

CRL

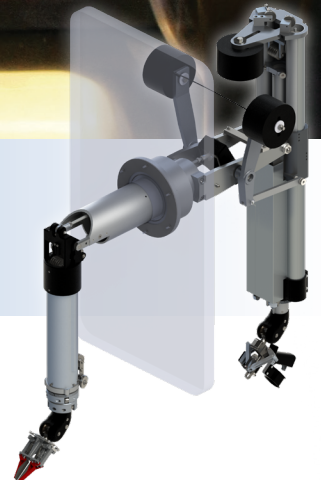
Central Research Laboratories

a **DESTACO** company



Telemanipulators

Visual Selection Guide







A Legacy of Innovative Experience

In 1945, at the dawn of the Atomic Age, three scientists from the Massachusetts Institute of Technology founded Central Research Laboratories (CRL) and pioneered early development of safer methods for handling hazardous and toxic products produced by this industry. With a legacy of over 70 years of innovative experience, CRL has continued to develop and build a full line of remote handling and containment solutions including Telemanipulators, Transfer Systems, Glove Ports, and Waste Drum Transfer Systems. These products allow operators to safely and efficiently perform various tasks in Nuclear and Life Science industries across the world.

The CRL team has the experience, expertise, and technologies to help with all your remote handling needs and strives to continually improve and develop innovative technology that help its customers achieve the highest level of performance. CRL is committed to its customers' needs and developing the best solutions for every project. Every product manufactured is created with those specific needs in mind to deliver the most customized solution available for every application.

crlsolutions.com

Central Research
laboratories

RED WING, MINN.

Proven Technology. Customized Solutions.

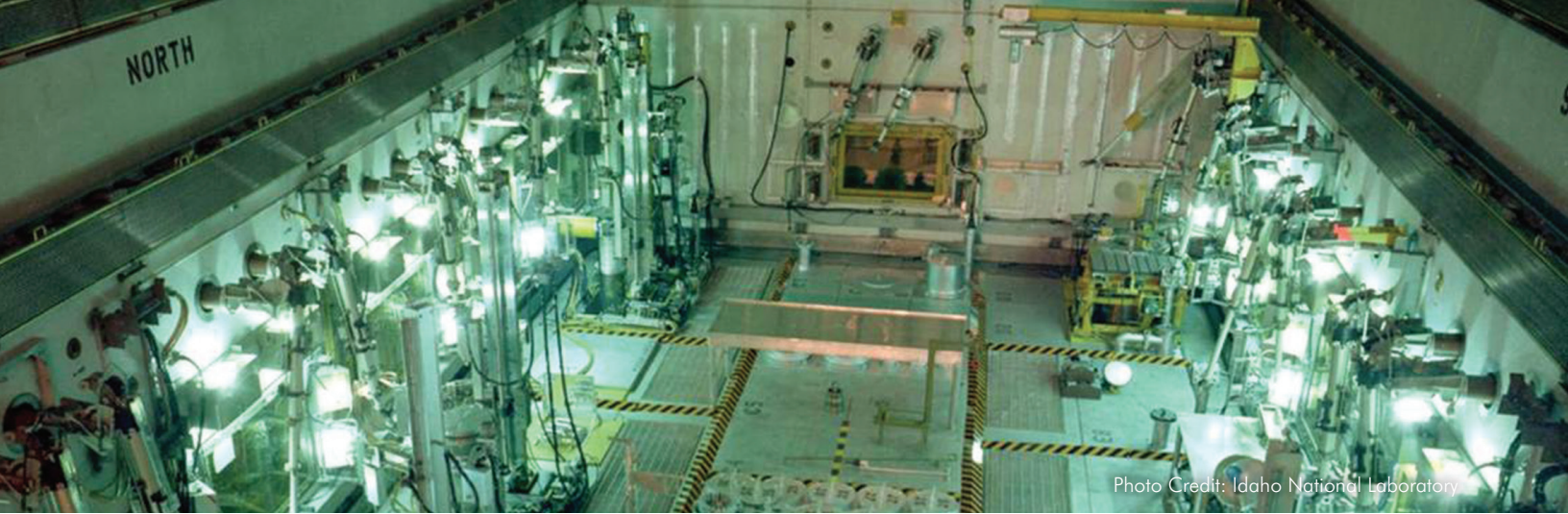


Photo Credit: Idaho National Laboratory

Proven Technology Customized for Your Specific Needs

For over 75 years CRL has been a trusted manufacturer of telem manipulators. Today, our experienced experts continue to deliver customized and innovative solutions to meet evolving industry needs.

CRL Telem manipulators extend the dexterous manipulative capabilities of a human operator remotely into a high radiation or hazardous environment. Typical tasks range from operation of laboratory instruments to the maintenance of large process equipment, all requiring dexterous manipulations. These tasks are unstructured and require real-time human intervention.

Natural motions of the hands at the command end are reproduced identically at the remote end. These operations are accomplished with a minimum of effort and a maximum of precision due to careful counter-balancing and reduction of mass, friction and lost motion. Very little force is required to initiate and maintain uniform motion in any horizontal or vertical direction.

One-Piece Telem manipulator

The one-piece telem manipulator is the most widely used and consists of a command arm, remote arm, and through-the-wall tube assembled as one unit. Stainless steel tapes and cables are used to transmit motions from the command arm to the remote arm in continuous closed loops. The single unit telem manipulator is installed and removed in the hot cell from the operator's side.

