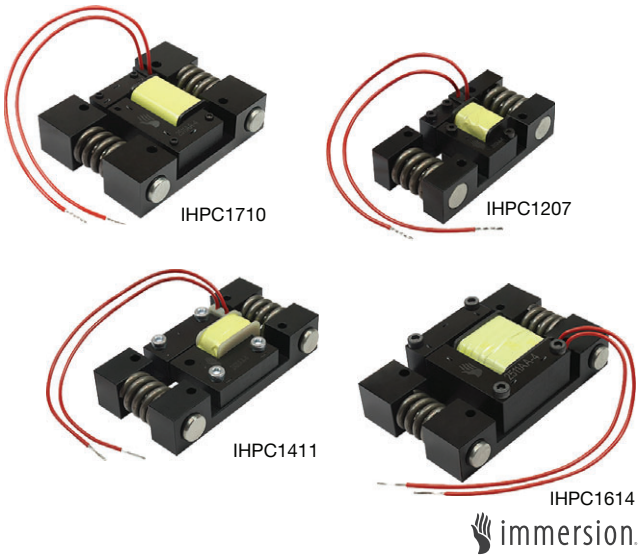
Electromagnetic Haptic Feedback Actuator With Carrier for Mounting



FEATURES

- High displacement (1.5 mm) for excellent touch perception through gloves
- Wide frequency band 50 Hz to 500 Hz
- Available in four sizes for force output up to 120 N
- Size: 73.66 mm x 43.13 mm x 16.73 mm
- High impulse vibrations for clear tactile feedback in noisy environments
- Drives 0.5 kg load to 6 *g*'s of acceleration with 12 V, 5 ms pulse (tested with Vishay's custom spring return fixture)
- Operates on low drive voltages from 8 V_{p-p} to 16 V_{p-p}
- Includes Immersion license for use of haptics
- Customization options for carrier available
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT
HALOGEN FREE
GREEN (5-2008)

LINKS TO ADDITIONAL RESOURCES

Product Page
3D Models

DESCRIPTION

The IHPC is an electromechanical haptic actuator that exploits solenoid technology to enable extremely responsive, high power touch feedback at low drive voltages. The device takes an amplified ac voltage input and produces a corresponding mechanical driving force for the feedback. Includes an IHPT® haptic device mounted to a robust aluminum carrier with springs to achieve oscillatory motion. The assembly includes four mounting holes for easy installation into the end application or test fixture. Ideal for prototyping use.

APPLICATIONS

- Touch screens
- Appliances, industrial equipment, factory automation and control
- Touch screens for human-machine interfaces

RELIABILITY SPECIFICATION

- Operating temperature range: -25 °C to 105 °C
- Tested to 1 million cycles
- Dielectric withstand voltage (coil to mount), 5 mA, 60 s = 150 V_{DC}

STANDARD ELECTRICAL SPECIFICATIONS

PART NUMBER	FORCE OUTPUT (N)	SPRING k CONSTANT TYP.	FORCE COEFFICIENT	RESPONSE TIME TYP. (ms)	L_0 INDUCTANCE ± 20 % AT 1 kHz, 0.25 V, 0 A (mH)	I_{RMS} TYP. (A_{RMS})	DCR TYP. (Ω)	DCR MAX. (Ω)
IHPC1207AGELR39AA0	25	165 N/mm (940 lbf/in) x 2	0.39	5	1.35	1.1	0.95	1.04
IHPC1710ACEL1R2AA0	45	165 N/mm (940 lbf/in) x 2	1.2	5	4.04	0.8	2	2.2
IHPC1411AFELR73AA0	80	165 N/mm (940 lbf/in) x 2	0.73	5	1.8	1.1	0.95	1.1
IHPC1614ACEL2R7BA0	120	165 N/mm (940 lbf/in) x 2	2.7	5	3.5	1.2	1.2	1.32

Notes

- All specifications are referenced to 25 °C ambient, and assume a 0.75 mm (0.030") gap
- Operating temperature range -25 °C to +105 °C
- Rated operating voltage: 16 V maximum

