

## 4.13 Parallel Pre-Stressed Actuators PPA M Series

Designed by CEDRAT TECHNOLOGIES, this new model of Direct Piezo Actuator results from developments carried out under contract of CNES, the French Space Agency. PPA model is twice lighter than its analogue conventional DPA, with the same electromechanical properties. Its compact size also makes its integration easier in mechanical assembly. The M series PPA produce displacement up to 40  $\mu\text{m}$  and can generate pushing a blocked force of 800 N.

References	Unit	PPA10M	PPA20M	PPA40M
Item Code		V-PPAM10	V-PPAM20	V-PPAM40
Notes		-	-	-
Displacement	( $\mu\text{m}$ )	8	20	40
Blocked force	(N)	800	800	800
Stiffness	(N/ $\mu\text{m}$ )	100	40	20
Resonance frequency (free-free)	(Hz)	65000	38800	25000
Response time (free-free)	(ms)	0,01	0,01	0,02
Resonance frequency (blocked-free)	(Hz)	32500	19400	12500
Response time (blocked-free)	(ms)	0,02	0,03	0,04
Voltage range	(V)	-20 ... 150	-20 ... 150	-20 ... 150
Capacitance	( $\mu\text{F}$ )	0,7	1,4	2,7
Resolution	(nm)	0,1	0,2	0,4
Thermo-mechanical behaviour	( $\mu\text{m}/^\circ\text{K}$ )	0,07	0,06	0,04
Height (in actuation direction)	(mm)	18,0	28,0	48,0
Base depth	(mm)	10,0	10,0	10,0
Base width (incl. wedge & wires)	(mm)	9,0	9,0	9,0
Mass	(g)	6,0	12,0	25,0
Standard mechanical interface - Top		1 centered M2.5 threaded hole 2.5 mm deep	1 centered M2.5 threaded hole 2.5 mm deep	1 centered M2.5 threaded hole 2.5 mm deep
Standard mechanical interface - Base		1 centered M2.5 threaded hole 2.5 mm deep	1 centered M2.5 threaded hole 2.5 mm deep	1 centered M2.5 threaded hole 2.5 mm deep
Standard electrical interface		2 PTFE insulated AWG30 wires 100 mm long with $\varnothing$ 1 banana plug	2 PTFE insulated AWG30 wires 100 mm long with $\varnothing$ 1 banana plug	2 PTFE insulated AWG30 wires 100 mm long with $\varnothing$ 1 banana plug

Table 4.14: Characteristics of the PPA M Actuators

Available option(s): SG, NM, VAC, HT  
 Available interface option(s): TH, SI

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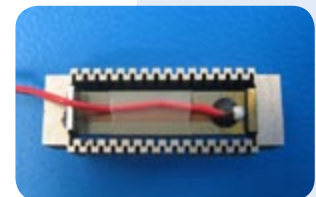


Figure 4.15: View of the PPA20M actuator

## 4.14 Parallel Pre-Stressed Actuators PPA L Series

Designed by CEDRAT TECHNOLOGIES, this new model of Direct Piezo Actuator results from developments carried out under contract of CNES, the French Space Agency. PPA model is twice lighter than its analogue conventional Direct Piezo Actuator, with the same electromechanical properties. It is suitable for dynamic applications and its compact size also makes its integration easier in mechanical assembly. The series so called the PPA L series produce displacement up to 80  $\mu\text{m}$  and can generate pushing a blocked force of 3500 N.

References	Unit	PPA40L	PPA60L	PPA80L
Item Code		V-PPAL40	V-PPAL60	V-PPAL80
Notes		-	-	-
Displacement	( $\mu\text{m}$ )	40	60	90
Blocked force	(N)	3500	3500	3500
Stiffness	(N/ $\mu\text{m}$ )	87,5	58,3	38,9
Resonance frequency (free-free)	(Hz)	15500	9500	7000
Response time (free-free)	(ms)	0,03	0,05	0,07
Resonance frequency (blocked-free)	(Hz)	7750	4750	3500
Response time (blocked-free)	(ms)	0,06	0,11	0,14
Voltage range	(V)	-20 ... 150	-20 ... 150	-20 ... 150
Capacitance	( $\mu\text{F}$ )	13,3	20,0	26,6
Resolution	(nm)	0,4	0,6	0,9
Thermo-mechanical behaviour	( $\mu\text{m}/^\circ\text{K}$ )	0,13	0,11	0,09
Height (in actuation direction)	(mm)	57,0	77,0	97,0
Base length	(mm)	23,5	23,5	23,5
Base width	(mm)	18,0	18,0	18,0
Mass	(g)	92,0	117,0	142,0
Standard mechanical interface - Top		1 centered M3 threaded hole 5 mm deep & 4 M2.5 threaded holes on $\varnothing$ 15 mm 4 mm deep	1 centered M3 threaded hole 5 mm deep & 4 M2.5 threaded holes on $\varnothing$ 15 mm 4 mm deep	1 centered M3 threaded hole 5 mm deep & 4 M2.5 threaded holes on $\varnothing$ 15 mm 4 mm deep
Standard mechanical interface - Base		1 centered M3 threaded hole 5 mm deep & 4 M2.5 threaded holes on $\varnothing$ 15 mm 4 mm deep	1 centered M3 threaded hole 5 mm deep & 4 M2.5 threaded holes on $\varnothing$ 15 mm 4 mm deep	1 centered M3 threaded hole 5 mm deep & 4 M2.5 threaded holes on $\varnothing$ 15 mm 4 mm deep
Standard electrical interface		2 PTFE insulated AWG30 wires 100 mm long with $\varnothing$ 1 banana plug	2 PTFE insulated AWG30 wires 100 mm long with $\varnothing$ 1 banana plug	2 PTFE insulated AWG30 wires 100 mm long with $\varnothing$ 1 banana plug