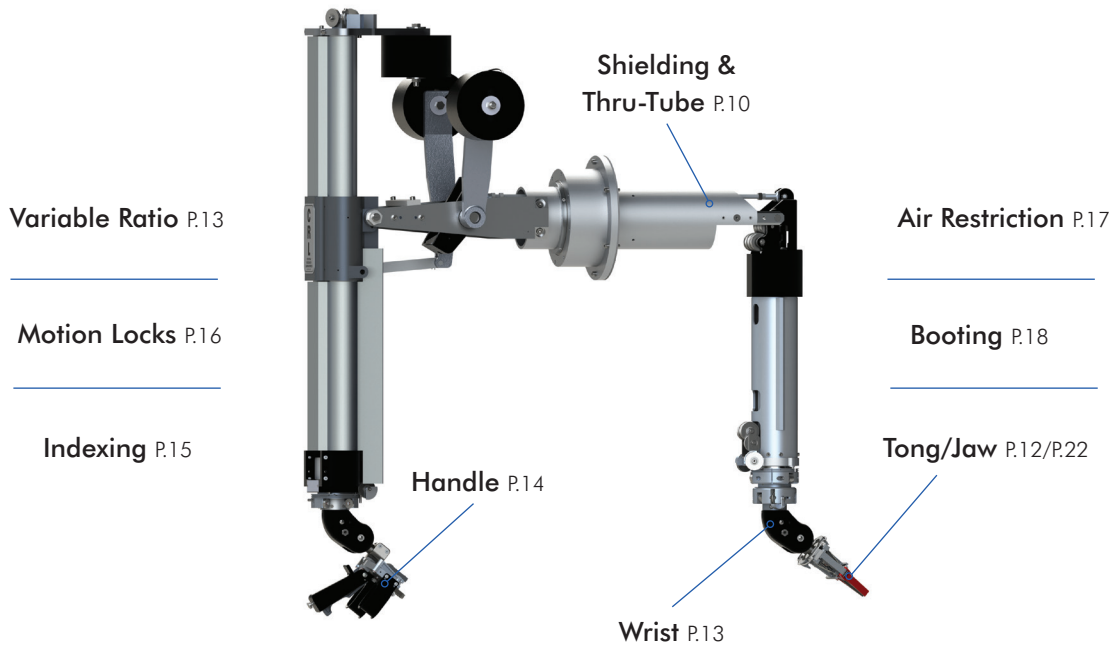
The installation is accomplished by indexing the remote arm to a position in line with the wall tube, inserting the telem manipulator into the wall sleeve, then indexing the remote arm down to an operating position inside the hot cell. The single unit telem manipulator is typically used when the in-cell atmosphere is air instead of an inert gas. Typically the atmosphere in-cell is at a negative pressure for one-piece telem manipulators. An optional booting assembly can be added to protect the remote arm from contamination.

Three-Piece Telem manipulator

The three-piece telem manipulator is typically used in an inert atmosphere cell, which requires careful environmental control. Typically the in-cell atmosphere is at a negative pressure for three-piece telem manipulator applications. The three-piece telem manipulator consists of three independent assemblies, the command arm, the remote arm and the through-the-wall tube (seal tube).

The command arm is removable and interchangeable with any seal tube. The remote arm is remotely removable with an in-cell crane and is also interchangeable with any seal tube. The seal tube is maintenance free and usually remains in the wall. When using a three-piece telem manipulator, provisions should be made to remove the remote arm from the hot cell through an air lock or transfer port for maintenance. The three-piece telem manipulator may also be installed and removed from the operator side similar to the single unit telem manipulator.

One-Piece Telemanipulator



Three-Piece Telemanipulator

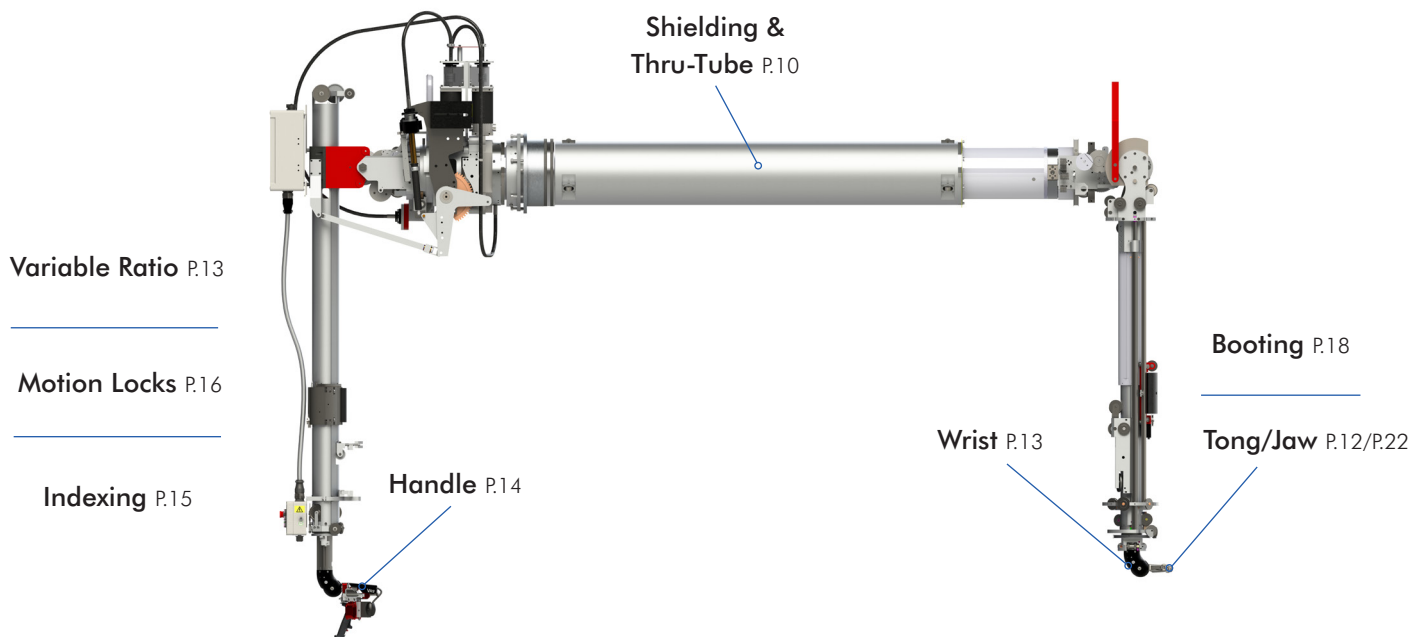


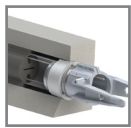
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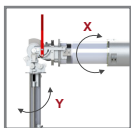
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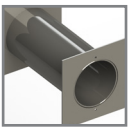
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Telemanipulator Selection Guide

CRL produces many different types of telemanipulators that are designed for many different working environments and uses. The following selection guide will give you a good starting point in specifying your telemanipulator using the loads that are intended to be worked on, and the amount of use they will see.

