

▶ Servo *Systems*

PROVEN INNOVATORS
Of Material Handling Systems

KNIGHT



Knight Servo Systems

Knight Servo Systems are Intelligent Assist Devices (IAD) that provide controlled transfer of workloads, including options to allow for various programmed product functionality.

Traditional hoists and tractors require the operator to push buttons in order to initiate a natural ergonomic motion. Servo Systems enable an operator to simply grasp the handle and move the load, eliminating pushbuttons.

As an extension of an operator's natural movement, this technology greatly improves accuracy and repeatability of the application. The inherent benefits include eliminating wasted motions, lagging reaction time, and the inertia of heavy loads.



▲ **KSH250 Servo Hoist**
Enables operator to precisely locate and/or float a load in the "Z" direction (250lb/113kg). Lifting capacity up to 1000lb/454kg on a single chain.



▲ **KSHCA1000 Servo Arm "Overhead Carriage"**
Servo Hoist mounted on an Articulating Arm. Allows for overhead extended reach within a work cell (1000lb/454kg).



▲ **KSHAEA750 Servo Hoist Articulating Extension Arm "Floor Mounted"** Articulating Extension Arm attached to a Servo Hoist. Allows for overhead extended non-linear reach within a work cell. May be mounted to a rotating carriage or floor mounted pedestal (750lb/340kg).



▲ **KSHAEA250 Servo Hoist Articulating Extension Arm "Floor Mounted"** Articulating Extension Arm attached to a Servo Hoist. Allows for overhead extended non-linear reach within a work cell. May be mounted to a single bridge, rotating carriage, or floor mounted pedestal (250lb/113kg).



▲ **KSHVAA250 Servo Hoist Vertical Articulating Arm "Floor Mounted"** Servo Hoist mounted on a vertical aluminum mast. Creates a steady state condition, eliminating the yarding of the chain. This hoist includes an articulating boom which enables the operator to reach underneath areas in a confined work cell (250lb/113kg).



▲ **KSHVA250 Servo Hoist Vertical Arm "Overhead Mounted"** Servo Hoist mounted on a vertical aluminum mast creates a steady state condition. Eliminates the yarding of the chain (250lb/113kg).



▲ **KSHTC500 Servo Hoist Twin Chain** Incorporates the benefits of a Servo System into a twin chain process. The twin chains control/balance/float unwieldy or long parts (500lb/227kg).



▲ **KSHTCDM2000 Servo Hoist Twin Chain Dual Motor** Incorporates the benefits of a Servo System into a twin chain process. The twin chains control/balance/float unwieldy or long parts. The dual motor Servo Hoist is for heavier loads up to 2000lbs/908kg.



▲ **KSHXYZ1000 Servo Tractor with "Z" Control** Combines X, Y and Z movements in one handle (1000lb/454kg).



▲ **KST4000 Servo Rack and Pinion Tractor** Accurately locates a load in the X and Y direction.

SERVO SYSTEMS FEATURES

HOIST AND TRACTOR:

Optional Remote Pendant

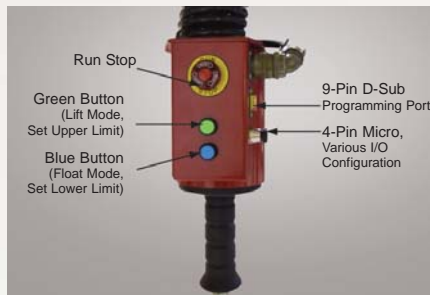
A pendant mounted separately from the end of the chain, or on a fixture. Permits operator to handle cumbersome loads and maneuver into tight spaces. Available in single or two speed option.



Two Speed : EBA9100

LED Status Indicators

LED Status Lights indicate the state the system is in, i.e. "lift mode" (green LED) or "float mode" (blue LED). LED may also be programmed to indicate actions such as: "clamps closed", "vacuum on", etc.



LED Fault Diagnostics

Fault recognition is displayed by a LED fault code diagnostic located on the drive unit. This feature improves maintenance response time by providing illuminated signals that correspond with a diagnostic chart. i.e. "bus fault", "low voltage", etc.

