

# XV Motor 230 V

## Economical Metric AC Servo Motor

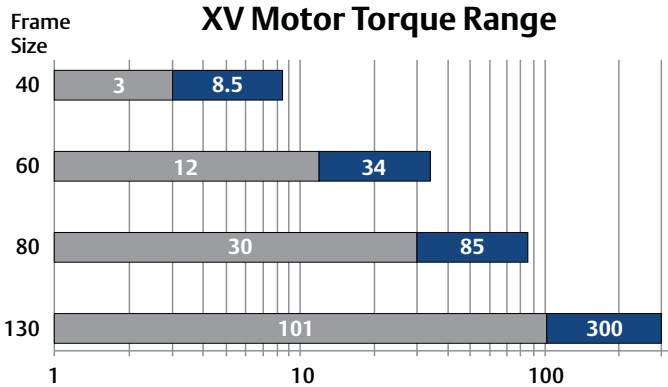
The XV Motor is a high performance, low-inertia and high-torque brushless AC servo motor in a compact economical package – ideal for high-volume applications. UL recognized, CE approved and RoHS compliant, XV Motors offer low-cost solutions with the features of a premium-priced servo offering.

Intended for higher throughputs and smaller machines, XV Motors are available in 4 frame sizes: 40, 60, 80 and 130 mm with speeds ranging from 2000 to 5000 rpm. Applications with continuous torque requirements up to 101 lb-in (11.4 Nm) are the perfect match for XV Motors.

XV Motors with 40, 60 and 80 mm are fitted with AMP (Tyco® Mate-n-Lock™) connectors on 1-ft flying leads. (For added strain relief, these connectors can be snapped into place through holes in panels or brackets.)

### Key Features

- Torque range: 0.95 to 101 lb-in (0.1 to 11.4 Nm)
- Speed rating to 5000 rpm
- Four frame sizes: 40, 60, 80 and 130 mm
- UL recognized, CE approved and RoHS
- Ambient operating temperature: 32 to 122 °F (0 to 40 °C)



## Order Code

XVM	60	4	T	B	N	S	0000
Motor	Frame Size (mm)	Torque	Connections	Brake	Feedback Device	Inertia	Specials
	Frame Order Code						
XVM	see table below for frame order code		C = MS connector	O = Unbraked	N = Incremental encoder 2048 ppr	S = Std.	Low voltage windings
230 V			T = AMP connector on flying leads (40-80 frame)	B = 24 V Holding Brake			

Frame Order Code	Stall Torque		Order Information	
	(in)	(mm)	Motor Only	Brake Motor
401	0.9	0.1	XVM-401-TONS-0000	XVM-401-TBNS-0000
402	1.4	0.16	XVM-402-TONS-0000	XVM-402-TBNS-0000
403	2.8	0.32	XVM-403-TONS-0000	XVM-403-TBNS-0000
604	2.8	0.32	XVM-604-TONS-0000	XVM-604-TBNS-0000
606	5.7	0.64	XVM-606-TONS-0000	XVM-606-TBNS-0000
6011	11.24	1.27	XVM-6011-TONS-0000	XVM-6011-TBNS-0000
8017	16.9	1.91	XVM-8017-TONS-0000	XVM-8017-TBNS-0000
8022	22.6	2.55	XVM-8022-TONS-0000	XVM-8022-TBNS-0000
8023	23.3	2.63	XVM-8023-TONS-0000	XVM-8023-TBNS-0000
8028	28.1	3.18	XVM-8028-TONS-0000	XVM-8028-TBNS-0000
13046	46.5	5.25	XVM-13046-CONS-0000	XVM-13046-CBNS-0000
13051	50.7	5.73	XVM-13051-CONS-0000	XVM-13051-CBNS-0000
13068	67.6	7.64	XVM-13068-CONS-0000	XVM-13068-CBNS-0000
13089	88.8	10.03	XVM-13089-CONS-0000	XVM-13089-CBNS-0000
130101	101.4	11.46	XVM-130101-CONS-0000	XVM-130101-CBNS-0000