(1) Applied force, in newtons, can be estimated by the following equation: F = FORCE COEFFICIENT x I_{PK}^2

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GLOBAL PART NUMBER

I	H	P	C	1	4	1	1	A	F	E	L	R	7	3	A	A	0
PRODUCT FAMILY				SIZE						PACKAGE CODE		FORCE COEFFICIENT			SERIES		

EL = includes Immersion license

R73 = 0.73

DESCRIPTION

IHPC1411AF	R73	TRAY	e3
MODEL	FORCE COEFFICIENT	PACKAGE CODE	JEDEC® LEAD (Pb)-FREE STANDARD

MATERIAL

Core	Laminated steel
Wire	Copper, PU/PA insulated
Solder	Hot dip tin
Carrier	Aluminum
Springs	Steel

WEIGHT

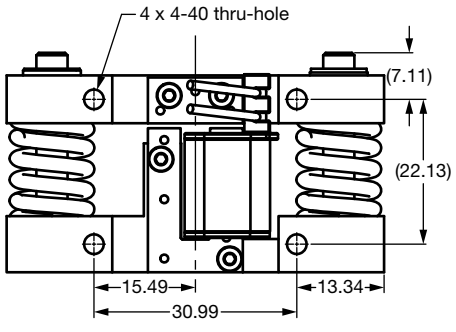
IHPC1207AGELR39AA0	81.8 g
IHPC1710ACEL1R2AA0	145 g
IHPC1411AFELR73AA0	138 g
IHPC1614ACEL2R7BA0	218.8 g

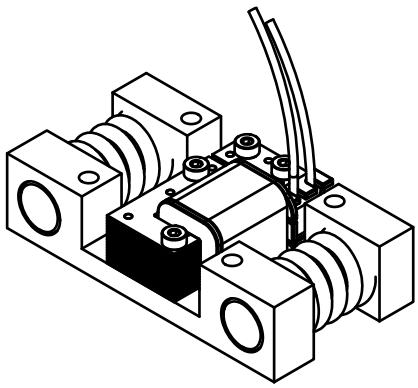
SOLDER COMPOSITION

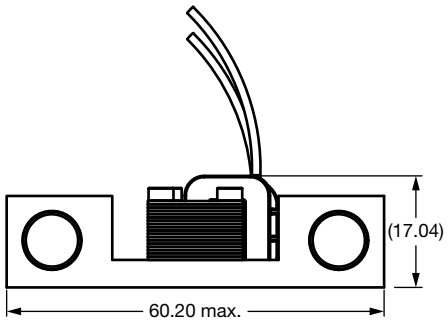
Sn	99.3 %
Cu	0.7 %

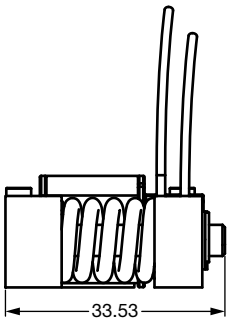
DIMENSIONS in inches [millimeters]

