



KONGSBERG
AUTOMOTIVE

Performing Reliably

Control Cable Technology



CONTENTS

SILVER LINE™	3
Cable Design & Application	4
 Push – Pull Cables	
30 Series – Push Pull Cables.....	6
40 Series – Push Pull Cables.....	7
60 Series – Push Pull Cables.....	8
80 Series – Push Pull Cables.....	9
 Positive Lock Cables	
30 Series & 40 Series	10
 Utility Cables	
20L & 30L Series	12
30 & 40 Series.....	14
Knobs & T-Handles.....	15
 Vernier Controls.....	
RVC Cables.....	17
PTO Cables	18
Accelerator Cable.....	19
Hardware & Accessories.....	20
Cable Assemblers Program	25
Warranty.....	26

Cable Product Range:

We design and manufacture cables for the following applications:

- Push Pull
- Gear Shift
- Positive Lock
- Remote Valve Control
- Throttle Control
- Pull Release
- Brake Actuation
- Gear Change
- Engine Choke
- Hood Release
- Window Regulator
- Seating Adjustment

CABLE EXPERTISE

Kongsberg Automotive Power Products Systems cables are the industry standard for the world's most successful manufacturers of agricultural, construction and material handling equipment and on-highway vehicles.

Kongsberg Automotive has the widest range of mechanical motion control cables available in the world and manufactures its uniquely designed and developed cables to a common standard across the globe. Our strength originated over sixty years ago with the development of the helical cable for aircraft controls. Today cables are produced for a vast range of driver control products in a wide variety of applications. From light duty throttle cables for outdoor power equipment to heavy duty brake and transmission cables for trucks and buses, Kongsberg Automotive can provide the solutions to meet all your cable requirements.



SERVICE AND COMMITMENT

Kongsberg Automotive has the capability and resources to support global customers wherever and whenever required and to provide the control cable technology solution to maximize vehicle performance. Kongsberg Automotive offers a combined level of engineering support, test capability and product range that is unmatched in the market.

As a global company, Kongsberg Automotive has strategically positioned design and manufacturing facilities to provide local support to our worldwide customers.

Kongsberg Automotive cable products are also available through a network of independent local distributors. Our Cable Assembler Program System locations are licensed distributors with trained technicians. They use 100% Kongsberg Automotive components and processing to build custom control cable assemblies for supply to local customers. These locations specialize in providing rapid response for replacement cables or small OEM production needs.

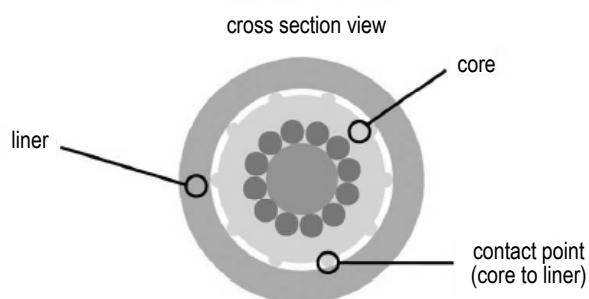




SILVER LINE™ Cable

Kongsberg Automotive SILVER LINE™ cables are the market leading cable solution for demanding control applications.

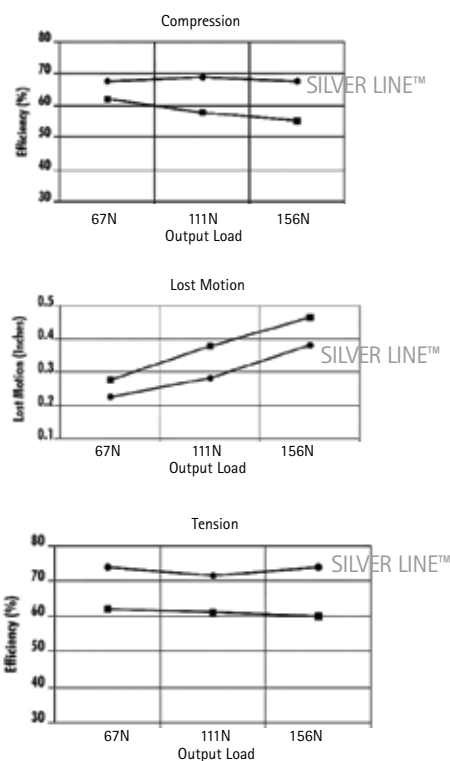
The unique SILVER LINE™ design incorporates a splined core. Ridges of the core allow a close fit with the cable's inner liner, but with minimal contact, so the core glides back and forth smoothly. The result - easy movement and minimum lost motion.



The SILVER LINE™ breakthrough design assures unparalleled smoothness and efficiency - with hardly any lost motion - even in the longest and most complex cable routings. This gives superior feel at the control in any vehicle and unparalleled performance.

- Cables are tested up to 1.3 million cycles, ensuring they perform reliably for an extended service life.
- All cables are lubricated for life and require zero maintenance.
- Available for 30, 40 & 60 series cables.
- Standard Operating temperature -40C to +100C.
- Double lip seals offer improved resistance to contamination ingress.

Kongsberg Automotive SILVER LINE™ cables are fully tested and proven in extreme conditions. The test data below shows how SILVER LINE™ out performs other industry standard control cables for both lost motion and efficiency. Competitor samples were obtained through established aftermarket sources. SILVER LINE™ Samples were randomly taken from ordinary production batches.



Features:

- Market leading durability
- Withstands the harsh demands of industrial vehicle applications
- Uniquely configured for low operating effort
- Precise actuation over long distances and in complex installations
- Common standards available globally through direct sales and distribution networks

CABLE DESIGN AND APPLICATION

Backlash

Backlash, which is apparent as lost motion under light push-pull input forces, is caused by the core member of the cable assembly moving from the inside to the outside of the bends in the cable with the change in direction of movement. It is a function of the clearance between the core and liner, the input force, and the total number of degrees of bend in the cable.

Cable Series	Maximum Backlash for 360°
20	.120 inches (3.1mm)
30	.120 inches (3.1mm)
40	.150 inches (3.8mm)
60	.180 inches (4.6mm)
80	.230 inches (5.8mm)

These figures are for input forces just sufficient to move the core. Lost motion, the sum of backlash plus core and conduit elongation (stretch and compression) will increase as cable length, degrees of bend, and loads are increased. The use of larger cable sizes for a given load will decrease the elongation portion of lost motion.

Temperature

Kongsberg Automotive cables, with standard lubricant, will operate at sustained temperatures from -40°C (-40°F) to +99°C (210°F). For operation at temperatures up to a maximum of +150°C (300°F) consult Kongsberg Automotive Engineering, as high temperature conduit is available.

Efficiency

Efficiency, or the relationship between the required input force for a given output load is primarily determined by bends in the cable. The required input, or the available output, may be calculated by using the following formula:

$$\text{Input Force} = (\text{Output Load}) (\text{Bend Factor})$$

$$\text{Output Force} = \text{Input Force} / \text{Bend Factor}$$

Total Degrees of Bend in Cable	90°	180°	270°	360°	450°
Bend Factors	1.2	1.4	1.6	1.8	2.0

Dynamic Seal™ with Lower Breakaway Force

All Kongsberg Automotive cables have patented Dynamic Seal rod seals. Their one-piece design was tested up to pressures of 3-5 bar after 1.3 million cycles. The seals are made from a proprietary thermoplastic composite impregnated with lifetime lubricant to minimise operating friction and reduce breakaway force by at least 30%. That translates into improved efficiency with reduced operator effort when Kongsberg Automotive cables are used.

Lifetime Lubrication

There are two sources of lubrication in Kongsberg Automotive cables, the lubricants impregnated in the core cover and the specialty lubricants applied to the core's exterior during manufacturing. The combination of these lubricants creates a low-friction environment that provides superior efficiency over the entire life of the cable, outlasting other cable designs.

Bend Radius

Kongsberg Automotive cables have recommended minimum bend radii to render optimum cable life. Installations requiring less than the optimum can easily be achieved but may shorten the cable's life.

Other variables affecting cable life include: output loads, cable length, and total degrees of cable bend in the installation. The sum effect of higher bend radii, lower loads, shorter lengths, and fewer degrees of total bend will all contribute to longer cable life.



Minimum Recommended Bend Radii

Cable bend radii should always be as generous as possible for maximum cable life and efficiency. The following are the minimum bend radii recommended. The life specified for the smaller bend radii reflects the fatigue life of the core.

Cable Series	Long life Minimum Bend Radius	150,000 Cycle Life Minimum Bend Radius
20	4"	*
30	8"	*
40	8"	5"
60	10"	5"
80	12"	7"

Maximum Recommended Input Loads

Recommended load ratings reflect the best balance between load and life characteristics. Cable operating life can be extended by utilising less than the maximum recommended load rating.

Infrequent, or momentary loads, may exceed recommended load ratings considerably without causing failure. This will however, shorten cable operating life.

Output Loads

1. Measure the force required to operate the object to be controlled (valve, throttle, PTO, etc.) For the best efficiency and longest operating life, install the cable so that it encounters the heaviest load in the "pull" mode of operation.
2. Using appropriate lever lengths, adjust the load and travel required to fall within load and travel capabilities of the cables.

