

rotork[®]

Process Controls

Electric motor performance data for CVA type actuators



Introduction

This guide provides CVA actuator range motor data, at the following power supply voltages:

AC Voltages at 50 & 60 Hz
100 to 240 V \pm 10%

DC Voltages
24 V \pm 10%

For AC supplies, the CVA uses a switch mode power supply to convert to 24 VDC. This voltage is used to feed the main control electronics and DC motor.

For DC supplies the CVA uses an internal DC/DC converter to guarantee supply quality.

Design criteria

The CVA utilises a special brushless DC motor, developed for use in applications where high modulation is required. Using a brushless DC motor enables the actuator to perform the high modulation duty for millions of operations with minimal wear.

CVA motor design

CVA motors are of a low inertia, brushless 24 VDC permanent magnet type and are class F insulated. All CVA models are suitable for S9 un-restricted modulation at full rated load.

CVA motor control protection

The primary protection for the motor is the load sensor. The load sensor is based upon a Wheatstone bridge and measures the actual force applied to the valve. Using this method and comparing the value to the load limits set in the configuration, effective motor and more importantly valve protection is achieved. Thermostats embedded in the motor windings (EP only) also protect the motor from overheating, although the likelihood of this happening is remote due to the high modulation design.

The use of load and temperature protection along with the sophisticated motor position control eliminates the need for traditional protection methods normally used for industrial motors.

Power supply cable sizing

As a minimum requirement, cables must be sized to ensure the volt drop does not exceed 10% of nominal supply voltage at rated load.

Fuse selection

Due to the unique nature of the motor duty and taking into account the comprehensive control protection of the CVA, sizing of fuses should be based upon protecting the power cable to the actuator.

Frequency converter and UPS

Where UPS systems are required, the power supply should have negligible harmonic distortion. In general terms actuators are designed to operate on power supplies conforming to recognised power supply standard such as EN 50160 – Voltage Characteristics of Electricity Supplied by Public Distribution Systems. Frequency converters are not normally required due to the switch mode power supply.

Power Consumption with Options

Option	Additional Current @ 24 VDC	Additional Power
Super Capacitor (CVL-5000) once charged	200 mA	4.8 W
Super Capacitor (other sizes) once charged	20 mA	0.48 W
Solenoid Lock/Manual Override	60 mA	1.44 W
Hart	10 mA	0.24 W
Pakscan	30 mA	0.72 W
Profibus	30 mA	0.72 W
Foundation Fieldbus	10 mA	0.24 W

* Super capacitors, option cards and other options consume additional power and must be included in the total consumptions calculations.

Power Consumption without Options and Accessories

240 V	CVL-500			CVL-1000			CVL-1500			CVL-5000			CVQ-1200			CVQ-2400		
	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)
Stationary	0.33	5.30	0.07	0.32	5.10	0.07	0.31	4.90	0.07	0.26	9.54	0.15	0.32	5.10	0.07	0.31	4.90	0.07
Full Speed - No Load	0.44	14.70	0.14	0.46	14.10	0.13	0.47	15.00	0.13	0.41	37.63	0.24	0.51	15.60	0.13	0.45	13.00	0.12
Full Speed - 50% Load	0.55	29.30	0.22	0.52	23.00	0.18	0.54	28.20	0.22	0.63	74.31	0.37	0.54	25.80	0.20	0.53	26.00	0.20
Full Speed - Full Load	0.56	32.10	0.24	0.58	30.00	0.22	0.55	36.00	0.27	0.73	116.80	0.55	0.56	31.80	0.24	0.56	40.00	0.30
Charging Super Capacitor (Peak Power)	0.63	55.00	0.36	0.56	44.00	0.33	0.59	43.00	0.30	0.90	127.82	0.59	0.56	44.00	0.33	0.59	43.00	0.30
Continuous 0.5 HZ, 2% Cycling Test - Full Load	0.45	17.55	0.16	0.49	18.00	0.15	0.59	38.00	0.27	0.57	43.79	0.28	0.54	26.00	0.20	0.55	36.00	0.27

