

New for 2001

Compact 6 DOF Force Feedback Master



Kraft TeleRobotics now offers a six-degree-of-freedom miniature force feedback master arm to further enhance the Kraft line of manipulator products.

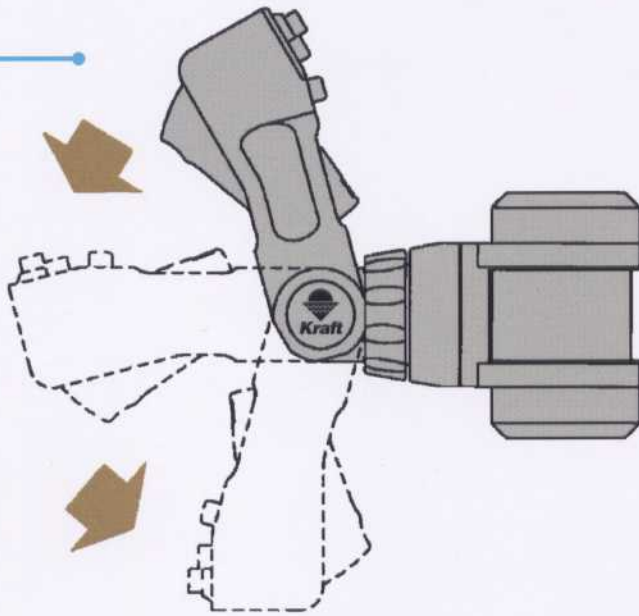
As the vital link between the remote manipulator and the human operator, the **Kraft *mini-master***[™] allows the operator to control complex manipulator motions in a comfortable and intuitive manner.

For more than two decades, Kraft TeleRobotics has demonstrated the ability to envision and develop technology to improve man's ability to safely perform work in hostile environments. The Kraft *mini-master* carries forward this tradition of technological innovation.



Kraft TeleRobotics

Unique, rotatable grip converts within seconds to provide the operator with joystick, pistol-grip, or stylus modes of operation.



Reconfigurable Hand Grip

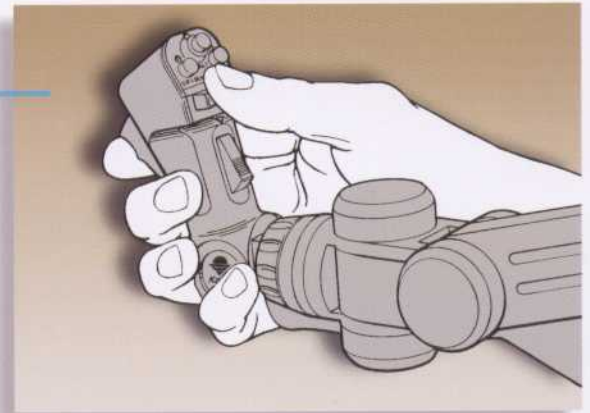
Operator preference, type of manipulative task, and a variety of mounting options all influence controller ergonomics. Operators will appreciate the unique, multi-position hand grip that allows the user to choose the most suitable configuration for any given situation.

Conveniently Located Fingertip Controls

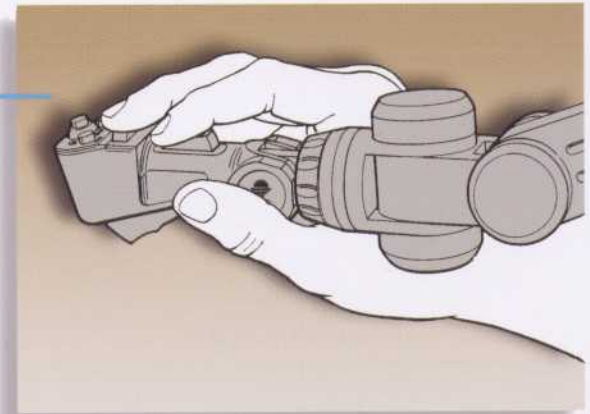
Operator is provided with direct access to core manipulator functions for fast positioning of the manipulator arm.

Comfortable left- or right-hand operation.