Virtual Limits

Programmable virtual limits prevent load movement beyond user-defined limitations. Limit settings improve productivity by restricting the up/down movement of the operator. Pre-set (coded) or manual options available.

Speed Reduction Points

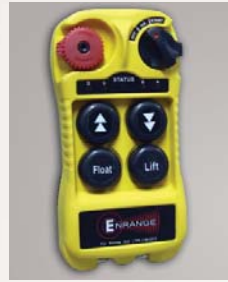
Programmable points in which the hoist will automatically reduce speed to allow precise placement of the load.

UP/DOWN Pendant Control with Trigger

(2) Two push buttons control the UP/DOWN motion of the Servo Hoist. An ergonomic trigger initiates "float mode".



MEPA9300



Wireless Remote and Receiver

Compact, rugged unit used for material handling and industrial applications. Includes (4) four, two-speed push buttons and E-Stop. Button configurations may be setup to simulate the Knight remote pendant. (Includes (2) two remotes)



LCD Display Handle

Microprocessor based control handle which displays information such as weights, error codes, diagnostics, set-up, etc. on an LCD screen. The addition of an accelerometer isolates inertial forces resulting from vibration within the system. Operator movement / force can be more accurately detected, resulting in a smoother, more responsive reaction.



Load Cell Fixture Handle

Attaches directly to fixture; eliminates the need for push buttons. Up/Down motion initiated by grasping anywhere on the fixture. Features load responsive handling.

HOIST:

Full Lifting Capacity

Up to 2000 lbs



Quick Disconnect

Attachment Choices

Each hoist is equipped with a control handle and one of the following attachments: bullard hook or shackle. Optional quick disconnect available upon request.

Standard Float Mode

The standard "float mode" can be enabled or disabled depending on the application. Allows operator to balance the load in a weightless condition, then manipulate into position without using an up/down pendant.

Chain

The robust design provides added durability and improves locating characteristics.

Gearbox

The gearbox is a worm gear style for reliable, maintenance-free operation.

Programming and Diagnostic Communication Port

Allows for easy set up, configuration, programming of system, and viewing fault tables (to rapidly identify problems). This port eliminates overhead connections to the system. Changes/repairs are made at floor level.

I/O Capabilities

Ability to attach accessories such as: clamps, pumps, switches, proximity limits, lights, etc.

Travel Distance

A standard travel distance of 12ft. [3.6m] supplied with hoist. An optional travel distance of up to 20ft.[6m] is available.



EBD1153-20
(Optional 20ft. chain length)

Manipulator Choices

Depending on the application, standard or customized manipulators are available.



Scissor Prong



Box Prong



Custom Vacuum
Lifter

Trolley

Designed to work in conjunction with Knight or alternative manufacturers' enclosed track rail systems. The EBA1127 Adapter Plate allows existing trolleys to attach to the Servo System.



EBA1020 4100 Series



EBA1030 7500 Series



EBA1127 Adapter Plate

TRACTOR:

Non-slip Rack and Pinion

Combined with standard Knight Aluminum Rail, the Servo Tractor offers a non-slip rack and pinion design. This system allows for accurate and repeatable positioning of the load.



Absolute Positioning

Tractor is programmed to automatically stop at the intended location, thus eliminating unnecessary motion. Maintains positioning; homing not required even after cycling power.

Clutch (24VDC)

When disengaged, allows for a free wheel condition. Provides operator additional freedom of movement.

Line Speed Synchronization

Tractor speed may be synchronized with the speed of an assembly line. Optional encoder monitors the line speed.

SAFETY FEATURES

HOIST AND TRACTOR:

Illuminated Run/Stop Button

An illuminated run/stop button visually indicates when the system is in a run/stop or fault condition.

Overload Capability

If load parameters exceed programmed capacity, hoist will not engage until the load is removed. This safety feature prevents an operator from loading or transferring more weight than the allowable system rating.

I/O Interlocks

Prevents unintentional release of loads while in transfer. Interfaces with load cell, which continuously monitors the load.

HOIST Specific:

Fail-Safe Brake

In the event of a power outage, or when the run/stop button is pushed, a fail-safe braking system engages to hold the unit in place. The system is halted until power is restored; no resetting required.