Approvals



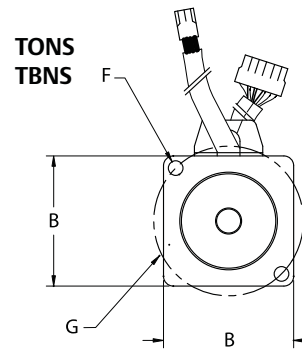
RoHS  
Compliant



# XV Motor 40 mm Frame Ratings and Dimensions

Motor Frame Size (mm)		40		
Voltage (Vrms)		230		
Model		XVM-401	XVM-402	XVM-403
Continuous Stall Torque (lb-in)		0.95	1.4	2.8
Continuous Stall Torque (Nm)		0.11	0.16	0.32
Peak Stall Torque (lb-in)		2.4	4.5	7.7
Peak Stall Torque (Nm)		0.27	0.51	0.87
Inertia (lb-in-sec <sup>2</sup> )		0.00001	0.00002	0.00004
Inertia (kgm <sup>2</sup> )		0.000001	0.000002	0.000005
Cogging (lb-in) (typ.)		0.02	0.03	0.06
Cogging (Nm) (typ.)		0.002	0.003	0.007
Weight Unbraked (lbs)		0.7	0.88	1.1
Weight Unbraked (Kg)		0.32	0.40	0.50
Number of Poles		8	8	8
<b>Rated Speed 3000 rpm</b>	Kt (lb-in/A) =	0.89	1.24	2.8
<b>Max. Speed 5000 rpm</b>	Kt (Nm/A) =	0.101	0.140	0.32
	Ke (V/k rpm) =	7.8	10.6	12.7
	Rated Torque (lb-in)	0.95	1.4	3.09
	Rated Torque (Nm)	0.11	0.16	0.35
	Stall Current (A)	1.07	1.20	1.38
	Rated Power (kW)	0.034	0.050	0.110
	R (ph-ph) (Ohms)	11.69	9.4	6.89
	L (ph-ph) (mH)	8.54	8.27	6.73

NOTE:  
The 40 mm-frame XV Motor has a 1-ft cable terminated with a Tyco Mate-n-Lock connector

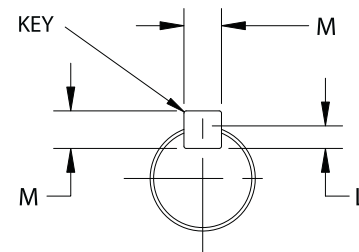
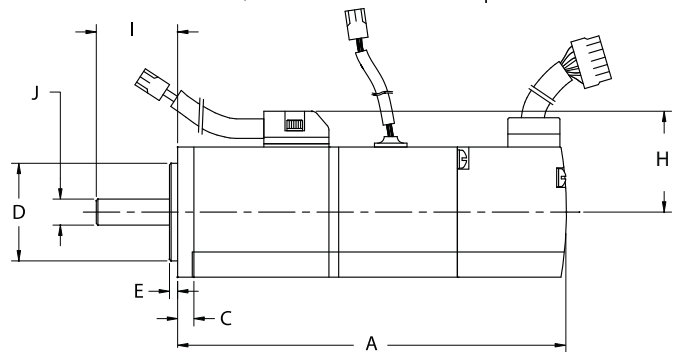


Flying lead length 1ft on 40mm, 60mm and 80mm

PLUG: AMP 172167-1  
mating connector - Amp  
housing - 172159-1  
pins - 170362-1

PLUG: AMP 172165-1  
mating connector - Amp  
housing - 172157-1  
pins - 170362-1

PLUG: AMP 172171-1  
mating connector - Amp  
housing - 172163-1  
pins - 170361-1



