

M3000
MANIPULATORS
M6000



Continuous Shoulder Rotation

Thanks to a proven shoulder rotate and slip ring design, the manipulator can be infinitely rotated in either the clockwise or counterclockwise directions.

Remote Recovery Drives

In the event of loss of power or a motor or control system failure, PaR provides standard external remote recovery drive couplers that allow the arm to be easily repositioned in addition to intentionally slipping the clutched joints.

High Capacity Lifting Hook

The high capacity lifting hook provides a convenient means of moving large loads (M3000 - 1000lbs/450kg; M6000 - 4000lbs/1800kg) when the manipulator is installed on a telescoping mast system.

Continuous Hand Rotation

The powered, continuous rotation of the hand eases operation with no external or internal cables to limit rotation - which is also extremely useful when working with threaded objects, such as fasteners and threaded lids.

Variable Force Hands

Grip force can be set at the operator controls allowing the grip force to be adjusted as needed.

Modular Hand Design

End-of-arm (EOA) tooling (e.g. grippers, dual hook hands) can be quickly exchanged using our proven locking collar design, which provides operators with readily available general purpose or task specific EOA tools.

Radiation Hardened

PaR's manipulators are rad hard up to 10E8 Rads (10E6 Gray)

Telescoping Mast Mount

A typical PaR manipulator accesses a work area using PaR's bridge, trolley and telescoping mast system.

Manipulator Removal and Storage

With the manipulator resting on a storage rack, removal of a single pin easily disconnects the manipulator from the mast - reverse the steps and the manipulator is re-installed and ready for work.

Shoulder, Elbow and Wrist Pivots

Pivot angles of 210° to 310° provide PaR's M3000 and M6000 a generous range of motion.

Slip Clutch Protection

All motions are electrically driven and are protected against overload by low maintenance slip clutches.

Modular Wrist Design

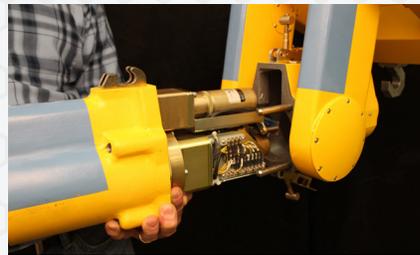
The modular wrist design allows for remotely and quickly exchanging wrist assemblies for maintenance, optional features or repair reasons.

Remote Tool Power

Located next to the hand is a remotely operated electrical power socket, with reversible polarity, for externally powered tooling solutions - providing operators unlimited access to powered tool solutions (and the socket's location at the hand and not at the mast, ensures tangle free convenience).