IHPC1207AG



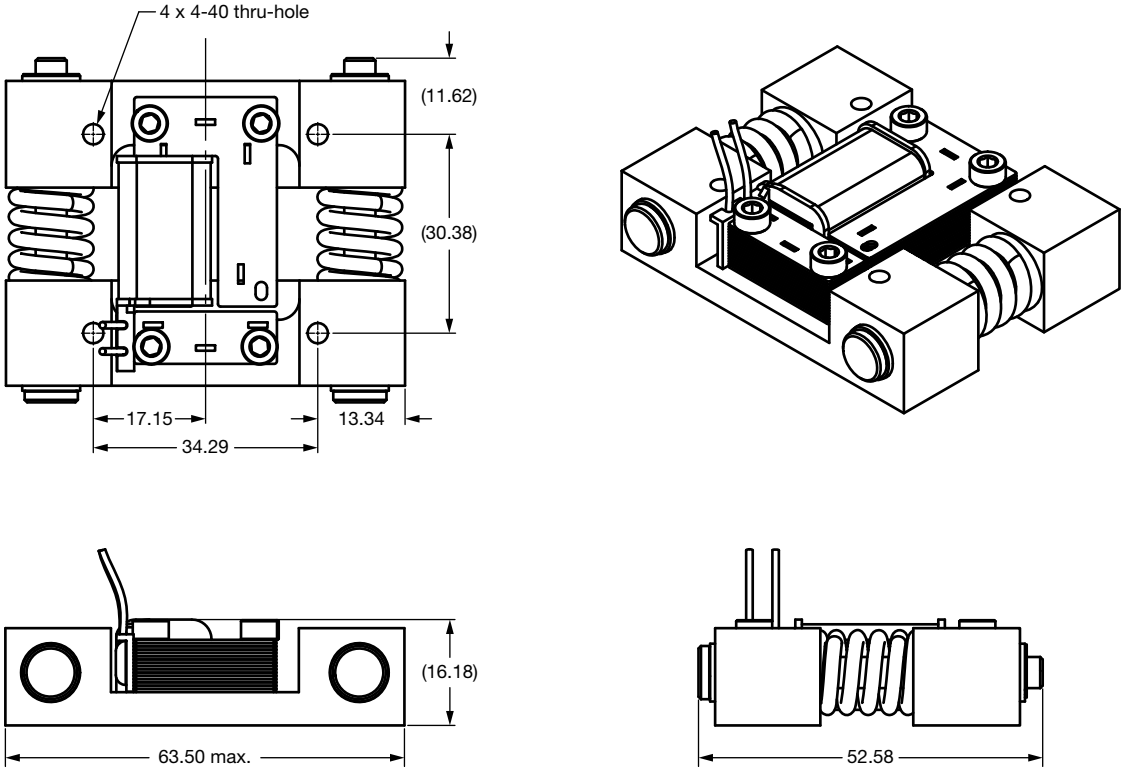




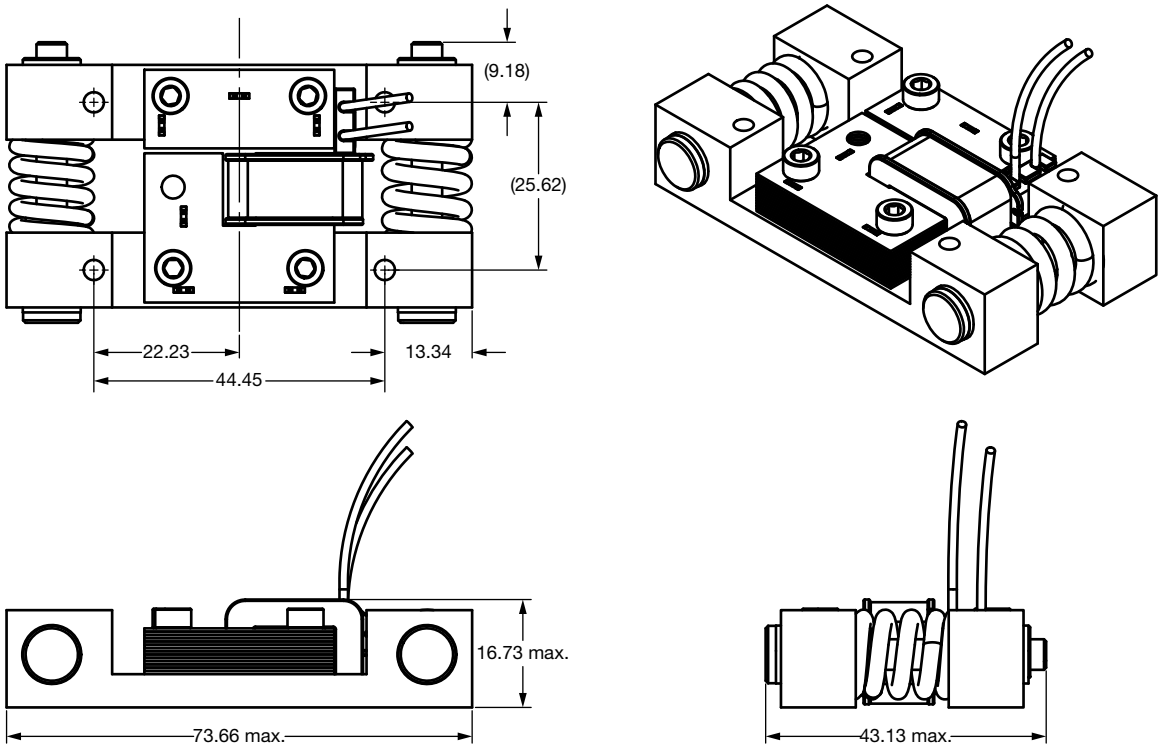


DIMENSIONS in inches [millimeters]

