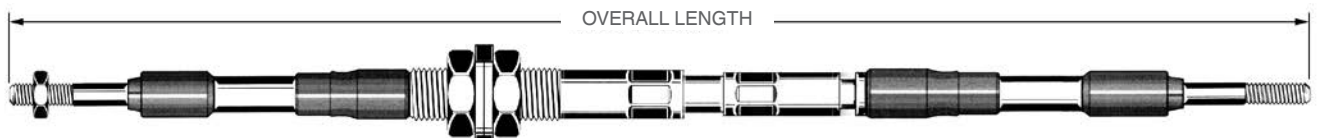
| S | Grade of Material |
|---|------------------------|
| S | Standard Carbon Steel |
| D | Deluxe Stainless Steel |

| -10 | Cable Series (casing dia. in mm) |
|------|----------------------------------|
| 8mm | 80 Series |
| 10mm | 100 Series |
| 12mm | 120 Series |
| 14mm | 140 Series |

| -3 | Length Of Stroke |
|----|---|
| | Specify in inches for imperial threads |
| | Specify in millimetres for metric threads |

| -BC | Outer Casing Fittings | Page |
|-----|--|------|
| B | Hi-Lex Bulkhead - Swivel end | 167 |
| C | Hi-Lex Clamp Type - Swivel end | 168 |
| D | Hi-Lex Hydraulic Valve (Imperial) | 171 |
| E | Hi-Lex Bulkhead Type - Rigid end | 169 |
| G | Hi-Lex T Handle Control Head (G, G2, G3, G4, G5) | 172 |
| H | Hi-Lex Bulk-head Type | 170 |
| J | See G4 | 172 |
| K | See M3 | 173 |
| M | Micro-Adjust Control Head (M, M2, M3) | 173 |
| N | See T | 172 |
| P | Hi-Lex Plain Type End Fitting (P, PS, PZ) | 170 |
| Q1 | Vernier Head - Quick Connect (light duty) | 173 |
| Q2 | Vernier Head - Quick Connect (heavy duty) | 173 |
| R | Hi-Lex F.D.A. Remote Valve Control | 171 |
| S | Hi-Lex Hydraulic Valve (Metric) | 171 |
| T | Hi-Lex Twist-Lock Control Head (T, T2, T3, T4, T5) | 172 |
| U | Hi-Lex Bulkhead Plain End (U, US) | 170 |
| V | Hi-Lex Vofa | 171 |
| W | Hi-Lex Rack and Pinion | 171 |
| Y | See M2 | 173 |
| X | Special Requirements - to be described in detail | |

| -0.9 | Overall Length - Specify In Meters |
|------|---|
| | This is required for rational computer ordering |



Therefore a cable IS-10-3-BC-0.900 is a 900mm long Series 100 assembly with 3" stroke, bulkhead fitted at the input end and clamp type fitted at the output end, made from standard grade material and Imperial thread sizes.

OR

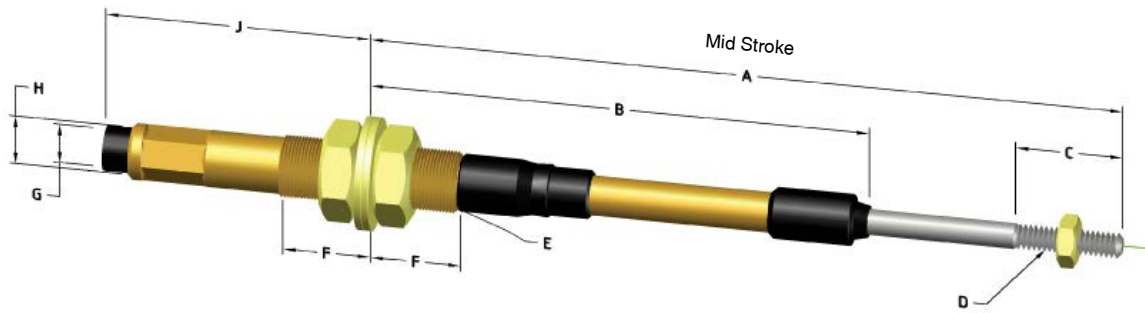
The cable MD-8-75-GB-2.5 is a 2.5 metre long, Series 80 assembly with 75mm stroke, a "T" handle control head fitting and a bulkhead type swivel output end fitting made from Deluxe grade materials with metric thread sizes.

Hi-Lex Cross Reference Chart

| Hi-Lex Part No. | Competitor 1 | Competitor 2 | Competitor 3 | Competitor 4 |
|-----------------|--------------|--------------|--------------|--------------|
| IS82CC | 32C | 173VGG2 | 183VGG2 | U2000LM2 |
| IS83CC | 33C | 173VGG3 | 183VGG3 | U2000LM3 |
| IS84CC | 34C | 173VGG4 | 183VGG4 | U2000LM4 |
| IS102CC | 42C | 173LGG2 | 183LGG2 | U2100LM2 |
| IS103CC | 43C | 173LGG3 | 183LGG3 | U2100LM3 |
| IS104CC | 44C | 173LGG4 | 183LGG4 | U2100LM4 |
| IS105CC | 45C | 173LGG5 | 183LGG5 | U2100LM5 |
| IS122CC | 62C | 173MGG2 | 183MGG2 | U2200LM2 |
| IS123CC | 63C | 173MGG3 | 183MGG3 | U2200LM3 |
| IS124CC | 64C | 173MGG4 | | U2200LM4 |
| IS142CC | 72C | | | |
| IS143CC | 73C | | | |
| IS144CC | 74C | | | |
| IS82BB | 32B | 173VTT2 | 183VTT2 | U2000LS2 |
| IS83BB | 33B | 173VTT3 | 183VTT3 | U2000LS3 |
| IS84BB | 34B | 173VTT4 | 183VTT4 | U2000LS4 |
| IS102BB | 42B | 173LTT2 | 183LTT2 | U2100LS2 |
| IS103BB | 43B | 173LTT3 | 183LTT3 | U2100LS3 |
| IS104BB | 44B | 173LTT4 | 183LTT4 | U2100LS4 |
| IS122BB | 62B | 173CTT2 | 183CTT2 | U2200LS2 |
| IS123BB | 63B | 173CTT3 | 183CTT3 | U2200LS3 |
| IS124BB | 64B | 173CTT4 | 183CTT4 | U2200LS4 |
| IS142BB | 72B | | | |
| IS143BB | 73B | | | |
| IS144BB | 74B | | | |
| IS82BC | 32BC | 173VTG2 | 183VTG2 | U2000LMS2 |
| IS83BC | 33BC | 173VTG3 | 183VTG3 | U2000LMS3 |
| IS84BC | 34BC | 173VTG4 | 183VTG4 | U2000LMS4 |
| IS102BC | 42BC | 173LTG2 | 183LTG2 | U2100LMS2 |
| IS103BC | 43BC | 173LTG3 | 183LTG3 | U2100LMS3 |
| IS104BC | 44BC | 173LTG4 | 183LTG4 | U2100LMS4 |
| IS122BC | 62BC | 173MTG2 | 183MTG2 | U2200LMS2 |
| IS123BC | 63BC | 173MTG3 | 183MTG3 | U2200LMS3 |
| IS124BC | 64BC | 173MTG4 | 183MTG4 | U2200LMS4 |
| IS142BC | 72BC | | | |
| IS143BC | 73BC | | | |
| IS144BC | 74BC | | | |
| IS83MB/M3B | 33VB | VLD16V02 | | |
| IS83MC/M3C | 33VC | VLD16L03 | | |
| IS103MB/M3B | 43VB | LD16L02 | | V700S |
| IS103MC/M3C | 43VC | LD16L03 | | V700M |
| IS83TB | 43PLB | VLD56V02 | | D1000S |
| IS83TC | 43PLC | VLD56V03 | | D1000S |
| IS83G3B | 33LB | VLD86V02 | | D1100S |
| IS83G3C | 33LC | VLD86V03 | | D1100M |
| DC40* (Marine) | 33C | VLD184VGG3 | | |
| DC41 (Marine) | 34C | | | |

