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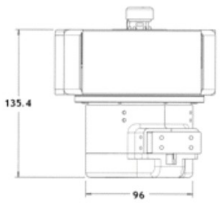
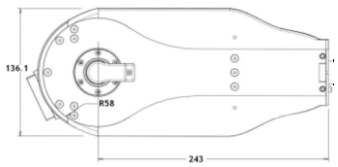
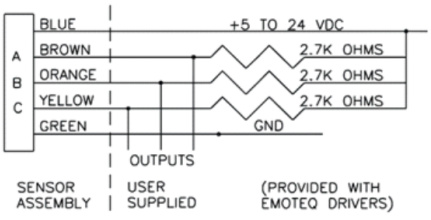
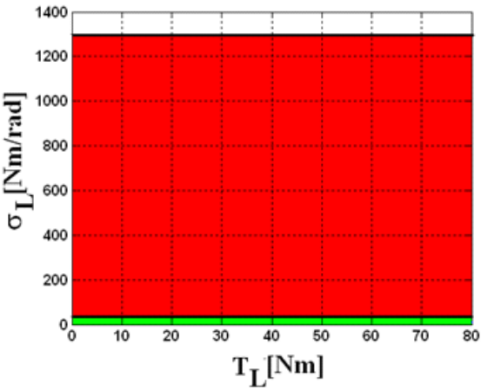
Actuator with Adjustable Stiffness

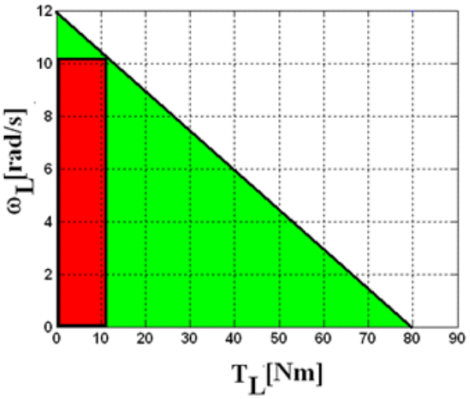


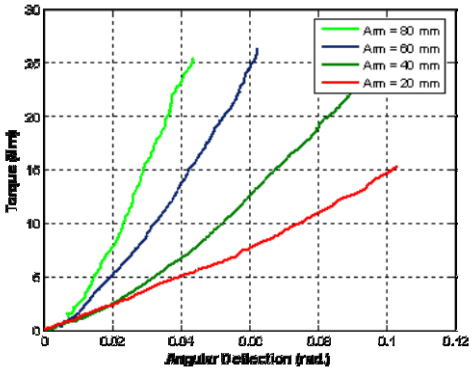


Operating Data				
#	(quantity)		(unit)	(value)
Mechanical				
1	Continuous Output Power		[W]	56
2	Nominal Torque		[Nm]	10.75
3	Nominal Speed		[rad/s]	10.2
4	Nominal Stiffness Variation Time	with no load	[s]	4
5		with nominal torque	[s]	6
6	Peak (Maximum) Torque		[Nm]	80
7	Maximum Speed		[rad/s]	12
8	Maximum Stiffness		[Nm/rad]	1300
9	Minimum Stiffness		[Nm/rad]	30
10	Maximum Elastic Energy		[J]	3.5
11	Maximum Torque Hysteresis		[%]	9
12	Maximum deflection	with max. stiffness	[°]	14
13		with min. stiffness	[°]	5
14	Active Rotation Angle		[°]	*/-120
15	Angular Resolution		[°]	0.02
16	Weight		[Kg]	1.8
Electrical				
17	Nominal Voltage		[V]	24
18	Nominal Current		[A]	2.3
19	Maximum Current		[A]	6.2
Control				
20	Voltage Supply		[V]	24
21	Nominal Current		[A]	2
22	I/O protocol		[]	Ethernet