40 mm motor has no keyway

Dimensions		XVM-401		XVM-402		XVM-403	
		(in)	(mm)	(in)	(mm)	(in)	(mm)
Unbraked Length — TONS/LONS (max)	A	2.98	76.0	3.27	83.0	3.92	99.5
Braked Length — TBNS/LBNS (max)		4.41	112.0	4.72	120.0	5.35	136.0
Flange Square	B	1.57	40.0	1.57	40.0	1.57	40.0
Flange Thickness	C	0.20	5.0	0.20	5.0	0.20	5.0
Pilot Diameter	D	1.18	30.0	1.18	30.0	1.18	30.0
Pilot Thickness	E	0.10	2.5	0.10	2.5	0.10	2.5
Bolt Hole Diameter	F	0.18	4.5	0.18	4.5	0.18	4.5
Bolt Circle Diameter	G	1.81	46.0	1.81	46.0	1.81	46.0
Connector Height (max)	H	1.22	31.0	1.22	31.0	1.22	31.0
Connector Height (max)		1.22	31.0	1.22	31.0	1.22	31.0
Shaft Length	I	0.98	25.0	0.98	25.0	0.98	25.0
Shaft Diameter	J	0.31	8.0	0.31	8.0	0.31	8.0

NOTE:  
All 40-mm frame XV Motors have smooth shafts

# XV Motor 60/80 mm Frame Ratings and Dimensions

Motor Frame Size (mm)		60			80			
Voltage (Vrms)		230						
Model		XVM-604	XVM-606	XVM-6011	XVM-8017	XVM-8022	XVM-8023	XVM-8028
Continuous Stall Torque (lb-in)		2.81	5.7	11.2	16.9	22.6	23.3	28.1
Continuous Stall Torque (Nm)		0.32	0.64	1.27	1.91	2.55	2.72	3.18
Peak Stall Torque (lb-in)		8.45	16.1	32.3	48.6	62.7	67.1	81.1
Peak Stall Torque (Nm)		0.95	1.82	3.65	5.49	7.08	7.58	9.16
Inertia (lb-in-sec <sup>2</sup> )		0.00010	0.00016	0.00028	0.00096	0.001335	0.001335	0.001705
Inertia (kgm <sup>2</sup> )		0.000011	0.000018	0.000032	0.00011	0.00015	0.00015	0.00019
Cogging (lb-in) (typ.)		0.06	0.11	0.24	0.18	0.23	0.24	0.28
Cogging (Nm) (typ.)		0.006	0.013	0.027	0.020	0.026	0.027	0.032
Weight Unbraked (lbs)		1.85	2.4	3.5	5.4	6.94	6.9	8.37
Weight Unbraked (Kg)		0.84	1.09	1.59	2.45	3.15	3.14	3.80
Number of Poles		8	8	8	8	8	8	8
Rated Speed 2000 rpm	Kt (lb-in/A) =						6.32	
Max. Speed 3000 rpm	Kt (Nm/A) =						0.714	
	Ke (V/k rpm) =						44.6	
	Rated Torque (lb-in)						24.1	
	Rated Torque (Nm)						2.72	
	Stall Current (A)						3.82	
	Rated Power (kW)						0.8556	
	R (ph-ph) (Ohms)						1.29	
	L (ph-ph) (mH)						9.1	
Rated Speed 3000 rpm	Kt (lb-in/A) =	1.82	3.76	4.15	5.0	5.04		5.5
Max. Speed 5000 rpm	Kt (Nm/A) =	0.206	0.425	0.469	0.565	0.569		0.621
	Ke (V/k rpm) =	12.43	29.3	29.5	35.2	35.6		39.2
	Rated Torque (lb-in)	2.81	6.13	12	17.9	22.6		28.1
	Rated Torque (Nm)	0.32	0.69	1.27	2.02	2.55		3.18
	Stall Current (A)	1.54	1.52	2.89	3.58	4.83		5.37
	Rated Power (kW)	0.100	0.218	0.426	0.635	0.802		0.998
	R (ph-ph) (Ohms)	2.49	4.15	1.64	1.43	0.87		0.75
	L (ph-ph) (mH)	7.37	15.21	7.32	9.2	5.9		5.04

NOTE:

The 60 mm and 80 mm-frame XV Motors have a 1-ft cable terminated with a Tyco Mate-n-Lock connector