IHPC1710AC

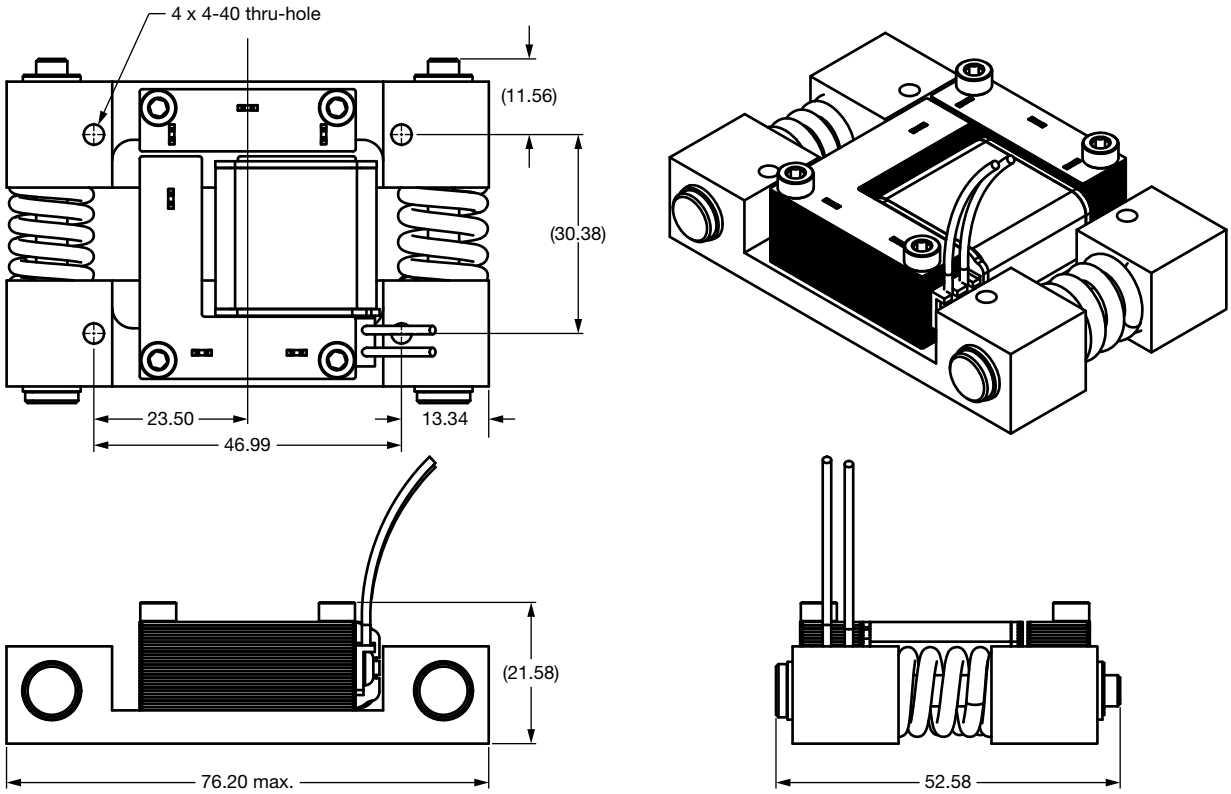


IHPC1411AF

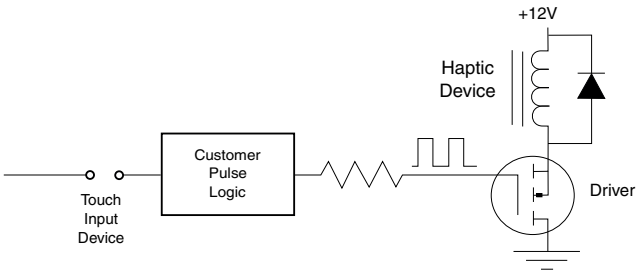


DIMENSIONS in inches [millimeters]

