

**Type 4110/4120 Travel Controllers**

**Type 4110/4120 Travel Controllers** provide reversing-plugging control of series or compound wound DC motors. The simple easy-to-understand system has smooth timed responsive acceleration and rectified type plugging. The motor is started with all the resistors in the circuit. Contactors short out the external resistance in timed steps under control of a master switch to provide smooth and rapid acceleration. During reversing a plugging contactor relay with rectifier prevents all the accelerating contactors from closing until the motor is practically at rest. This keeps all the resistance in the circuit during reversal to provide safe, controlled stopping.

The Type 4110 is a NEMA Class 1 controller with 5 or 6 speed points, negative line M contactor and 5370-48713-102 electronic overload protection.

The Type 4120 is a NEMA Class 2 controller with 4 speed points and 5370-48713-101 electronic overload protection.

**230 VDC Single Motor Controller with Protection** *Discount Schedule E41 (ER)*

Max HP	Crane Rating NEMA Size	Amps	No. of Speed Points	Open Panel	NEMA Type 1 Enclosed (Indoor)	NEMA Type 1A Enclosed (w/ Gasket)	NEMA Type 3R Enclosed (Outdoor)	Deduct for Panel w/o Protection
<b>Type 4110 Class 1 Controller</b>								
15	2	67	5	\$11,640	\$15,240	\$16,080	\$16,920	\$2,720
35	3	133	5	\$13,040	\$17,040	\$17,880	\$18,720	\$2,800
55	4	200	5	\$15,420	\$19,420	\$20,260	\$21,100	\$3,040
110	5	400	5	\$21,020	\$25,620	\$26,640	\$27,300	\$3,520
135	5A	530	6	\$27,720	\$33,240	\$34,080	\$34,920	\$3,940
225	6	800	6	\$38,000	\$45,000	\$45,980	\$46,900	\$4,600
330	7	1200	6	\$47,140	\$53,860	\$54,700	\$55,540	\$5,840
550	8	1800	6	\$78,820	\$87,500	\$88,340	\$89,180	\$8,240
<b>Type 4120 Class 2 Controller</b>								
7.5	1	30	4	\$8,400	\$11,100	\$11,940	\$12,780	\$1,840
15	2	67	4	\$9,660	\$12,360	\$13,200	\$14,040	\$2,000
35	3	133	4	\$11,700	\$14,700	\$15,540	\$16,380	\$2,380
55	4	200	4	\$14,200	\$17,200	\$18,040	\$18,880	\$2,660

For Duplex motor controllers, double single motor controller list price.

See page 3 & 7 for Resistors

See page 4 & 5 for Panel Modifications

See page 6 for Special Construction

See page 7 for Master Switches



**Type 4111/4121 Mill Duty Dynamic Lowering Hoist Controllers**

**Type 4111 and 4121 Mill Duty Dynamic Lowering Hoist Controllers** for crane service are built with four, five or six speed points using mill duty components throughout. Dynamic lowering control panels are suitable for use with DC series motors on crane hoist drives without a mechanical load brake and for use with a power limit switch.

Standard features include:

Complete operator control, hoisting and lowering.

High speed no-load hoisting and lowering.

Off point dynamic braking.

Positive series brake operation with all loads.

Smooth definite-time acceleration.

The Type 4111 is a NEMA Class 1 controller with 5 or 6 speed points, negative line M contactor and 5370-48713-102 electronic overload protection.

The Type 4121 is a NEMA Class 2 controller with 4 speed points and 5370-48713-101 electronic overload protection