220/230 V	CVL-500			CVL-1000			CVL-1500			CVL-5000			CVQ-1200			CVQ-2400		
	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)
Stationary	0.33	5.30	0.07	0.33	4.80	0.06	0.32	4.70	0.06	0.26	8.94	0.15	0.33	4.80	0.06	0.32	4.70	0.06
Full Speed - No Load	0.44	14.70	0.14	0.49	13.60	0.12	0.47	14.70	0.13	0.44	37.61	0.24	0.49	15.80	0.13	0.45	13.00	0.12
Full Speed - 50% Load	0.55	29.30	0.22	0.54	22.40	0.17	0.53	26.80	0.21	0.64	74.72	0.39	0.55	24.30	0.18	0.52	27.00	0.22
Full Speed - Full Load	0.56	32.10	0.24	0.56	31.10	0.23	0.58	36.00	0.26	0.72	112.20	0.54	0.59	31.20	0.22	0.55	38.50	0.29
Charging Super Capacitor (Peak Power)	0.63	55.00	0.36	0.55	44.00	0.33	0.55	42.00	0.32	0.90	128.00	0.62	0.55	44.00	0.33	0.55	42.00	0.32
Continuous 0.5 HZ, 2% Cycling Test - Full Load	0.45	17.50	0.16	0.57	29.30	0.21	0.59	37.00	0.26	0.63	46.06	0.29	0.57	27.20	0.20	0.49	35.00	0.30

110 V	CVL-500			CVL-1000			CVL-1500			CVL-5000			CVQ-1200			CVQ-2400		
	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)	Power Factor (VAC)	Power (W)	Current (A)
Stationary	0.56	4.70	0.03	0.59	4.01	0.03	0.31	4.10	0.06	0.40	7.04	0.16	0.59	4.01	0.03	0.31	4.10	0.06
Full Speed - No Load	0.63	12.80	0.08	0.60	11.00	0.08	0.60	12.38	0.09	0.60	35.33	0.34	0.63	13.50	0.09	0.45	13.00	0.12
Full Speed - 50% Load	0.66	26.20	0.17	0.62	20.00	0.13	0.62	25.00	0.17	0.68	73.84	0.72	0.64	21.00	0.14	0.52	27.00	0.22
Full Speed - Full Load	0.66	32.10	0.20	0.62	27.00	0.18	0.60	33.00	0.23	0.69	112.80	1.03	0.64	29.90	0.20	0.55	38.50	0.29
Charging Super Capacitor (Peak Power)	0.69	58.20	0.35	0.60	43.00	0.30	0.55	42.00	0.32	0.99	126.74	1.16	0.60	43.00	0.30	0.55	42.00	0.32
Continuous 0.5 HZ, 2% Cycling Test - Full Load	0.53	17.10	0.13	0.60	33.00	0.23	0.60	36.00	0.25	0.74	41.57	0.44	0.63	25.10	0.17	0.49	35.00	0.30

24 VDC	CVL-500			CVL-1000			CVL-1500			CVL-5000			CVQ-1200			CVQ-2400		
		Power (W)	Current (A)		Power (W)	Current (A)		Power (W)	Current (A)		Power (W)	Current (A)		Power (W)	Current (A)		Power (W)	Current (A)
Stationary		5.04	0.21		5.04	0.21		5.04	0.21		4.80	0.20		4.32	0.18		4.32	0.18
Full Speed - No Load		16.20	0.68		16.20	0.68		16.20	0.68		46.80	1.95		13.20	0.55		13.20	0.55
Full Speed - 50% Load		29.28	1.22		29.28	1.22		29.28	1.22		96.00	4.00		27.84	1.16		27.84	1.16
Full Speed - Full Load		38.16	1.59		38.16	1.59		38.16	1.59		137.04	5.71		39.84	1.66		39.84	1.66
Charging Super Capacitor (Peak Power)		48.00	2.00		48.00	2.00		48.00	2.00		141.00	5.94		48.00	2.00		48.00	2.00
Continuous 0.5 HZ, 2% Cycling Test - Full Load		32.40	1.35		32.40	1.35		32.40	1.35		51.18	2.20		15.60	0.65		15.60	0.65

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