

PACMotion™ High Speed Servo Motion Control

Integrated, Scalable, and Precise Control

Emerson provides flexible, easy to use, end-to-end solutions perfect for discrete manufacturing and hybrid control. PACMotion servo motion control continues this approach with high-speed motion, tighter control, and simple integration. The PACMotion family gives you the ability to increase throughput, improve yield, and reduce expenses while minimizing development costs.

Fully Integrated for System Simplicity

PACMotion is tightly integrated with Emerson PACSystems RX3i and PAC Machine Edition engineering tool. With motion, HMI, PLC, and machine logic events integrated into the same view, PACMotion streamlines synchronization for simple setup, maintenance, and troubleshooting. Standard motion blocks make it easy to assemble applications and operators can even dynamically change motion profiles. This gives you the ability to manage smaller lot sizes and rapid changeovers for increased machine utilization.

High Speed, Precision Control

To facilitate quick and easy implementation, PACMotion uses the open EtherCAT communications protocol. Widely considered the standard for motion control, EtherCAT communications provides the peace of mind that all PACMotion products will work cohesively with your existing, and future, motion control technology.

Scalability and Flexibility

Speed is critical for effective motion control, and PACMotion communicates across a 1 Gigabit per second throughput backplane for higher speeds than traditional networks. In fact, communications, position, and path planner loops are updated in quarter, half, and single millisecond intervals respectively.



Utilizing a backplane also allows PACMotion to be a directly scalable solution. PACMotion's performance is maintained as you expand so update loops remain constant whether your system requires 4 axes or 40. This ensures that you never have to worry about performance degradation.

Three Components, One Solution

The PACMotion High Speed Servo Motion Control portfolio combines servo drives, and servo motors, with the PMM345 motion controller to create a single powerful solution.

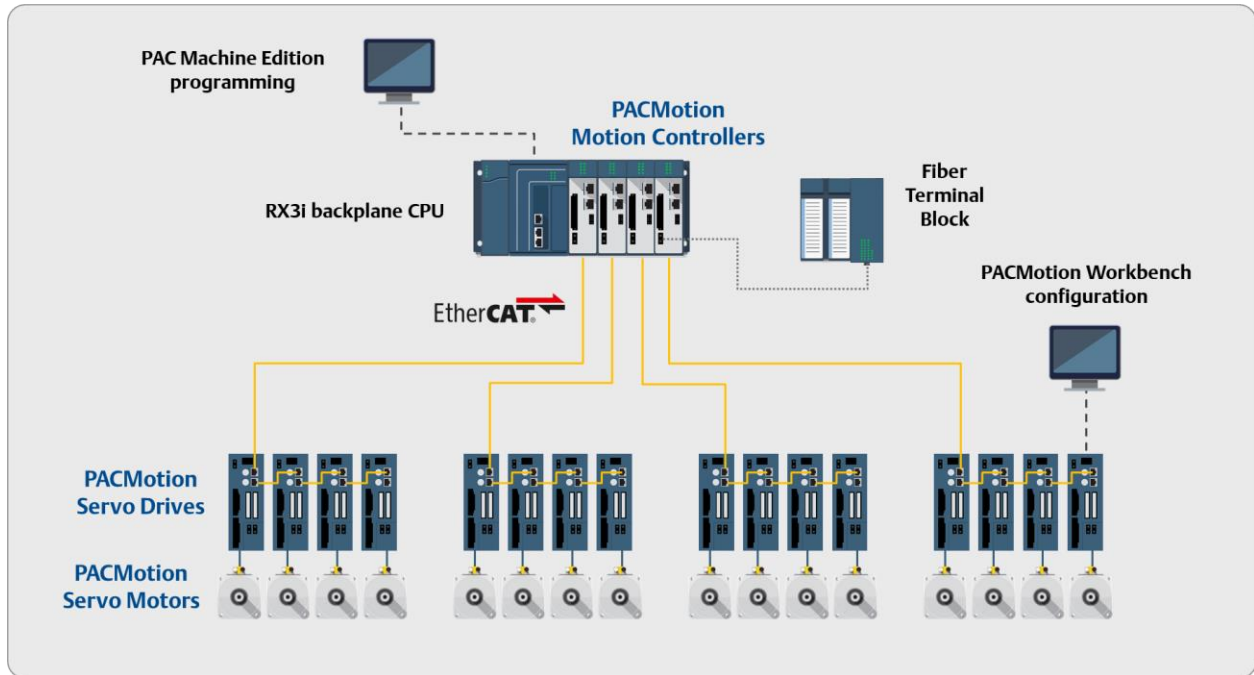
PACMotion offers high-speed, reliable, and easy to use systems. At Emerson, we're a complete automation provider delivering a powerful and comprehensive portfolio of automation technology. We partner with end users to expand operations while tightening supply chain control.

Easy Upgrade Path

For users with previous generations of PACMotion solutions, we've ensured the migration process is simple and painless. The PMM345 Motion Controller is the same footprint and utilizes the same motion commands as its PMM335 predecessor so you can easily upgrade. We also offer the intuitive PACMotion Workbench software for easy servo drive configuration, and a PACMotion Servo Sizing App to easily select the perfect motor for every situation.



System Architecture



PACMotion Motion Controller

Dedicated processor which enables PACSystems™ RX3i servo motion control and coordinates with PACMotion Servo Drives

Features	Benefits
<ul style="list-style-type: none"> Fast motion path planning (1ms), position (500µs), and communications (250µs) update rates 	<ul style="list-style-type: none"> Improved accuracy and faster response to changing control requirements
<ul style="list-style-type: none"> Built on open EtherCAT communications 	<ul style="list-style-type: none"> Easily integrate your existing, and future, motion control technology
<ul style="list-style-type: none"> Consistent motion update rate regardless of the number of axes 	<ul style="list-style-type: none"> Scalability without worries of performance degradation
<ul style="list-style-type: none"> Patented JerkFree technology 	<ul style="list-style-type: none"> Faster settling to final motion positions and prevents material slippage at any point in the motion execution
<ul style="list-style-type: none"> Double precision (64-bit) floating point 	<ul style="list-style-type: none"> Advanced motion programming and control
<ul style="list-style-type: none"> 5 axes per controller: 4 physical and 1 virtual 	<ul style="list-style-type: none"> 50 coordinated axes of control in a single system: 40 physical and 10 virtual
<ul style="list-style-type: none"> Optional Fiber Terminal Block (FTB) allows distributed motion-centric I/O 	<ul style="list-style-type: none"> Reduced wiring complexity and cost
<ul style="list-style-type: none"> Change motion profiles on the fly 	<ul style="list-style-type: none"> Ability to manage smaller lot sizes and rapid changeovers
<ul style="list-style-type: none"> Same footprint as PMM335 predecessor 	<ul style="list-style-type: none"> Modernization in hours, not days