The cable travel required to move a lever of a given length through a given number of degrees can be computed as follows:

$$\text{Travel} = 2 * \sin(\theta) * \text{length of lever}$$

The output motion of the workend of the cable is essentially the same as the input motion. For example, a 3 inch pushing movement at the input end will result in a 3 inch pushing movement (less backlash) at the output end. If a differential between input/output and/or direction of movement is desired, it must be accommodated in the design of the lever and attaching point at the work end.

Layout

1. Control & Work End

Where cable ends are to be connected to objects requiring linear movement only, (such as valve spools, etc.), maximum life and efficiency can be achieved by accurately aligning, in both planes, the cable hubs with the objects to be controlled.

Where cable ends are to be connected to levers, etc., the connection point will describe an arc as the cable moves through its travel. Standard cables with rod and sleeve type end fittings have a built-in swivel to accommodate this deflection.

For best operating life and efficiency, keep this deflection to a minimum. This can be accomplished by locating the cable center line.

Anchor the cable securely, so that the anchor point will not move as load is applied. In most cases, the cable end must be anchored to the object to be controlled. This is especially important on engine and transmission controls, where power package "roll" could otherwise cause inadvertent operation of the control.

2. Cable Path

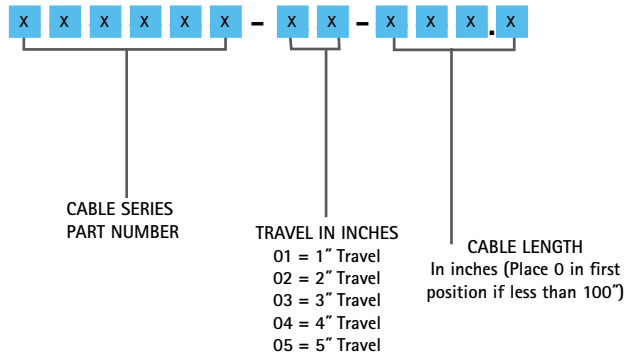
Although cables are flexible motion transfer devices, the best performance and life can be attained by keeping the number of bends to a minimum. Where bends are required, allow as generous a radius as is practical.

3. Protection

Kongsberg Automotive cables are sealed and resist abrasion and contamination. They should, however, be protected against pinching, shearing and crushing, and the effects of excess heat. The operating ends should be shielded against direct spray and excessive dust.

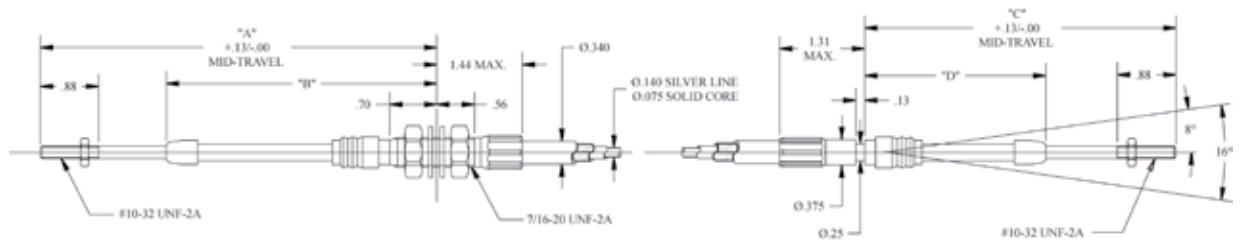
Push Pull Cables

Part Numbering System



Example: 316831-02-150.0 is a SILVER LINE™ 30 series bulkhead cable, with a 2 inch travel, and 150 inches long.

30 Series

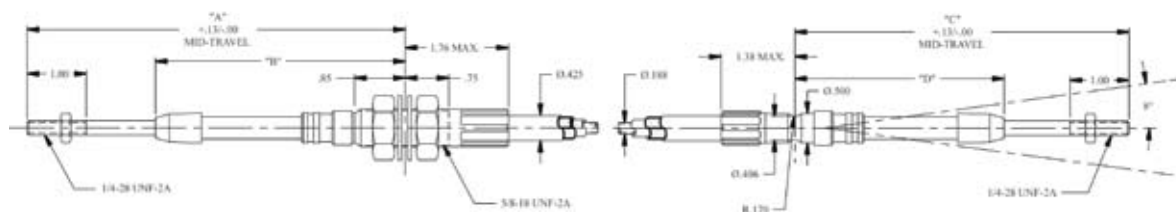


Travel	Bulkhead Type Fitting		Clamp Type Fitting		Input Load Pounds (N) Push/Pull
	"A"	"B"	"C"	"D"	
1"	4.38 (111.2)	3.00 (76.2)	3.69 (93.7)	2.31 (58.6)	50/50 (222/222)
2"	5.88 (149.3)	4.00 (101.6)	5.19 (131.8)	3.31 (84.0)	50/50 (222/222)
3"	7.38 (187.4)	5.00 (127.0)	6.69 (169.9)	4.31 (109.4)	40/50 (178/222)
4"	8.88 (225.5)	6.00 (152.4)	8.19 (208.0)	5.31 (134.8)	30/50 (133/222)
5"	10.38 (263.6)	7.00 (177.8)	9.69 (246.1)	6.31 (160.2)	20/50 (89/222)

All Dimensions are in inches (mm)

30 Series Cable Types	End Type	Cable Series Part Number
30 B SILVER LINE™	Bulkhead	316831
30 C SILVER LINE™	Clamp	316832
30 BC SILVER LINE™	Bulkhead/Clamp	316833
30 B Solid Core	Bulkhead	036559
30 C Solid Core	Clamp	065870
30 BC Solid Core	Bulkhead/Clamp	037990

40 Series



*Metric Rod Ends are M6 x 1.

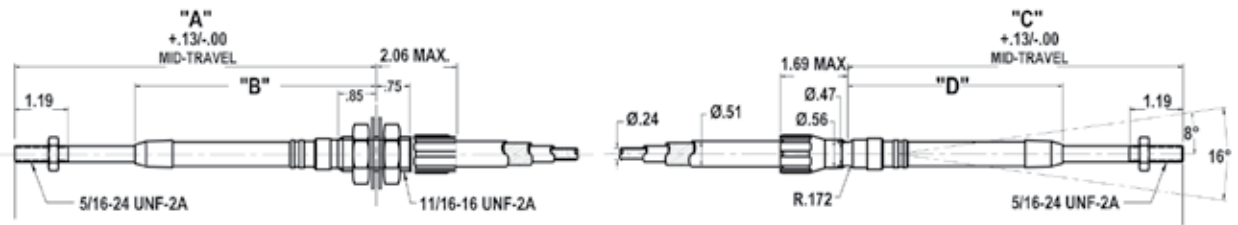
Travel	Bulkhead Type Fitting		Clamp Type Fitting		Input Load Pounds (N)
	"A"	"B"	"C"	"D"	Push/Pull
1"	4.63 (117.6)	3.13 (79.5)	4.00 (101.6)	2.50 (63.5)	150/170 (667/756)
2"	6.13 (155.7)	4.13 (104.9)	5.50 (139.7)	3.50 (88.9)	150/170 (667/756)
3"	7.63 (193.8)	5.13 (130.3)	7.00 (177.8)	4.50 (114.3)	130/170 (578/756)
4"	9.13 (231.9)	6.13 (155.7)	8.50 (215.9)	5.50 (139.7)	110/170 (489/756)
5"	10.63 (270.0)	7.13 (181.1)	10.00 (254.0)	6.50 (165.1)	90/150 (400/667)

All Dimensions are in inches (mm)

40 Series Cable Types	End Type	Cable Series Part Number
40 B SILVER LINE™	Bulkhead	038011
40 C SILVER LINE™	Clamp	038012
40 BC SILVER LINE™	Bulkhead/Clamp	038013
40B SILVER LINE™ Metric Rod Ends *	Bulkhead	310801
40C SILVER LINE™ Metric Rod Ends *	Clamp	310802
40BC SILVER LINE™ Metric Rod Ends *	Bulkhead/Clamp	310803

* Available in 2", 3", and 4" travel only.