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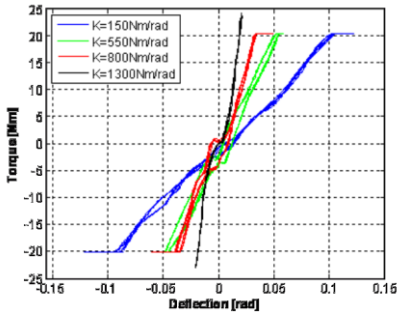
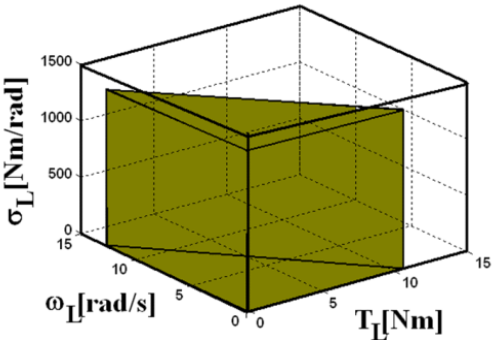
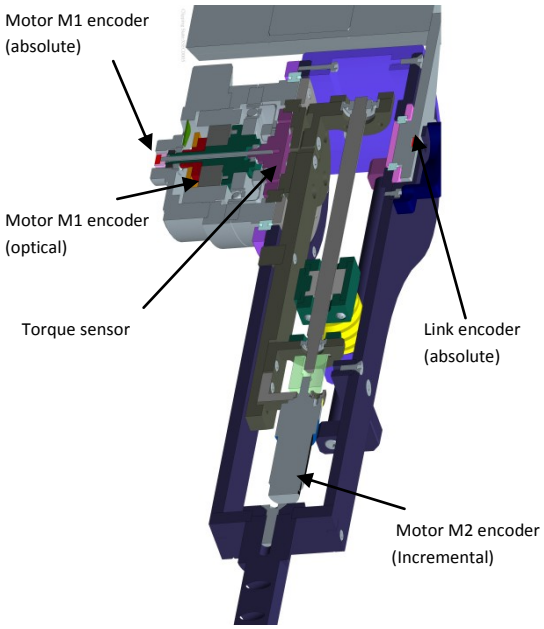
Additional Characteristics

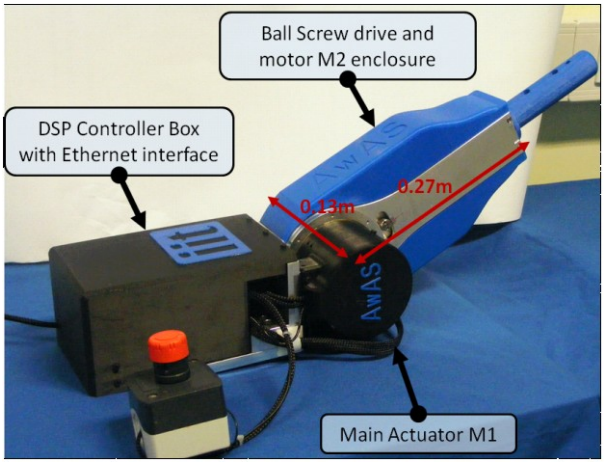




Sensor Map

Additional sensors data			
#	(quantity)	(unit)	(value)
a0	**Sensor 1 and 2**		
a1	Resolution	[CPR]	20000
a2	Range	[kHz]	650
a3	I/O protocol	[yyy]	Ethernet
ax	(specific sensor properties)	[yyy]	xxx
b0	**Sensor 3**		
bx	Resolution	[LPR]	512
by	Range	[kHz]	1600
bz	I/O protocol	[yyy]	Ethernet
n0	**Sensor n**		
...	...	...	...





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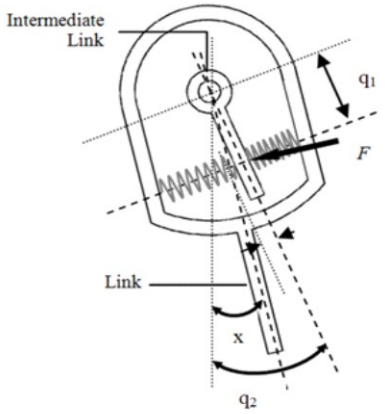
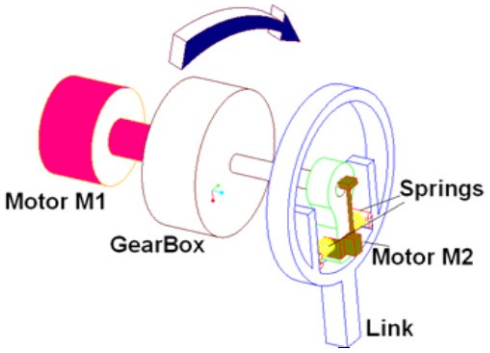
Model





Mathematical model (K_s=80N/mm, l_0=6mm)

101	Recoil Point Function	$x_e = q_2$
102	Energy Function	$H = 1/2\ K_s[(l_0+q_1 \sin(x-q_2))^2+(l_0-q_1 \sin(x-q_2))^2]$
103	Output Torque Function	$\tau = 2\ K_s\, q_1^2 \sin(x-q_2)\cos(x-q_2)$
104	Output Stiffness Function	$\sigma = 2\ K_s\, q_1^2 (2\cos^2(x-q_2)-1)$
105	Spring Torque Function	$e_S = e_S(q_1, q_2, x)$
106	Springs to Motors Transmission Ratio	$A = A(q_1, q_2, x)$
107	Springs to Output Transmission Ratio	$B = B(q_1, q_2, x)$