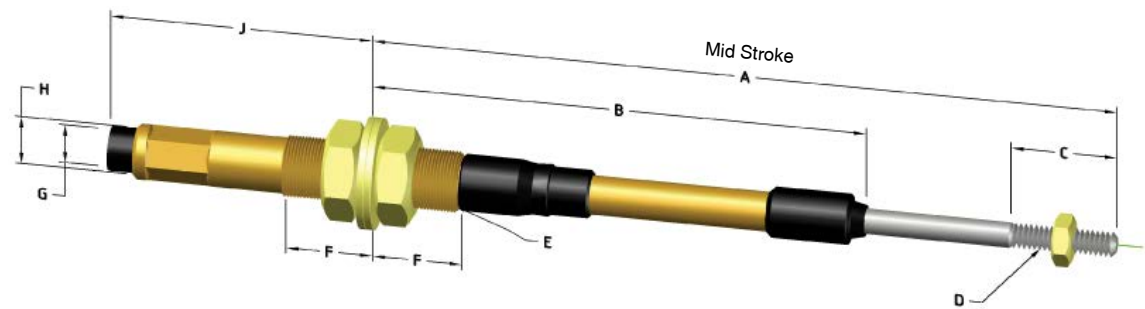
*For premium application Use DC55 refer to page 176.

Hi-Lex Code B Swivel Bulkhead Type Metric Series



| Series | Stroke | A | B | C | D | E | F | H | G | J |
|--------|--------|-------|-------|------|-----------|------------|------|-------|-------|------|
| 80 | 50 | 146.0 | 97.5 | 20.0 | M5 x 0.8 | M12 x 1.25 | 17.5 | Ø11.0 | Ø8.0 | 47.0 |
| | 75 | 183.5 | 122.5 | | | | | | | |
| | 100 | 221.0 | 147.5 | | | | | | | |
| 100 | 25 | 116.5 | 79.0 | 22.0 | M6 x 1.0 | M14 x 1.5 | 20.0 | Ø13.0 | Ø10.0 | 60.0 |
| | 50 | 154.0 | 104.0 | | | | | | | |
| | 75 | 191.5 | 129.0 | | | | | | | |
| 120 | 100 | 229.0 | 154.0 | 25.0 | M8 x 1.25 | M16 x 1.5 | 25.0 | Ø15.0 | Ø12.0 | 74.0 |
| | 50 | 169.5 | 104.0 | | | | | | | |
| | 75 | 207.0 | 139.0 | | | | | | | |
| 140 | 100 | 244.5 | 164.0 | 30.0 | M10 x 1.5 | M18 x 1.5 | 27.5 | Ø17.0 | Ø14.0 | 82.0 |
| | 50 | 182.5 | 122.0 | | | | | | | |
| | 75 | 220.0 | 147.0 | | | | | | | |
| | 100 | 257.5 | 172 | | | | | | | |

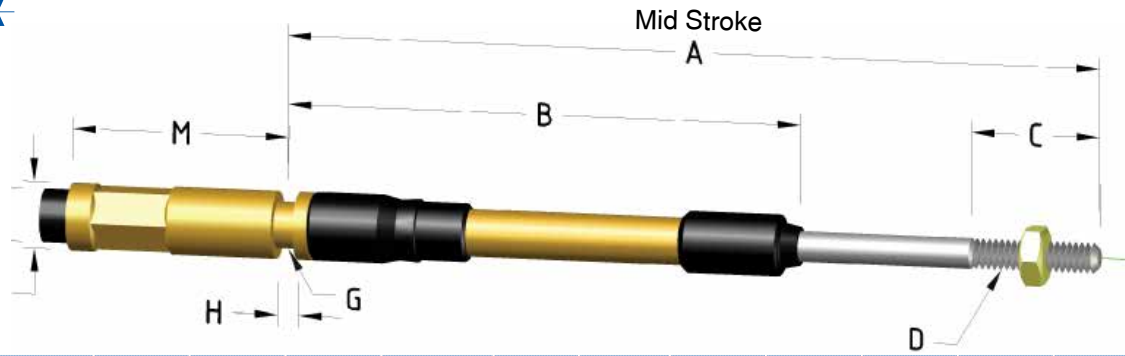
Hi-Lex Code B Swivel Bulkhead Type Imperial Series



| SERIES | STROKE | A | B | C | D | E | F | H | G | J |
|--------|--------|-------|-------|---------------|----------------|-----------------|------|----------------|----------------|-----------------|
| 80 | 1 | 108.5 | 72.5 | 25/32" (20.0) | 10 - 32 UNF | 7/16" - 20 UNF | 17.5 | 7/16" (Ø11.1) | 0.15" (Ø8.0) | 1 53/64" (46.5) |
| | 2 | 148.0 | 97.5 | | | | | | | |
| | 3 | 187.5 | 122.5 | | | | | | | |
| | 4 | 223.0 | 147.5 | | | | | | | |
| 100 | 1 | 118.5 | 79.0 | 7/8" (22.0) | 1/4" - 28 UNF | Standard | 20.0 | 33/64" (Ø13.0) | 0.394" (Ø10.0) | 2 5/16" (46.5) |
| | 2 | 156.0 | 104.0 | | | 5/8" - 20 UNF | | | | |
| | 3 | 193.5 | 129.0 | | | Deluxe | | | | |
| | 4 | 231.0 | 154.0 | | | M14 x 1.5 | | | | |
| 120 | 1 | 133.0 | 89.0 | 1" (25.0) | 5/16" - 24 UNF | Standard | 25.0 | 19/32" (Ø15.0) | 0.472" (Ø12.0) | 2 13/32" (74.0) |
| | 2 | 170.5 | 114.0 | | | 11/16" - 16 UNF | | | | |
| | 3 | 208.0 | 139.0 | | | Deluxe | | | | |
| | 4 | 245.5 | 164.0 | | | M16 x 1.5 | | | | |
| 140 | 1 | 146.0 | 97.0 | 3/16" (30.0) | 3/8" - 24 UNF | M18 x 1.5 | 27.5 | 43/64" (Ø17.0) | 9/16" (Ø14.0) | 3.23" (82.0) |
| | 2 | 183.5 | 122.0 | | | | | | | |
| | 3 | 221.0 | 147.0 | | | | | | | |
| | 4 | 258.5 | 172.0 | | | | | | | |