60 Series - Push Pull Cables



Travel	Bulkhead Type Fitting		Clamp Type Fitting		Input Load Pounds (N) STANDARD & SILVER LINE™ Push/Pull
	"A"	"B"	"C"	"D"	
1"	5.06 (128.5)	3.38 (85.8)	4.38 (111.2)	2.69 (68.3)	200/200 (890/890)
2"	6.56 (166.6)	4.38 (111.2)	5.88 (149.3)	3.69 (93.7)	200/200 (890/890)
3"	8.06 (204.7)	5.38 (136.6)	7.38 (187.4)	4.69 (119.1)	180/200 (800/890)
4"	9.56 (242.8)	6.38 (162.0)	8.88 (225.5)	5.69 (144.5)	50/200 (222/890)
5"	11.06 (280.9)	7.38 (187.4)	10.38 (263.6)	6.69 (169.9)	120/200 (534/890)

All Dimensions are in inches (mm)

60 Series XL Cable Types	End Type	Cable Series Part Number
60 B SILVER LINE™	Bulkhead	316861
60 C SILVER LINE™	Clamp	316862
60 BC SILVER LINE™	Bulkhead/Clamp	316863
60B	Bulkhead	304261
60C	Clamp	304262
60BC	Bulkhead/Clamp	304263

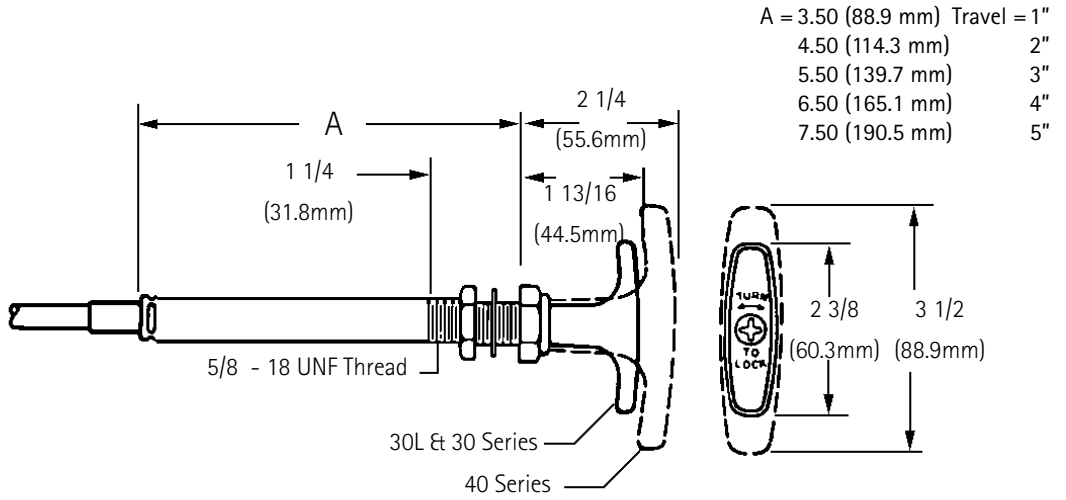
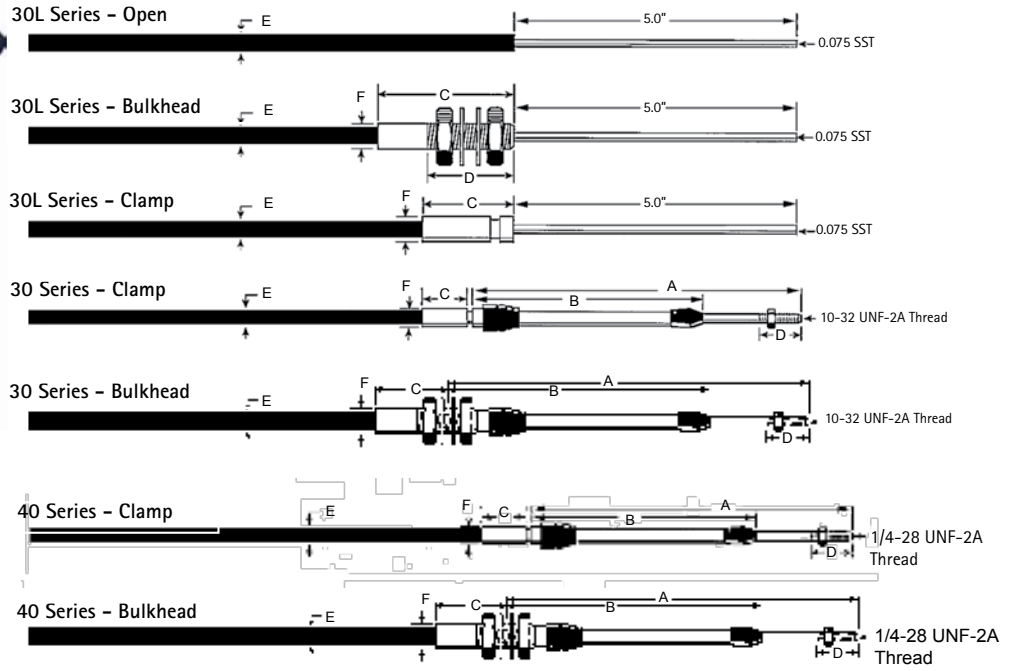
Features:

Positive Lock Cables

Positive Locks allow desired settings to be made and released by turning the T-handle less than 1/8 of a turn in either direction.



Cable End Types



Positive Lock Cables

CABLE SERIES	PART NUMBER	END TYPE	TRAVEL	"A"	"B"	"C"	"D"	"E" DIA.	"F" DIA.	MIN. BEND RADIUS	
30L	043820-02-XXX.X (length in inches)	OPEN	2" (50.8)	-	-	-	-	.26	-	6" (152.4)	
	043150-02-XXX.X (length in inches)	BULKHEAD		-	-	1.88	1.00	.26	.38		
	043151-02-XXX.X (length in inches)	CLAMP		-	-	1.31	-	.26	.38		
	30L	043820-03-XXX.X (length in inches)	OPEN	3" (76.2)	-	-	-	-	.26	-	6" (152.4)
		043150-03-XXX.X (length in inches)	BULKHEAD		-	-	1.88	1.00	.26	.38	
		043151-03-XXX.X (length in inches)	CLAMP		-	-	1.31	-	.26	.38	
	30L	043820-04-XXX.X (length in inches)	OPEN	4" (101.6)	-	-	-	-	.26	-	6" (152.4)
		043150-04-XXX.X (length in inches)	BULKHEAD		-	-	1.88	1.00	.26	.38	
		043151-04-XXX.X (length in inches)	CLAMP		-	-	1.31	-	.26	.38	
30	043143-02-XXX.X (length in inches)	BULKHEAD	2" (50.8)	6.88 (174.7)	4.00 (101.6)	1.44	.88	.34	.44	5" (127.0)	
	043142-02-XXX.X (length in inches)	CLAMP		6.19 (157.2)	3.31 (157.2)	1.13	.88	.34	.38		
	30	043143-03-XXX.X (length in inches)	BULKHEAD	3" (76.2)	8.88 (225.5)	5.00 (127.0)	1.44	.88	.34	.44	5" (127.0)
		043142-03-XXX.X (length in inches)	CLAMP		8.19 (208.0)	4.31 (109.4)	1.13	.88	.34	.38	
	30	043143-04-XXX.X (length in inches)	BULKHEAD	4" (101.6)	10.88 (276.3)	6.00 (152.4)	1.44	.88	.34	.44	5" (127.0)
		043142-04-XXX.X (length in inches)	CLAMP		10.19 (258.8)	5.31 (134.8)	1.13	.88	.34	.38	
40	043143-02-XXX.X (length in inches)	BULKHEAD	2" (50.8)	6.88 (174.7)	4.00 (101.6)	1.44	.88	.34	.44	5" (127.0)	
	043142-02-XXX.X (length in inches)	CLAMP		6.19 (157.2)	3.31 (157.2)	1.13	.88	.34	.38		
	40	043143-03-XXX.X (length in inches)	BULKHEAD	3" (76.2)	8.88 (225.5)	5.00 (127.0)	1.44	.88	.34	.44	5" (127.0)
		043142-03-XXX.X (length in inches)	CLAMP		8.19 (208.0)	4.31 (109.4)	1.13	.88	.34	.38	
	40	043143-04-XXX.X (length in inches)	BULKHEAD	4" (101.6)	10.88 (276.3)	6.00 (152.4)	1.44	.88	.34	.44	5" (127.0)
		043142-04-XXX.X (length in inches)	CLAMP		10.19 (258.8)	5.31 (134.8)	1.13	.88	.34	.38	

All Dimensions are in inches (mm)

CABLE HARDWARE	PART NUMBER
30L Stop Collar	037693
T-Handle - black plastic 2 3/8"	043133-001
30L Clamp	043229
30L Pivot	047639
30L Pivot	047640
30L Pivot	047641
T-Handle - aluminum 3 1/2"	048407
30L Bulkhead Adapter Kit	300673
30L Clamp Adapter Kit	302485
30C Clamp to Bulkhead Kit	304307

Features:

These cables feature open, solid wire ends and are recommended for light duty, light load applications. Chokes, switches, throttles, valves, latches, etc., with a light or "pull only" load, are ideal uses for 20L or 30L Series utility cables. All feature corrosion resistant construction and non-metallic liners for long life and easy operation.