DUTY CYCLE Intermittent: Short, intermittent periods of time | Continuous: Constant use

CELL SIZE Small: Glovebox | Medium: Slightly larger working area; may require indexing to reach all areas comfortably
Large: Large hot cell

ONE-PIECE TELEMANIPULATOR						
MAX. CAPACITY	MODEL	DUTY CYCLE		CELL SIZE CYCLE		
		Intermittent	Continuous	Small	Medium	Large
10 lb (4.5 Kg)	G-LDR	✓		✓		
	G-LD		✓	✓		
	H		✓	✓		
	G		✓		✓	
20 lb (9 Kg)	G-HD		✓		✓	
	E		✓			✓
	8		✓		✓	
50 lb (22.6 Kg)	E-HD		✓			✓
	8-HD		✓		✓	
100 lb (45.3 Kg)	F		✓			✓

THREE-PIECE TELEMANIPULATOR						
MAX. CAPACITY	MODEL	DUTY CYCLE		CELL SIZE CYCLE		
		Intermittent	Continuous	Small	Medium	Large
10 lb (4.5 Kg)	L	✓		✓		
20 lb (9 Kg)	L-HD		✓		✓	
	RE-LT		✓			✓
50 lb (22.6 Kg)	RE-T		✓			✓

Telemanipulator Motion Options Guide

Telemanipulator motions can be driven through the unit using stainless steel tape, aircraft-quality stainless steel cable or roller chain, depending on feel, load and longevity requirements.

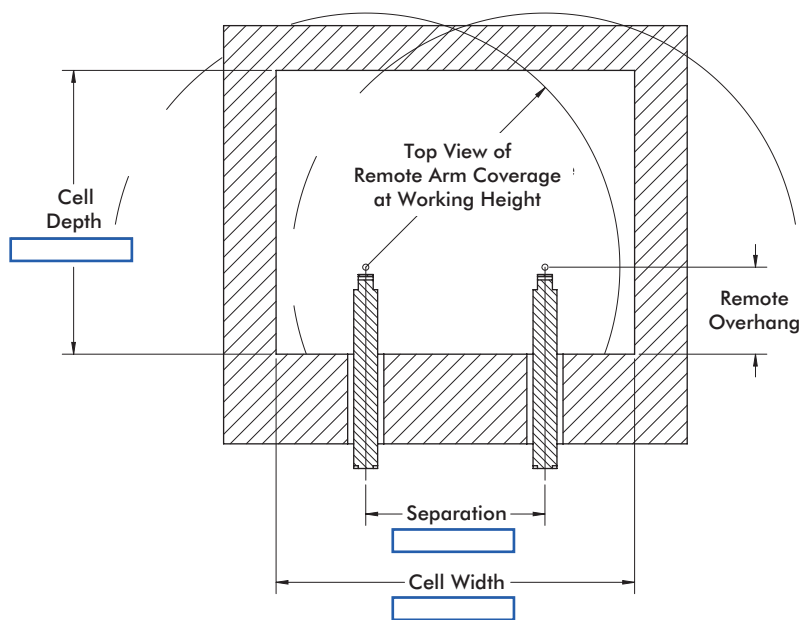
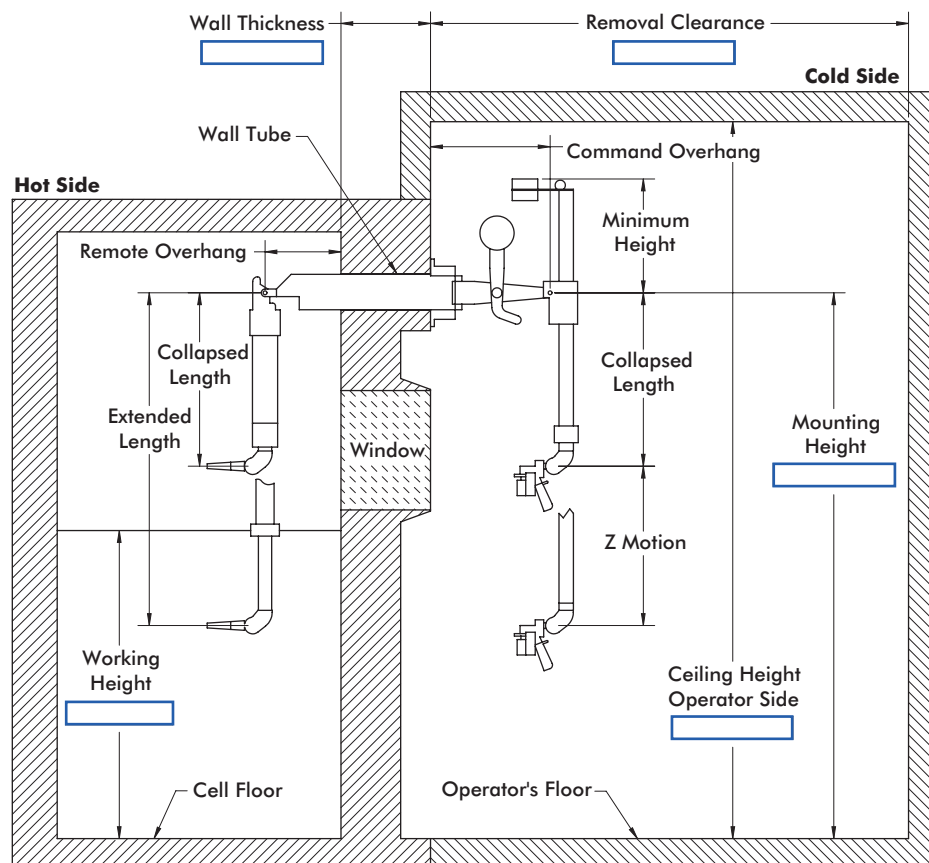
See p.9 (FEEL description) for more detailed information on cable, tape and chain options.

C=Cable / **T**=Tape / **R**=Chain / **C/R**=Cable & Chain / **T/C**=Tape & Cable / **T/R**=Tape & Chain

MOTIONS								
MODEL	Z		AZIMUTH		ELEVATION/ TWIST		TONG	
	Standard	Available	Standard	Available	Standard	Available	Standard	Available
G-LDR	C		C		C		C	
G-LD	C	T	C		T	C	C	C/R
H			C		C		C	
G	C	T	C		T		C	C/R
G-HD	C		C		C		C	C/R
E	T	C	C		T		T	
8	T	C	C		T	C	T	C
E-HD	T	C	C		T	T/R	T/C	T/R
8-HD	T	C	C		T	C	T	
F	T		T		T		T/C	
L	T	C	C		T		T/C	
L-HD		C	C		C/R		C	C/R
RE-T	T		C		T		T	
RE-LT	T		C		T		T	

TELEMANIPULATOR SPECIFICATION GUIDE

The image below shows the typical dimensions of the hot and cold side of the cell required to specify the physical size requirements for a telemanipulator. Use this form and work with your local CRL Sales Representative to help select the proper telemanipulator size and options for your cell and applications.