PACMotion Servo Drives

Compact and powerful drives, perfect for driving synchronous servomotors with closed-loop control of torque, speed, and position

Features	Benefits
<ul style="list-style-type: none"> Drives covering 1,100 W – 16,000W of output current ratings 	<ul style="list-style-type: none"> Multiple options to best fit your application
<ul style="list-style-type: none"> Built on open EtherCAT communications 	<ul style="list-style-type: none"> Easily integrate your existing, and future, motion control technology
<ul style="list-style-type: none"> Safe Torque Off (STO) according to IEC 62061 SIL 2 onboard 	<ul style="list-style-type: none"> Constant emphasis on operator safety
<ul style="list-style-type: none"> Designed for PACMotion Servo motors, but can also support 3rd-party motors 	<ul style="list-style-type: none"> Seamlessly integrates into any motion application
<ul style="list-style-type: none"> Synchronized clocks with the motion controller 	<ul style="list-style-type: none"> Entire system is synchronized to ensure all components work together



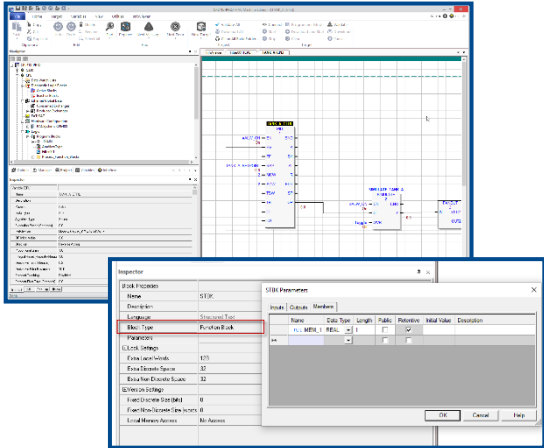
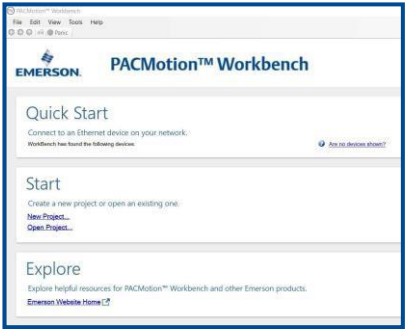
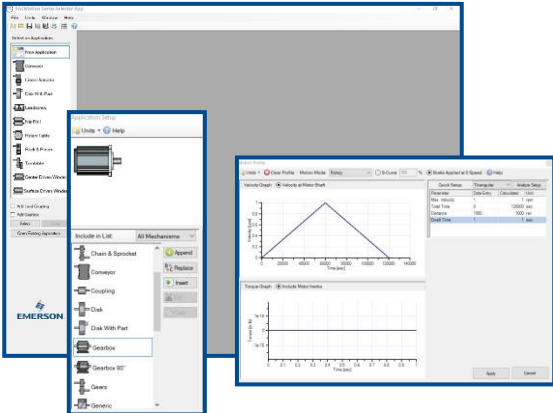
PACMotion Servo Motors

Designed for a wide variety of servo motion needs including industrial robots, machine tools, textile/packing machinery and similar dynamic applications

Features	Benefits
<ul style="list-style-type: none"> Several sizes and customizations available 	<ul style="list-style-type: none"> Multiple options to best fit your application
<ul style="list-style-type: none"> Built on open EtherCAT communications 	<ul style="list-style-type: none"> Easily integrate your existing, and future, motion control technology
<ul style="list-style-type: none"> Functional replacements for FANUC motors 	<ul style="list-style-type: none"> Modernization in hours, not days
<ul style="list-style-type: none"> Low inertia 	<ul style="list-style-type: none"> Move to new positions quickly
<ul style="list-style-type: none"> Option for single cable connection 	<ul style="list-style-type: none"> Save time on maintenance and installation
<ul style="list-style-type: none"> Exceptionally low cogging and harmonic distortion 	<ul style="list-style-type: none"> Ensures smooth performance



PACMotion Software Suite

Tool	Function
<p>PAC Machine Edition (PME)</p>	<p>A single programming solution for your entire automation portfolio, PME ensures streamlined deployment and management of all PACSystems and PACMotion devices. With PME you can program your high-speed servo motion control applications and your HMI, PLC, and machine logic all in the same view. PME also provides pre-defined, re-usable modules for reduced programming and configuration costs.</p> 
<p>PACMotion Workbench</p>	<p>Integrated within PME, PACMotion Workbench offers features like device discovery and servo tuning to help you configure your PACMotion Servo Drives. PACMotion Workbench has been designed for a simple user experience and even provides detailed connection diagrams to aid in troubleshooting. With an intuitive layout and comprehensive instructions, deploying a servo drive has never been easier.</p> 
<p>PAC Motion Servo Sizing Application</p>	<p>To ensure you always choose the right motor for your application, the PAC Motion Servo Sizing App is available to all PACMotion users. This tool aids in motion design by providing users a graphical interface to match PACMotion Servo Motors with various tools and products. Components like lead screws, timing belts, gear boxes, and electrical motors are all included. As users input key parameters like diameter of gears/pulleys, ratio of gear box, and load, the PAC Motion Servo Sizing App determines which motor is right for the job.</p> 

Specifications

PMM345 Motion Controller

Specification	Value	Additional Details
Motion Path Planning Update Rate	1ms	Consistent update regardless of the number of axes in the system
Position Loop Update Rate	500 μ s	All axes in the RX3i rack are updated simultaneously
Communications Loop Update Rate	250 μ s	All axes in the RX3i rack are updated simultaneously
Controlled Axes / Module	4	PACMotion servo motors (IC830M-) are supported via an EtherCAT interface
Master Axes / Module	1	Can be a virtual time-based or incremental encoder master
Servo Command Interface	EtherCAT (RJ45, CAT5e shielded or better)	100Mb/s data transfer
Maximum Axes per RX3i	40 + 10 master axes	Requires 16 slot backplane, CPU and 2 power supplies (AC or DC)
Position Resolution:	1,000,000 counts/rev	Consistent regardless of encoder type
Accuracy by Encoder Type:		
Smart Feedback Device (SFD3)	\pm 9 arcmin \pm 0.1500 degrees	Single-turn absolute encoder – Single Cable
Hiperface DSL	\pm 1.33 arcmin \pm 0.0222 degrees	Multi-turn absolute encoder – Single Cable
BiSS Multi-turn	\pm 0.6 arcmin \pm 0.0100 degrees	Multi-turn absolute encoder – Dual Cable (Bidirectional/Serial/Synchronous)
Feedback Type	Incremental/Absolute Serial Encoder	Battery backup required for absolute feedback mode
Faceplate I/O:		
24V General Purpose Inputs	4 optically isolated; source/sink	—
24V High-Speed Inputs	2 optically isolated; source/sink	Open circuit detection; can be used to connect a quadrature master encoder (500 kHz max)
24V General Purpose Inputs/Outputs	2 optically isolated; source/sink	125mA maximum output current each
Connector	Plug-on Screw Terminal	—
Floating Point Support	Yes	Double precision IEEE 754
Cam Profiles per Module	256 at one time	Up to 2048 profiles can be stored in the RX3i file system for use by any module
Synch/Delayed Start	Up to 8 axes	Axes can be on any module and are synchronized over the backplane. Ensures motion function blocks are executed on the same sample or at a specific offset
High Speed Position Capture	2 Inputs per axis	Configured as touch probes
Certifications	ATEX, CE	—