Utility Cables

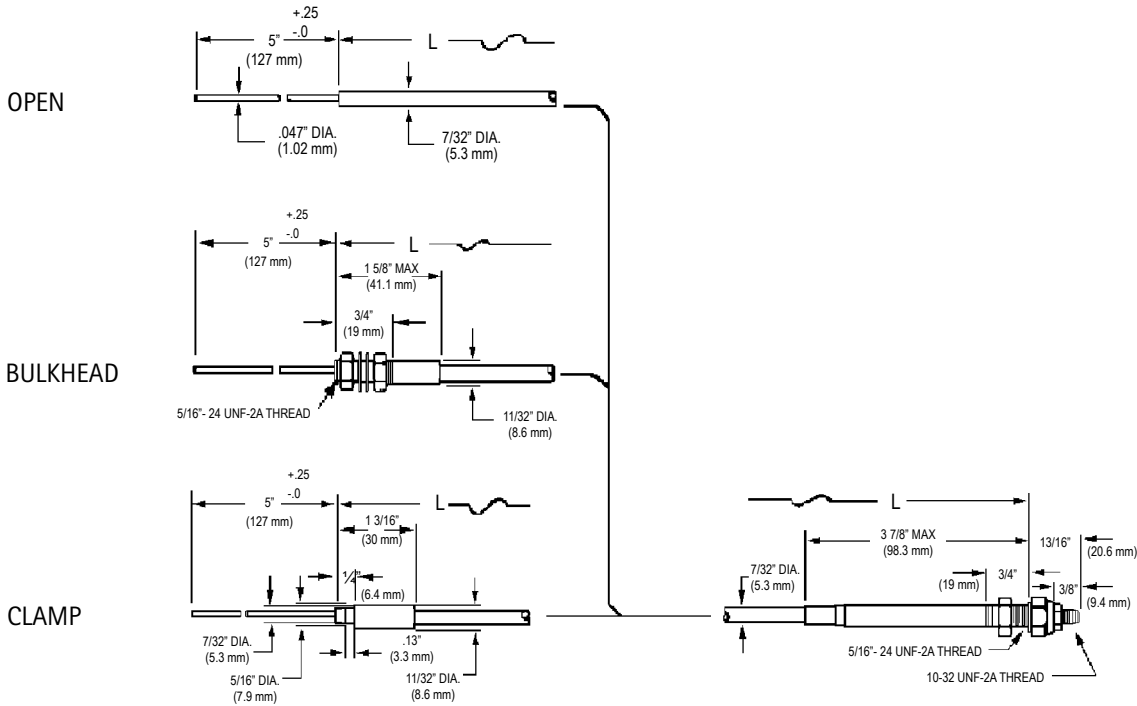
Series	END TYPE	RECOMMENDED MINIMUM BEND RADIUS	MAXIMUM TRAVEL	PART NUMBER
20L	Open	6.00" (152.4mm)	3.00" (76.2mm) 5.00" (127mm)	048711-00-XXX.X (length in inches) 048721-00-XXX.X (length in inches)
	Bulkhead	6.00" (152.4mm)	3.00" (76.2mm) 5.00" (127mm)	048712-00-XXX.X (length in inches) 048722-00-XXX.X (length in inches)
	Clamp	6.00" (152.4mm)	3.00" (76.2mm) 5.00" (127mm)	048713-00-XXX.X (length in inches) 048723-00-XXX.X (length in inches)
30L	Open	4.00" (101.6mm)	2.50" (63.5mm)	048701-00-XXX.X (length in inches)
	Bulkhead	4.00" (101.6mm)	2.50" (63.5mm)	048702-00-XXX.X (length in inches)
	Clamp	4.00" (101.6mm)	2.50" (63.5mm)	048703-00-XXX.X (length in inches)

See Knobs Et T-Handles page for selections and part numbers.

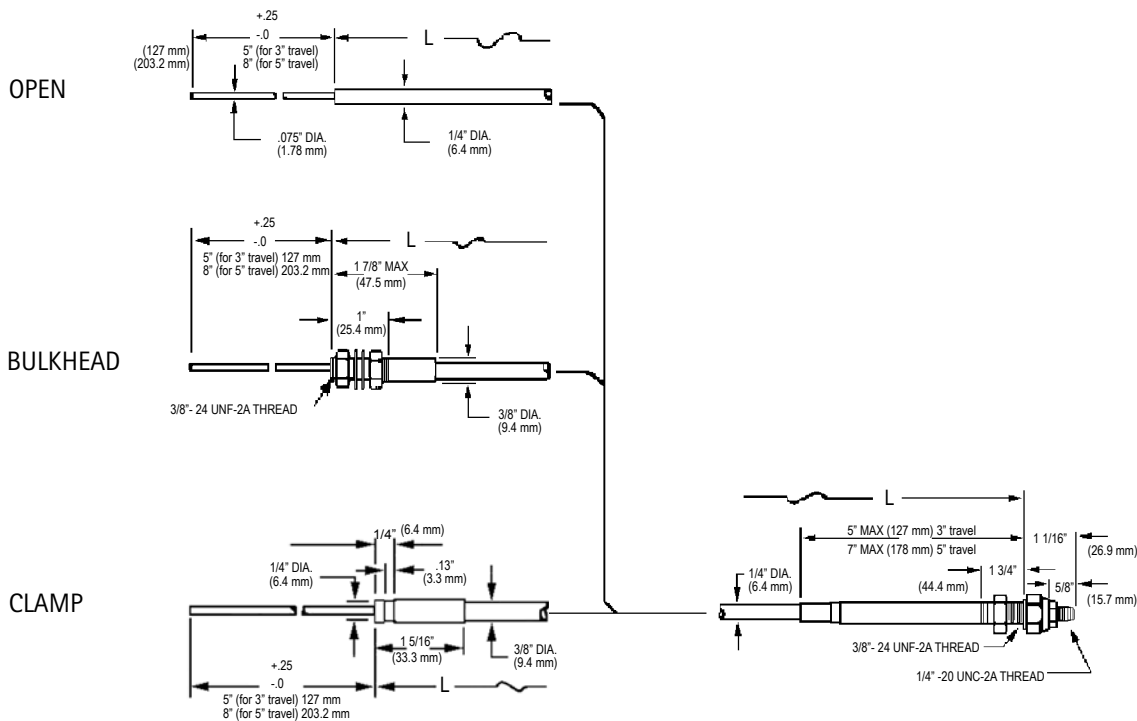


30L SERIES CABLE HARDWARE	PART NUMBER
Stop Collar	037693
Clamp	043229
Pivot	047639
Pivot	047640
Pivot	047641
Bulkhead Adapter Kit	300673
Clamp Adapter Kit	302485

20 L Series - Utility Cables



30L Series - Utility Cables



Utility Cables:

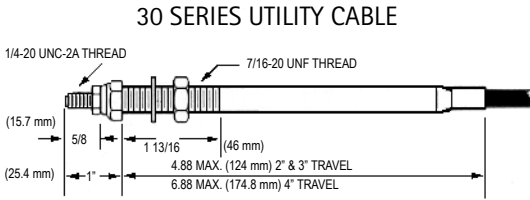
These cables feature open, solid wire ends and are recommended for light duty, light load applications. Chokes, switches, throttles, valves, latches, etc., with a light or "pull only" load, are ideal uses for 30L Series utility cables. All feature corrosion resistant construction and non-metallic liners for long life and easy operation.

Utility Cables:

These cables feature rod and sleeve ends, and are designed for applications with heavier loads, and both "push to operate" and "pull to operate" functions

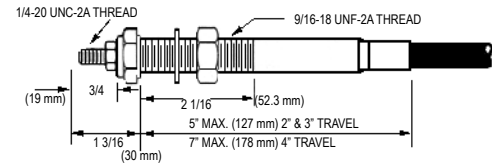
30 Et 40 Series - Utility Cables

HANDLE END



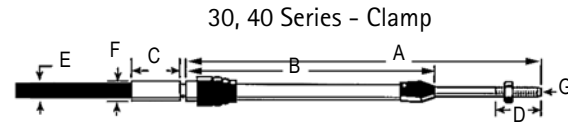
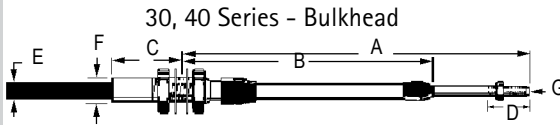
.075" (1.9 mm) Dia. Solid Stainless Steel Core.

40 SERIES UTILITY CABLE



1/8" (3.2 mm) Dia. Armored Strand Core.