FEATURES

On Storage Rack



Wrist Removal



Hand Removal



Camera Systems



Tool Power



High Capacity Lifting Hook



Rad-Hard Stainless Steel Option

DEPLOYMENT

M3000



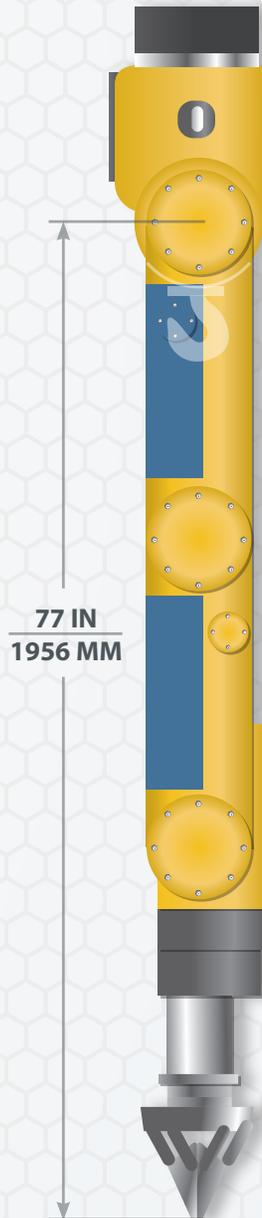
M3000

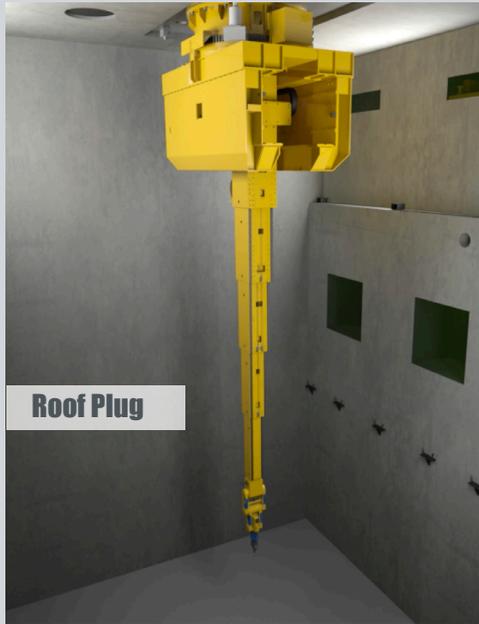
WEIGHT	200 LBS	[91 KG]
REACH	45.5 IN	[1156 MM]
HAND CAPACITY	150 LBS	[68 KG]
HOOK CAPACITY	1000 LBS	[455 KG]
RAD RESISTANCE	10 ⁸ Rad	10 ⁶ Gy

M6000

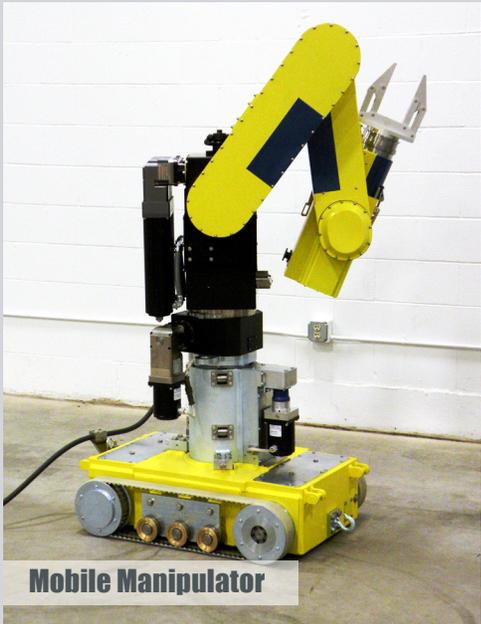
WEIGHT	550 LBS	[250 KG]
REACH	77.0 IN	[1956 MM]
HAND CAPACITY	400 LBS	[181 KG]
HOOK CAPACITY	4000 LBS	[1814 KG]
RAD RESISTANCE	10 ⁸ Rad	10 ⁶ Gy

M6000

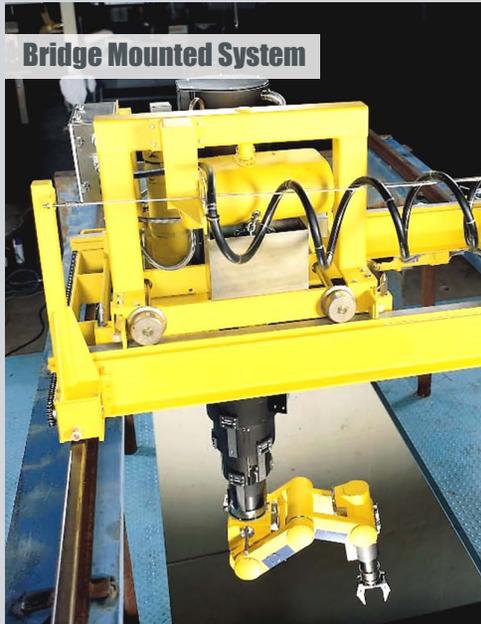




PaR Manipulators are typically deployed from telescoping mast/trolley/bridge systems, wall-mounted carriages or elevators. Above is a roof plug deployed system in a hot cell with roof access.



Manipulators have the ability to be mounted on tracked vehicles. The above system is used for remote MSM removal.



Multiple mounting and deployment combinations can be designed and engineered to tackle any and all extreme environmental applications. Above is a typical bridge-trolley-mast system.