PACMotion Servo Drives

Specification	Units	Value by Drive Part Number: IC830DP _____-NBEC							
		00306	00606	01206	02406	00307	00607	01207	02407
Drive Continuous Output Power	Watts	1100	2000	4000	8000	2000	4000	8000	16,000
Rated Supply Voltage	V	120/240				240/480			
Bus Voltage	Vdc	Approximately 1.33 x Vrms (continuous) (established strictly by incoming AC power, no internal settings necessary)							
Control Logic, Supply Voltage	V	24							
Rated Output Current (RMS value ±3%)	A	3	6	12	24	3	6	12	24
Peak Output Current (±3%)	A	9	18	30	48	9	18	30	48
Peak Time	S	5							
Current Loop Bandwidth Max.	kHz	2.5 to 4		2 to 3		2.5 to 4		2 to 3	
Velocity Loop Bandwidth Max.	Hz	0 to 1000		0 to 800	0 to 600	0 to 800	0 to 600		
Position Loop Bandwidth Max.	Hz	1 to 250							
Update Rate	MHz	1.5							
Weight (Standard Width)	kg	1.1		2	3.7	2.7		5.3	
Weight (Extended Width)	kg	1.3		2.2	4	2.9		5.5	
Height, without Connectors	mm	168		196	248	256		306	385
Height, with Connector	mm	200		225	280	290		340	526
Standard Width Front/Back	mm	54/59		72/78.4	96/100	65/70		99/105	185/185
Extended Width Front/Back	mm	84/89		91/96	96/100	95/100		99/105	-
Depth, without Connectors	mm	156		187	228	185		228	225
Depth, with Connectors	mm	185		<215	<265	<225		<265	<265

PACMotion Servo Motors – Frame Size 2 Performance Data

		Specification	Symbol	Units	IC830M21C-	IC830M22E-	IC830M23E-	IC830M24F-
		PACMotion Servo Drive Compatibility	-	-	120/240V Drives only	120/240V Drives only	120/240V Drives only	120/240V Drives only
		Max Rated DC Bus Voltage	Vbus	Vdc	320	320	320	320
		Continuous Torque (Stall) for ΔT winding = 100°C *[1,2,7,8,9]	Tcs	Nm	0.48	0.87	1.16	1.42
				lb-in	4.2	7.7	10.3	12.6
		Continuous Current (Stall) for ΔT winding = 100°C *[1,2,7,8,9]	Ics	Arms	1.58	2.73	2.78	3.89
		Continuous Torque (Stall) for ΔT winding = 60°C *[2]	Tcs	Nm	0.38	0.70	0.93	1.14
				lb-in	3.4	6.2	8.23	10.1
		Max Mechanical Speed*[5]	Nmax	rpm	8000	8000	8000	8000
		Peak Torque *[1,2]	Tp	Nm	1.47	2.76	3.86	4.82
				lb-in	13.0	24.4	34.2	42.7
		Peak Current	Ip	Arms	6.3	10.9	11.1	15.6
Drive DC Bus Voltage	160 Vdc	Rated Torque (speed) *[1,2,7,8,9,10]	Trtd	Nm	0.46	0.81	1.1	1.33
				lb-in	4.0	7.1	9.7	11.8
		Rated Speed	Nrtd	rpm	2500	3500	2500	3000
	Rated Power (speed) *[1,2,7,8,9]	Prtd	kW	0.12	0.30	0.29	0.42	
			Hp	0.16	0.40	0.39	0.56	
	Rated Torque (speed) *[1,2,7,8,9,10]	Trtd	Nm	0.39	.70	0.98	1.12	
			lb-in	3.4	6.2	8.7	9.9	
	Rated Speed	Nrtd	rpm	8000	8000	6500	8000	
	Rated Power (speed) *[1,2,7,8,9]	Prtd	kW	0.32	0.59	0.67	0.94	
			Hp	0.43	0.79	0.89	1.26	
	Rated Torque (speed) *[1,2,7,8,9,10]	Trtd	Nm	-	-	-	-	
			lb-in	-	-	-	-	
Rated Speed	Nrtd	rpm	-	-	-	-		
Rated Power (speed) *[1,2,7,8,9]	Prtd	kW	-	-	-	-		
		Hp	-	-	-	-		
Rated Torque (speed) *[1,2,7,8,9,10]	Trtd	Nm	-	-	-	-		
		lb-in	-	-	-	-		
Rated Speed	Nrtd	rpm	-	-	-	-		
Rated Power (speed) *[1,2,7,8,9]	Prtd	kW	-	-	-	-		
		Hp	-	-	-	-		
Torque Constant (± 10%) *[1]	Kt	Nm/Arms	0.30	0.32	0.42	0.36		
		lb-in/Arms	2.7	2.8	3.7	3.2		
Back EMF Constant (± 10%) *[6]	Ke	V/krpm	19.5	20.4	27.0	23.4		
Motor Constant	Km	N-m/√W	0.0679	0.114	0.147	0.171		
		lb-in/√W	0.601	1.01	1.30	1.52		
Resistance (line-line) (± 10%) *[6]	Rm	ohm	13	5.22	5.44	2.94		
Inductance (line-line)	L	mH	19	9.7	11.1	6.16		
Inertia (includes Resolver feedback) (± 10%) *[3]	Jm	kg-cm ²	0.11	0.16	0.22	0.27		
		lb-in-s ²	9.5E-05	1.4E-04	1.9E-04	2.4E-04		
Optional Brake Inertia (additional) (± 10%)	Jm	kg-cm ²	0.012	0.012	0.012	0.012		
		lb-in-s ²	1.1E-05	1.1E-05	1.1E-05	1.1E-05		
Weight	W	kg	0.82	1.1	1.38	1.66		
		lb	1.8	2.4	3.0	3.7		
Static Friction *[1,10]	Tf	Nm	0.002	0.005	0.007	0.01		
		lb-in	0.02	0.04	0.06	0.09		
Viscous Damping *[1]	Kdv	Nm/krpm	0.0046	0.0055	0.0065	0.0074		
		lb-in/krpm	0.04	0.05	0.06	0.07		
Thermal Time Constant	TCT	minutes	8	9	1.	11		
Thermal Resistance	K ^{thw-a}	°C/W	1.43	1.19	1.10	1.07		
Pole Pairs	-	-	3	3	3	3		