OUTPUT END



CABLE SERIES	PART NUMBER	MIN. BEND RADIUS	TRAVEL	END TYPE	"A"	"B"	"C"	"D"	"E" DIA.	"F" DIA.	"G" THREAD UNF-2A
30	038033-02-XXX.X (length in inches)	8" (203.2)	2" (50.8)	Bulkhead	6.88 (174.7)	4.00 (101.6)	1.44 (36.5)	.88 (22.3)	.34 (8.6)	.44 (11.1)	10-32
	038038-02-XXX.X (length in inches)			Clamp	6.19 (157.2)	3.31 (84.0)	1.13 (28.7)	.88 (22.3)	.34 (8.6)	.38 (9.6)	10-32
	038033-03-XXX.X (length in inches)	8" (203.2)	3" (76.2)	Bulkhead	8.88 (225.5)	5.00 (127.0)	1.44 (36.5)	.88 (22.3)	.34 (8.6)	.44 (11.1)	10-32
	038038-03-XXX.X (length in inches)			Clamp	8.19 (208.0)	4.31 (109.4)	1.13 (28.7)	.88 (22.3)	.34 (8.6)	.38 (9.6)	10-32
	038033-04-XXX.X (length in inches)	8" (203.2)	4" (101.6)	Bulkhead	10.88 (276.3)	6.00 (152.4)	1.44 (36.5)	.88 (22.3)	.34 (8.6)	.44 (11.1)	10-32
	038038-04-XXX.X (length in inches)			Clamp	10.19 (258.8)	5.31 (134.8)	1.13 (28.7)	.88 (22.3)	.34 (8.6)	.38 (9.6)	10-32
40	038043-02-XXX.X (length in inches)	5" (127.0)	2" (50.8)	Bulkhead	7.13 (181.1)	4.13 (104.9)	1.76 (44.7)	1.00 (25.4)	.43 (10.9)	.62 (15.7)	.250-28
	038046-02-XXX.X (length in inches)			Clamp	6.50 (165.1)	3.50 (88.9)	1.38 (35.1)	1.00 (25.4)	.43 (10.9)	.56 (14.2)	.250-28
	038043-03-XXX.X (length in inches)	5" (127.0)	3" (76.2)	Bulkhead	9.13 (231.9)	5.13 (130.3)	1.76 (44.7)	1.00 (25.4)	.43 (10.9)	.62 (15.7)	.250-28
	038046-03-XXX.X (length in inches)			Clamp	8.50 (215.9)	4.50 (114.3)	1.38 (35.0)	1.00 (25.4)	.43 (10.9)	.56 (14.2)	.250-28
	038043-04-XXX.X (length in inches)	5" (127.0)	4" (101.6)	Bulkhead	11.13 (282.7)	6.13 (155.7)	1.76 (44.7)	1.00 (25.4)	.43 (10.9)	.62 (15.7)	.250-28
	038046-04-XXX.X (length in inches)			Clamp	10.50 (266.7)	5.50 (139.7)	1.38 (35.0)	1.00 (25.4)	.43 (10.9)	.56 (14.2)	.250-28

All Dimensions are in inches (mm) See Knobs Et T-Handles page for selections and part numbers.

Knobs & T-Handles - Utility Cables

BASE NUMBER	MATERIAL	COLOR	"S" DIM.	"T" DIM	AVAILABLE THREAD	AVAILABLE IDENTIFICATION
KNOBS						
043310	Plastic	Black	7/8"	29/32"	A only	All
043267	Plastic	Black	1-3/8"	1-3/32"	A, B	All
T-HANDLES						
041884	Plastic	Black	2-3/8"	1-5/16"	A, B	All
042978	Plastic	Red	2-3/8"	1-5/16"	A, B	All
037601	Aluminum	Natural	2-3/8"	1-5/16"	A, B	All
038364	Aluminum	Natural	3-1/2"	1-3/4"	B only	All

Knobs & Handles:

A variety of knobs and T-Handles are available. When ordering a utility cable the customer must specify the knob or T-handle required. It is included in the price and is assembled to and shipped with the cable. The part number consists of a base number which specifies configuration, color and material, a suffix number which specifies identification (or lack of it) and a suffix letter which specifies thread size.

IDENTIFICATION SUFFIX NUMBER			
-01 Plain (no indent.)	-04 Throttle	-07 Close	-10 Raise
-02 Stop	-05 Choke	-08 Emergency Stop	-15 Fuel Shutoff
-03 Shutoff	-06 Open	-09 PTO	-16 Engine Stop

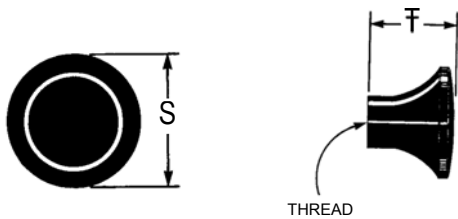
UTILITY CABLE THREAD SIZES AT CONTROL HEAD END

- 20 Series 10-32
- 30L Series 1/4-20
- 30 Series 1/4-20
- 40 Series 1/4-20

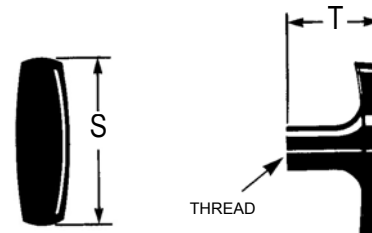
THREAD SUFFIX LETTERS

- A 10-32
- B 1/4-20

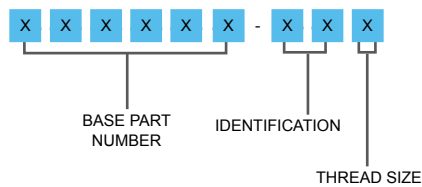
KNOB



T-HANDLE



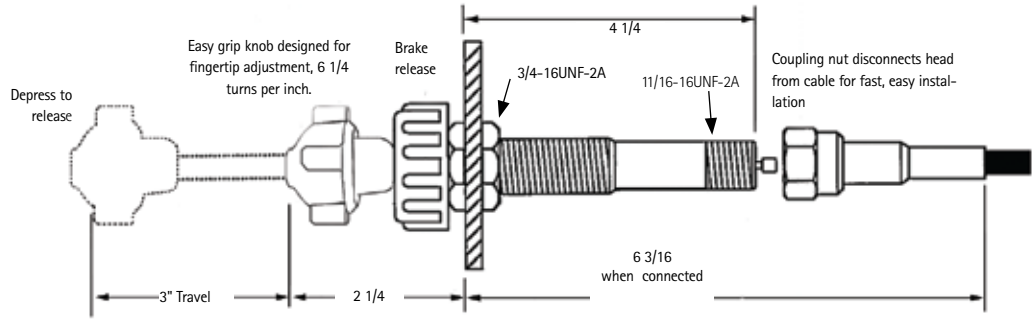
Example: 043267-04A is a black plastic knob with the identification "Throttle" and #10-32 threads.



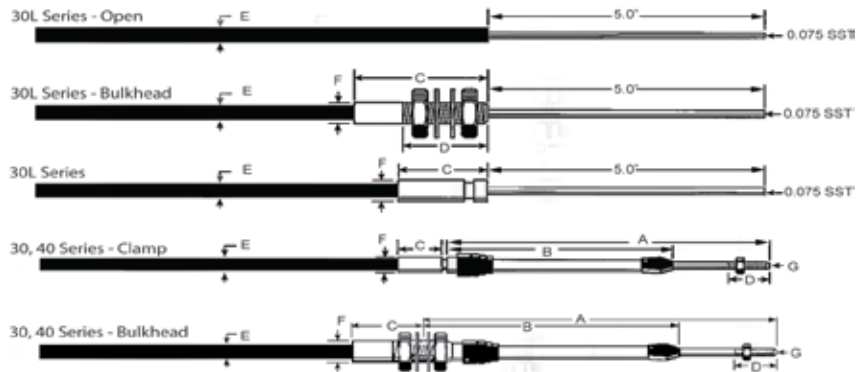
Features:

- Coarse Adjustment - depress top of grip and pull the Vernier knob out until an approximate rpm or setting is achieved.
- Fine Adjustment - rotate Vernier knob for precise adjustment
- Adjustable Brake - accurate settings can be maintained through vibration or governor back pressure by setting the correct amount of friction on the brake.
- Fast Shutdown - simply depress top of grip and simultaneously push in the knob for immediate shutdown.
- 3" cable travel. Travel can be reduced using stop collar.

Vernier Controls



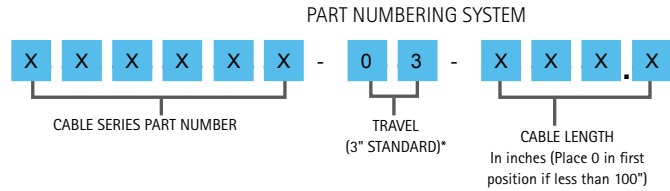
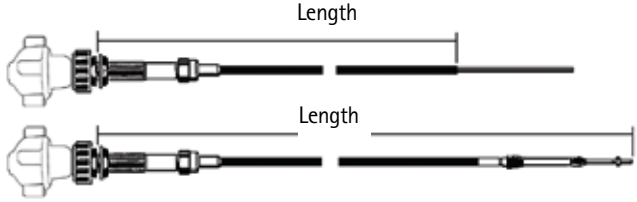
Series Description	End Type	Cable Series Part Number (cable only)	Cable Series Part Number (cable w/head)	Min. Bend Radius	"A"	"B"	"C"	"D"	"E" Dia.	"F" Dia.	"G" Thread UNF-2A
30L	Open	307141	317341	6"	-	-	-	-	.26	-	-
30L	Bulkhead	307142	317342	6"	-	-	1.88	1.00	.26	.38	-
30L	Clamp	307143	317343	6"	-	-	1.31	-	.26	.38	-
30	Bulkhead	307144	317344	8"	8.88	5.00	1.44	.88	.26	.44	.187-32
30	Clamp	307145	317345	8"	8.19	4.31	1.13	.88	.26	.38	.187-32
40	Bulkhead	307146	317346	8"	9.13	5.13	1.76	1.00	.43	.62	.250-28
40	Clamp	307147	317347	8"	8.50	4.50	1.38	1.00	.43	.56	.250-28