IHPC1614AC

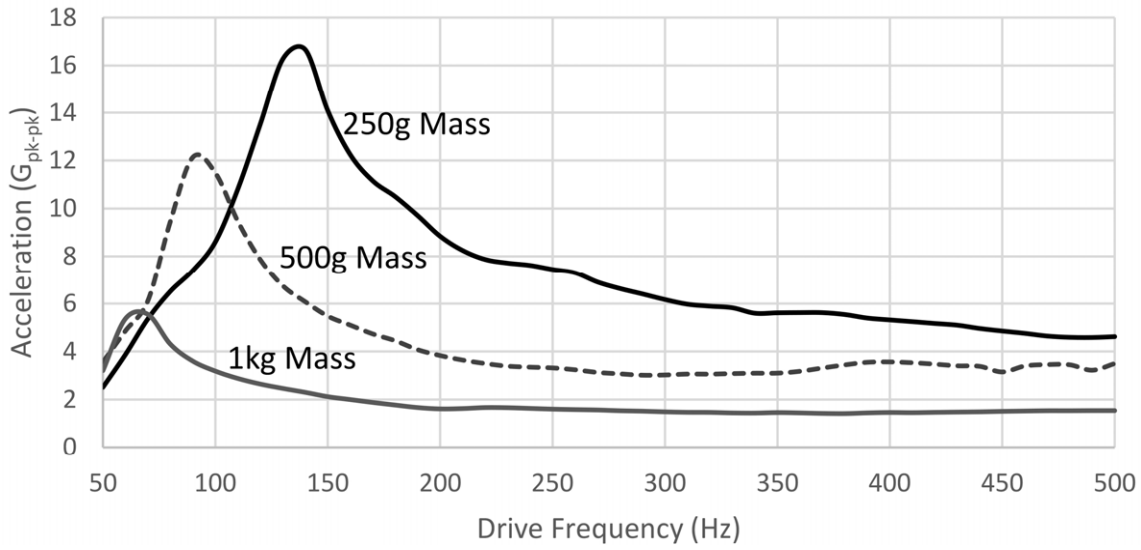


TYPICAL APPLICATION

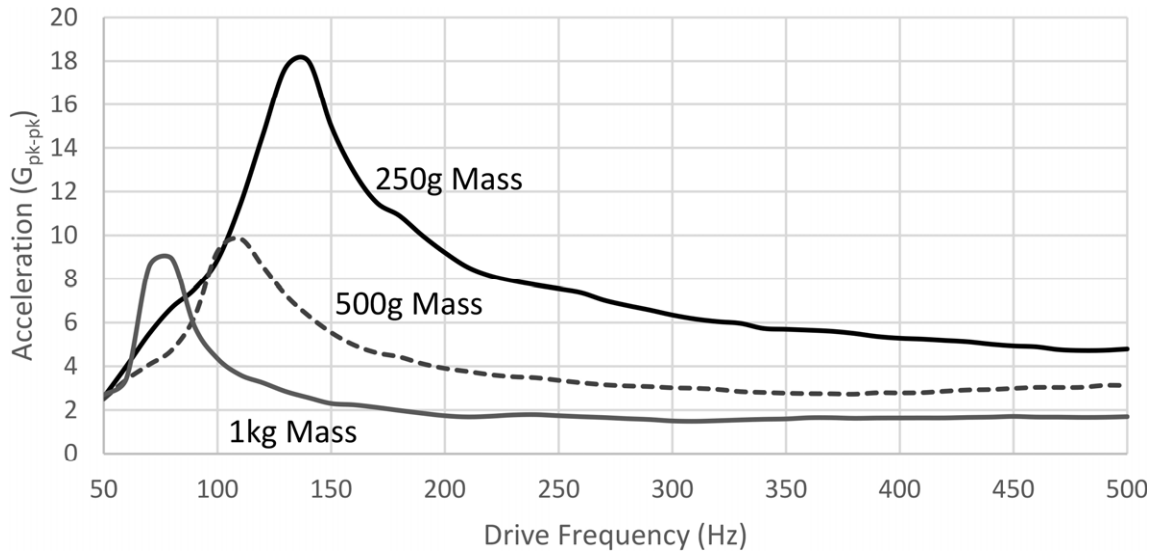


TYPICAL RESPONSE CURVES

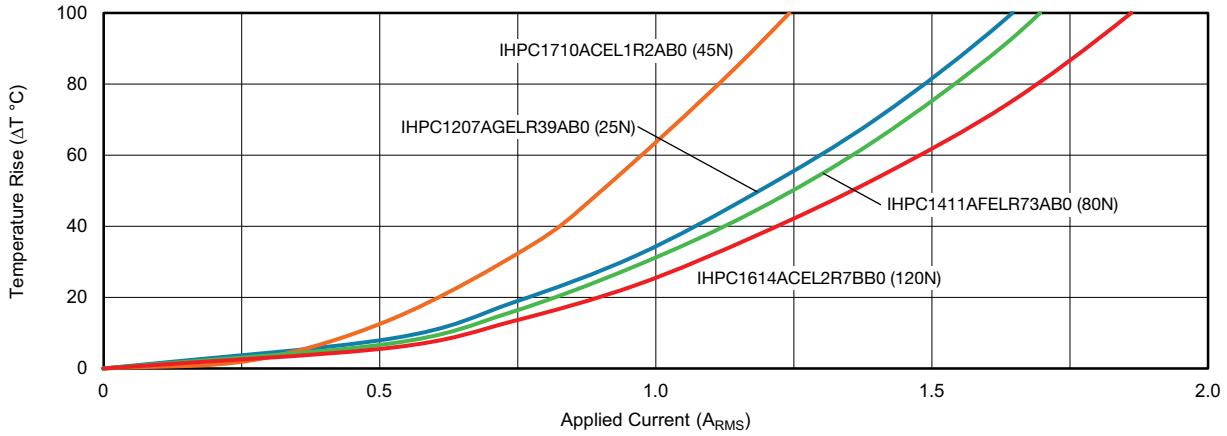
SPRING A



SPRING B



TEMPERATURE RISE

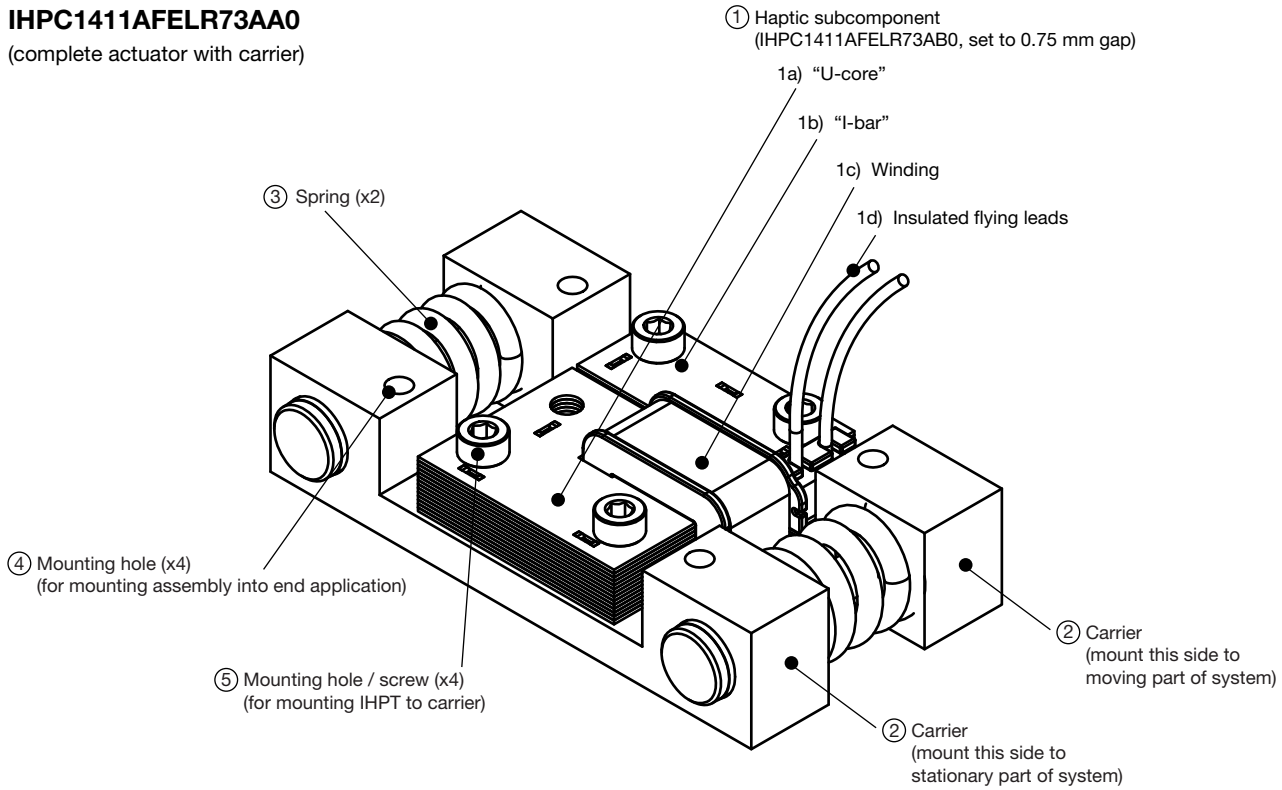


QUICK START INSTRUCTIONS

- Mount the haptic actuator assembly into the end system using the steps outlined in “Installation into End Application” section
- Generating haptic feedback
  - Apply an AC voltage signal to the two flying leads

CONSTRUCTION DIAGRAM

IHPC1411AFELR73AA0
(complete actuator with carrier)



INSTALLATION INTO END APPLICATION

To mount haptic actuator assembly into the end system or test fixture, secure device using the four mounting holes available in the carrier:

a. Connect the **I-bar carrier wing** assembly to the moving portion (e.g., LCD display)