**230 VDC Single Motor Controller with Protection** *Discount Schedule E41 (ER)*

Max HP	Crane Rating NEMA Size	Amps	No. of Speed Points	Open Panel	NEMA Type 1 Enclosed (Indoor)	NEMA Type 1A Enclosed (w/ Gasket)	NEMA Type 3R Enclosed (Outdoor)	Deduct for Panel w/o Protection
<b>Type 4111 Class 1 Controller</b>								
15	2	67	5	\$12,940	\$16,540	\$17,380	\$18,220	\$2,100
35	3	133	5	\$14,040	\$18,040	\$18,880	\$19,720	\$2,180
55	4	200	5	\$16,900	\$20,900	\$21,740	\$22,580	\$2,420
110	5	400	5	\$23,000	\$27,600	\$28,440	\$29,280	\$2,900
135	5A	530	6	\$30,110	\$36,620	\$36,460	\$37,300	\$3,320
225	6	800	6	\$38,320	\$45,360	\$46,280	\$47,200	\$3,980
330	7	1200	6	\$47,540	\$54,260	\$55,100	\$55,940	\$5,220
550	8	1800	6	\$85,440	\$94,120	\$94,960	\$95,800	\$7,420
<b>Type 4121 Class 2 Controller</b>								
7.5	1	30	4	\$9,250	\$11,950	\$12,790	\$13,630	\$1,220
15	2	67	4	\$10,960	\$13,660	\$14,500	\$15,340	\$1,380
35	3	133	4	\$11,760	\$14,760	\$15,600	\$16,440	\$1,760
55	4	200	4	\$14,460	\$17,460	\$18,300	\$19,140	\$2,040

For Duplex motor controllers, double single motor controller list price.