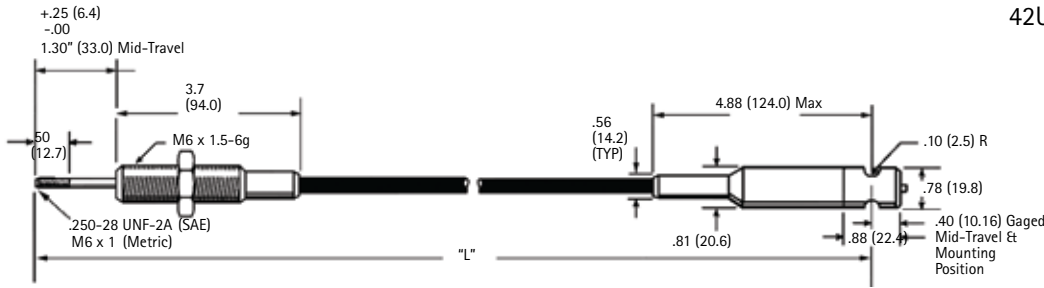
Vernier Hardware and Accessories	Part Number
30L Stop Collar	037693
30L Clamp	043229
30L Pivot	047639
30L Pivot	047640
30L Pivot	047641
30L Bulkhead Adapter Kit	300673
30L Clamp Adapter Kit	302485
30C Clamp to Bulkhead Kit	304307
40C Clamp to Bulkhead Kit	304308
Control Head	317310

Measuring and Ordering

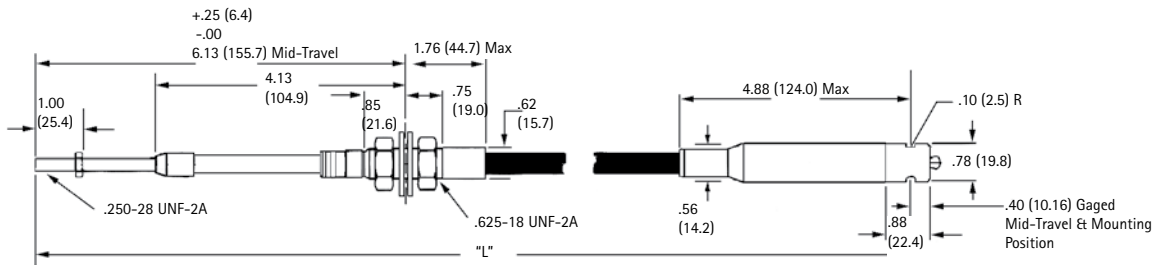
- Cable length stamped on the cable is the overall length that is achieved when the vernier control head is attached to the cable.
- All L-type cables are measured to the point where the core wire exits the cable conduit.
- Cables with rod-type end fittings are measured to the rod end.
- A Quick Release Vernier Control can be ordered as two separate items. Use part number 317310 for the Vernier Control Head. Then order the desired cable part number, immediately followed by the desired cable length expressed in inches (order in 1 ft. increments.) Cables over 20 ft. are special order.



RVC Cables



42UG CABLE



40BG CABLE

RVC Cables:

Used in conjunction with Remote Valve Control heads. RVC cables are used to operate hydraulic spool valves.



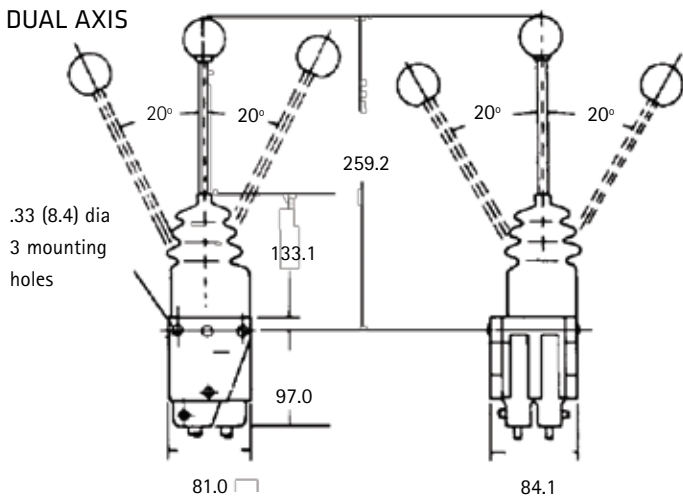
Single-Axis systems consist of a control head, a cable of proper length and a bonnet-type connection kit for each valve. Please specify the correct cable length and appropriate connection kit.

Dual Axis systems consist of a control head, two cables of proper length and two connection kits.

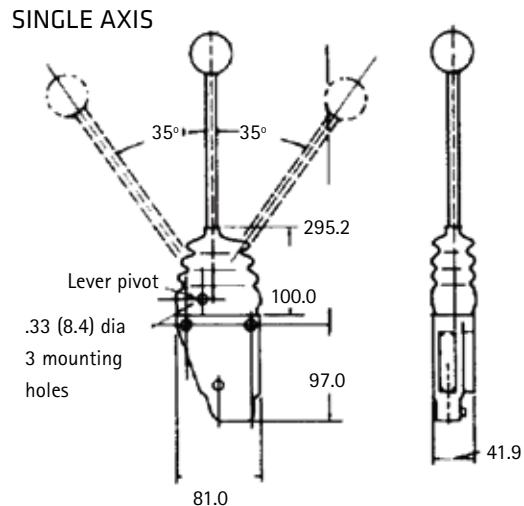
Remote Valve Control Cables	Part Numbers
42UG Cable - SAE	302845-00-XXX.X (length in inches)
42UG Cable - Metric	309584-00-XXX.X (length in inches)
42BG Cable - SAE	302665-00-XXX.X (length in inches)

Remote Valve Controls	Part Numbers	Bonnet-Type Connection Kits (for UG cables)	Part Numbers
Single Axis (with round screw-on knob)	206301	Commercial Intertech VA20	307489
Single Axis (without knob on handle)	212507	Cross BA, BC, CA, CD	302890
Single Axis (with flat top knob)	316597	Energy CVSD, CVP, CCVA-200	303032
Dual Axis (with round screw-on knob)	308721	Rex Roth 30-S2, MP-18	303034
Dual Axis (with flat top knob)	316598	Vickers CM11-Clevis Kit	045985
Flat Top Knob	309984		
Optional Decals for Flat Top Knobs	309985-001 through -005		

DUAL AXIS



SINGLE AXIS



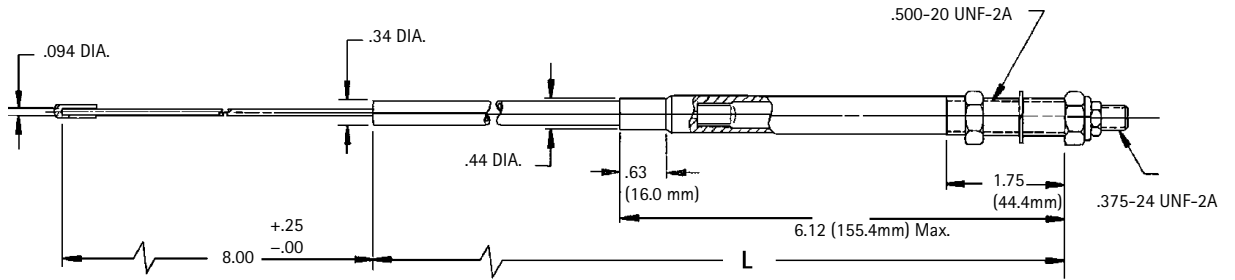
Features:

Classic Kongsberg Automotive quality is built into this PTO cable. Its tough polyethylene outer jacket provides protection from weather, splash, and spray, while the stainless steel core moves smoothly inside a specially formulated polyethylene liner. In addition, the knob is solid to withstand the rigors of heavy duty use.

Complete Interchangeability and Simple Installation

The Kongsberg Automotive thread sizes make this cable 100% interchangeable with manufacturers of PTO's. Packaged complete with knob, conduit clip kit, and PTO decals. Our PTO cable is ideal for both new and replacement applications. It has 5 full inches of travel, is available in 5 foot increments, and can be cut to required lengths for specific applications.