Hi-Lex Code C Swivel Bulkhead Type Metric Series

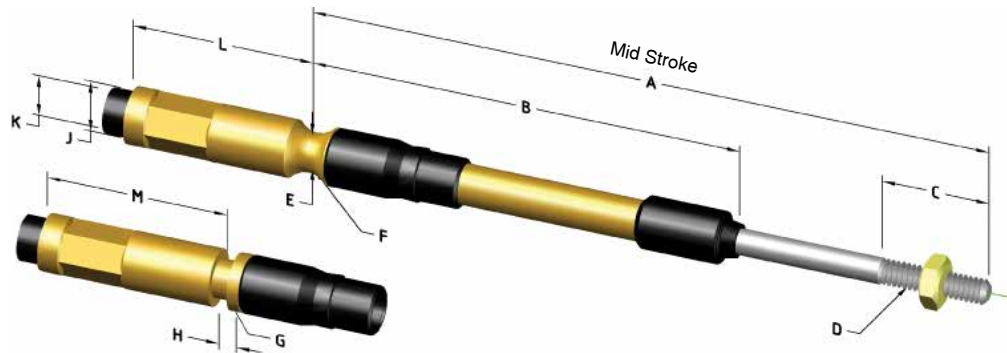
HI-LEX



| SERIES | STROKE | A | B | C | D | E | F | G | H | J | K | L | M |
|--------|--------|-------|-------|------|-----------|---|---|-------|-----|-------|-------|---|------|
| 80 | 50 | 134.0 | 85.0 | 20.0 | M5 x 0.8 | - | - | Ø7 | 3.5 | Ø11.0 | Ø8.0 | - | 33.0 |
| | 75 | 171.5 | 110.0 | | | | | | | | | | |
| | 100 | 209.0 | 135.0 | | | | | | | | | | |
| 100 | 25 | 103.5 | 65.5 | 22.0 | M6 x 1.0 | - | - | Ø9.5 | 4.3 | Ø13.0 | Ø10.0 | - | 43.0 |
| | 50 | 141.0 | 90.5 | | | | | | | | | | |
| | 75 | 178.5 | 115.5 | | | | | | | | | | |
| 120 | 50 | 153.5 | 98.0 | 25.0 | M8 x 1.25 | - | - | Ø11.5 | 5.3 | Ø15.0 | Ø12.0 | - | 50.0 |
| | 75 | 191.0 | 123.0 | | | | | | | | | | |
| | 100 | 228.5 | 148.0 | | | | | | | | | | |
| 140 | 50 | 167.0 | 106.0 | 30.0 | M10 x 1.5 | - | - | Ø13.5 | 6.4 | Ø17.0 | Ø14.0 | - | 56.0 |
| | 75 | 204.5 | 131.0 | | | | | | | | | | |
| | 100 | 242.0 | 156.0 | | | | | | | | | | |

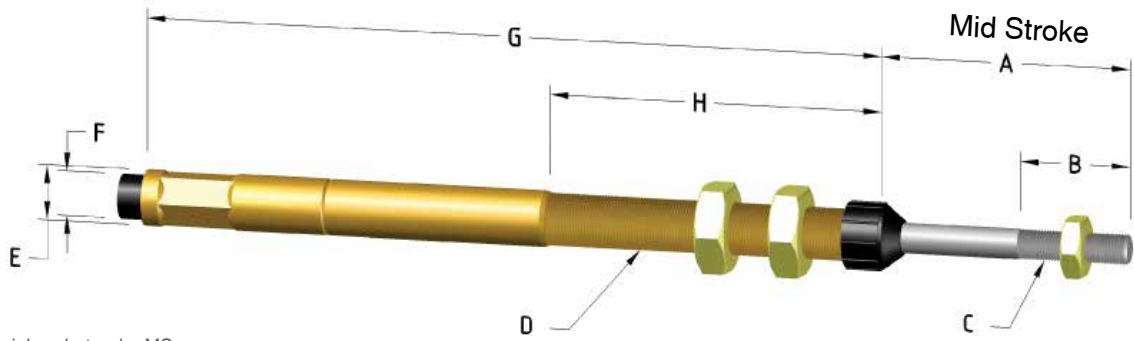
Hi-Lex Code C Swivel Bulkhead Type Imperial Series

HI-LEX



| SERIES | STROKE | A | B | C | D | E | F | G | H | J | K | L | M |
|--------|--------|-------|-------|-------------------|-------------------|-------------------|------------------|-------------------|----------------|-------------------|-------------------|--------------------|--------------------|
| 80 | 1 | 98.5 | 60.0 | 25/32" (20.0) | 10 - 32 UNF | - | - | 1/4" (Ø6.35) | 9/64" (3.5) | 0.394" (Ø10.0) | 0.315" (Ø8.0) | - | 1 19/64" (33.0) |
| | 2 | 136.0 | 85.0 | | | | | | | | | | |
| | 3 | 173.5 | 110.0 | | | | | | | | | | |
| | 4 | 221.0 | 135.0 | | | | | | | | | | |
| 100 | 1 | 103.5 | 65.5 | 7/8" (22.0) | 1/4" - 28 UNF | 13/32" (Ø10.3) | 11/64" (4.4R) | - | - | 1/2" (Ø12.7) | 0.394" (Ø10.0) | 1 49/64" (45.0) | - |
| | 2 | 141.0 | 90.5 | | | | | | | | | | |
| | 3 | 178.5 | 115.5 | | | | | | | | | | |
| | 4 | 216.0 | 140.5 | | | | | | | | | | |
| | 6 | 291.0 | 190.5 | | | | | | | | | | |
| 120 | 2 | 152.0 | 95.0 | 1" (25.0) | 5/16" - 24 UNF | 15/32" (Ø12.0) | 11/64" (4.4R) | - | - | 19/32" (Ø15.0) | 0.472" (Ø12.0) | 2 9/32" (57.9) | - |
| | 3 | 189.5 | 120.5 | | | | | | | | | | |
| | 4 | 227.0 | 146.0 | | | | | | | | | | |
| 140 | 1 | 130.5 | 81.0 | 1 3/16" (56.0) | 3/8" - 24 UNF | - | - | 17.32" (Ø13.5) | 1/4" (6.4) | 0.669" (Ø17.0) | 0.551" (Ø14.0) | - | 2 13/64" (56.0) |
| | 2 | 168.0 | 106.0 | | | | | | | | | | |
| | 3 | 205.5 | 131.0 | | | | | | | | | | |
| | 4 | 243.0 | 156.0 | | | | | | | | | | |

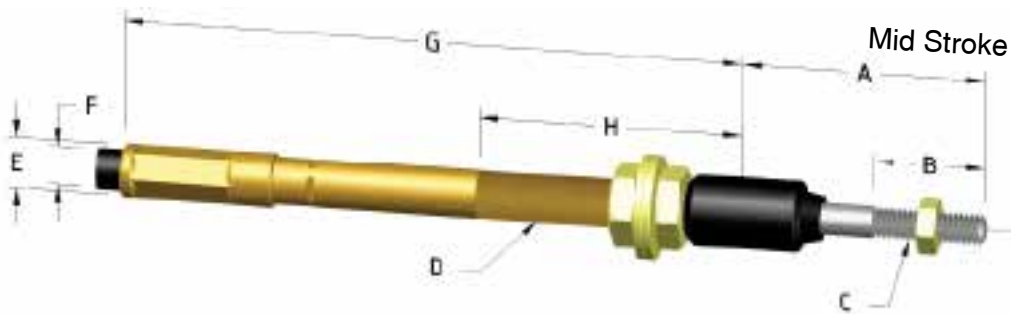
Hi-Lex Code E Non-Swivel Bulkhead Type Metric Series



NOTE: All stainless but order MS.

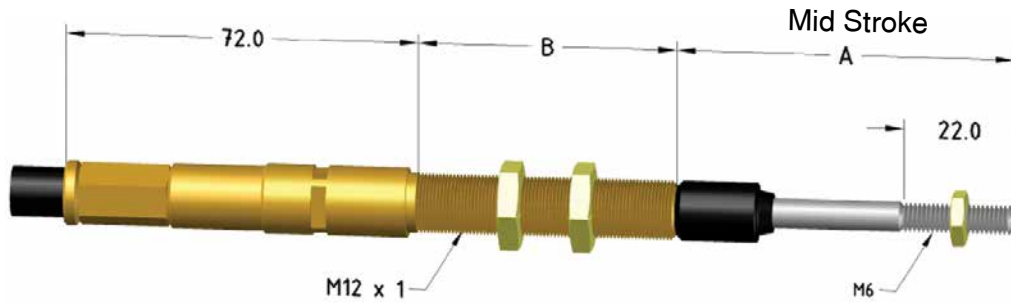
| SERIES | STROKE | A | G | H | B | C | D | E | F |
|--------|--------|------|-------|-------|------|-----------|-----------|-------|-------|
| 80 | 25 | 42.0 | 120.0 | 65.0 | 20.0 | M5 x 0.8 | M10 x 1.0 | Ø11.0 | Ø8.0 |
| | 50 | 54.5 | 145.0 | 90.0 | | | | | |
| | 75 | 67.0 | 170.0 | 115.0 | | | | | |
| | 100 | 79.5 | 195.0 | 140.0 | | | | | |
| 100 | 25 | 53.5 | 159.0 | 65.0 | 29.0 | M6 x 1.0 | M12 x 1.0 | Ø13.0 | Ø10.0 |
| | 50 | 66.0 | 184.0 | 90.0 | | | | | |
| | 75 | 78.5 | 209.0 | 115.0 | | | | | |
| | 100 | 91.0 | 234.0 | 140.0 | | | | | |
| 120 | 25 | 55.0 | 174.0 | 65.0 | 29.0 | M8 x 1.25 | M14 x 1.0 | Ø15.0 | Ø12.0 |
| | 50 | 67.5 | 199.0 | 90.0 | | | | | |
| | 75 | 80.0 | 224.0 | 115.0 | | | | | |
| | 100 | 92.5 | 249.0 | 140.0 | | | | | |