Recommended, Available and Not Available Options

✓	
●	
✗	

✓ Recommended

● Available

✗ Not Available

Recommended: These options are recommended and work best with the specified models

Available: These options are available for the specified models

Not Available: These options are not available or suited for the specified models

Price, Usage and Feel Ratings

PRICE

◆ Lowest ◆◆ Midgrade ◆◆◆ Premium

Lowest: Higher volume; Lowest cost solution

Midgrade: Requires special material or some customization

Premium: Requires high grade, special material and customization or extra components

USAGE

◆ Intermittent ◆◆ Continuous ◆◆◆ Heavy

Related to the Duty Cycle, Intermittent use telemanipulators are meant to be used for short, intermittent periods of time, not continuously. Continuous cycle telemanipulators are designed for constant use. Heavy Duty cycle telemanipulators can work continuously, and are designed for Demolition and Decontamination (D&D) and higher weight capacity in mind.

FEEL

◆ Light ◆◆ Medium ◆◆◆ Heavy

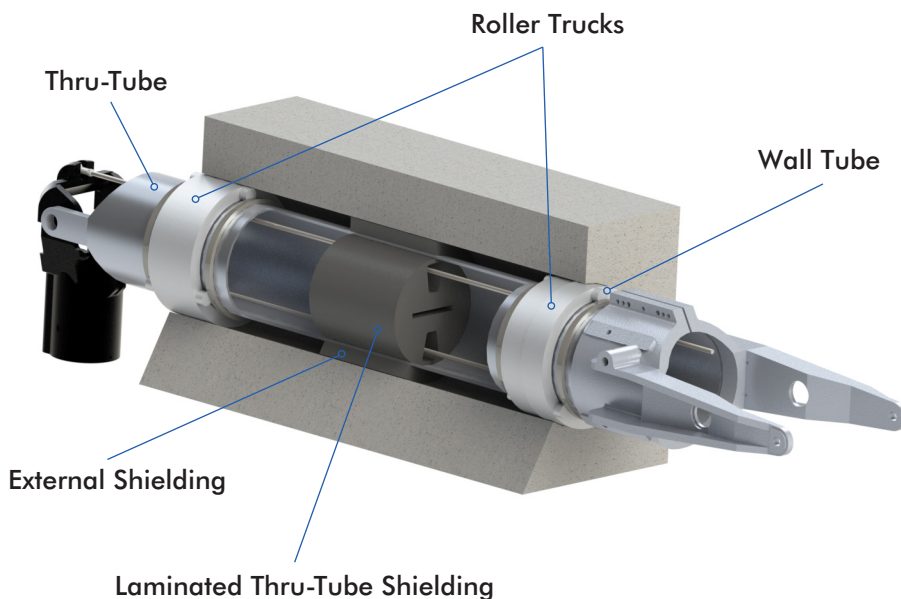
A telemanipulator's "feel" is a combination of how smooth and precise everything moves and the frictions of that movement. A light feeling telemanipulator will be very easy to move in all motions, but will generally be lower capacity or use all tape motion transmission. Medium feeling telemanipulators will start to incorporate cables, and chains in the wrist joints for durability. Heavy feeling arms are still smooth, but are all cable with chain wrist joints, and are generally high capacity arms focusing less on feel and more on durability and capacity.

Radiation Shielding and Thru-Tube

Lead or Steel shielding can be provided in the telemanipulator thru-tube to match the lead equivalence of the cell wall, and Boronated Polyethylene can be provided for neutron absorption when required. The shielding is mounted in and/or around the telemanipulator thru-tube and is normally located so it is centered in the cell wall. The internal thru-tube shielding and external thru-tube to wall tube shielding configurations can be provided as shown below:

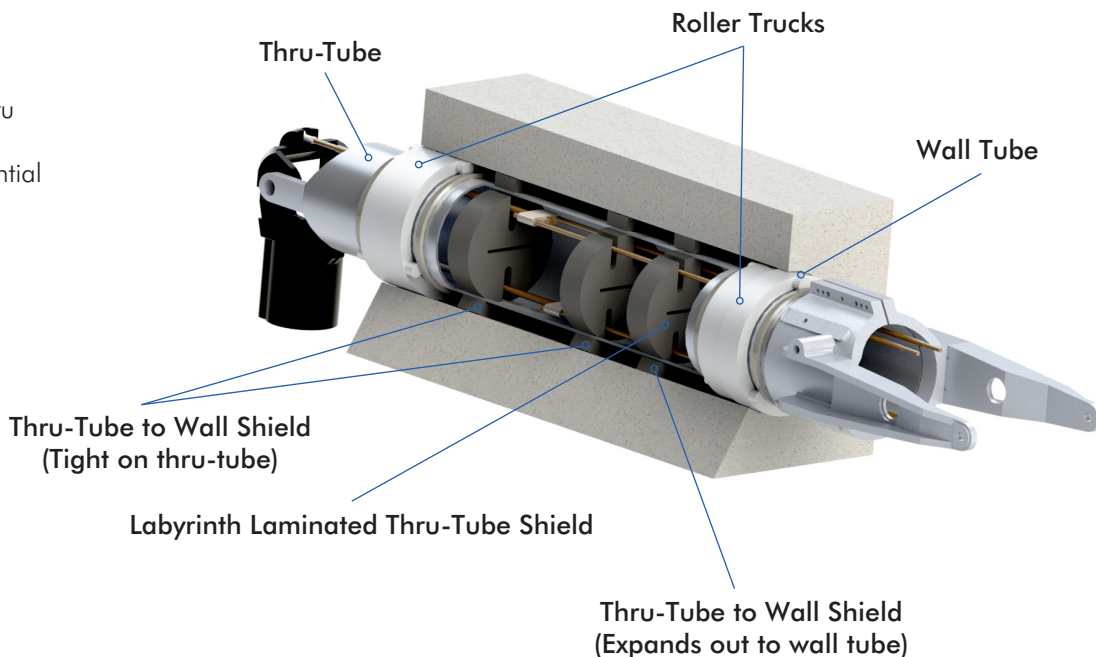
Thru-Tube Shielding Laminated Design:

- Straight tie rods pass thru aligned slots in internal shielding pieces.