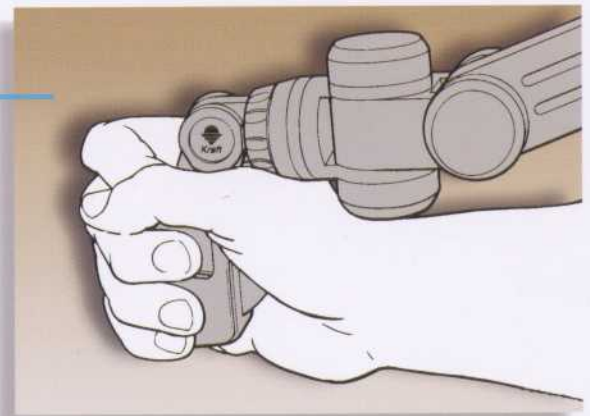
Left- or right-handed operators benefit equally from the *mini-master's* ergonomic design.



Joystick Mode of Operation



Stylus Mode of Operation



Pistol-Grip Mode of Operation

Kraft *mini-master*™

Performance in Motion™



High Fidelity Force Feedback

Bilateral control provides scaled manipulator forces to the operator. This improves awareness and allows the operator to perform tasks that might otherwise be impossible without the dimension of feeling and the compliant nature of a force feedback system. In addition to improved telepresence, the force feedback compliance greatly reduces the risk of damage to both the work site and the manipulator arm.

Compact and Lightweight

A unique counterbalancing system allows the force feedback *mini-master* to have a total stand-alone weight of under 3 pounds, making it highly portable.

Minimal Operating Volume

Operator fatigue is significantly reduced during extended use, making the *mini-master* well suited for use within the confined operating environment typical of undersea vehicles.

Numerous Mounting Configurations

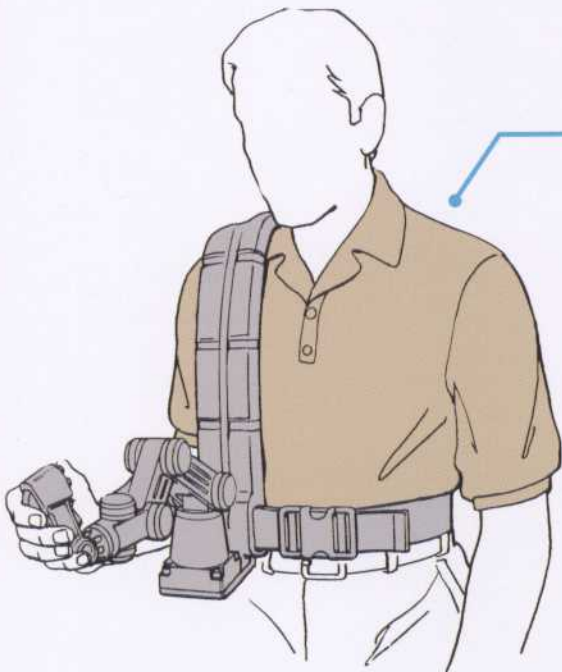
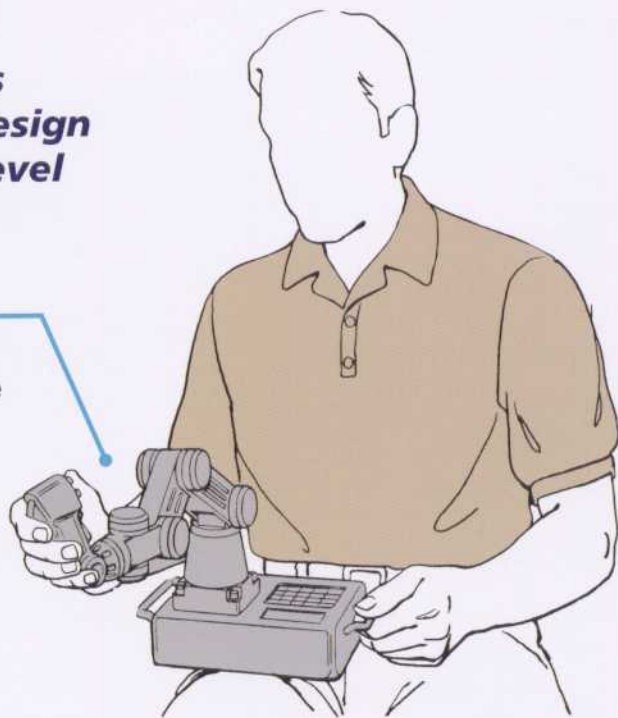
A variety of both portable and fixed control options.