Hi-Lex Code E Non-Swivel Bulkhead Type Imperial Series



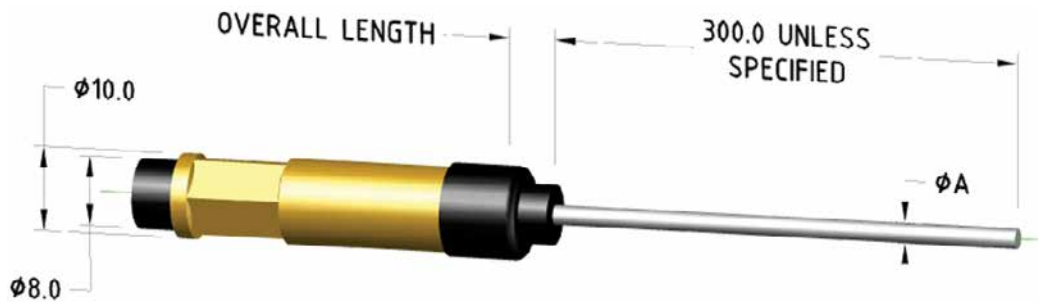
| SERIES | STROKE | A | G | H | B | C | D | E | F |
|--------|--------|------|-------|------|------|----------------|-----------------|----------------|----------------|
| 80 | 2 | 53.5 | 122.0 | 52.0 | 22.0 | 1/4" - 28 UNF | 3/8" - 24 UNF | 7/16" (Ø11.1) | 0.315" (Ø8.0) |
| | 3 | 65.0 | 147.0 | | | | | | |
| | 4 | 78.5 | 172.0 | | | | | | |
| 100 | 2 | 67.5 | 121.0 | 51.0 | 22.0 | 1/4" - 28 UNF | 9/16" - 18 UNF | 3/64" (Ø13.0) | 0.393" (Ø10.0) |
| | 3 | 80.0 | 142.0 | | | | | | |
| | 4 | 92.5 | 168.0 | | | | | | |
| 120 | 2 | 55.5 | 160.0 | 60.0 | 25.0 | 5/16" - 24 UNF | 11/16" - 16 UNF | 19/32" (Ø15.0) | 0.472" (Ø12.0) |
| | 3 | 93.0 | | | | | | | |
| | 4 | - | | | | | | | |

Code H - Series 100



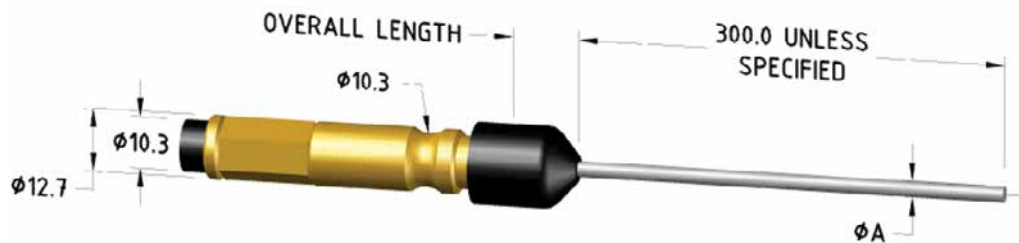
| | | | |
|------------------|------|------|-------|
| Stroke | 50 | 75 | 100 |
| Dim A Mid-Stroke | 68.0 | 80.5 | 93.0 |
| Dim B | 50.0 | 75.0 | 100.0 |

Code P + PS + PZ - Series 80



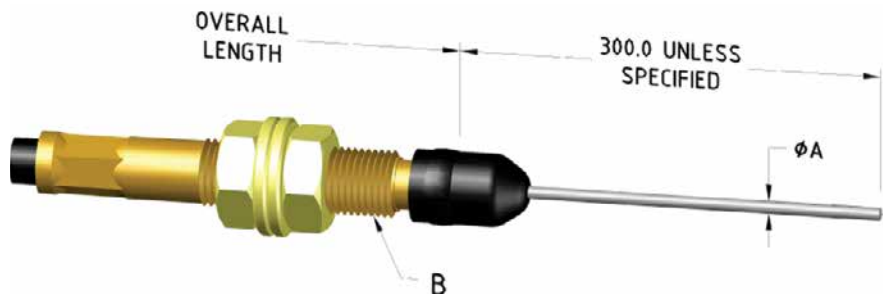
| | ØA |
|----|---|
| P | 2.3mm Hi-Lex stranded |
| PS | 2.0 stainless steel solid |
| PZ | 2.0 stainless steel solid, easy cut, no ferrule |

Code P + PS - Series 100



| | ØA |
|----|---------------------------|
| P | 3.3mm Hi-Lex stranded |
| PS | 2.0 stainless steel solid |

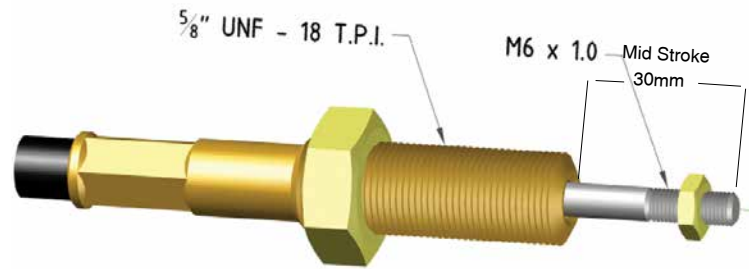
Code U & US - Series 80 & 100



| Series | Type | B | | ØA |
|--------|----------|----------|----|---------------------|
| 80 | Metric | M12x1.25 | U | 2.3 Hi-Lex stranded |
| | | | US | 2.0 S/S Solid |
| | Imperial | 7/16-20 | U | 2.3 Hi-Lex stranded |
| | | | US | 2.0 S/S Solid |
| 100 | Metric | M14x1.5 | U | 3.3 Hi-Lex stranded |
| | | | US | 2.0 S/S Solid |
| | Imperial | 5/8-18 | U | 3.3 Hi-Lex stranded |
| | | | US | 2.0 S/S Solid |

Code D - Series 100

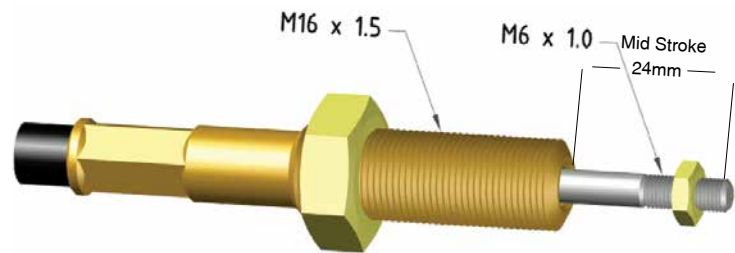
HI-LEX



Maximum stroke 54mm.