PACMotion Servo Motors – Frame Size 4 Performance Data

		Specification	Symbol	Units	IC830M41E	IC830M42E	IC830M42G	IC830M42H	IC830M43G	IC830M43K
		PACMotion Servo Drive Compatibility	-	-	All Drives	All Drives	All Drives	All Drives	All Drives	All Drives
		Max Rated DC Bus Voltage	Vbus	Vdc	640	640	640	640	640	640
		Continuous Torque (Stall) for ΔT winding = 100°C * [1,2,7,8,9]	Tcs	Nm	2.02	3.42	3.53	3.54	4.80	4.90
				lb-in	17.9	30.3	31.2	31.3	42.5	43.4
		Continuous Current (Stall) for ΔT winding = 100°C * [1,2,7,8,9]	Ics	A(rms)	2.85	2.74	4.80	6.0	4.87	9.60
		Continuous Torque (Stall) for ΔT winding = 60°C * [2]	Tcs	Nm	1.62	2.74	2.82	2.83	3.84	3.92
				lb-in	14.3	24.2	25.0	25.0	34.0	34.7
		Max Mechanical Speed * [5]	Nmax	rpm	6000	6000	6000	6000	6000	6000
		Peak Torque * [1,2]	Tp	Nm	6.28	11.3	11.5	13.34	16.1	16.4
				lb-in	55.6	99.7	102	118.1	142.5	145.2
		Peak Current	Ip	Arms	11.4	11.0	19.2	30	19.5	38.4
160 Vdc		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm	1.94	-	-	3.03	-	4.08
				lb-in	17.2	-	-	26.8	-	36.1
320 Vdc		Rated Speed	Nrttd	rpm	1200	-	-	2000	-	2500
				Rated Power (speed) * [1,2,7,8,9]	Prttd	kW	0.24	-	-	0.67
Hp	0.33	-	-			0.90	-	1.43		
560 Vdc		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm	1.82	3.12	2.90	2.72	4.00	2.62
				lb-in	16.1	27.6	25.7	24.1	35.4	23.2
640 Vdc		Rated Speed	Nrttd	rpm	3000	1800	3500	4500	2500	6000
				Rated Power (speed) * [1,2,7,8,9]	Prttd	kW	0.57	0.59	1.06	1.28
Hp	0.77	0.79	1.42			1.72	1.41	2.21		
160 Vdc		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm	1.58	2.81	2.35	-	3.01	-
				lb-in	14.0	24.9	20.8	-	26.6	-
320 Vdc		Rated Speed	Nrttd	rpm	6000	3500	6000	-	5000	-
				Rated Power (speed) * [1,2,7,8,9]	Prttd	kW	0.99	1.03	1.48	-
Hp	1.33	1.38	1.98			-	2.1	-		
560 Vdc		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm	1.58	2.72	2.35	-	2.57	-
				lb-in	14.0	24.1	20.8	-	22.7	-
640 Vdc		Rated Speed	Nrttd	rpm	6000	4000	6000	-	6000	-
				Rated Power (speed) * [1,2,7,8,9]	Prttd	kW	0.99	1.14	1.48	-
Hp	1.33	1.53	1.98			-	2.2	-		
		Torque Constant (± 10%) * [1]	Kt	Nm/Arms	0.71	1.26	0.74	0.59	0.99	0.52
				lb-in/Arms	6.3	11.2	6.5	5.22	8.76	4.6
		Back EMF Constant (± 10%) * [6]	Ke	V/krpm	45.6	80.9	47.5	38.3	63.9	33.2
		Motor Constant	Km	N-m/√W	0.236	0.369	0.381	-	-	-
				lb-in/√W	2.09	3.26	3.37	-	-	-
		Resistance (line-line) (± 10%) * [6]	Rm	ohm	6.02	7.78	2.51	1.65	2.61	0.74
		Inductance (line-line)	L	mH	18.4	26.8	9.2	6.0	10.8	2.9
		Inertia (includes Resolver feedback (± 10%) * [3])	Jm	kg-cm ²	0.81	1.5	1.5	1.5	2.1	2.1
				lb-in-s ²	7.2E-04	1.3E-03	1.3E-03	1.3E-03	1.8E-03	1.8E-03
		Optional Brake Inertia (additional) (± 10%)	Jm	kg-cm ²	0.068	0.068	0.068	0.068	0.068	0.068
				lb-in-s ²	6.0E-05	6.0E-05	6.0E-05	6.0E-05	6.0E-05	6.0E-05
		Weight	W	kg	2.44	3.39	3.39	3.39	4.35	4.35
				lb	5.4	7.5	7.5	7.5	9.8	9.8
		Static Friction * [1,10]	Tf	Nm	0.014	0.026	0.026	0.026	0.038	0.038
				lb-in	0.12	0.23	0.23	0.23	0.34	0.34
		Viscous Damping * [1]	Kdv	Nm/krpm	0.009	0.013	0.013	0.013	0.017	0.017
				lb-in/krpm	0.08	0.12	0.12	0.12	0.15	0.15
		Thermal Time Constant	TCT	minutes	13	17	17	17	20	20
		Thermal Resistance	R _{thw-a}	°C/W	0.97	0.80	0.80	0.80	0.70	0.70
		Pole Pairs	-	-	5	5	5	5	5	5