See page 3 & 7 for Resistors

See page 4 & 5 for Panel Modifications

See page 6 for Special Construction

See page 7 for Master Switches



## Resistors

**Travel Resistors**

**Hoist Resistors**

*Discount Schedule E42 (ES)*

Max HP Single Motor	NEMA Class without Armature Shunt			NEMA Class with 1st Point Armature Shunt			152DL	162DL	172DL	List Price Adders			
	152P	162P	172P	152PAS	162PAS	172PAS				Service DB	Emerg. DB	Cont. Slow- down	Teaser Field
5	\$1,120	\$1,330	\$1,960	\$2,205	\$2,415	\$3,500	\$3,255	\$3,255	\$4,550	\$1,680	\$1,610	\$2,030	\$1,470
7.5	\$1,120	\$1,330	\$1,960	\$2,205	\$2,415	\$3,500	\$3,255	\$3,255	\$4,550	\$1,680	\$1,610	\$2,310	\$1,470
10	\$1,120	\$1,330	\$1,960	\$2,205	\$2,415	\$3,500	\$3,255	\$3,255	\$4,550	\$1,680	\$1,610	\$2,590	\$1,470
15	\$1,360	\$1,750	\$2,520	\$2,485	\$2,835	\$4,130	\$3,255	\$4,025	\$5,635	\$1,890	\$1,610	\$3,150	\$1,470
20	\$1,750	\$2,205	\$3,220	\$2,835	\$3,170	\$5,355	\$4,690	\$5,880	\$8,225	\$2,030	\$1,610	\$4,480	\$1,470
25	\$2,065	\$2,625	\$3,815	\$3,150	\$3,710	\$5,355	\$4,690	\$5,880	\$8,225	\$2,240	\$2,660	\$5,250	\$1,470
30	\$2,380	\$3,045	\$4,410	\$3,465	\$4,130	\$6,020	\$5,460	\$6,825	\$9,555	\$2,450	\$2,660	\$5,740	\$1,470
35	\$2,660	\$3,465	\$5,005	\$3,780	\$4,515	\$6,545	\$6,160	\$7,840	\$10,990	\$2,590	\$2,660	\$6,230	\$1,470
40	\$3,010	\$3,850	\$4,800	\$4,095	\$4,970	\$7,175	\$6,930	\$8,750	\$12,250	\$2,835	\$2,660	\$6,930	\$1,470
45	\$3,264	\$4,305	\$6,052	\$4,410	\$5,670	\$8,225	\$7,630	\$9,765	\$13,650	\$3,325	\$2,660	\$7,630	\$2,275
50	\$3,675	\$4,620	\$6,720	\$4,760	\$6,160	\$8,960	\$8,295	\$10,745	\$15,050	\$3,640	\$2,660	\$8,400	\$2,275
60	\$4,270	\$5,600	\$8,120	\$5,565	\$6,790	\$10,010	\$9,590	\$12,600	\$17,640	\$3,850	\$2,660	\$9,170	\$2,275
65	\$4,585	\$6,020	\$8,715	\$5,985	\$7,840	\$11,375	\$10,535	\$13,615	\$19,075	\$4,550	\$2,870	\$10,640	\$2,275
70	\$4,970	\$6,475	\$9,380	\$6,405	\$8,400	\$12,180	\$11,270	\$14,560	\$20,370	\$4,865	\$2,870	\$10,050	\$2,870
75	\$5,180	\$6,825	\$9,905	\$6,790	\$8,925	\$12,950	\$11,970	\$15,540	\$21,770	\$5,180	\$2,870	\$15,890	\$2,870
90	\$6,195	\$6,990	\$15,330	\$8,050	\$10,570	\$15,295	\$14,210	\$18,375	\$25,725	\$6,090	\$2,870	\$17,990	\$2,870
100	\$6,790	\$8,960	\$13,020	\$8,855	\$11,655	\$16,905	\$15,610	\$20,335	\$28,455	\$6,720	\$2,870	\$18,760	\$2,870
110	\$7,490	\$9,870	\$14,315	\$9,730	\$12,810	\$18,585	\$17,080	\$22,260	\$31,150	\$7,385	\$4,340	\$18,760	\$4,690
125	\$7,840	\$11,130	\$16,135	\$10,955	\$14,455	\$20,965	\$19,215	\$25,200	\$35,280	\$8,330	\$4,340	\$21,280	\$4,690
135	\$9,030	\$11,970	\$17,360	\$11,760	\$15,785	\$22,890	\$20,685	\$23,190	\$37,870	\$9,170	\$5,810	\$30,100	\$4,690
150	\$10,045	\$13,230	\$19,215	\$12,985	\$17,220	\$24,990	\$22,785	\$29,890	\$41,860	\$9,940	\$5,810	\$31,780	\$4,690
175	\$11,585	\$15,365	\$22,260	\$15,050	\$20,020	\$29,015	\$26,495	\$34,860	\$48,790	\$10,920	\$5,810	\$35,980	\$4,690
200	\$13,160	\$17,500	\$25,375	\$17,080	\$22,750	\$32,970	\$30,100	\$39,550	\$55,370	\$13,125	\$5,810	\$37,520	\$5,880
225	\$14,770	\$19,670	\$28,560	\$19,180	\$25,585	\$37,100	\$33,740	\$44,345	\$62,090	\$14,910	\$7,175	---	\$8,190
250	\$16,870	\$22,260	\$32,270	\$21,840	\$28,945	\$42,000	\$38,500	\$50,330	\$70,455	\$16,240	\$7,735	---	\$8,190
275	\$18,480	\$24,395	\$35,350	\$24,010	\$31,710	\$45,990	\$42,105	\$55,090	\$77,140	\$18,340	\$8,750	---	\$9,310
300	\$20,020	\$26,530	\$38,465	\$26,040	\$34,545	\$49,490	\$45,745	\$59,850	\$83,790	\$19,880	\$10,500	---	\$9,310
325	\$21,560	\$28,630	\$41,545	\$28,035	\$37,275	\$54,040	\$49,385	\$64,785	\$90,685	\$20,860	\$10,500	---	\$10,220
350	\$23,170	\$30,765	\$44,555	\$30,170	\$39,900	\$57,890	\$52,990	\$69,685	\$97,580	\$21,840	\$11,550	---	\$10,220
375	\$24,745	\$32,900	\$47,670	\$32,200	\$42,735	\$61,950	\$56,630	\$74,375	\$104,160	\$22,820	\$12,250	---	\$10,220
400	\$26,075	\$35,070	\$50,820	\$34,230	\$45,535	\$66,010	\$60,305	\$79,065	\$110,705	---	---	---	\$12,740
425	\$27,930	\$35,945	\$52,115	\$36,295	\$50,575	\$68,250	\$63,805	\$81,690	\$117,460	---	---	---	\$12,740
450	\$29,505	\$39,340	\$57,050	\$38,360	\$51,135	\$74,165	\$67,480	\$88,690	\$124,180	---	---	---	\$12,740
475	\$31,640	\$41,895	\$60,725	\$41,090	\$54,460	\$78,995	\$72,240	\$94,675	\$132,545	---	---	---	\$17,780
500	\$33,740	\$44,485	\$68,005	\$43,820	\$57,890	\$83,930	\$77,035	\$100,625	\$140,910	---	---	---	\$17,780

See page 7 for Resistor Modifications and Resistor Types



# Euclid™ DC Crane Controllers

## Panel Modifications

Discount Schedule E41 (ER)