Thru-Tube Shielding Labyrinth Design:

- Staggered tie rods pass thru staggered slots in internal shielding, minimizing potential shine path.



Internal Shielding**Laminated**

✓	G-LDR, G-LD, G, H
●	G-HD, L, R, RE, 8, E, E-HD, F
✗	

Lead



PRICE

Stainless
Steel

PRICE

Boronated
Poly

PRICE

Labyrinth

✓	E, E-HD, F
●	G-HD, G, L, R, RE, 8
✗	G-LDR, G-LD, H

Lead



PRICE

Stainless
Steel

PRICE

Boronated
Poly

PRICE

External Shielding**Laminated**

✓	G, G-LD, G-HD, H, 8, E, E-HD, F
●	G-LDR, R, RE
✗	L

Lead



PRICE

Stainless
Steel

PRICE

Boronated
Poly

PRICE

Labyrinth

✓	G, G-HD, E, E-HD, 8, F
●	R, RE
✗	G-LDR, G-LD, H, L

Lead



PRICE

Stainless
Steel

PRICE

Boronated
Poly

PRICE

Penetration Hole Size**Ø4.76 in (120.9 mm)**

G-LDR only

Ø7.5 in (190.5 mm)

G-LD, G-HD, L, H

Ø10 in (254 mm)E, E-HD, F, 8,
8-HD, L-HD, RE**Custom**

Tong Jaw

A variety of tong jaw options are available to handle the type of load that is required to be manipulated. Various jaws are available for both types to handle various shapes and types of loads.

A load hook is available to move the heaviest of loads without damaging the wrist joint and tapes/cables.



SRL Tong

- Heavy Duty Applications
- Interchangeable Jaws

✓	E-HD, F, RE, 8-HD, G-HD, L-HD
●	G, 8, E, L, H
✗	G-LDR

Aluminum

◆◆	◆◆	◆◆
PRICE	USAGE	FEEL

Stainless Steel

◆◆◆	◆◆◆	◆◆
PRICE	USAGE	FEEL



RCD Tong

- Light Duty Applications
- Interchangeable Tong

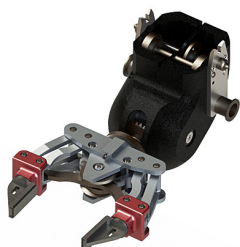
✓	G-LDR, G, G-LD, L
●	H, E, 8
✗	F, 8-HD, E-HD, RE, G-HD, L-HD

Aluminum

◆◆	◆	◆◆◆
PRICE	USAGE	FEEL

Stainless Steel

◆◆◆	◆◆	◆◆◆
PRICE	USAGE	FEEL



Power Tong

- Heavy Duty Applications
- Interchangeable Jaws
- Requires full Power Tong system for use (additional cost)

✓	
●	RE
✗	All other telemanipulators

Aluminum

◆◆◆	◆◆◆	◆◆
PRICE	USAGE	FEEL

Stainless Steel

◆◆◆	◆◆◆	◆◆
PRICE	USAGE	FEEL



2-piece Tong



3-piece Tong

Small 2-piece or 3-piece Tong

- Light Duty Applications where a sealed tong is required

✓	L, L-HD, G, G-HD
●	H, E, RE-T
✗	E-HD, F, RE

◆◆◆	◆◆	◆◆◆
PRICE	USAGE	FEEL

Large 2-piece or 3-piece Tong

- Heavy Duty Applications where a sealed tong is required

✓	E-HD, F, RE
●	
✗	All other telemanipulators

◆◆◆	◆◆◆	◆◆
PRICE	USAGE	FEEL

Wrist

The wrist joint is a collection of gears, bevel gears, bearing, and pulleys. They mesh together to give the telemanipulator the hand-like motion that are their trademarks. On a remote arm, the wrist and tong area of a telemanipulator gets the most contaminated. Sometimes having special tongs or wrist joints might help with a tricky job. The Removable Wrist joint will help with those special cases where a standard tong/wrist is problematic.



Removable Wrist

✓	
●	RE, E-HD, F
✗	All other telemanipulators



Removable Wrist
(Shown removed)

Tape

◆◆◆	◆◆	◆◆◆
PRICE	USAGE	FEEL

Cable

◆◆◆	◆◆	◆◆
PRICE	USAGE	FEEL

Chain

◆◆◆	◆◆◆	◆
PRICE	USAGE	FEEL



Non-Removable Wrist

✓	All telemanipulators
●	
✗	

Tape

◆◆	◆◆	◆◆◆
PRICE	USAGE	FEEL

Cable

◆◆	◆◆	◆◆
PRICE	USAGE	FEEL

Chain

◆	◆◆◆	◆
PRICE	USAGE	FEEL

Variable Ratio

Sometimes it is advantageous to move the remote arm further than the command arm is moved in 'Z' motion. This also allows a telemanipulator to cover a larger hot cell for a given command arm.

Variable Ratio

- Ratios available are 4:3, 1.5:1

✓	
●	G, G-HD
✗	All other telemanipulators

X
◆◆◆
PRICE
◆◆◆
FEEL

Y
◆◆◆
PRICE
◆◆◆
FEEL

Z
◆◆◆
PRICE
◆◆◆
FEEL

Handles

CRL can provide a variety of handles chosen for operation comfort and efficiency. All handles shown can be operated with either hand and are not interchangeable on the telemanipulator without major disassembly.