PACMotion Servo Motors – Frame Size 6 Performance Data

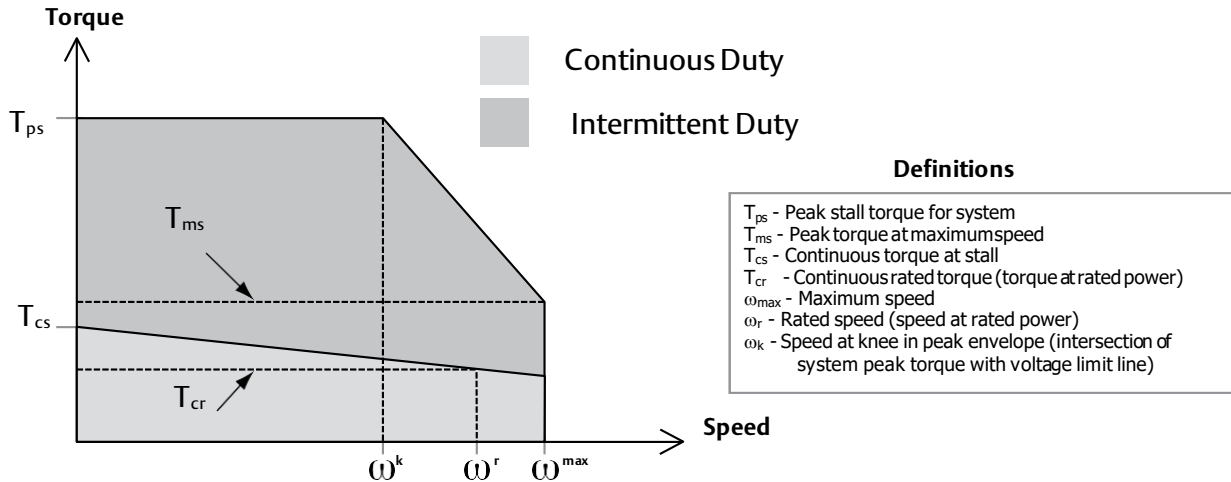
		Specification	Symbol	Units	IC830M62H	IC830M62K	IC830M62L	IC830M62M	IC830M63L	IC830M63M
		PACMotion Servo Drive Compatibility	-	-	All Drives	All Drives	All Drives	All Drives	All Drives	All Drives
		Max Rated DC Bus Voltage	Vbus	Vdc	640	640	640	640	640	640
		Continuous Torque (Stall) for ΔT winding = 100°C * [1,2,7,8,9]	Tcs	Nm	11.9	12.2	12.2	12.2	16.8	17.0
				lb-in	105	108	108	108	149	150
		Continuous Current (Stall) for ΔT winding = 100°C * [1,2,7,8,9]	Ics	A(rms)	5.4	9.6	12.0	13.4	11.1	13.8
		Continuous Torque (Stall) for ΔT winding = 60°C * [2]	Tcs	Nm	9.5	9.8	9.8	9.72	13.4	13.6
				lb-in	84	86.7	87	86	119	120
		Max Mechanical Speed * [5]	Nmax	rpm	6000	6000	6000	6000	6000	6000
		Peak Torque * [1,2]	Tp	Nm	29.6	41.2	30.1	30.2	42.6	43.0
				lb-in	262	365	266	267	377	381
		Peak Current	Ip	Arms	16.2	48.0	36.0	40.3	33.3	41.4
		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm	-	-	-	-	-	-
				lb-in	-	-	-	-	-	-
		Rated Speed	Nrtd	rpm	-	-	-	-	-	-
		Rated Power (speed) * [1,2,7,8,9]	Prttd	kW	-	-	-	-	-	-
				Hp	-	-	-	-	-	-
		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm	10.8	10.4	10.0	9.50	14.2	14.3
				lb-in	99	92	89	84.1	126	127
		Rated Speed	Nrtd	rpm	1000	2000	2500	3000	1500	2000
		Rated Power (speed) * [1,2,7,8,9]	Prttd	kW	1.17	2.18	2.62	2.98	2.23	2.99
				Hp	1.57	2.92	3.51	4.00	2.99	4.01
		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm	10.2	9.0	7.42	5.70	12.9	11.3
				lb-in	90.3	79.7	65.7	50.4	114	100
		Rated Speed	Nrtd	rpm	2000	3500	5000	6000	3000	4000
		Rated Power (speed) * [1,2,7,8,9]	Prttd	kW	2.14	3.30	3.89	3.58	4.05	4.73
				Hp	2.86	4.4	5.21	4.80	5.43	6.34
		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm	9.9	9.0	5.74	5.70	12.0	10.5
				lb-in	87.6	79.7	50.8	50.4	106	92.9
		Rated Speed	Nrtd	rpm	2400	4500	6000	6000	3500	4500
		Rated Power (speed) * [1,2,7,8,9]	Prttd	kW	2.49	3.77	3.61	3.58	4.4	4.95
				Hp	3.34	5.06	4.84	4.80	5.90	6.63
		Torque Constant (± 10%) * [1]	Kt	Nm/Arms	2.2	1.28	1.0	0.91	1.5	1.24
				lb-in/Arms	19.5	11.3	8.85	8.1	13.3	11.0
		Back EMF Constant (± 10%) * [6]	Ke	V/krpm	142	82.1	65.5	58.8	98.2	79.9
		Motor Constant	Km	N-m/√W	0.989	-	0.949	0.984	1.26	1.30
				lb-in/√W	8.75	-	8.40	8.71	11.2	11.5
		Resistance (line-line) (± 10%) * [6]	Rm	ohm	3.3	1.08	0.74	0.57	0.94	0.61
		Inductance (line-line)	L	mH	25.4	8.5	5.4	4.4	7.4	4.9
		Inertia (includes Resolver feedback (± 10%) * [3])	Jm	kg-cm ²	17	17	17	17	24	24
				lb-in-s ²	0.015	0.015	0.015	0.015	0.021	0.021
		Optional Brake Inertia (additional) (± 10%)	Jm	kg-cm ²	0.61	0.61	0.61	0.61	0.61	0.61
				lb-in-s ²	5.4E-04	5.4E-04	5.4E-04	5.4E-04	5.4E-04	5.4E-04
		Weight	W	kg	8.9	8.9	8.9	8.9	11.1	11.1
				lb	19.6	19.6	19.6	19.6	24.4	24.4
		Static Friction * [1,10]	Tf	Nm	0.05	0.05	0.05	0.05	0.1	0.1
				lb-in	0.44	0.44	0.44	0.44	0.9	0.9
		Viscous Damping * [1]	Kdv	Nm/krpm	0.04	0.04	0.04	0.04	0.06	0.06
				lb-in/krpm	0.35	0.35	0.35	0.35	0.53	0.53
		Thermal Time Constant	TCT	minutes	20	20	20	20	25	25
		Thermal Resistance	R _{thw-a}	°C/W	0.46	0.46	0.46	0.46	0.41	0.41
		Pole Pairs	-	-	5	5	5	5	5	5