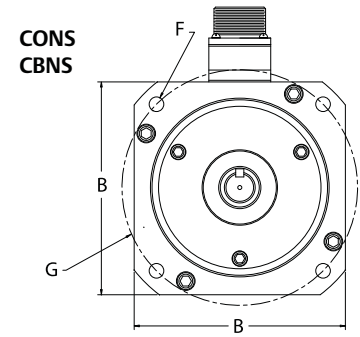
Dimensions		XVM-604		XVM-606		XVM-6011		XVM-8017		XVM-8022 XVM-8023		XVM-8028	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
Unbraked Length — TONS/LONS (max)	<b>A</b>	3.64	92.5	4.17	106.0	5.28	134.0	5.43	138.0	6.22	158.0	7.01	178.0
Braked Length — TBNS/LBNS (max)		5.14	130.0	5.75	146.0	6.85	174.0	7.01	178.0	7.80	198.0	8.58	218.0
Flange Square	<b>B</b>	2.44	62.0	2.44	62.0	2.44	62.0	3.15	80.0	3.15	80.0	3.15	80.0
Flange Thickness	<b>C</b>	0.24	6.0	0.24	6.0	0.24	6.0	0.43	11.0	0.43	11.0	0.43	11.0
Pilot Diameter	<b>D</b>	1.97	50.0	1.97	50.0	1.97	50.0	2.76	70.0	2.76	70.0	2.76	70.0
Pilot Thickness	<b>E</b>	0.12	3.0	0.12	3.0	0.12	3.0	0.12	3.0	0.12	3.0	0.12	3.00
Bolt Hole Diameter	<b>F</b>	0.24	6.0	0.24	6.0	0.24	6.0	0.26	6.60	0.26	6.6	0.26	6.60
Bolt Circle Diameter	<b>G</b>	2.76	70.0	2.76	70.0	2.76	70.0	3.54	90.0	3.54	90.0	3.54	90.0
Connector Height (max)	<b>H</b>	1.73	44.0	1.73	44.0	1.73	44.0	2.09	53.0	2.09	53.0	2.09	53.0
Connector Height (max)		1.73	44.0	1.73	44.0	1.73	44.0	2.09	53.0	2.09	53.0	2.09	53.0
Shaft Length	<b>I</b>	1.18	30.0	1.18	30.0	1.18	30.0	1.57	40.0	1.57	40.0	1.57	40.0
Shaft Diameter	<b>J</b>	0.55	14.0	0.55	14.0	0.55	14.0	0.63	16.0	0.63	16.0	0.63	16.0
Shaft Key Dimensions													
Keyway Length (min)	<b>K</b>	0.89	22.5	0.89	22.5	0.89	22.5	1.18	30.0	1.18	30.0	1.18	30.0
Keyway Depth	<b>L</b>	0.12	3.0	0.12	3.0	0.12	3.0	0.12	3.0	0.12	3.0	0.12	3.0
Keyway Width	<b>M</b>	0.197	5.0	0.197	5.0	0.197	5.0	0.197	5.0	0.197	5.0	0.197	5.0

NOTE:

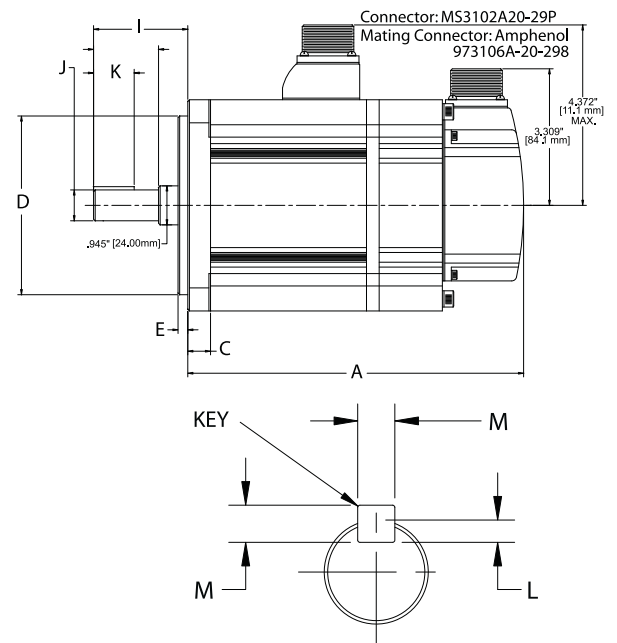
See motor dimensional drawing on previous page.

