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EXO-004

The Caplex® EXO-004 is a tethered wearable hip exoskeleton, powered and controlled by Humotech's standard Full-Sized or Portable off-board actuation and control systems. It can be configured for unilateral or bilateral use. Each joint is actuated bi-directionally in flexion and extension with the use of two bowden cables per joint. Passive ad/abduction is accommodated with a mechanical linkage. Thigh attached comfort is enhanced by the use of linear and rotary passive degrees of freedom at the thigh pad. Universal transmission units at the joints are utilized as modules for converting linear bowden cable actuation into rotational joint motion, and these modules can be removed and used for other purposes, wearable robotics or otherwise.

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PROPERTY

SPECIFICATION

Active degrees of freedom (per side)	Bidirectional rotary joint at hip for sagittal plane control, with optional antagonist actuation
Passive degrees of freedom (per side)	<ol style="list-style-type: none"> 1. A two-linkage hinge is included to allow for free movement for abduction/adduction at the hip. 2. A rotary joint is included at the thigh pad to conform to the user's leg during motion. 3. A linear slide is included at the thigh pad to conform to the user's leg during motion.
Waist width adjustability	Three discrete sizes ranging from 30" up to 36"
Force sensors (per side)	2x inline load cells for forefoot torque applied, accurate within +/- 1%
Angle sensors (per side)	2x differential magnetic encoders for hip rotary angles, 5760 CPR (23040 PPR) (can be modified by request)
Range of motion (sagittal plane)	Adjustable, Can rotate up to +/-115 degrees (230 degrees total ROM) with hardstops
Range of motion (frontal plane)	<p>Abduction: 45 degrees (or more, depending on user's flexibility)</p> <p>Adduction: 115 degrees (or more, depending on user's flexibility)</p>
Maximum torque (sagittal plane - flexion/extension)	+/- 50 Nm
Device weight (without tether)	3.7 kg
Device dimensions	Approximately 20" wide, 11.5" from front to back, 22.5" tall

Features

- ★ Extremely wide range of motion accommodates full user mobility in sagittal and frontal planes
- ★ Antagonistic actuation provides assistance/resistance in either flexion or extension in the sagittal plane
- ★ Design conforms to and moves with the body for maximal comfort
- ★ Can be used for a wide range of activities including walking, running, stair ascent/descent, sitting, squatting, lunging, etc.
- ★ Slim profile permits freedom of movement without having to worry about the exoskeleton getting in the way of arms and legs
- ★ Off-board actuation scheme provides maximal torque and speed capabilities while minimizing worn mass