PTO Cable



CABLE HARDWARE	PART NUMBER
PTO Cable	317010-E9-XXX.0 (length in inches)
Hub Adapter Kit	062267
PTO Conduit Kit	302001
Red Knob Only	305481
PTO Kit with Red Knob, PTO Decal & Conduit Kit	305491

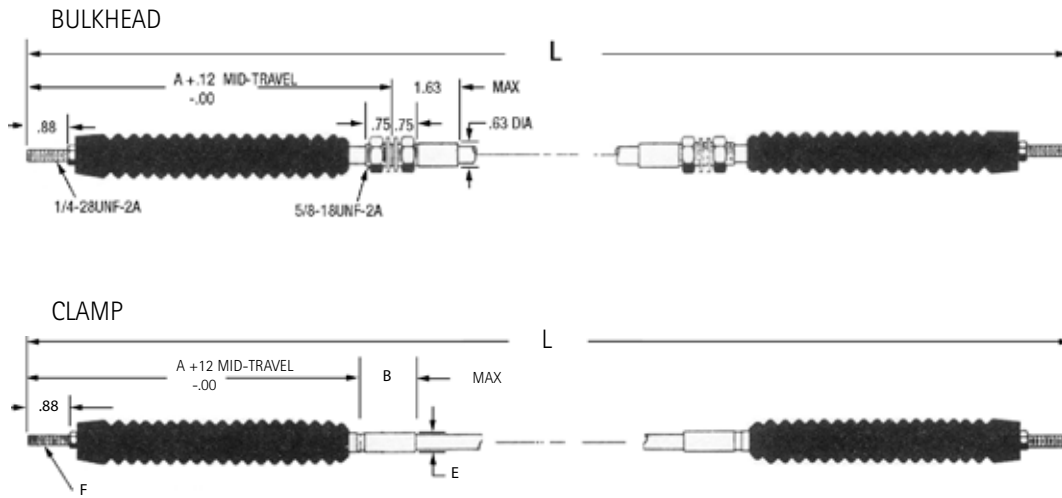
PTO Cables are available in 5 foot increments only.



Accelerator Cables

Accelerator Cables:

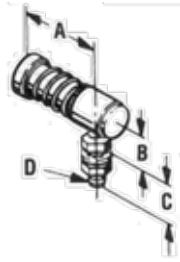
These cables are designed to perform with mechanical throttle controls and engines.



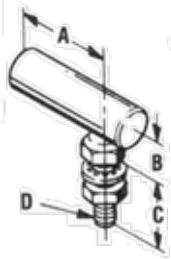
CABLE SERIES	PART NUMBER	END TYPE	TRAVEL	"A"	"B"	"C"	"D"	"E" DIA.	"F" THREAD UNF-2A	"G" THREAD UNF-2A	Recommended Max. load (pull only)
30	068334-02-XXX.X (length in inches)	BULKHEAD	2" (50.8)	5.88 (149.4)	1.44	.56	.56	.44	10-32	7/16-20	40 lbs. (178 N)
	068333-02-XXX.X (length in inches)	CLAMP		5.19 (131.8)	1.13	-	-	.44	10-32	-	
	068334-03-XXX.X (length in inches)	BULKHEAD	3" (76.2)	7.38 (187.5)	1.44	.56	.56	.44	10-32	7/16-20	
	068333-03-XXX.X (length in inches)	CLAMP		6.69 (169.9)	1.13	-	-	.44	10-32	-	
40	068343-02-XXX.X (length in inches)	BULKHEAD	2" (50.8)	6.12 (155.6)	1.63	.75	.75	.63	1/4-28	5/8-18	100 lbs. (444 N)
	068357-02-XXX.X (length in inches)	CLAMP		5.50 (139.7)	1.38	-	-	.50	1/4-28	-	
	068343-03-XXX.X (length in inches)	BULKHEAD	3" (76.2)	7.62 (193.7)	1.63	.75	.75	.63	1/4-28	5/8-18	
	068357-03-XXX.X (length in inches)	CLAMP		7.00 (177.8)	1.38	-	-	.50	1/4-28	-	
	0301127-02-XXX.X (length in inches)	BULKHEAD/CLAMP	(COMBINATION OF ABOVE 40 SERIES BULKHEAD & CLAMP)							1/4-28	
0301127-03-XXX.X (length in inches)	BULKHEAD/CLAMP	(COMBINATION OF ABOVE 40 SERIES BULKHEAD & CLAMP)							1/4-28	-	

All Dimensions are in inches (mm)

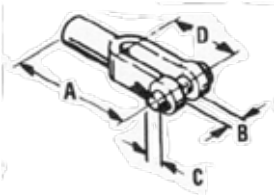
Hardware & Accessories



Type QR



Type ST



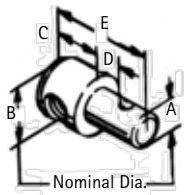
Clevis

BALL JOINTS					
Part Number	A	B	C	D	Type
30 Series					
031126	31/32 (24.6)	15/32 (11.9)	9/19 (14.3)	1/4-28 UNF-2A	QR
031799-001	29/32 (23.0)	15/32 (11.9)	7/16 (11.1)	10-32 UNF-2A	QR
035242	1 1/8 (28.6)	17/32 (13.5)	7/8 (22.2)	5/16-24 UNF-2A	QR
40 Series					
029104	31/32 (24.6)	15/32 (11.9)	9/16 (14.3)	1/4-28 UNF-2A	QR
032267	31/32 (24.6)	17/32 (13.5)	7/8 (22.2)	5/16-24 UNF-2A	QR
60 Series					
029108	1 1/8 (28.6)	17/32 (13.5)	7/8 (22.2)	5/16-24 UNF-2A	QR
038491	1 1/8 (28.6)	17/32 (13.5)	11/16 (17.5)	5/16-24 UNF-2A	ST

CLEVIS				
Part Number	A	B	C	D
30 Series				
031125	2 (50.8)	9/32 (7.1)	1/4 (6.4)	1 1/4 (31.8)
031800	1 9/16 (39.7)	3/16 (4.8)	3/16 (4.8)	1 (25.4)
033395	2 1/4 (57.2)	11/32 (8.7)	5/16 (7.9)	1 7/16 (36.50)
40 Series				
029025	2 (50.8)	9/32 (7.1)	1/4 (6.4)	1 1/4 (31.8)
042212	2 1/4 (57.2)	11/32 (8.7)	5/16 (7.9)	1 7/16 (36.5)
045985	2 1/2 (63.5)	7/16 (11.1)	3/8 (9.5)	1 5/8 (41.3)
60 Series				
029132-001	2 1/4 (57.2)	11/32 (8.7)	5/16 (7.9)	1 7/16 (36.5)
042034	2 1/2 (63.5)	7/16 (11.1)	3/8 (9.5)	1 5/8 (41.3)

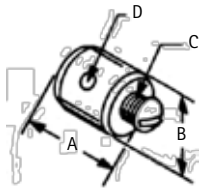
All Dimensions are in Inches (mm)

Hardware & Accessories

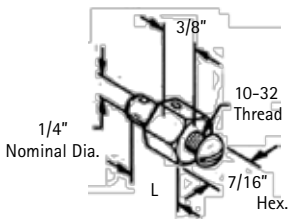


Pivots

PIVOTS					
Part Number	A	B	C	D	E
30 Series					
031029	1/4 (6.4)	7/16 (11.1)	21/64 (8.3)	9/64 (3.6)	5/8 (15.9)
031539	1/4 (6.4)	7/16 (11.1)	3/8 (9.5)	.191 (4.9)	23/32 (18.3)
032392	1/4 (6.4)	7/16 (11.1)	21/64 (8.3)	.295 (7.5)	25/32 (19.8)
40 Series					
039110	1/4 (6.4)	1/2 (12.7)	7/16 (11.1)	9/64 (3.6)	3/4 (19.1)
042419	3/8 (9.5)	9/16 (14.3)	1/2 (12.7)	25/64 (9.9)	1 3/16 (20.6)
045199	5/16 (7.9)	1/2 (12.7)	9/16 (14.3)	9/64 (3.6)	29/32 (23.0)



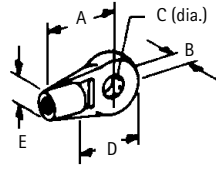
STOP COLLAR				
Part Number	A	B	C	D
30 Series Only				
037693	3/8 (9.5)	3/8 (9.5)	8-32 -	3/32 (2.4)



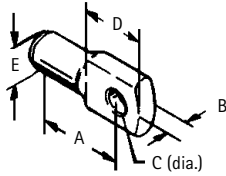
CORE FITTINGS		
Part Number	Lever Thickness	"L" Dim.
30L Series		
047639	1/8 (3.0)	21/32 (16.5)
047641	1/4 (6.4)	13/16 (20.6)

All Dimensions are in Inches (mm)

Hardware & Accessories



317413
300646



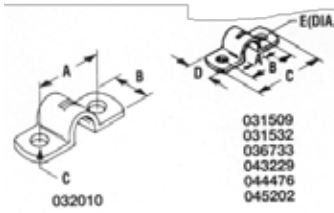
037639
041134
046170

TERMINAL EYES

Part Number	A	B	C	D	E
30 Series					
317413 (Aluminum)	1 (25.4)	15/64 (6.0)	5/16 (7.9)	3/4 (19.1)	1/2 (12.7)
300646 (Nylon)	1 (25.4)	15/64 (6.0)	5/16 (7.9)	3/4 (19.1)	1/2 (12.7)
40 Series					
041134	1 3/8 (34.9)	5/16 (7.9)	5/16 (7.9)	3/4 (19.1)	1/2 (12.7)
046170	1 3/8 (34.9)	5/16 (7.9)	1/4 (6.4)	3/4 (19.1)	1/2 (12.7)
037639	1 (25.4)	15/64 (6.0)	5/16 (7.9)	3/4 (19.1)	1/2 (12.7)