# XV Motor 130 mm Frame Ratings and Dimensions

Motor Frame Size (mm)		130				
Voltage (Vrms)		230				
Model		XVM-13046	XVM-13051	XVM-13068	XVM-13089	XVM-130101
Continuous Stall Torque (lb-in)		46.5	50.7	67.6	88.8	101.4
Continuous Stall Torque (Nm)		5.25	5.73	7.64	10.03	11.46
Peak Stall Torque (lb-in)		137	147.8	199.2	260.4	296.4
Peak Stall Torque (Nm)		15.48	16.70	22.51	29.42	33.49
Inertia (lb-in-sec <sup>2</sup> )		0.01061	0.01061	0.01535	0.01535	0.02001
Inertia (kgm <sup>2</sup> )		0.00120	0.00120	0.00173	0.00173	0.00226
Cogging (lb-in) (typ.)		0.47	0.51	0.68	0.89	1.01
Cogging (Nm) (typ.)		0.053	0.057	0.076	0.100	0.115
Weight Unbraked (lbs)		15.86	15.8	19.1	21.3	22.47
Weight Unbraked (Kg)		7.21	7.18	8.68	9.68	10.21
Number of Poles		8	8	8	8	8
<b>Rated Speed 1000 rpm</b>	Kt (lb-in/A) =		12.57		13.45	13.6
<b>Max. Speed 2000 rpm</b>	Kt (Nm/A) =		1.420		1.520	1.537
	Ke (V/k rpm) =		85.8		94.6	89.96
	Rated Torque (lb-in)		50.7		88.76	101.4
	Rated Torque (Nm)		5.73		10.03	11.46
	Stall Current (A)		4.15		6.75	7.63
	Rated Power (kW)		0.600		1.050	1.200
	R (ph-ph) (Ohms)		1.9		1.41	0.87
	L (ph-ph) (mH)		20.1		15.99	10.67
<b>Rated Speed 2000 rpm</b>	Kt (lb-in/A) =	7.5		7.4		
<b>Max. Speed 3000 rpm</b>	Kt (Nm/A) =	0.847		0.836		
	Ke (V/k rpm) =	53.1		54.21		
	Rated Torque (lb-in)	46.5		67.6		
	Rated Torque (Nm)	5.25		7.64		
	Stall Current (A)	6.28		9.23		
	Rated Power (kW)	1.101		1.600		
	R (ph-ph) (Ohms)	0.77		0.47		
	L (ph-ph) (mH)	7.76		5.3		



Connector standard: MS3102A20-4P  
Mating Connector: Amphenol MS3106A-20-4S  
Connector brake: MS3102A20-15P  
Mating Connector: Amphenol MS3106A-20-15S



Dimensions		XVM-13046		XVM-13051		XVM-13068		XVM-13089		XVM-130101	
		(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
Unbraked Length (max)	A	6.61	168.0	6.61	168.0	7.56	192.0	7.56	192.0	8.50	216.0
Braked Length (max)		8.11	206.0	8.11	206.0	9.06	230.0	9.06	230.0	10.0	254.0
Flange Square	B	5.12	130.0	5.12	130.0	5.12	130.0	5.12	130.0	5.12	130.0
Flange Thickness	C	0.55	14.0	0.55	14.0	0.55	14.0	0.55	14.0	0.55	14.0
Pilot Diameter	D	4.33	110.0	4.33	110.0	4.33	110.0	4.33	110.0	4.33	110.0
Pilot Thickness	E	0.24	6.0	0.24	6.0	0.24	6.0	0.24	6.0	0.24	6.0
Bolt Hole Diameter	F	0.35	9.0	0.35	9.0	0.35	9.0	0.35	9.0	0.35	9.0
Bolt Circle Diameter	G	5.71	145.0	5.71	145.0	5.71	145.0	5.71	145.0	5.71	145.0
Connector Ht — Unbraked (max)	H	4.41	112.0	4.41	112.0	4.41	112.0	4.41	112.0	4.41	112.0
Connector Ht — Braked (max)		4.41	112.0	4.41	112.0	4.41	112.0	4.41	112.0	4.41	112.0
Shaft Length	I	2.28	58.0	2.28	58.0	2.28	58.0	2.28	58.0	2.28	58.0
Shaft Diameter	J	0.75	19.0	0.75	19.0	0.87	22.0	0.87	22.0	0.87	22.0
Shaft Key Dimensions											
Keyway Length (min)	K	0.98	25.0	0.98	25.0	0.98	25.0	0.98	25.0	0.98	25.0
Keyway Depth	L	0.118	3.0	0.118	3.0	0.138	3.50	0.138	3.50	0.138	3.5
Keyway Width	M	0.197	5.0	0.197	5.0	0.236	6.0	0.236	6.0	0.236	6.0