Load Sensing

A built-in load sensing function allows the device to adjust dynamically as load capacity changes.

TRACTOR Specific:

Movement Interrupt Cycle

If moving in an auto-mode cycle, the Servo System will automatically stop if an obstacle/operator crosses its path.

CASE STUDY TURBINE TRANSFER

INDUSTRY: Aviation

PROBLEM:

Operators experienced difficulty maneuvering/attaching a cumbersome jet engine component onto the main assembly. Using conventional single-speed hoists, entire assemblies were being damaged and scrapped. Since substantial financial costs were being incurred by the manufacturer, a suitable transfer system needed to be developed.

- **Over Traveling** - Operators consistently overshot the location target by having to maneuver the hoist using the UP/DOWN controls on the pendants.
- **Vibration** - Constant vibration in the arm made the marriage of parts more difficult.
- **Control** - Operators had difficulty aligning the assemblies with one hand on the pendant while the other was on the load.
- **360° Rotation** - The plant layout needed a system that could rotate 360°.



SOLUTION:

Knight Servo Hoist Articulating Extension Arm 700lbs Hoist @ 230VAC 1 Phase (KSHAEA700-2301)

- The Knight Servo Articulating Arm allowed the operator to maneuver the application with both hands on the load. The programmable "float mode" permitted a more precise marriage of the assemblies.
- The pressure-sensitive pendant handle provided the operator with a precise, natural movement as compared to a traditional UP/DOWN pendant control.
- Knight's patented anti-vibration program, which detects vibrations of arm components, eliminated vibrations in the arm.
- A slip ring provided the arm with 360° movement.

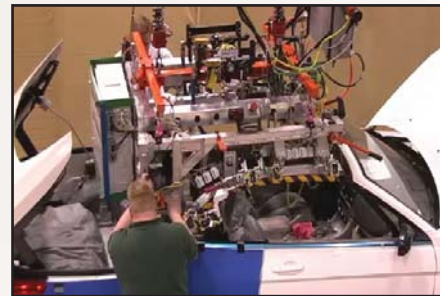
CASE STUDY WINDOW ALIGNMENT

INDUSTRY: Automotive

PROBLEM:

Plant management expressed concerns regarding stability of a window placement alignment fixture. Initially utilizing a pneumatic balancer to secure the 800lb. fixture proved unreliable. In order to insure an accurate application, a system needed to be developed to stabilize the original fixture.

- **Bouncing** - Pneumatic balancer was not robust enough to balance the bulky alignment fixture without causing damage to both the vehicle and /or fixture.
- **Weight Fluctuation** - Pneumatic balancer was not able to "float" the alignment fixture once attached to the vehicle. In addition, operators entering and exiting the vehicle caused additional weight fluctuations that interfered with the application process.
- **Constant Pressure** - Plant required a system which would maintain a constant load of 150lbs to simulate the convertible top. This was a critical factor in the consistent alignment/installation of the side windows.



SOLUTION:

Knight Servo Hoist Twin Chain Dual Motor 1400lbs Hoist @ 230VAC 1 Phase (KSHTCDM1400-2301)

- Knight's twin-chain, dual motor Servo Hoist essentially doubled the capacity of a single chain hoist. This innovative system dramatically increased the stability in balancing the bulkier alignment fixture.
- The hoist automatically shifted into "float mode" once 150lbs had been registered. The operators were then able to clamp the fixture to the vehicle and accurately align the side windows.
- Whenever the operators entered or exited the vehicle, the hoist adjusted for the weight differential and kept the applied weight pressure.
- During the cycle of operation, the hoist monitored and responded to the dynamic changes in the height of the car while simulating a constant 150lb load.
- Operators were able to adjust the parameter settings on-site as needed.