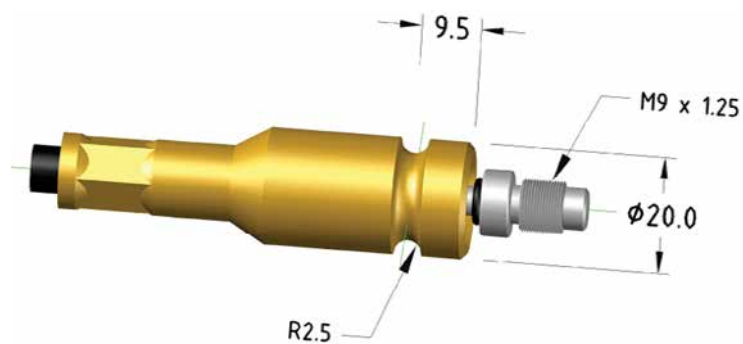
Code S - Series 100

HI-LEX



Code R - Series 80 & 100

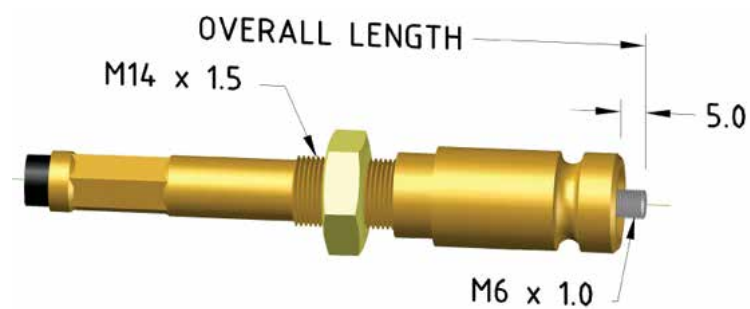
HI-LEX



Cable end to suit single and dual axis remote valve control actuators. Maximum stroke 24mm.

Code V - Series 80 & 100

HI-LEX



Code W - Series 80 & 100

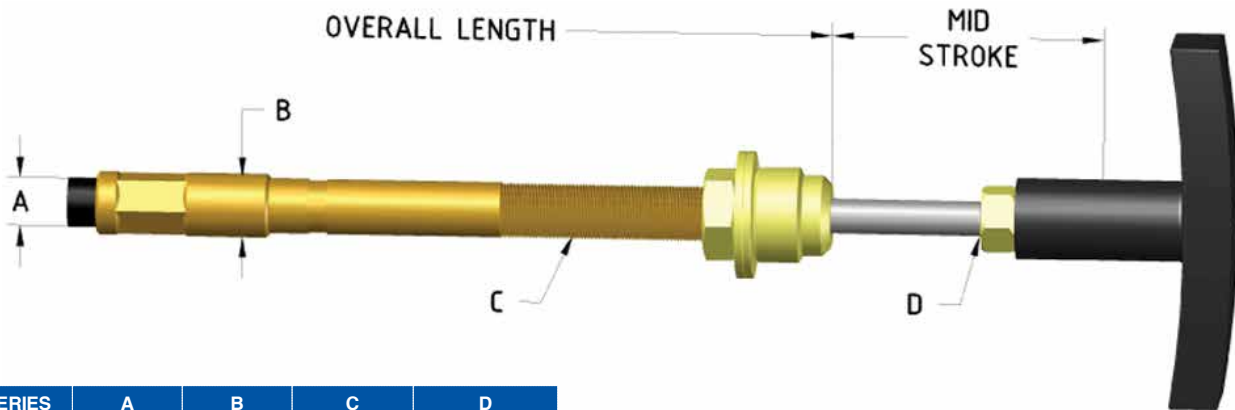
HI-LEX



M5 - comes with M8 x 1.25 adaptor. Maximum stroke 60mm.

Code G - SERIES 80 & 100

HI-LEX

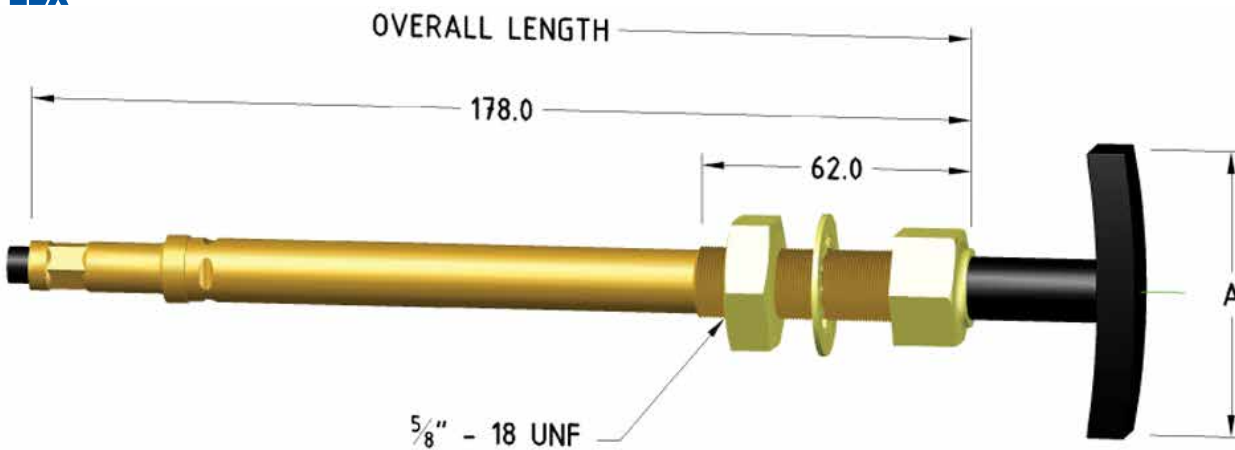


| SERIES | A | B | C | D |
|--------|-----|-------|----------|-----------|
| 80 | Ø8 | Ø11.1 | 3/8"-24 | 1/4" - 28 |
| 100 | Ø10 | Ø13 | 9/16"-18 | 1/4" - 28 |

NOTE: Overall length of Knob Controls is taken from face of cap nut or housing. Tee handles are available in either black or red with either imperial or metric threads.

Code T

HI-LEX



A versatile locking control which can be locked in position at a turn of the handle anywhere throughout its operating range. When locked this control will resist both push and pull loads up to 135N. - Maximum effective travel = 102mm.

Alternative Knobs

HI-LEX



G & T3 Standard Black Plastic
 Part No.....2400131 (Imperial - 1/4)
 Part No.....2006759 (Metric - M6)

HI-LEX



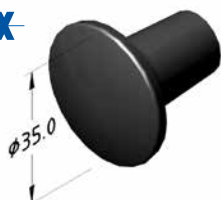
G2 & T2 Red Plastic
 Part No.....2401567 (Imperial - 1/4)
 Part No.....2401568 (Metric - M6)

HI-LEX



G3 & T Metal Handle
 Part No.....2400538 (Imperial - 1/4)

HI-LEX



G4 & T4 Black Metal Round
 Part No.....2400129 (Imperial - 1/4)

HI-LEX



G5 & T5 Black Plastic Printed
 Part No.....2006760 (Imperial - 1/4)

HI-LEX

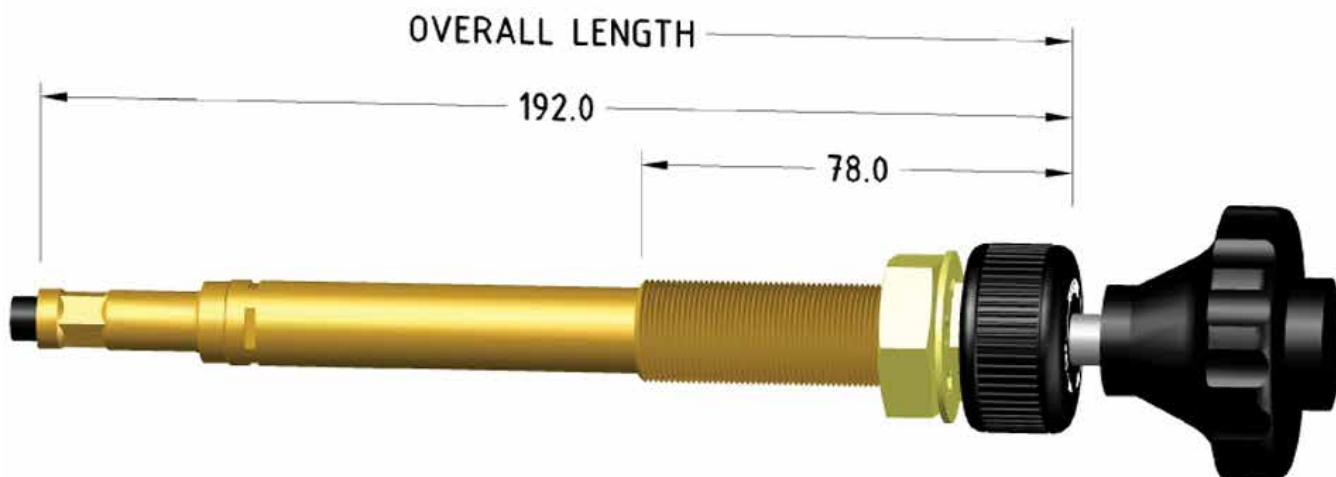


Red Plastic Printed
 Part No.....2401570 (Imperial - 1/4)