PACMotion Servo Motors – Frame Size 7 Performance Data

		Specification	Symbol	Units	IC830M72L	IC830M72P	IC830M72Q	IC830M72R	IC830M73P	IC830M73Q	IC830M74Q
		PACMotion Servo Drive Compatibility	-	-	All Drives	All Drives	All Drives	120/240V Drives only	All Drives	All Drives	All Drives
		Max Rated DC Bus Voltage	Vbus	Vdc	640	640	640	320	640	640	640
		Continuous Torque (Stall) for ΔT winding = 100°C * [1,2,7,8,9]	Tcs	Nm	30	29.4	29.5	29.8	41.6	41.5	52.2
				lb-in	266	260	261	263.7	368	367	426
		Continuous Current (Stall) for ΔT winding = 100°C * [1,2,7,8,9]	Ics	Arms	11.5	18.7	23.5	33.1	19.5	24.5	26.1
		Continuous Torque (Stall) for ΔT winding = 60°C * [2]	Tcs	Nm	24	23.5	23.6	23.8	33.3	33.2	41.8
				lb-in	212	208	209	210.6	295	294	370
		Max Mechanical Speed * [5]	Nmax	rpm	6000	6000	6000	6000	6000	6000	6000
		Peak Torque * [1,2]	Tp	Nm	79.5	78.5	78.4	79.2	111	111	141
				lb-in	70.4	695	694	701	985	982	1250
		Peak Current	Ip	Arms	34.5	56.1	70.5	99.3	58.6	73.5	78.3
160 Vdc		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm	-	-	-	25.1	-	-	-
				lb-in	-	-	-	222	-	-	-
320 Vdc		Rated Speed	Nrtd	rpm	-	-	-	1500	-	-	-
				Rated Power (speed) * [1,2,7,8,9]	Prtd	kW	-	-	-	3.94	-
560 Vdc		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm		-	23.8	23.3	19.4	34.7	33.4
				lb-in	-	211	205	171.7	307	296	379
640 Vdc		Rated Speed	Nrtd	rpm	-	1800	2000	3250	1300	1500	1200
				Rated Power (speed) * [1,2,7,8,9]	Prtd	kW	-	4.49	4.86	8.85	4.72
640 Vdc		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm		25.3	20.1	16.3	-	28.5	25.2
				lb-in	224	178	144	-	252	223	279
640 Vdc		Rated Speed	Nrtd	rpm	1500	3000	4000	-	2400	3000	2500
				Rated Power (speed) * [1,2,7,8,9]	Prtd	kW	3.97	6.31	6.83	-	7.16
640 Vdc		Rated Torque (speed) * [1,2,7,8,9,10]	Trtd	Nm		24.3	18.2	14.1	-	26.3	22.0
				lb-in	215	161	125	-	233	195	242
640 Vdc		Rated Speed	Nrtd	rpm	1800	3500	4500	-	2800	3500	3000
				Rated Power (speed) * [1,2,7,8,9]	Prtd	kW	4.58	6.67	6.65	-	7.71
640 Vdc		Torque Constant (± 10%) * [1]	Kt	Nm/Arms		2.6	1.58	1.3	0.9	2.13	1.7
				lb-in/Arms	23.0	14.0	11.5	8.0	18.9	15	17.7
		Back EMF Constant (± 10%) * [6]	Ke	V/krpm	169	102	81.2	58.3	137	109	129
		Motor Constant	Km	Nm/√W	2.21	2.18	2.08	-	2.82	2.67	3.27
				lb-in/√W	19.6	19.3	18.4	-	25.0	23.6	28.9
		Resistance (line-line) (± 10%) * [6]	Rm	ohm	0.92	0.35	0.26	0.12	0.38	0.25	0.25
		Inductance (line-line)	L	mH	13.6	5.0	3.2	1.63	5.9	3.7	3.8
		Inertia (includes Resolver feedback (± 10%) * [3])	Jm	kg-cm ²	65	65	65	65	92	92	120
				lb-in-s ²	0.057	0.057	0.057	0.057	0.082	0.082	0.11
		Optional Brake Inertia (additional) (± 10%)	Jm	kg-cm ²	1.64	1.64	1.64	1.64	1.64	1.64	1.64
				lb-in-s ²	1.46 x 10 ⁻³	1.46 x 10 ⁻³	1.46 x 10 ⁻³	1.46 x 10 ⁻³	1.46 x 10 ⁻³	1.46 x 10 ⁻³	1.46 x 10 ⁻³
		Weight	W	kg	19.7	19.7	19.7	19.7	26.7	26.7	33.6
				lb	43.4	43.4	43.4	43.4	58.8	58.8	74.0
		Static Friction * [1,10]	Tf	Nm	0.16	0.16	0.16	0.16	0.24	0.24	0.33
				lb-in	1.4	1.4	1.4	1.4	2.1	2.1	2.9
		Viscous Damping * [1]	Kdv	Nm/krpm	0.06	0.06	0.06	0.06	0.13	0.13	0.2
				lb-in/krpm	0.5	0.5	0.5	0.5	1.2	1.2	1.8
		Thermal Time Constant	TCT	minutes	46	46	46	46	53	53	60
		Thermal Resistance	R _{thw-a}	°C/W	0.39	0.39	0.39	0.39	0.33	0.33	0.30
		Pole Pairs	-	-	5	5	5	5	5	5	5

PACMotion Servo Motors – Performance Data Notes

Torque-speed Curve Calculations:



Motor Compatibility:

All motors will operate with the 120/240Vac drives. Motors with 320V Max DC Bus Voltage are not compatible with 240/480Vac drives

Drive DC Bus Voltage calculation:

- 1.33 x Vrms = Vdc bus
- Approximate Values -
- 120 Vrms = 160Vdc
- 240 Vrms = 320Vdc
- 400 Vrms = 560Vdc
- 480 Vrms = 640Vdc

Bus voltage of the drive is established strictly by the incoming AC power. No internal settings necessary.

Table Footnotes:

- [1] Motor winding temperature rise, $\Delta T=100^{\circ}C$, at $40^{\circ}C$ ambient.
- [2] All data referenced to sinusoidal commutation.
- [3] Add parking brake if applicable for total inertia.
- [4] Motor with standard heat sink.
- [5] May be limited at some values of Vbus.
- [6] Measured at $25^{\circ}C$.
- [7] Brake motor option reduces continuous torque ratings by following values (all values in Nm):

Frame Size 2			Frame Size 4	Frame Size 5	Frame Size 6		Frame Size 7
IC830M21	IC830M22	IC830M23	All Motors	All Motors	IC830M62	IC830M63	All Motors
0.00	0.01	0.02	0.12	0.15	0.5	0.9	1

- [8] Non-Resolver feedback options reduces continuous ratings following values (all values in Nm):

Frame Size 2	Frame Size 4		Frame Size 5	Frame Size 6		Frame Size 7	
All Motors	IC830M41	IC830M42	All Motors	IC830M62	IC830M63	IC830M72	IC830M73
0.00	0.1	0.1	0.15	0.9	1.2	2.0	2.7

- [9] Motors with non-resolver feedback and brake option reduce continuous torque by following values (all values in Nm):