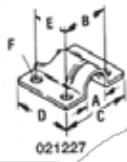


037664



032010

031509
031532
036733
043229
044476
045202



021227



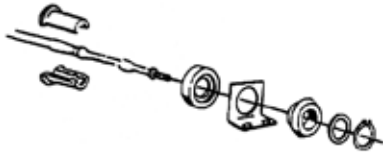
021600

CLAMPS

Part Number	A	B	C	D	E	F	G	H
30L & 30 Series								
031509	3/8 (9.5)	1 (25.4)	1 1/2 (38.1)	1/2 (12.7)	12/64 (5.1)			
30 Series Only								
032010	7/8 (22.2)	1/2 (12.7)	3/16 (4.7)					
021600	1/4 (6.35)	7/8 (22.10)	2 3/4 (69.8)	1 1/4 (31.8)	3/4 (18.92)	1 (25.4)	13/64 (5.16)	17/64 (6.76)
40 Series								
021227	1/2 (12.7)	1 (25.4)	1 1/2 (38.1)	1 1/4 (31.8)	3/4 (19.1)	7/32 (5.6)		
021600	1/4 (6.35)	7/8 (22.10)	2 3/4 (69.8)	1 1/4 (31.8)	3/4 (18.92)	1 (25.4)	13/64 (5.16)	17/64 (6.76)
031532	1/2 (12.7)	1 (25.4)	1 1/2 (38.1)	1/2 (12.7)	7/32 (5.6)			
60 Series								
036733	9/16 (14.3)	1 1/4 (31.8)	1 3/4 (44.5)	5/8 (15.9)	9/32 (7.1)			

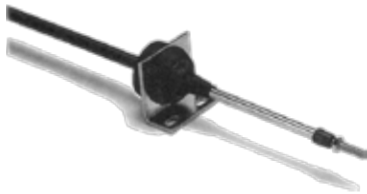
All Dimensions are in Inches (mm)

Hardware & Accessories

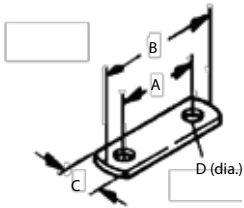


CABLE MOUNTING/ANTI-VIBRATION KITS	
Part Number	Description
294200	30 Series C-Mounting / Isolator Kit
294201	40 Series C-Mounting / Isolator Kit

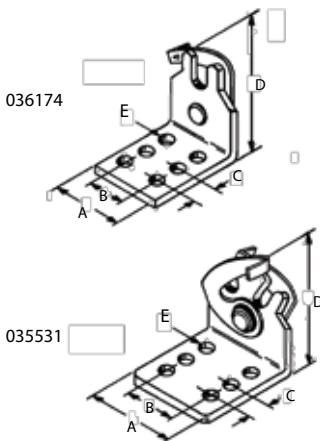
- Reduces Noise and Vibration
- Reduces Cable Cost (Clamp vs Bulkhead)



U-BOLT KITS	
Part Number	Description
063651	40 Series U-Bolt Kit for 40C Cables
063988	60 Series U-Bolt Kit for 60C Cables



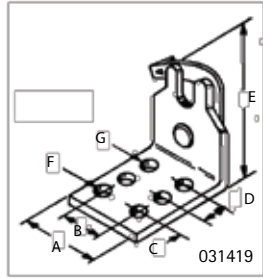
SHIMS				
Part Number	A	B	C	D
031538	1 (25.4)	1 1/2 (38.1)	1/2 (12.7)	12/64 (5.1)
037884	1 1/4 (31.8)	1 3/4 (44.5)	5/8 (15.9)	9/32 (7.1)



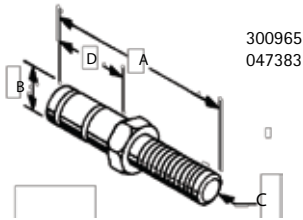
CABLE HOOK CLIP					
Part Number	A	B	C	D	E
036174 (SINGLE)	1 (25.4)	1/2 (12.7)	3/8 (9.5)	1 1/2 (38.1)	13/64 (5.1)
035531 (DUAL)	1 1/4 (31.8)	3/4 (19.0)	3/8 (9.5)	1 1/2 (38.1)	13/64 (5.1)

All Dimensions are in Inches (mm)

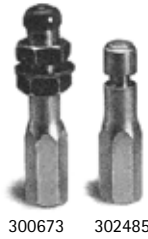
Hardware & Accessories



CABLE CLIP							
Part Number	A	B	C	D	E	F	G
30 Series Only							
031419	1 (25.4)	1/2 (12.7)	3/8 (9.5)	1/2 (12.7)	1 3/16 (30.1)	1/4 (6.3)	3/16 (4.7)



TERMINAL EYE PIN				
Part Number	A	B	C	D
300965	1 1/2 (38.1)	5/16 (8.0)	1/4-28 -	19/32 (15.1)



30L CABLE ADAPTER KITS	
Part Number	Description
300673	Bulkhead Adapter Kit
302485	Clamp Adapter Kit

Distributors

Need local service and support?

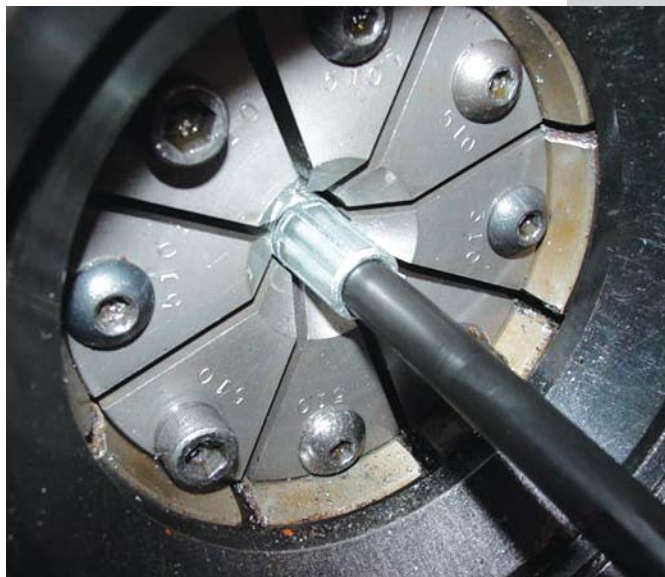
The Kongsberg Automotive Cable Assembler Program enables Kongsberg Automotive distributors to assemble cable controls within their own facilities to service their local markets. Urgent service and repairs can be provided locally, and a wide range of cables can be assembled within minutes.

Licensed Distributors employ trained technicians and 100% Kongsberg Automotive components to build the exact cables you need. Each cable is individually inspected and tested to meet strict operating standards before it is sold to a customer.

In addition to the full Kongsberg Automotive product line, Distributors can provide local assembly of the following cables (assembled to exact lengths):

- 30, 40, 60, and 80 Series Push Pull cables
- Vernier Control Cables
- Positive Lock Cables
- Accelerator Cables
- RVC Cables
- Utility Cables
- Modulator Cables

For the name of a licensed Distributor near you, see our website at www.kongsbergautomotive.com/, or call us at 936 856 2971.



LIMITED WARRANTY

KONGSBERG AUTOMOTIVE POWER PRODUCTS

Kongsberg Automotive warrants to the first retail (end user) purchaser of this product, or a Kongsberg Automotive product incorporated in another vendor's product that, for a period of one (1) year from the date of original purchase, such product will be free from defects in materials and workmanship. Kongsberg Automotive makes no warranty as to merchantability or to fitness of its products for a particular purpose.

The above warranty does not apply to a product that has not been installed or maintained in accordance with Kongsberg Automotive's instructions, been subjected to damage in an accident or abused during operation, or repaired or modified by persons other than Kongsberg Automotive. The warranty is also void when Kongsberg Automotive products are installed on a vehicle, engine or piece of equipment judged by Kongsberg Automotive to be an inappropriate application of its product, or when Kongsberg Automotive products are used with other industrial accessory products which in Kongsberg Automotive's judgement are incompatible with the Kongsberg Automotive product or adversely affect its performance or durability.

If any Kongsberg Automotive product is used commercially, for such purposes as rental or other income-producing activities, then this warranty is limited to 90 days from the date of original retail purchase.

Kongsberg Automotive's responsibility in respect to warranty claims is limited solely to repair or replacement of product found by Kongsberg Automotive to be defective. Kongsberg Automotive does not pay for labor charges connected with the removal of a product deemed to be defective or with installation or replacement of repaired product, or for any other incidental or consequential damages.

To make a claim under this warranty, return the product believed to be defective to your local industrial dealer or Kongsberg Automotive distributor, along with proof of purchase. If your dealer or distributor feels that a warranty claim is justified, he/she should contact Kongsberg Automotive giving a description of the product and requesting authorization to return it to the factory.

Merchandise should not be returned to Kongsberg Automotive until a Return Goods Authorization form is received.

After receipt of an authorization from your dealer or distributor, you should return the product, freight prepaid, to:

Kongsberg Automotive
PO Box 588, 300 S. Cochran
Willis, TX 77378

If found to be defective, and all return charges have been prepaid, Kongsberg Automotive will repair or replace the product and return it freight prepaid.