Table 4.15: Characteristics of the PPA L Actuators



Figure 4.16: View of the PPA40L Actuator

Available option(s): SG, VAC, HT  
Available interface option(s): TH, SI

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## 4.15 Parallel Pre-Stressed Actuators PPA XL Series

Designed by CEDRAT TECHNOLOGIES, this new model of Direct Piezo Actuator results from developments carried out under contract of CNES, the French Space Agency. PPA model is twice lighter than its analogue conventional Direct Piezo Actuator, with the same electromechanical properties. It is suitable for dynamic applications and its compact size also makes its integration easier in mechanical assembly. The XL series produce displacement up to 120  $\mu\text{m}$  and can generate pushing a blocked force of 7000 N.

References	Unit	PPA40XL	PPA80XL	PPA120XL
Item Code		V-PPAXL40	V-PPAXL80	V-PPAXL120
Notes		-	-	-
Displacement	( $\mu\text{m}$ )	38	80	114
Blocked force	(N)	7000	7000	7000
Stiffness	(N/ $\mu\text{m}$ )	184,2	87,5	61,4
Resonance frequency (free-free)	(Hz)	15000	6500	5000
Response time (free-free)	(ms)	0,03	0,08	0,10
Resonance frequency (blocked-free)	(Hz)	7700	3500	2600
Response time (blocked-free)	(ms)	0,07	0,14	0,19
Voltage range	(V)	-20 ... 150	-20 ... 150	-20 ... 150
Capacitance	( $\mu\text{F}$ )	24,0	48,0	72,0
Resolution	(nm)	0,4	0,8	1,1
Thermo-mechanical behaviour	( $\mu\text{m}/^\circ\text{K}$ )	0,16	0,12	0,08
Height (in actuation direction)	(mm)	60,0	100,0	140,0
Base length	(mm)	30,0	30,0	30,0
Base width	(mm)	30,0	30,0	30,0
Mass	(g)	254,0	319,0	384,0
Standard mechanical interface - Top		1 centered M5 threaded hole 6 mm deep & 4 M3 threaded holes on $\varnothing$ 20 mm 6 mm deep	1 centered M5 threaded hole 6 mm deep & 4 M3 threaded holes on $\varnothing$ 20 mm 6 mm deep	1 centered M5 threaded hole 6 mm deep & 4 M3 threaded holes on $\varnothing$ 20 mm 6 mm deep
Standard mechanical interface - Base		1 centered M5 threaded hole 6 mm deep & 4 M3 threaded holes on $\varnothing$ 20 mm 6 mm deep	1 centered M5 threaded hole 6 mm deep & 4 M3 threaded holes on $\varnothing$ 20 mm 6 mm deep	1 centered M5 threaded hole 6 mm deep & 4 M3 threaded holes on $\varnothing$ 20 mm 6 mm deep
Standard electrical interface		2 PTFE insulated AWG30 wires 100 mm long with $\varnothing$ 1 banana plug	2 PTFE insulated AWG30 wires 100 mm long with $\varnothing$ 1 banana plug	2 PTFE insulated AWG30 wires 100 mm long with $\varnothing$ 1 banana plug

Table 4.16: Characteristics of the PPA XL Actuators

Available option(s): SG, VAC  
Available interface option(s): TH, SI

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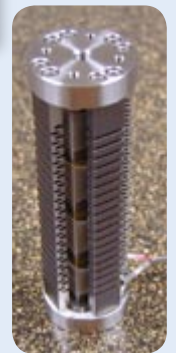


Figure 4.17 : View of the PPA80XL Actuator