# XV Motor Selection Considerations

## XV Motor Feedback – All Frame Sizes

XV Motors include a 5 Vdc incremental encoder with 2048 pulses per revolution.

## Motor Selection

### Motor Derating

Any adverse operating conditions require that the motor performance be derated. These conditions include ambient temperature above 104 °F (40 °C), motor mounting position, drive switching frequency or a drive oversized for the motor.

### Ambient Temperatures

For ambient temperatures above 104 °F (40 °C), the torque must be derated.

### Mounting Arrangements

In general, motor torque should be derated if the motor mounting surface is heated from an external source such as a gearbox, the motor is connected to a poor thermal conductor, or the motor is mounted in a confined space with restricted air flow.

### Drive Switching Frequency

Most drive current ratings are reduced at higher switching frequencies. See individual drive manuals for details.

### Thermal Test Conditions

The performance data shown was recorded with an ambient temperature of 68 °F (20 °C) and the motor mounted on a thermally-isolated aluminum plate.

### Thermal Protection

The XV Motors do not have and are not offered with a winding thermal temperature sensor. Motor feedback cables have the Motor Temperature Sensor lines defeated (shorted between pin 14 (GND) and pin 15 (5 V)). These cables include cable model numbers XUFTS-xxx and XUFCS-xxx (where -xxx is cable length in feet).

All Control Techniques' brand servo drives have a current-limiting algorithm in the firmware specifically to limit current levels. When properly matched and limited to the motor specifications, the drive firmware will fault the drive when the rated rms current of the motor is exceeded.

### Environmental Conditions

Any liquids or gases that may come into contact with the motor must be confirmed to ensure compliance with the correct international standards.

### Ingress Protection

Standard models have an ingress rating (IP rating) as listed in the table below.

Frame Size	IP rating	Exclusions
40 mm	IP55*	Shaft through area of face plate and connectors
60 mm	IP55*	Shaft through area of face plate and connectors
80 mm	IP65*	Shaft through area of face plate and connectors
130 mm	IP65*	Shaft through area of face plate

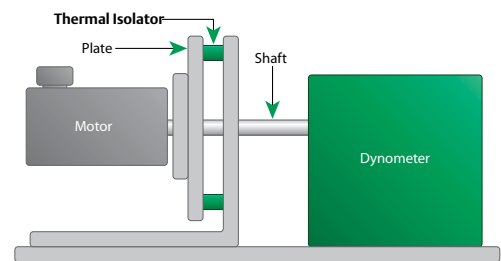
NOTE:

\* Shaft seal option is not available

### Brake Operation



Do not apply the brake while the motor shaft is rotating. The brake can only take a limited number of emergency braking operations and must not be used for repeated dynamic braking.



Motor Frame (mm)	Aluminum Heatsink Plate	
	(in)	(mm)
40	5.91 x 5.91 x 0.24	150 x 150 x 6
60	5.91 x 5.91 x 0.24	150 x 150 x 6
80	9.84 x 9.84 x 0.39	250 x 250 x 10
130	9.84 x 9.84 x 0.39	250 x 250 x 10

## XV Motor Holding Brake Specifications

Motor Frame Size (mm)	Power Supply (Vdc)	Current (A)	Static Torque		Mechanical Engagement Time (ms)	Added Inertia		Added Weight (kg)
			(lb-in)	(Nm)		(lb-in-sec <sup>2</sup> )	(kg•m <sup>2</sup> x 10 <sup>-3</sup> )	
40	24	0.25	2.8	0.318	20	0.0000023	0.003	0.2
60	24	0.27	13.0	1.47	50	0.000045	0.048	0.6
80	24	0.38	28.6	3.23	60	0.00011	0.125	0.7
130	24	0.29	70.8	8	40	0.000478	0.54	0.83