Opposed Grip

- Used for Light Handling

✓	G-LDR, G-LD, G, L, E, 8, H
●	G-HD, L-HD, RE-T
✗	E-HD, F, RE, 8-HD

◆	◆	◆◆◆
PRICE	USAGE	FEEL



Pistol Grip

- Used for Heavy Handling

✓	
●	All other telemanipulators
✗	G-LDR

✓	F, RE
●	E-HD, 8-HD
✗	G-LDR, G-LD, G, G-HD, L, L-HD

1-Speed	◆◆	◆◆◆	◆◆
	PRICE	USAGE	FEEL

2-Speed (Ratchet)	◆◆◆	◆◆◆	◆◆
	PRICE	USAGE	FEEL



Motion Grip

- Used for Heavy Handling

✓	G-HD, L-HD, RE-T
●	G-LDR, G, L, E, 8
✗	F, RE, E-HD

◆◆	◆◆◆	◆◆
PRICE	USAGE	FEEL



VR8

- Improved ergonomics for operator comfort; **easily interchangeable**

✓	G-LDR, G, L, E, 8, H, RE-T
●	G-LD, G-HD, L-HD
✗	E-HD, F, RE, 8-HD

Opposed Grip	◆◆	◆◆	◆◆◆
	PRICE	USAGE	FEEL

Indexing

Telemanipulator indexing lets you change the relationship of the command and remote arms to improve in cell reach, or make operations easier by allowing the operator to stand in a comfortable position.

In some cases indexing in Y motion also allows the telemanipulator to be installed in or removed from a wall tube.

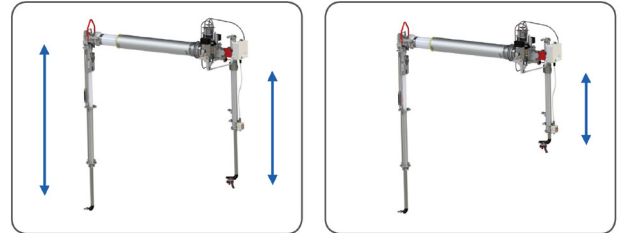
Z Manual Ergonomic Adjustment

- Independent height adjustment on command arm
- Provides ergonomic comfort adjustment for operators



✓	RE
●	G, L, L-HD AVAILABLE SOON!
✗	All other telemanipulators

◆
PRICE



Y Manual

- Manual Y-indexing provides 15, 30, and 45 degree command to remote indexing and is performed by moving a lever

✓	G-LD
●	G-LDR
✗	All other telemanipulators

◆
PRICE

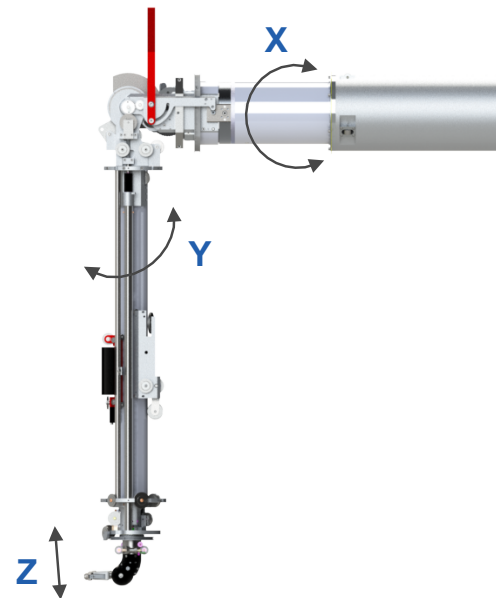
Electrical System

- Electrical indexing uses motors and switches to control the telemanipulator indexing motions

✓	All other telemanipulators
●	
✗	G-LD, G-LDR

UL
◆◆◆
PRICE

Non-UL
◆◆◆
PRICE



Electrical System - Indexing Options

X Electrical

- X indexing controls the left and right orientation of the remote arm

✓	All other telemanipulators
●	
✗	G-LD, G-LDR

◆◆◆
PRICE

Y Electrical

- Y indexing controls the forward and back orientation of the remote arm

✓	All other telemanipulators
●	
✗	G-LD, G-LDR

◆◆◆
PRICE

Z Electrical

- Z indexing (or Extension) controls the height of the remote arm in relation to the command arm

✓	E, E-HD, F, RE
●	G, G-HD, L, L-HD
✗	8, 8-HD, H, G-LD, G-LDR

◆◆◆
PRICE

Motion Locks

Motion locks for CRL telemanipulators are used to lock the telemanipulator rigidly in any position within the dimensional limits of the telemanipulator. This allows the telemanipulator to hold an object in space without requiring an operator, and facilitates the installation and removal of the telemanipulator.

In general, motion locks come in three distinct units:

- X Motion
- Y Motion
- Z Motion, Azimuth and Elevation/Twist Rotations

The three units can be operated independently, or together (manually or pneumatically actuated).

The tong/grip lock is a part of all standard telemanipulator handle assemblies.



X Motion

- This locks the telemanipulator in position left/right

✓	All other telemanipulators
●	
✗	G-LDR

Mechanical



PRICE

Pneumatic



PRICE

Y Motion

- This locks the telemanipulator from moving forward or backward

✓	All other telemanipulators
●	
✗	G-LDR

Mechanical



PRICE

Pneumatic



PRICE

Z Motion, Azimuth and Elevation/Twist Rotations

- This locks the wrist motion, and keeps the telemanipulator from going up and down

✓	All other telemanipulators
●	
✗	G-LDR

Mechanical



PRICE

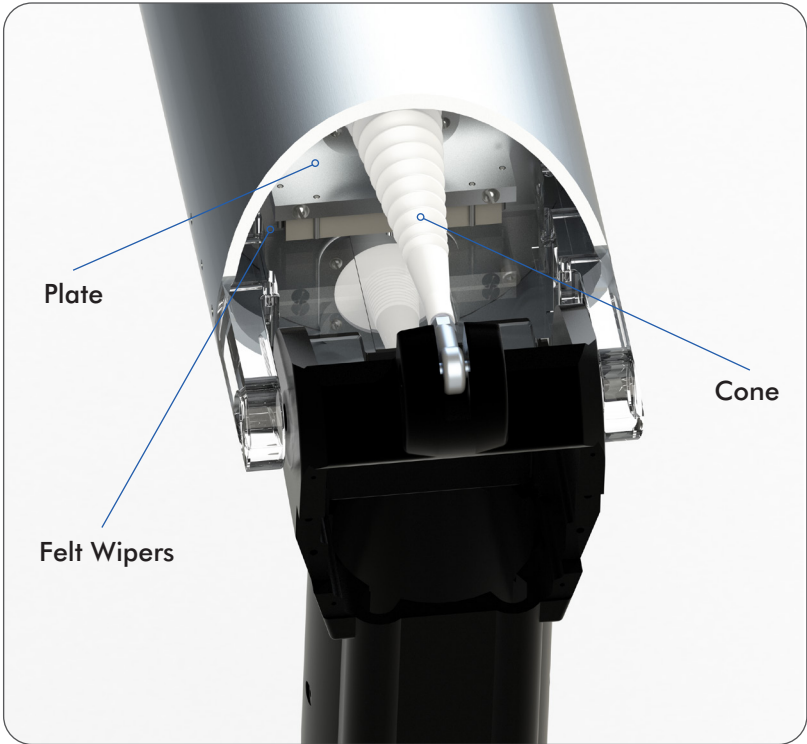
Pneumatic



PRICE

Air Restriction

The air restriction feature reduces the air flow through the telemanipulator thru-tube. It is mounted inside the thru-tube, near the remote end, and consists of a plate with central felt wipers through which the tapes and cables operate and two cones (boot-like sleeves) through which the tie rods operate.