Frame Size 2			Frame Size 4		Frame Size 5	Frame Size 6		Frame Size 7	
IC830M 21	IC830M 22	IC830M 23	IC830M 41	IC830M 42	All Motors	IC830M 62	IC830M 63	IC830M 72	IC830M 73
0.00	0.02	0.05	0.22	0.36	0.39	1.6	2.4	3.9	5.1

- [10] For motors with optional shaft seal, reduce torque shown by following values and increase T_r by the same amount:

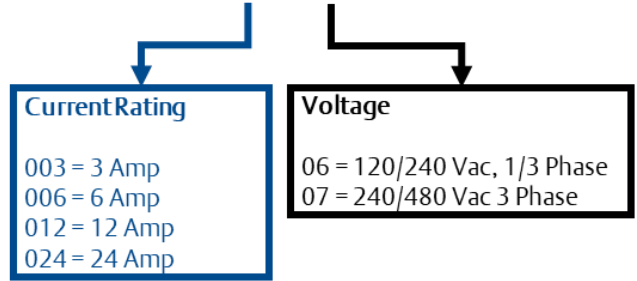
Frame Size 2			Frame Size 4		Frame Size 5	Frame Size 6		Frame Size 7	
All Motors			All Motors		All Motors	All Motors		All Motors	
0.047 Nm (0.41 lb-in)			0.071 Nm (0.63 lb-in)		0.013 Nm (0.1.2 lb-in)	0.25 Nm (2.21 lb-in)		0.25 Nm (2.21 lb-in)	

PACMotion Servo Motors – Motor Dimensions

Motor	Flange Width	Overall Length (no brake)	Heat Sink Size [Aluminum Plate]	Pilot	Mounting Hole Diameter	Bolt Circle Diameter	Shaft Diameter	Shaft Length	Key Width	Key Height
	(mm)	(mm)	(in)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
IC830M21C-KK	58	95.4	10"x10"x1/4"	50	5.8	70	9	25	3	10.2
IC830M22E-KK	58	114.4	10"x10"x1/4"	50	5.8	70	9	25	3	10.2
IC830M23E-CK	58	133.4	10"x10"x1/4"	50	5.8	70	14	30	5	16
IC830M24F-CK	58	152.4	10"x10"x1/4"	50	5.8	70	14	30	5	16
IC830M41E-DC	84	147.8	10"x10"x1/4"	80	7	100	10	32	3	11.2
IC830M42E-DC	84	147.8	10"x10"x1/4"	80	7	100	10	32	3	11.2
IC830M42E-GC	84	147.8	10"x10"x1/4"	80	7	100	14	30	5	16
IC830M42G-DC	84	147.8	10"x10"x1/4"	80	7	100	10	32	3	11.2
IC830M42G-GC	84	147.8	10"x10"x1/4"	80	7	100	14	30	5	16
IC830M42H-DC	84	147.8	10"x10"x1/4"	80	7	100	10	32	3	11.2
IC830M43G-GC	84	176.8	10"x10"x1/4"	80	7	100	14	30	5	16
IC830M43K-GC	84	176.8	10"x10"x1/4"	80	7	100	14	30	5	16
IC830M62H-BK	138	172.2	18"x18"x1/2"	110	9	145	24	55	8	27
IC830M62H-EK	138	172.2	18"x18"x1/2"	110	9	145	19	55	6	21.5
IC830M62K-BK	138	172.2	18"x18"x1/2"	110	9	145	24	55	8	27
IC830M62L-BK	138	172.2	18"x18"x1/2"	110	9	145	24	55	8	27
IC830M62L-EK	138	172.2	18"x18"x1/2"	110	9	145	19	55	6	21.5
IC830M62M-BK	138	172.2	18"x18"x1/2"	110	9	145	24	55	8	27
IC830M63L-BK	138	197.2	18"x18"x1/2"	110	9	145	24	55	8	27
IC830M63M-BK	138	197.2	18"x18"x1/2"	110	9	145	24	55	8	27
IC830M72L-KK	188	201.7	18"x18"x1/2"	114.3	13.5	200	35	79	10	38
IC830M72P-KK	188	201.7	18"x18"x1/2"	114.3	13.5	200	35	79	10	38
IC830M72Q-KK	188	201.7	18"x18"x1/2"	114.3	13.5	200	35	79	10	38
IC830M72R-KK	188	201.7	18"x18"x1/2"	114.3	13.5	200	35	79	10	38
IC830M73P-KK	188	235.7	18"x18"x1/2"	114.3	13.5	200	35	79	10	38
IC830M73Q-KK	188	235.7	18"x18"x1/2"	114.3	13.5	200	35	79	10	38
IC830M74Q-KK	188	269.7	18"x18"x1/2"	114.3	13.5	200	35	79	10	38

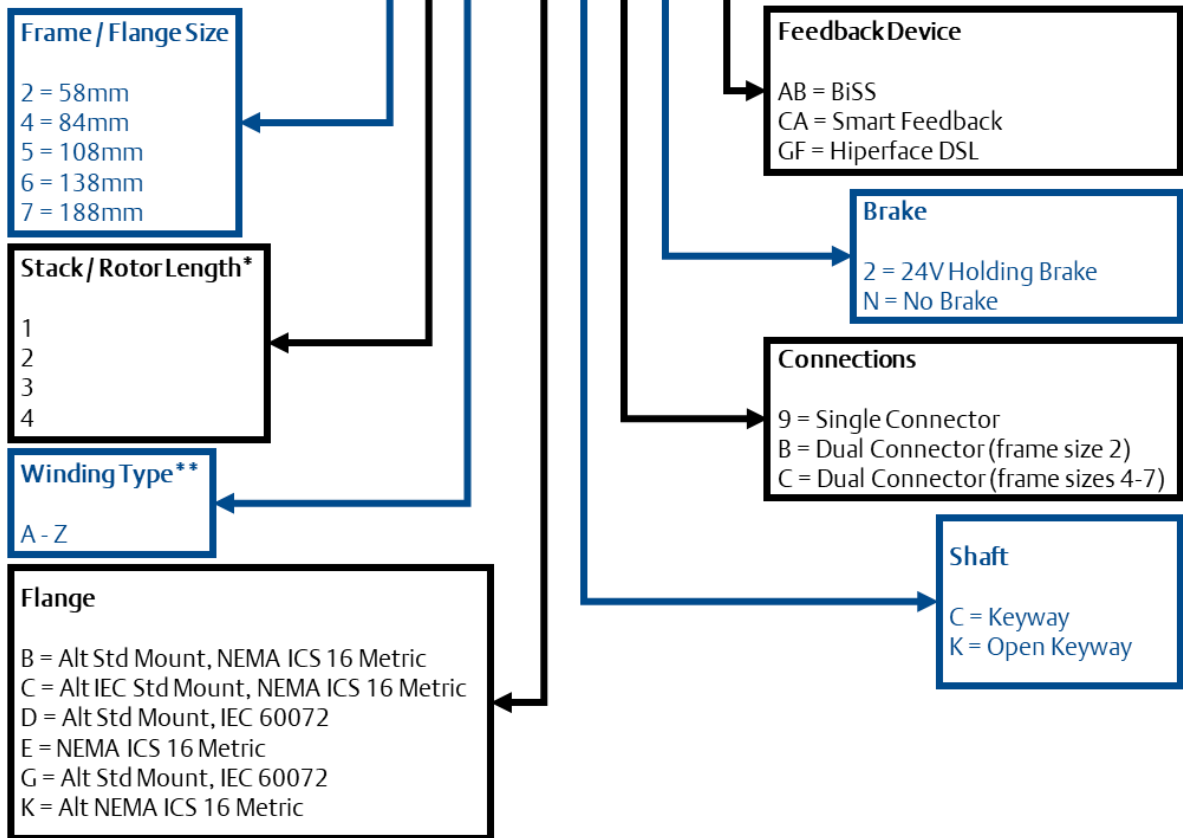
Understanding the Part Numbers PACMotion Servo Drives