Other Knobs - See Page 17

Code M

**FLEXIBLE DRIVE
AGENCIES**

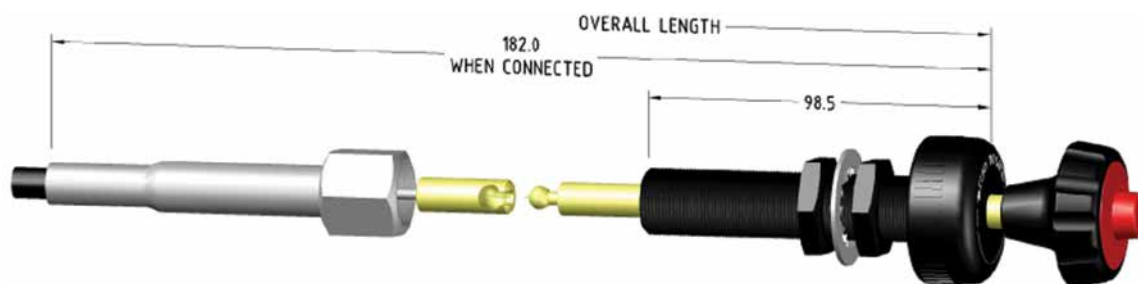


| | Description |
|----|---|
| M | Normal Vernier control with variable friction adjustment |
| M2 | Normal Vernier control with black dust cover (Part No. 2400185) |
| M3 | Round knob, no friction adjust (Old Code Y) |
| M4 | Normal Vernier control with red dust cover (Part No. 2400185R) |



M & M2 have variable friction adjustment. (code M2 has 2400185 Dust Cover) Series 80 & 100.

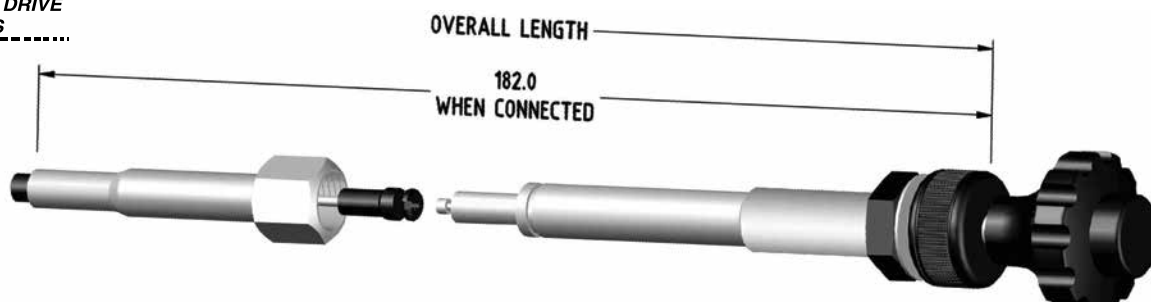
Q1 Vernier Quick Connect Control Head (Detachable) - Light Duty



This Quick-Connect control head contains all the benefits of the standard vernier micro-adjust control head but has the added feature of incorporating a fully sealed detachable ball and socket. This detachable feature allows for replacement of the head or cable assembly without the need to disassemble the head - a bonus that will reduce time and costs with installation and future servicing. Vernier features full 75mm travel and 4mm of travel per rotation and a Red Button to allow for Emergency idle situations. Series 80 & 100.

Q2 Vernier Quick Connect Control Head (Detachable) - Heavy Duty

**FLEXIBLE DRIVE
AGENCIES**



Can use Part No. 2400185 (black) or 2400185R (red) dust covers. Compatible with competitors controls. Series 80 & 100.

Light & Heavy Duty Control Cables & Knobs

Safety Controls For Diesel Powered Vehicles

An essential fitment to diesel-powered equipment as a safety engine stop control to comply with current state regulations. Also ideal for use on applications requiring fixed settings, such as a throttle for stationary engines. These cables feature ratchet type shaft, preventing accidental release of the control. Release can only be achieved by positive rotation of the knob.

Universal Light Duty - DC30

**FLEXIBLE DRIVE
AGENCIES**



Knob embossed "turn release" Available in stock lengths: 1500 - 2250 - 3000 - 3750 - 4500mm .
Special Lengths Made To Order

Heavy Duty - DC38

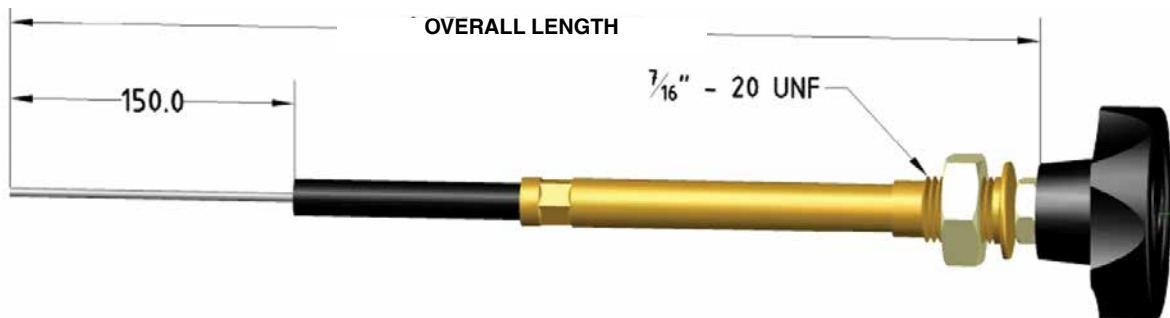
**FLEXIBLE DRIVE
AGENCIES**



Knob Embossed turn release. Available in stock lengths 1500, 1750, 2000, 2250, 2500, 2750, 3000, 3750, 4000.
Special Lengths Made To Order

Heavy Duty - DC1 (DC22 Plastic Casting)

**FLEXIBLE DRIVE
AGENCIES**



Black Knob (Ø35mm), galv. inner wire (Ø1.6mm), monocoil Galv. steel casing (Ø6.4mm) Available in stock lengths: 1500 - 2250 - 3000 - 4500mm

Alternative Knobs - M6 + 1/4 From Code G - T



Standard Knob
Part No.....2006129 (M6)



Optional Knob
Part No.....2006111 (M6)



Optional Knob
Part No.....2006141 (M6)



Optional Knob
Part No.....2007999 (M6)



Optional Knob
Part No.....2006779 (M6)



Optional Knob
Part No.....2006250 (M6)



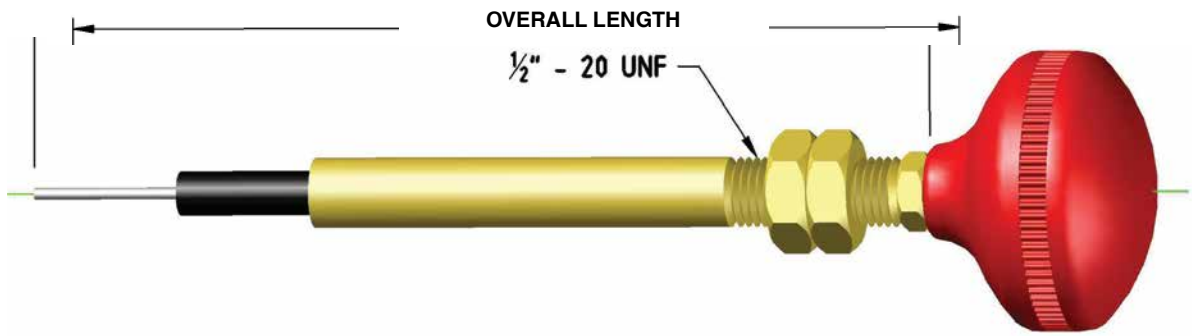
Optional Knob
Part No.....2400577 (1/4 thread)