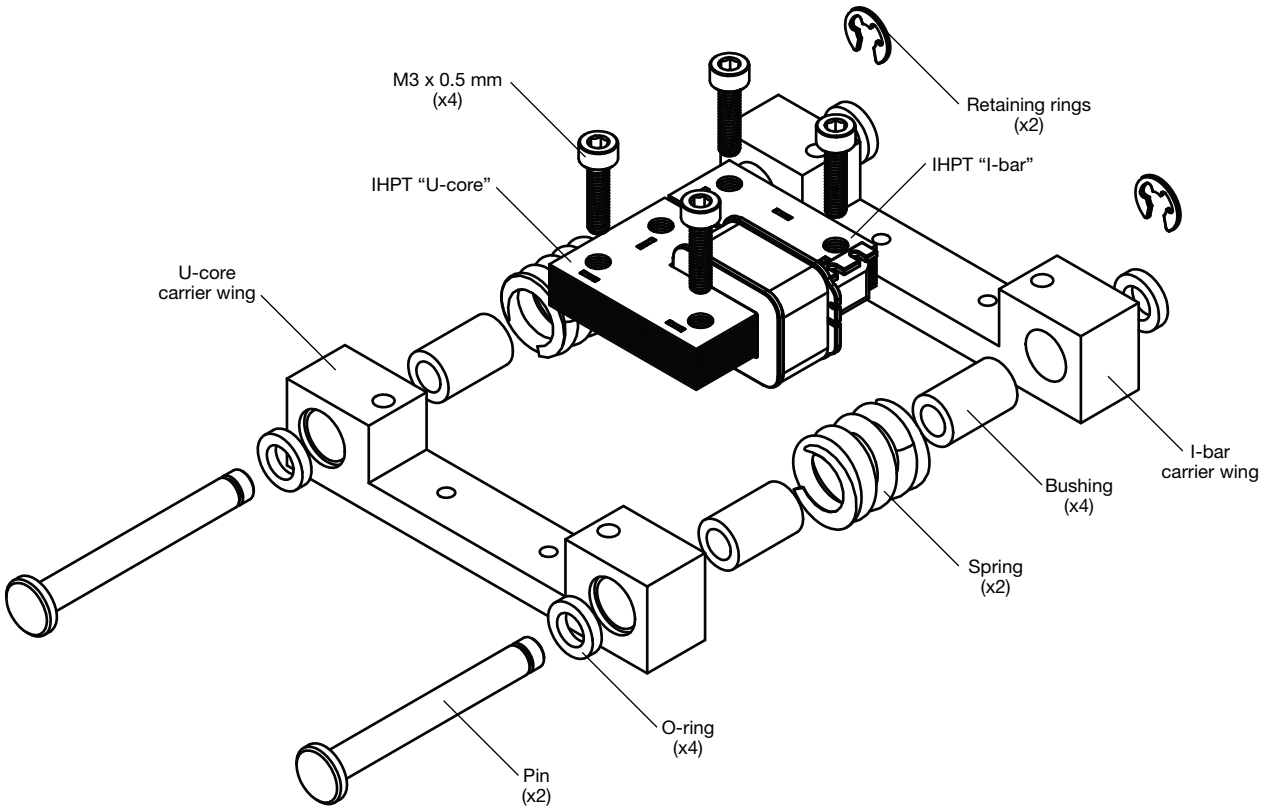
b. Connect the **U-core carrier wing** assembly to the frame or stationary portion of the haptic system (e.g., frame)

c. Tighten all socket head screw with an M1.5 Allen wrench

INSTRUCTIONS FOR SWAPPING OUT SPRING

The stiffness of the spring (or other return mechanisms such as elastomeric rings or leaf springs) can significantly influence the actuator's frequency response. A stiffer spring (higher spring k constant) can increase the resonant frequency of the system. Conversely, a softer spring will lower it.

Follow the below instructions to swap out the springs with the second set of springs that was provided with the purchased product or with other custom springs as desired.



1. The device comes pre-assembled with 165 N/mm springs. To remove the currently installed springs, disassemble the carrier as follows:

   a. Use vice, clamp, or similar fixture to compress both carrier wings together to loosen the spring tension and allow for removal of **retaining rings**

   b. Remove **retaining rings**

   c. Pull apart the **U-core carrier wing**, **I-bar carrier wing**, **pins**, and **O-rings** (the **bushings** and **IHPT** can remain mounted to the carrier)

2. To install new springs, re-assemble the carrier as follows:

   a. Select the desired **spring**

   b. Ensure **bushings** are secure in the holes and are flush with the outside of the carrier

   c. Insert one **O-ring** each to both **pins**, push **O-ring** all the way to the head of the **pin**

   d. Insert **pins** into the **U-core carrier wing** assembly

e. Insert one **spring** onto each **pin**, making sure the **springs** fit around the **bushing**
f. Assemble the **I-bar carrier wing** to the **U-core carrier wing** assembly
g. Use vice, clamp, or similar fixture to compress the **carrier wings** to allow access to the retaining grooves on the **pins**
h. Insert the remaining two **O-rings** onto the protruding ends of the **pins**; push **O-rings** into counter-bore hole so they are seated around pin
i. Install **retaining rings** to grooves of the **pins** to secure **pins** in place
j. Release pressure and remove assembly from vice
k. If necessary, tighten **M3 x 0.5 mm socket head screws** with an M1.5 Allen wrench to secure IHPT to carrier

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