Mod. No.	Description	Note	1	2	3	4	5	5A	6	7	8
<b>Power Devices</b>											
1	Power Fuse Clips		\$200	\$200	\$400	\$480	\$720	\$800	\$1,200	\$1,400	\$2,000
2	Power Fuses with Clips		\$400	\$400	\$800	\$1,000	\$1,600	\$1,920	\$2,800	\$3,200	\$5,000
3	Supply Power CB in place of MKS		\$400	\$600	\$1,600	\$12,800	\$15,340	\$16,600	\$19,870	\$41,280	\$65,200
4	Supply EOL Relay w/ Diagnostic	9	\$320	\$320	\$320	\$320	---	---	---	---	---
5	Main Knife Switch		\$400	\$400	\$440	\$600	\$1,020	\$1,520	\$1,520	\$2,680	\$4,720
6	Control Circuit (30 amp max.)										
	a. Knife Switch		\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400
	b. Fuses w/ clips		\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200
7	Overload Relays										
	a. Electronic w/ Diagnostics	2	\$1,460	\$1,460	\$1,460	\$1,460	\$1,460	\$1,460	\$1,460	\$1,460	\$1,460
	b. Thermal Inverse Time Trip		\$260	\$360	\$360	\$510	N/A	N/A	N/A	N/A	N/A
8	Electronic Ground Detection Relay	1	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400	\$2,400
9	Electronic Load Balance Relay	1	\$1,600	\$1,600	\$1,600	\$1,600	\$1,600	\$1,600	\$1,600	\$1,600	\$1,600
<b>Power Circuit Devices</b>											
10	Additional Acceleration Step										
	a. Contactor		\$360	\$540	\$940	\$1,220	\$1,820	\$2,200	\$3,080	\$3,800	\$6,640
	b. Static Timer		\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
11	Armature Shunt Contactor	3	\$360	\$540	\$940	\$1,220	\$1,820	\$2,200	\$3,080	\$3,800	\$6,640
12	Power Terminal Boards		\$500	\$600	\$1,000	\$1,400	\$1,800	\$2,400	\$3,200	\$4,600	\$6,920
13	Series Brake Transfer Knife Switch	5	---	\$2,000	\$2,820	\$4,620	\$6,520	\$7,820	\$12,040	\$13,260	\$14,360
14	Second Plugging Step		\$1,240	\$1,420	\$1,820	\$2,100	\$2,700	\$3,080	\$3,960	\$4,680	\$5,520
15	Service Dynamic Braking with										
	a. Initiating Contact		\$1,600	\$1,960	\$2,760	\$3,320	\$4,520	\$5,280	\$7,040	\$8,480	\$14,160
	b. Time Delay Relay		\$2,480	\$2,840	\$3,640	\$4,200	\$5,400	\$6,160	\$7,920	\$9,360	\$15,040
16	Plug To Stop		\$2,480	\$2,480	\$2,480	\$2,480	\$2,480	\$2,480	\$2,480	\$2,480	\$2,480
17	Emergency Dynamic Braking Single Point										
	a. Single or Two motor in Series		---	\$6,900	\$8,300	\$9,080	\$13,780	\$16,440	\$23,760	\$29,200	\$44,320
	b. Two Motors in Parallel		---	\$4,120	\$5,520	\$8,200	\$11,800	\$14,080	\$19,360	\$23,680	\$40,720
18	Emergency Dynamic Braking Auto Decel	3									
	a. Single or Two motor in Series		---	\$9,180	\$10,580	\$11,360	\$15,580	\$18,720	\$26,040	\$31,430	\$46,600
	b. Two Motors in Paralle		---	\$8,900	\$12,500	\$15,020	\$20,420	\$23,840	\$31,760	\$38,240	\$63,800
19	Off Point Graduated Dynamic Brake		\$1,360	\$1,360	\$1,360	\$1,360	\$1,360	\$1,360	\$1,360	\$1,360	\$1,360
20	Dynamic Braking Contactor		\$540	\$810	\$1,410	\$1,830	\$2,730	\$3,300	\$5,640	\$5,640	\$9,960