Optional Knob
Part No.....2400576 (1/4 thread)

Heavy Duty - DC31

FLEXIBLE DRIVE AGENCIES



Pull Action Only (2mm S/S inner) Push - pull or power take-off... Ideal for hydraulic valves on most types of equipment. Available in stock lengths: 2000 - 2250 - 3000 - 3750 - 4500mm. Special Lengths Made To Order

Heavy Duty - DC2

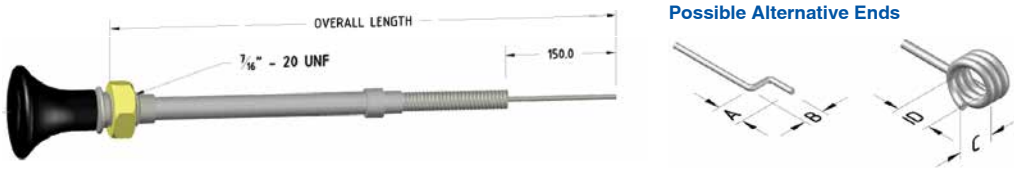
FLEXIBLE DRIVE AGENCIES



Black A.B.S. knob, galv. inner wire (Ø1.6mm), dual plastic casing (Ø6.4mm) Available in stock lengths: 1500 - 2250 - 3000 - 4500mm

Light Duty Series A

FLEXIBLE DRIVE AGENCIES



Black knob (Ø25.4mm), galv. inner Wire (Ø1.4mm), monocoil galv. steel casing (Ø4.8mm). Available in stock lengths: 1500 - 2250 - 3000 - 3750 - 4500mm

Universal Light Duty - DC50

FLEXIBLE DRIVE AGENCIES



Black plastic knob, stainless steel inner wire (Ø1.4mm), dual plastic steel reinforced casing (Ø4.9mm) features adjustable friction collar available in stock length: 1500mm

Universal Light Duty - DC51

FLEXIBLE DRIVE AGENCIES



Black plastic knob, galv. inner wire (Ø1.4mm), monocoil galv. steel casing (Ø4.9mm) features adjustable friction collar. Available in stock length: 1500mm

Marine Grade Control Cables - DC40 & DC55

HI-LEX



3" available in stock lengths: 2m to 8m, in 1/4m increments. Also available with 4" Stroke (Part No. DC41× Length) Stainless steel construction make it suitable for marine application.

The DC55 (blue casing) and DC40 (black casing) control cables work to the same dimensions; however the DC55 uses a coated and longitudinally ribbed inner to increase efficiency in longer applications (recommended over 10m) and multiple routes.

The DC55 is also a deluxe alternative in shorter lengths. Suits Hi-Lex, Teleflex Morse and Ultraflex control heads, also Mariner and Chrysler outboard, stern drives, and most inboard engines.

DC40K Knob Conversion Kit To Suit DC40

HI-LEX

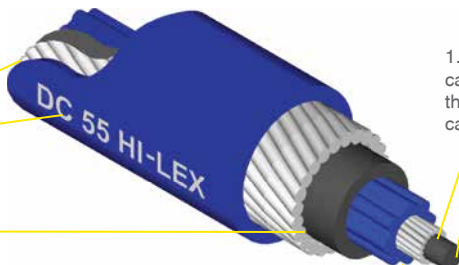


DC55

HI-LEX

4. A zinc plated structure, impregnated and coated by oil and UV resistant polyethylene outer casing ensures that this cable will handle the harshest marine environments.

3. The polyethylene liner matched to the 'ribbed' inner minimises friction.



1. The process of winding smaller cables over the solid core ensures that this is the most flexible and strongest cable for its compact size.

2. This inner is then covered with a unique 'ribbed' nylon coating to guarantee minimum friction and maximum efficiency.

Marine Grade Controls

HI-LEX



AT27H

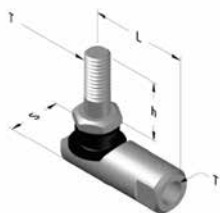
AT25H

Part No.....AT27H - Dual lever control with twist throttle lock on both levers. Standard Imperial 80 series 3" stroke C ends or DC40/DC55 cables.

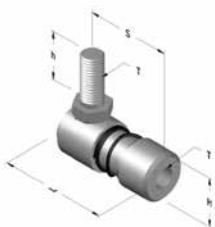
Part No.....AT25H - Dual lever control with twist throttle lock and 3 position lever. Standard Imperial 80 series 3" stroke C ends or DC40/DC55 cables.

Optional 100 series components available for use with 100 series C cable ends.

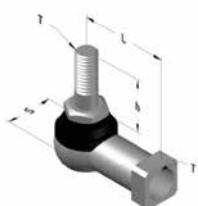
Standard Ball Stud Ends



| Part No. | Series | T | H | h | S | L |
|----------|--------|-----------|------|------|------|------|
| 2406381 | 80 | 10 - 32" | 11.1 | 11.1 | 22.2 | 29.4 |
| 2406382 | 100 | 1/4" - 28 | 11.9 | 14.3 | 24.6 | 33.3 |



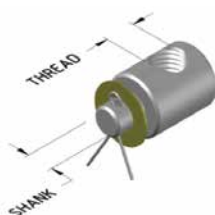
| Part No. | Series | T | h | H | S | L |
|----------|--------|------------|------|------|------|------|
| 2406383 | 80 | 10" - 32" | 11.0 | 14.3 | 24.6 | 31.8 |
| 2406378 | 100 | 1/4" - 28 | 14.3 | 14.3 | 24.6 | 31.8 |
| 2406379 | 120 | 5/16" - 24 | 17.5 | 15.9 | 28.6 | 36.9 |
| 2406380 | 140 | 3/8" - 24 | 22.2 | 19.1 | 34.9 | 44.5 |



Metric Ball Joints

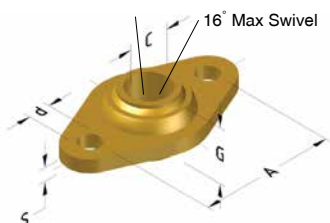
| Part No. | Series | T | h | S | L |
|----------|--------|-----|-------|-------|------|
| 2406306 | 100 | M6 | 14.5 | 18.55 | 38.4 |
| 2406308 | 120 | M8 | 17.15 | 22.05 | 45.9 |
| 2406310 | 140 | M10 | 19.9 | 26.95 | 55.8 |

Swivels



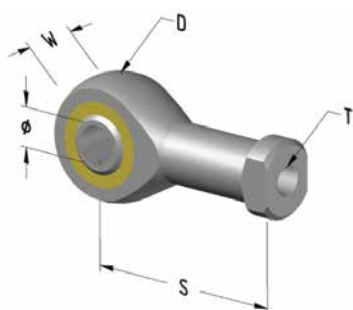
| Thread | Shank | | Kit Part No. |
|----------|--------------|--------------|--------------|
| | Ø 1/4" Shank | Ø 5/6" Shank | |
| 10 x 32 | Q10267 | | 80 |
| 1/4 - 28 | Q10268 | Q102972 | 100 |
| 5/16-24 | Q10269 | Q102973 | 120 |

Swivels Flanges



| Part No. | Series | A | C | D | G | S | SW | Material |
|----------|--------|----|------|-----|----|---|----|----------|
| 1128001E | 120 | 40 | 14.1 | 6.4 | 16 | 4 | 22 | Brass |
| 11280013 | 140 | 52 | 16.2 | 8.2 | 22 | 5 | 24 | Brass |
| 2406002 | 100 | 40 | 12.2 | 6.2 | 16 | 4 | 17 | Steel |