NOTES:

Figures shown in individual motor sections are at 68 °F (20 °C) ambient

Apply a derate factor of 0.7 to standard brake torque figures if motor temperature is above 212 °F (100 °C)

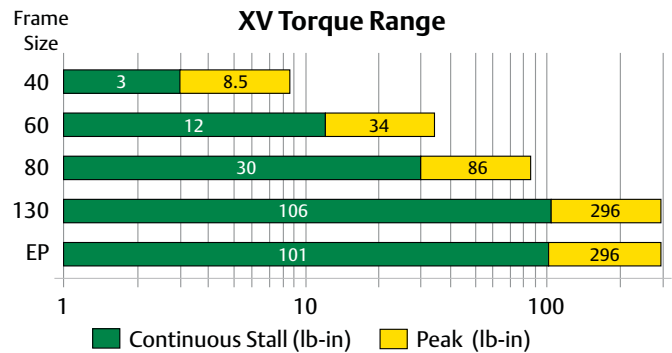
# XV Motor Selection Considerations

## XV Series Servo Motor 230 V

The XV series servo motors provide a low-cost, high-quality servo motor solution for light industrial applications. The XV offers the smallest frame sizes of any servo motors from Control Techniques starting at 40 mm. This compact motor is a great solution for many servo applications and is also a good option for stepper motor replacements. XV servo motors are available in 230 Vac input voltage rating with a 2048 ppr incremental encoder.

- Available in four frame sizes: 40, 60, 80 and 130 mm
- Speed range from 2000 to 5000 rpm

- Cost-effective replacement for stepper motor
- CE, UL and RoHS compliant



## Sample Motor and Drive Combinations

Epsilon EP and Unimotor XV – 230 V, 1Ø														
Drive Model	Motor Model	Cont. Stall Torque		Peak Torque		Rated Torque		Rated Power		Rated Operating Speed	Inertia		Kt	
		lb-in	Nm	lb-in	Nm	lb-in	Nm	HP	kW		lb-in sec <sup>2</sup>	kgm <sup>2</sup>	lb-in/Arms	Nm/Arms
EP202	XV-402	1.41	0.16	4.00	0.45	1.41	0.16	0.07	0.05	3000	0.00002	0.000002	1.24	0.14
EP202	XV-403	2.81	0.32	7.70	0.87	2.80	0.32	0.13	0.10	3000	0.00004	0.000004	2.21	0.25
EP202	XV-606	5.70	0.64	16.10	1.82	5.70	0.64	0.27	0.20	3000	0.00016	0.000018	3.72	0.42
EP204	XV-6011	11.20	1.27	32.30	3.65	11.20	1.27	0.54	0.40	3000	0.00028	0.000032	4.07	0.46
EP204	XV-8017	16.90	1.91	39.70	4.48	16.90	1.91	0.80	0.60	3000	0.00096	0.000109	4.96	0.56
EP204	XV-8023	23.30	2.63	51.00	5.76	23.30	2.63	0.74	0.55	2000	0.00133	0.000151	6.37	0.72
EP206	XV-8028	28.10	3.17	71.50	8.08	28.10	3.17	1.34	1.00	3000	0.00170	0.000192	5.50	0.62
EP206	XV-13046	46.50	5.25	97.50	11.00	46.50	5.25	1.48	1.10	2000	0.01100	0.001245	7.50	0.85
EP206	XV-13051	50.70	5.73	148.00	16.70	50.70	5.73	0.80	0.60	1000	0.01100	0.001245	12.60	1.42
EP216*	XV-13068	67.60	7.64	199.00	22.50	67.60	7.64	2.15	1.60	2000	0.01530	0.001732	74.0	0.84
EP209	XV-13089	88.80	10.00	242.00	27.40	88.80	10.00	1.41	1.05	1000	0.01530	0.001732	13.50	1.52
EP209	XV-130101	101.00	11.50	245.00	27.70	101.00	11.50	1.61	1.20	1000	0.02001	0.002265	13.60	1.54

NOTES: Drive switching frequency 10 kHz unless noted  
 \*3 phase ratings listed