Air Restriction

- Used in place of booting on one-piece telemanipulators

✓	
●	G-LD, G-HD, H, E, E-HD, 8, 8-HD, F
✗	L, L-HD, RE, G-LDR

Booting

A booting assembly is typically used to restrict air flow into the hot cell and to protect the remote arm from contamination. Booting can be provided as polyurethane, CSM coated polyurethane or PVC sleeve material.

For one-piece models, the tong assembly or jaws can be disconnected and entire telemanipulator removed with booting still in place and no loss of containment.

For three-piece models, the entire remote arm can be disconnected from seal tube with booting still in place.

Material

Poly

- ◆
PRICE
- ◆
USAGE

Poly CSM

- ◆◆
PRICE
- ◆◆
USAGE

*Poly CSM is suggested for use with harsh chemicals or cleaning agents.



Wall Mounting Options

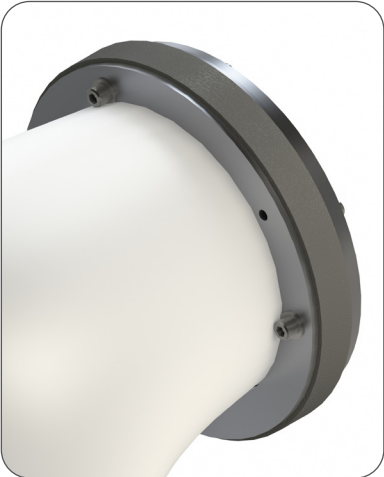


Clamp to wall

- Used for one-piece

◆
PRICE

✓	G-LDR
●	
✗	All other telemanipulators

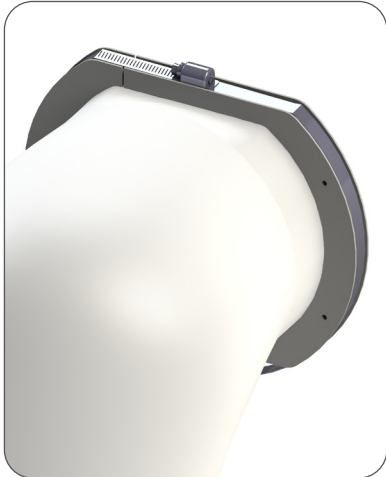


Clamp to push-through ring

- Used for one-piece or three-piece

◆
PRICE

✓	All other telemanipulators
●	RE, L, L-HD
✗	G-LDR



Clamp to remote arm

- Used for three-piece

◆
PRICE

✓	RE, L, L-HD
●	
✗	All other telemanipulators

Tong Mounting Options



Over Tong

✓	SRL Tongs with non-removable wrist
●	Power Tong
✗	All other tongs

◆
PRICE

◆
USAGE

◆
FEEL



Boot/Tong Adapter

✓	RCD Tongs with non-removable wrist
●	
✗	All other tongs

◆
PRICE

◆
USAGE

◆
FEEL



Boot/2-piece Tong

✓	Small & Large 2-piece Tongs
●	
✗	All other tongs

◆◆
PRICE

◆◆
USAGE

◆◆◆
FEEL



Boot/3-piece Tong

✓	Small & Large 3-piece Tongs
●	
✗	All other tongs

◆◆◆
PRICE

◆◆
USAGE

◆◆◆
FEEL



Boot/Removable Wrist

✓	SRL & Power Tongs with removable wrist
●	
✗	

◆◆
PRICE

◆◆◆
USAGE

◆◆◆
FEEL

Installation/Removal Carts

The Installation/Removal Cart is a multipurpose system which can be used for the installation and removal of telemanipulators. The system consists of a transportation cart and a lift carriage, which allows the units to be moved horizontally and vertically for proper alignment during installation and removal process.



Large Cart

- Typically used for heavy-duty units with high mounting heights

✓	E, E-HD, F, 8, 8-HD, RE
●	G, G-HD, L, L-HD
✗	G-LD, G-LDR



Small Cart

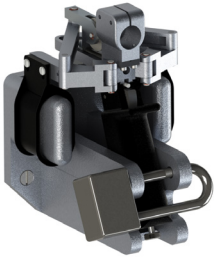
- Typically used for light duty units with low mounting heights

✓	G, G-HD, G-LD, G-LDR
●	
✗	E, 8, F, RE, L



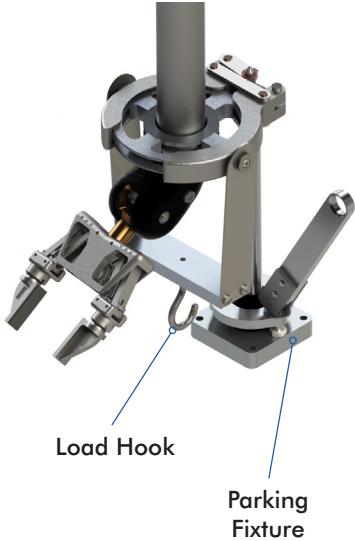
Storage Carts

- For storage use of one or two telemanipulators
- Variable heights available to accommodate all telemanipulators



Tamper Lock

Tamper locks can be used to lock the telemanipulator handle to the cell wall and prevent damage to the telemanipulator or in-cell equipment by unauthorized operators.