Durable Aluminum Construction

The *mini-master* is designed to deliver long-term reliability.

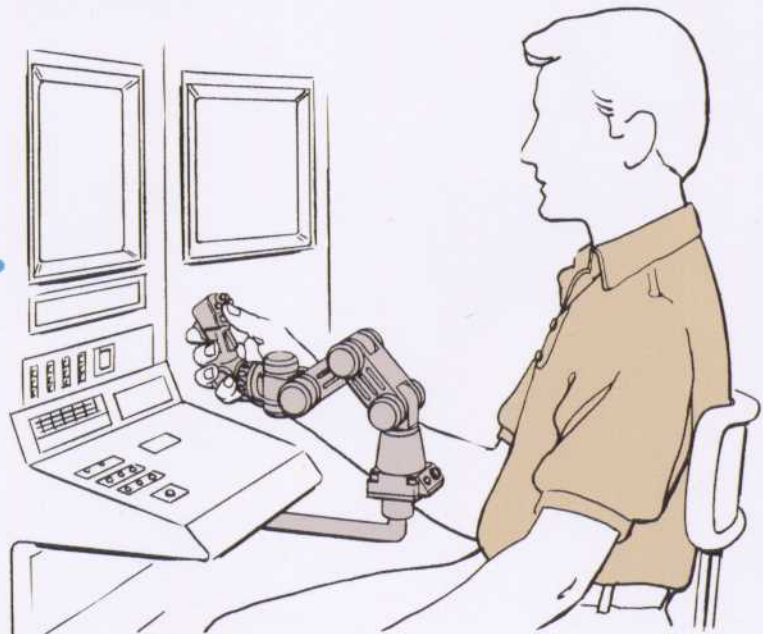
The mini-master™ mounting systems utilize a completely new range of design concepts for the greatest possible level of comfort.

In its standard configuration, the *mini-master* is mounted to a compact, portable operator control unit which can be hand-held or placed on nearly any surface for operation. The high level of portability makes this configuration an ideal choice for the highly confined operating environment of a manned vehicle or small control van. A color LCD display with touch-screen interface displays application menus and allows the operator to select various operating options.

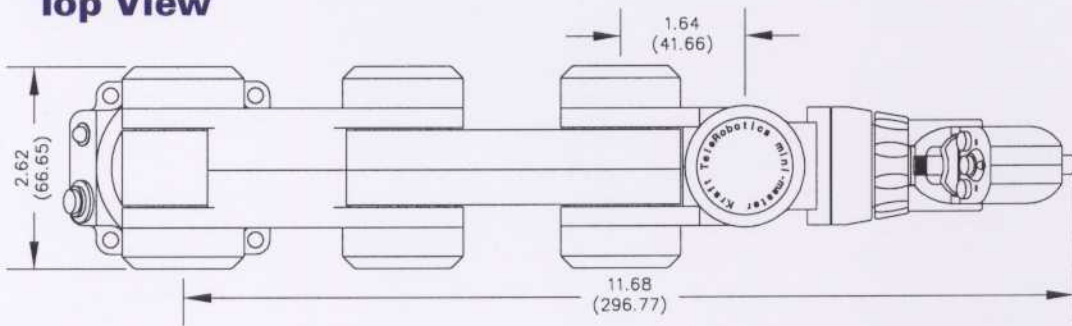


The Quick-don™ shoulder mount simply “hooks” over the operator’s left or right shoulder to position the *mini-master* comfortably close to the operator’s body. It can be used when seated or standing, and provides complete freedom of movement while allowing true “hands-free” mobility. The no-slip, air-cell foam backing ensures comfortable and stable support of the *mini-master* controller. When not in use, the *mini-master* can be extended upward and secured to the padded frame with a protective flap and velcro closure.