Rod Ends



Imperial (Steel On Steel)

| Part No. | Series | T (Thread) | Ø | D | S | W |
|----------|--------|------------|------|----|----|----|
| AF3G | 80 | 10-32 | 3/16 | 19 | 27 | 8 |
| AF4G | 100 | 1/4"-28 | 1/4 | 19 | 29 | 10 |
| AF5G | 120 | 5/16" - 24 | 5/16 | 22 | 35 | 11 |
| AF6G | 140 | 3/8"-24 | 5/16 | 26 | 40 | 13 |

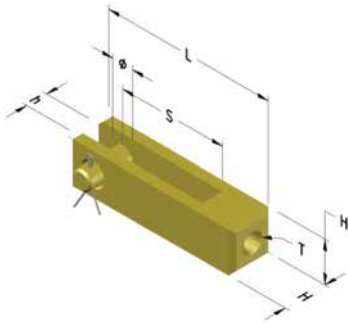
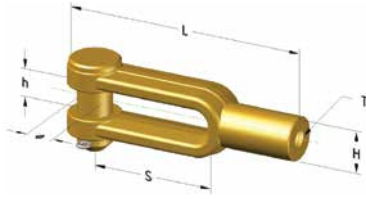
Imperial (Bronzed Lined)

| Part No. | Series | T (Thread) | Ø | D | S | W |
|----------|--------|------------|------|----|----|------|
| VF3G | 80 | 10-32 | 3/16 | 19 | 27 | 7.9 |
| VF4G | 100 | 1/4"-28 | 1/4 | 19 | 29 | 9.4 |
| VF5G | 120 | 5/16"-24 | 5/16 | 22 | 34 | 11.1 |

Metric (Bronzed Lined)

| Part No. | Series | T (Thread) | Ø | D | S | W |
|----------|--------|------------|---|----|----|----|
| PHS5 | 80 | M5X0.8 | 5 | 18 | 27 | 8 |
| PHS6 | 100 | M6X1.0 | 6 | 20 | 32 | 9 |
| PHS8 | 120 | M8X1.25 | 8 | 24 | 37 | 12 |

Clevises



Imperial (Cast & Plated)

| Part No. | Series | d | h | S | L | H | T |
|----------|--------|------|------|-------|-------|-------|------------|
| 2406416S | 80 | 1/4 | 1/4 | 1.25" | 2.25" | 0.45" | 10/32UNF |
| 2406417S | 100 | 5/16 | 5/16 | 1.45" | 2.55" | 0.53" | 1/4-28UNF |
| 2406418S | 120 | 3/8 | 7/16 | 1.65" | 2.9" | 0.66" | 5/16-24UNF |

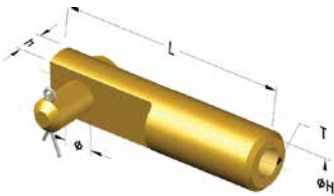
Imperial (Machined)

| Part No. | Series | d | h | S | L | H | T |
|----------|--------|------|-------|------|------|-------|------------|
| 2406416 | 80 | 3/16 | 3/16 | 1.0" | 1.6" | 0.37" | 10x32UNF |
| 2406417 | 100 | 1/4 | 9/32 | 1.0" | 1.9" | 0.47" | 1/4-28UNF |
| 2406418 | 120 | 5/16 | 11/32 | 1.6" | 2.6" | 0.63" | 5/16-24UNF |
| 2406419 | 140 | 3/8 | 7/16 | 2.0" | 3.2" | 0.78" | 3/8-24UNF |

Metric (Machined)

| Part No. | Series | d | h | S | L | H | T |
|----------|--------|----|----|----|----|----|-----------|
| 2406408 | 80 | 5 | 5 | 25 | 41 | 10 | M5 x 0.8 |
| 2406409 | 100 | 6 | 6 | 30 | 49 | 12 | M6 x 1.0 |
| 2406410 | 120 | 8 | 8 | 40 | 66 | 16 | M8 x 1.25 |
| 2406411 | 140 | 10 | 10 | 50 | 82 | 20 | M10 x 1.5 |

Eye Ends



Imperial

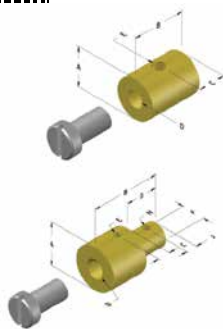
| Part No. | Series | d | h | s | L | H | T |
|----------|--------|-----|-----|----|----|----|-------------|
| 2406420 | 80 | 4.7 | 4.7 | 14 | 40 | 10 | 10x32UNF |
| 2406421 | 100 | 6.3 | 6.3 | 18 | 50 | 12 | 1/4"-28UNF |
| 2406422 | 120 | 7.9 | 7.9 | 20 | 60 | 16 | 5/16"-24UNF |
| 2406423 | 140 | 9.5 | 9.5 | 28 | 75 | 20 | 3/8"-24UNF |

Metric

| Part No. | Series | d | h | s | L | H | T |
|----------|--------|----|----|----|----|----|---------|
| 2406404 | 80 | 5 | 5 | 14 | 40 | 10 | M5x0.8 |
| 2406405 | 100 | 6 | 6 | 18 | 50 | 12 | M6x1.0 |
| 2406406 | 120 | 8 | 8 | 20 | 60 | 16 | M8x1.25 |
| 2406407 | 140 | 10 | 10 | 28 | 75 | 20 | M10x1.5 |

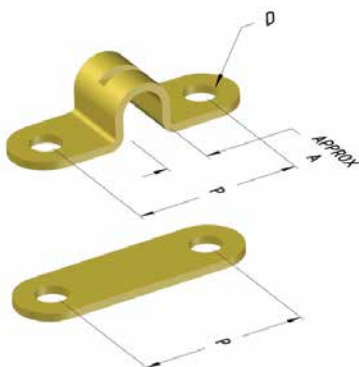
Adjustable Stops

FLEXIBLE DRIVE AGENCIES



| Part No. | Type | A | B | C | D | E | F | G | H | J |
|----------|------|-------------|--------------|-------------|----------|-------------|-----|-----|-----|-----|
| 2103383 | | 3/8" (SQ) | 1/2" (12.7) | 1/4" (6.3) | M5 x 0.8 | .114 (2.9) | | | | |
| 1138 | | 3/8" (9.5) | 19.3 | 4.8 | 3/16"-24 | 3.4 | 6.0 | 9.7 | 2.1 | 3.0 |
| 1139 | | 3/8" (9.6) | 1/2" (12.8) | 1/4" (6.4) | 3/16"-24 | .133" (3.4) | | | | |
| 1140 | | 5/16" (8.0) | 7/16" (11.2) | 7/32" (5.6) | 3/16"-24 | .094" (2.4) | | | | |
| 1141 | | 1/4" (6.4) | 3/8" (9.6) | 3/16" (4.8) | 1/8"-40 | .082" (2.1) | | | | |
| SK7034 | | 7/16" (Hex) | 16.5 | 3.5 | 10-32 | 2.6 | 6.3 | 7.2 | 2.6 | 2.4 |

Cable Casing Clamps



| Part No. | Series | Approx. A | P | D | Base Plate |
|----------|-----------------|-----------|----|------|------------|
| AM318SO | Metric | 80 | 11 | 24 | AM316SO |
| 2006804 | Metric/Imperial | 80 | 10 | 25 | Supplied |
| 2406424 | Metric/Imperial | 80 | 10 | 30 | - |
| 2406412 | Metric | 80 | 11 | 30 | - |
| 2400221 | Metric/Imperial | 100 | 13 | 25 | 2400223 |
| 2406413 | Metric/Imperial | 100 | 13 | 35 | - |
| 2406402 | Metric/Imperial | 120 | 15 | 31.5 | 2406401 |
| 2406415 | Metric/Imperial | 140 | 17 | 45 | - |