IC830D P **003** **06** – NB EC



PACMotion Servo Motors

IC830M **2** **3** **E** – **C** **K** **B** **N** **AB** 00



*value varies by frame size
**see manual for full definitions

Ordering Info

Catalog Number	Description
Servo Motion Controller	
IC695PMM345	PACMotion Servo Motion Controller, compatible with RX3i backplane control systems
IC695FTB1B132	Fiber terminal Block kit: includes the base and two high density extended shroud box style screw terminal blocks
Servo Drives	
IC830DP00306-NBEC	PACMotion Servo Drive, 3A, 120/240 V
IC830DP00606-NBEC	PACMotion Servo Drive, 6A, 120/240 V
IC830DP01206-NBEC	PACMotion Servo Drive, 12A, 120/240 V
IC830DP02406-NBEC	PACMotion Servo Drive, 24A, 120/240 V
IC830DP00307-NBEC	PACMotion Servo Drive, 3A, 240/480 V
IC830DP00607-NBEC	PACMotion Servo Drive, 6A, 240/480 V
IC830DP01207-NBEC	PACMotion Servo Drive, 12A, 240/480 V
IC830DP02407-NBEC	PACMotion Servo Drive, 24A, 240/480 V
Servo Motors – Frame Size 2	
IC830M21C-KK92CA00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Single Conn., Brake, SFD3, Single-Turn Abs
IC830M21C-KK92GF00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Single Conn., Brake, HIPERFACE DSL, Multi-Turn Abs
IC830M21C-KK9NCA00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Single Conn., SFD3, Single-Turn Abs
IC830M21C-KK9NGF00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Single Conn., HIPERFACE DSL, Multi-Turn Abs
IC830M21C-KKB2AB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M21C-KKBNAB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M22E-KK92CA00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Single Conn., Brake, SFD3, Single-Turn Abs
IC830M22E-KK92GF00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Single Conn., Brake, HIPERFACE DSL, Multi-Turn Abs
IC830M22E-KK9NCA00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Single Conn., SFD3, Single-Turn Abs
IC830M22E-KK9NGF00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Single Conn., HIPERFACE DSL, Multi-Turn Abs
IC830M22E-KKB2AB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M22E-KKBNAB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M23E-CK92CA00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Single Conn., Brake, SFD3, Single-Turn Abs
IC830M23E-CK92GF00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Single Conn., Brake, HIPERFACE DSL, Multi-Turn Abs
IC830M23E-CK9NCA00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Single Conn., SFD3, Single-Turn Abs
IC830M23E-CK9NGF00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Single Conn., HIPERFACE DSL, Multi-Turn Abs
IC830M23E-CKB2AB00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M23E-CKBNAB00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M24F-CK92CA00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Single Conn., Brake, SFD3, Single-Turn Abs
IC830M24F-CK92GF00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Single Conn., Brake, HIPERFACE DSL, Multi-Turn Abs
IC830M24F-CK9NCA00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Single Conn., SFD3, Single-Turn Abs
IC830M24F-CK9NGF00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Single Conn., HIPERFACE DSL, Multi-Turn Abs
IC830M24F-CKB2AB00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M24F-CKBNAB00	PACMotion Servo Motor, NEMA, 14x30mm Shaft, 5mm Open Key, Dual Conn., BiSS, Multi-Turn Abs

IC830M62M-BK92CA00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., Brake, SFD3, Single-Turn Abs
IC830M62M-BK92GF00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., Brake, HIPERFACE DSL, Multi-Turn Abs
IC830M62M-BK9NCA00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., SFD3, Single-Turn Abs
IC830M62M-BK9NGF00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., HIPERFACE DSL, Multi-Turn Abs
IC830M62M-BKC2AB00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M62M-BKCNAB00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M63L-BK92CA00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., Brake, SFD3, Single-Turn Abs
IC830M63L-BK92GF00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., Brake, HIPERFACE DSL, Multi-Turn Abs
IC830M63L-BK9NCA00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., SFD3, Single-Turn Abs
IC830M63L-BK9NGF00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., HIPERFACE DSL, Multi-Turn Abs
IC830M63L-BKC2AB00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M63L-BKCNAB00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M63M-BK92CA00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., Brake, SFD3, Single-Turn Abs
IC830M63M-BK92GF00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., Brake, HIPERFACE DSL, Multi-Turn Abs
IC830M63M-BK9NCA00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., SFD3, Single-Turn Abs
IC830M63M-BK9NGF00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Single Conn., HIPERFACE DSL, Multi-Turn Abs
IC830M63M-BKC2AB00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M63M-BKCNAB00	PACMotion Servo Motor, NEMA, 24x55mm Shaft, 8mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
Servo Motors – Frame Size 7	
IC830M72L-KKC2AB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M72L-KKCNAB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M72P-KKC2AB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M72P-KKCNAB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M72Q-KKC2AB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M72Q-KKCNAB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M72R-KKC2AB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M72R-KKCNAB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M73P-KKC2AB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M73P-KKCNAB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M73Q-KKC2AB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M73Q-KKCNAB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., BiSS, Multi-Turn Abs
IC830M74Q-KKH2AB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., Brake, BiSS, Multi-Turn Abs
IC830M74Q-KKHAB00	PACMotion Servo Motor, NEMA, 9x25mm Shaft, 3mm Open Key, Dual Conn., BiSS, Multi-Turn Abs

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