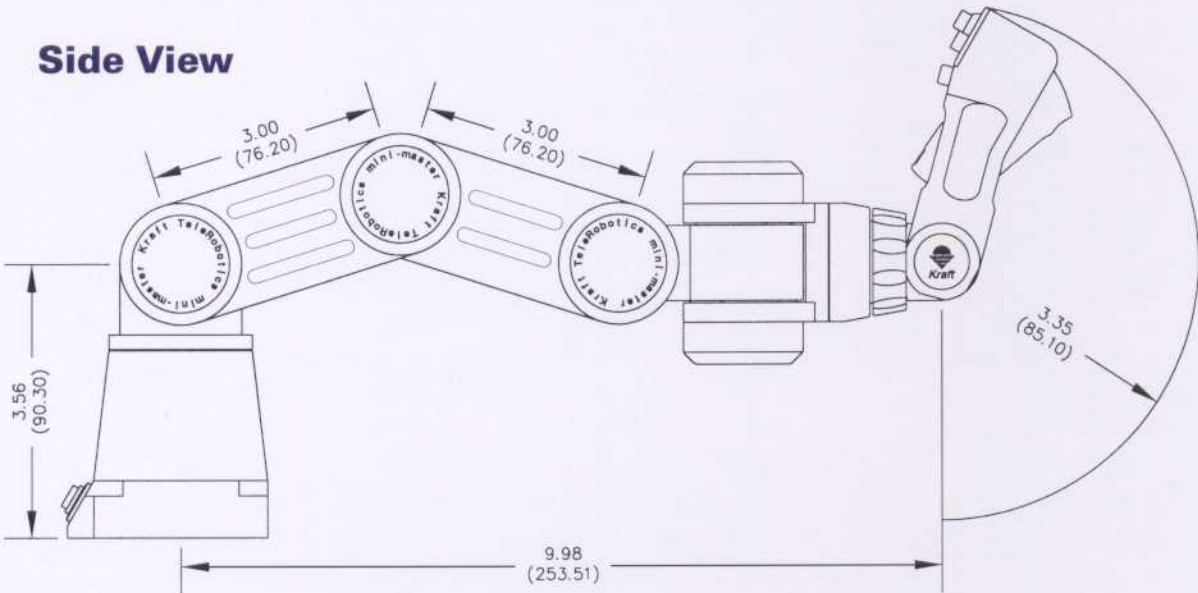
The TDX™ mounting system provides a sturdy, movable mounting base for the *mini-master*. Using a variety of joints and carrier arms, a customized support arm can be created to position the *mini-master* for optimum operator comfort. TDX™ component elements can be selected to allow mounting of the support arm directly to a control console, operator’s chair, or floor mount pedestal.



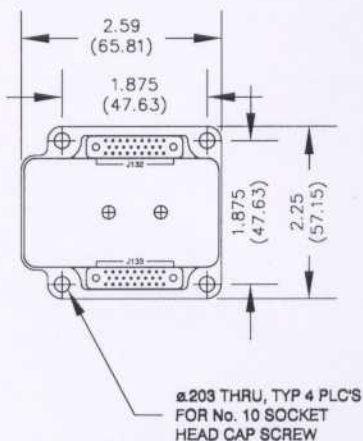
Top View



Side View



Bottom View



General Specifications

Degrees of Freedom	6
Maximum Reflected Force	4 lbs. (17.8 N)
Weight	2.8 lbs. (1.27 kg)
Joint Sensor	Conductive Plastic Potentiometers
Actuators	Electric, Direct Drive

Joint Motion	Total Angular Excursion
Shoulder Azimuth (SA)	180°
Shoulder Elevation (SE)	120°
Elbow Pitch (EL)	110°
Wrist Pitch (WP)	120°
Wrist Yaw (WY)	120°
Wrist Roll (WR)	120°

Front Trigger Actuation Force	8 oz. (2.2 N)
Rear Trigger Actuation Force	1 lb. (4.4 N)



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