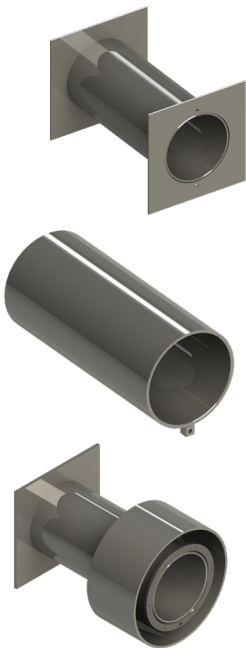
Load Hook

The Load Hook accessory is a remotely removable device that hangs from the end of the telemanipulator remote arm. Its hook is used to pick up objects that are normally too heavy or awkward to handle in the tongs.

*Not available on G-LDR

Parking Fixture

The Parking Fixture is used to install and remove the Load Hook. It is also used to store the Load Hook when not in use.



Wall Tubes

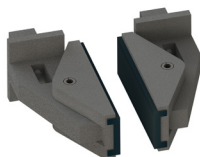
Wall tubes for accepting and mounting telemanipulators are available in a variety of lengths, styles and materials. This includes choices for flanges and bag-out recesses.

Jaws

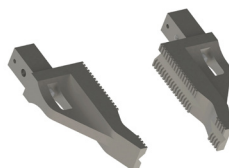
Various styles of jaws are available to handle a wide variety of shapes, types of loads, and application uses. Custom jaws can also be designed to accommodate specific application needs.



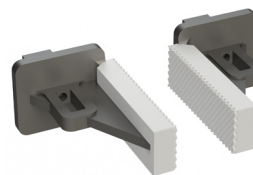
File Face Jaw



Pivoting Finger Jaw



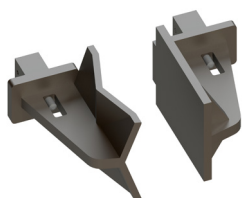
Vial Jaw



Removable-Pad Jaw

- Available Pad Material:
Buna-N or Ura-Rad

- Available Pad Material:
CSM, Silicone, Buna-N

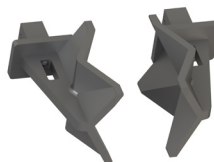


18° Vee & Flat Jaw



Extended Removable-Pad Jaw

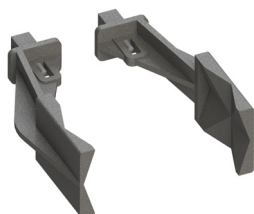
- Available Pad Material:
CSM, Silicone, Buna-N



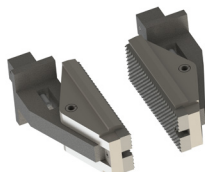
30° Vee Jaw



Extended 30° Vee Jaw



Extended 18° Vee Jaw

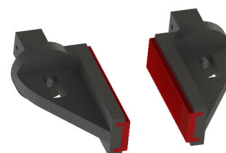


Pivoting Finger File Face Jaw



Standard Jaw

- Buna-N
Pad Material



Standard Jaw

- Ura-Rad
Pad Material

[illegible]

Telemanipulator Type:
☐ One-piece ☐ Three-piece
Handling Capacity: _____ lb (kg)
☐ Intermittent ☐ Continuous ☐ Heavy
Telemanipulator Size:

Cell dimensions: L _____

W _____

H _____

One-piece Telemanipulator:
☐ G-LDR ☐ G-LD ☐ H

☐ G-HD ☐ E ☐ 8

☐ E-HD ☐ 8-HD ☐ F
Three-piece Telemanipulator:
☐ L ☐ L-HD ☐ RE ☐ RE-T
Radiation Shielding:
☐ Internal
Laminated ☐ Lead ☐ Stainless Steel ☐ Borinated PolyLabyrinth ☐ Lead ☐ Stainless Steel ☐ Borinated Poly
☐ External
Laminated ☐ Lead ☐ Stainless Steel ☐ Borinated PolyLabyrinth ☐ Lead ☐ Stainless Steel ☐ Borinated PolyPenetration Hole Size ☐ Ø4.76 ☐ Ø7.5 ☐ Ø10 ☐ Custom _____**Tong/Jaws:**SRL tong ☐ Aluminum ☐ Stainless SteelRCD tong ☐ Aluminum ☐ Stainless SteelPower tong ☐ Aluminum ☐ Stainless Steel
☐ Small 2-piece tong ☐ Large 2-piece tong | ☐ Small 3-piece tong ☐ Large 3-piece tong
Wrist:Removable ☐ Tape ☐ Cable ☐ ChainNon-Removable ☐ Tape ☐ Cable ☐ Chain**Variable Z Ratio:**
☐ 4:3 ☐ 1.5:1

Handle Options:

- ☐ Opposed Grip
- Pistol Grip: ☐ 1-speed ☐ 2-speed (Ratchet)
- ☐ Motion Grip
- ☐ VR8 Opposed Grip

Indexing:

- ☐ Y Manual ☐ Z Manual
- ☐ Electrical System
- ☐ X Electrical ☐ Y Electrical ☐ Z Electrical

Locks:

- ☐ X Motion ☐ Y Motion ☐ Z Motion, Azimuth and Elevation/Twist Rotations
- ☐ Mechanical ☐ Pneumatic

☐ **Air Restriction****Booting:**

- ☐ One-piece Telemanipulator ☐ Three-piece Telemanipulator
- ☐ Poly ☐ Poly CSM
- Wall Attachment ☐ Clamp to wall ☐ Clamp to push-through ring ☐ Clamp to remote arm
- Tong Attachment ☐ Over Tong ☐ Boot/Tong Adapter ☐ Boot/2-piece Tong ☐ Boot/3-piece Tong
- ☐ Boot/Removable Wrist

Accessories

Installation/Removal Cart: ☐ Large Cart ☐ Small Cart

- ☐ Storage Cart
- ☐ Tamper Locks
- ☐ Load Hook
- ☐ Parking Fixture
- ☐ Wall Tube

- Jaws** ☐ File Face ☐ Pivoting Finger (Buna-N) ☐ Pivoting Finger (Ura-Rad) ☐ Removable-Pad
- ☐ 18° Vee & Flat ☐ Extended Removable-Pad ☐ 30° Vee ☐ Extended 30° Vee ☐ Extended 18° Vee
- ☐ Pivoting Finger File Face ☐ Standard Jaw (Buna-N) ☐ Standard Jaw (Ura-Rad)



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