ENGINEERING DATA

Model	Capacity lbs [kg]	Speed Max.	Voltage / Phase
Servo Hoist			
KSH250-1151 Single Chain	250 [113]	98.43' fpm [30mpm]	115 / 1 Phase
KSH250-2301 Single Chain	250 [113]	196.85' fpm [60mpm]	230 / 1 Phase
KSH500-2301 Single Chain	500 [227]	98.43' fpm [30mpm]	230 / 1 Phase
KSH750-2301 Single Chain	750 [340]	123.03' fpm [37.5mpm]	230 / 1 Phase
KSH1000-2301 Single Chain	1000 [454]	82.02' fpm [25mpm]	230 / 1 Phase
KSH2000-2301 Reeved Unit	2000 [908]	41.01' fpm [12.5mpm]	230 / 1 Phase

Servo Hoist Twin Chain			
KSHTC250-2301	250 [113]	196.85' fpm [60mpm]	230 / 1 Phase
500lb, 750lb, and 1000lb arms are application dependent and considered a special order.			

- Chain spreads are 2ft [.6m] standard. Additional spreads are determined per application.

Servo Hoist Twin Chain Dual Motor			
KSHTCDM500-2301	500 [227]	196.85' fpm [60mpm]	230 / 1 Phase
KSHTCDM1000-2301	1000 [454]	98.43' fpm [30mpm]	230 / 1 Phase
KSHTCDM1500-2301	1500 [680]	123.03' fpm [37.5mpm]	230 / 1 Phase
KSHTCDM2000-2301	2000 [908]	82.02' fpm [25mpm]	230 / 1 Phase

- Chain spreads are 2ft [.6m] standard. Additional spreads are determined per application.

Servo Hoist Articulating Arm On An Overhead Carriage			
KSHCA500-2301	500 [227]	98.43' fpm [30mpm]	230 / 1 Phase
KSHCA1000-2301	1000 [454]	82.02' fpm [25mpm]	230 / 1 Phase

Servo Hoist Articulating Arm Floor Mounted			
KSHFA500-2301	500 [227]	98.43' fpm [30mpm]	230 / 1 Phase
KSHFA1000-2301	1000 [454]	82.02' fpm [25mpm]	230 / 1 Phase

Model	Capacity lbs [kg]	Speed Max.	Voltage / Phase
Servo Hoist Articulating Extension Arm			
KSHAEA250-2301	250 [113]	196.85' fpm [60mpm]	230 / 1 Phase
KSHAEA500-2301	500 [227]	98.43' fpm [30mpm]	230 / 1 Phase
KSHAEA750-2301	750 [340]	123.03' fpm [37.5mpm]	230 / 1 Phase
KSHAEA1000-2301	1000 [454]	82.02' fpm [25mpm]	230 / 1 Phase

Servo Hoist Vertical Arm			
KSHVA250-2301	250 [113]	196.85' fpm [60mpm]	230 / 1 Phase
500lb, 750lb, and 1000lb arms are application dependent and considered a special order.			

Servo Hoist Extension Arm			
KSHEA250-2301	250 [113]	196.85' fpm [60mpm]	230 / 1 Phase
500lb, 750lb, and 1000lb arms are application dependent and considered a special order.			

Servo Hoist Vertical Articulating Arm			
KSHVAA250-2301	250 [113]	196.85' fpm [60mpm]	230 / 1 Phase
500lb, 750lb, and 1000lb arms are application dependent and considered a special order.			

Servo Rack and Pinion Tractor			
KST4000	4000 [1814]	174.53' fpm [53.20mpm]	230 / 1 Phase

Servo Tractor with "Z" Control			
KSHXZ1000	1000 [454]	174.53' fpm [53.20mpm]	230 / 1 Phase

Servo "X / Y" Tractor with "Z" Control			
KSHXYZ1000	1000 [454]	174.53' fpm [53.20mpm]	230 / 1 Phase

- Servo Hoist load lifting capacity rated up to 2000lbs [908 kg].
- Servo Hoist Extension Arms reach up to 12ft [3.7m].
- Servo Hoist Articulating Extension Arms have post heights of 8ft [2.4m] and 10ft [3.0m].
- Tractor variable speed up to 174.53 fpm [53.20mpm].
- Hoist variable speed up to 196.85 fpm [60mpm].
- Industry Standards 24 VDC, 2 AMP power is available for custom tooling such as: clamps, pumps, switches, proximity limits, lights, etc.
- H5 rated (continuous duty cycle).
- 230 VAC, single phase 50/60 Hz.



Made With Pride In The USA

Information in this brochure is accurate at time of printing. Please contact a Knight Representative to verify product information.



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