Long Reach Crane Installed / Wall-Mounted Solutions

HANDS



Parallel Jaw Hands



Double Hook Hand



Single Hook Hand



Clam Grab

Single and Double Hook Hands and Parallel Jaw Grippers

PaR's manipulators use a locking collar and slip ring design, allowing the end-of-arm tools to be treated as modular, exchangeable accessories. Typically, hook hands and parallel jaw grippers are used, but other special purpose end-of-arm tools can be developed using the interface features as well. Hook hands are either

configured as single hook or double hook and both have a powered anvil to provide positive holding and locking on picked or held items. Parallel jaw hands are provided in different jaw opening sizes with varying finger shapes, lengths, features, finishes and materials. Powered and non-powered tools can be picked up and operated using

uniform grab features if needed. A single hook hand (shown above) can grab a standard powered tool or a lifting fixture can be added to the tool to allow for single, parallel jaw or double hook interface (shown on tools below) for a higher degree of tool control. Powered tool plugs can also be inserted and removed remotely.

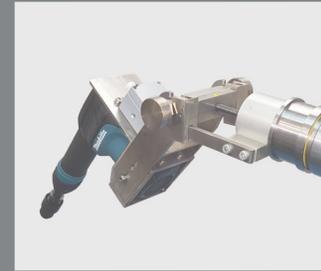
TOOLS

Standard & Customized Tools

PaR Systems can provide tools which utilize the remote tool power socket located on the wrist assembly. We have a wide variety of existing designs, such as nut drivers, reciprocating saws, nibblers or we can develop a custom design for your needs. Non-powered tools, such as the window wiper have been developed by PaR upon customer request. Other customers have in-house capabilities and develop their own tooling to match up with the features of the hook hands and grippers.



Single Hook In Use



Nut Driver



Nibbler



Tool Power Change Station



Reciprocating Saw



Remote Window Wiper



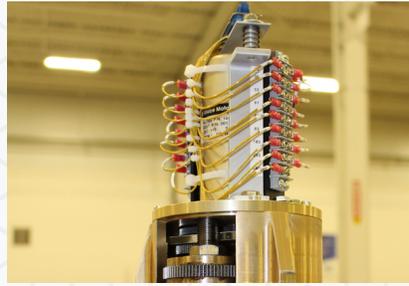
Finger Switch Controller

PaR Systems manipulators are operated using a finger switch controller. The portable control console is easily mounted via wall brackets or can be placed on a dedicated control stand. Features include a flexible power cable with a quick-disconnect plug making it easy to mate the controller to the power center or an outside cell junction box. The intuitive console provides precise control of all axes, grip force, tool power and rotation direction. Additional switches can be added for mast, trolley and bridge functionality.



Wireless Controller

Wireless finger switch controllers have all the proportional and accurate movements found in the hardwired controllers. When lightweight portability is required PaR wireless controllers are a great option.



Interface Wiring

PaR has incorporated the use of slip rings at the mast and hand interface to provide continuous rotation at these two critical axes. This design is time tested and is the most reliable wiring interface available, providing a cable free, snag free manipulator.



Joystick Controller

PaR offers a joystick controller option as an alternative to the standard finger switch controller. Motion of individual axes is controlled by joystick movement and push buttons. Joystick controllers utilize an HMI interface, which provides graphical support for the operator.

Top 10 Design Features

- 1 Slip clutches and electric current limiting are built-in protecting against accidental overload of the system.
- 2 Fully sealed, corrosion-resistant materials and finishes are used on external surfaces, allowing for easy wash-down.
- 3 The manipulator is compact to ease restricted space operations.
- 4 Practical “box” construction is used to provide maximum rigidity and external smoothness.
- 5 All wiring is internal to eliminate snagging and to allow for easy decontamination of the exterior.
- 6 Access plates are built-in for easy clutch adjustment and general maintenance.
- 7 Easily adjustable and stable drive chain tighteners are provided on all pivoting motions.
- 8 Hands and tools can be changed remotely by simple push-pull motions.
- 9 A high load-capacity hook is fastened to the shoulder housing. The manipulator hand easily reaches the hook, for placing of lifting straps.
- 10 The intuitive console provides precise control of grip force, tool power, as well as deployment axes (e.g. bridge, trolley, mast) and is variable speed and stepless for fluid control.



PaR Systems, LLC
707 County Road E West
Shoreview, Minnesota 55126-7007 USA
Toll Free: **1.800.464.1320**
T: **1.651.484.7261** | F: **1.651.483.2689**
E: **nuclear@par.com** | **www.par.com**