**Panel Modifications**

*Discount Schedule E41 (ER)*

Mod. No.	Description	Note	1	2	3	4	5	5A	6	7	8
<b>Relays</b>											
21	Control Relay (6 Circuits Max)		\$800	\$800	\$800	\$800	\$800	\$800	\$800	\$800	\$800
22	Voltage Relay (PR, JK, LSR, NP)										
	a. Electromechanical		\$880	\$880	\$880	\$880	\$880	\$880	\$880	\$880	\$880
	b. Electronic		\$1,140	\$1,140	\$1,140	\$1,140	\$1,140	\$1,140	\$1,140	\$1,140	\$1,140
23	Substitute Electronic Voltage Relay		\$260	\$260	\$260	\$260	\$260	\$260	\$260	\$260	\$260
24	Low Voltage Relay		\$620	\$620	\$620	\$620	\$620	\$620	\$620	\$620	\$620
25	Electronic Current Relay	2	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
26	Substitute Electronic Time/Current Acceleration for Static Time	4	\$2,550	\$2,550	\$2,550	\$2,550	\$2,550	\$2,550	\$2,550	\$2,550	\$2,550
<b>Miscellaneous</b>											
27	Brake Shunt Relay w/ Disch. Thy.		\$1,360	\$1,360	\$1,360	\$1,360	\$1,360	\$1,360	\$1,360	\$1,360	\$1,360
28	Ammeter Shunt										
	a. 50 mV		\$240	\$240	\$280	\$360	\$680	\$840	\$1,000	\$1,080	\$1,420
	b. 100 mV		\$360	\$360	\$400	\$600	\$1,400	\$1,840	\$2,260	\$2,320	\$3,110
29	Miniature Ammeter (Panel Mount)		\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400	\$400
30	Arc Suppressors										
	a. Radio Operation - Hoist		\$1,400	\$1,600	\$1,600	\$1,600	\$1,600	\$1,800	\$1,800	\$1,800	---
	b. Radio Operatio - Travel		\$1,400	\$1,400	\$1,400	\$1,400	\$1,400	\$1,600	\$1,600	\$1,600	---
	c. Pendant Operatio - Hoist		---	---	\$600	\$600	\$1,600	\$1,80	\$1,800	\$1,800	---
	d. Pendant Operation - Travel		---	---	\$400	\$400	\$1,400	\$1,600	\$1,600	\$1,600	---
31	Enclosure Space Heater Operated By:										
	a. "M" Aux. Contact		\$880	\$880	\$880	\$880	\$880	\$880	\$880	\$880	\$880
	b. Thermostat		\$1,380	\$1,380	\$1,380	\$1,380	\$1,380	\$1,380	\$1,380	\$1,380	\$1,380
32	Enclosure Light and Switch		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
33	Knife Switch Control Terminal Board		\$800	\$800	\$800	\$800	\$800	\$800	\$800	\$800	\$800
34	ARC Suppressor Each		\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200	\$200

**Footnotes:**

1. Requires (2) ammeter shunts. See Note 6.
2. Requires (1) ammeter shunt. See Note 6.
3. Does not include resistor price.
4. Requires (1) ammeter shunt per controller. See Note 6.
5. For duplex controllers using series brakes.
6. Modification adder does not include ammeter shunt.  
 Type 4110/4111 controllers have (1) 50mV negative shunt as standard component
7. For 550 VDC operation add 10% to all list prices.
8. For duplex controller double all prices except modifications 9,13,17b, 18b and 26.
9. Type 4120/4121 controllers only.



**Description of Panel Modifications**

Mod No.	Description
14.	Second plugging step is recommended for use on bridge drives of heavy cranes such as ladle cranes.
15.	Service dynamic braking is used to decelerate a crane travel drive under normal operation and is sometimes used in place of plugging.
16.	Plug to stop is used to decelerate a crane drive under normal operation. This circuit provides a faster slowdown than service dynamic braking.
17.	Emergency dynamic braking provides a reliable means to decelerate high speed, high inertia travel drives under a loss of power. (If drive normally reaches maximum running speed use Mod. 18), This circuit converts the motor or motors into self excited generators to provide the braking power.
18.	Emergency dynamic braking with graduated deceleration provides a quicker, smoother stop under a loss of power than Mod. 11. Recommended for high speed, high inertia drives which normally reach maximum running speed.
19.	Off point graduated dynamic braking is recommended for use with DC hoists handling high inertia fixed loads, such as bucket hoists. The circuit eases the mechanical shock which occurs during stopping.

**Special Construction**

*Discount Schedule E41 (ER)*

Unitized Constructon		
Description	Top Mounted Resistors	Side Mounted Resistors
Mounting individual controllers and resistor racks on common skid	Estimate length of each skid. Multiply length by \$600 per foot.	
Interwire controller to main disconnect if on same skid	Add 10% of controller price.	
Mount and wire resistors.	\$600 per motion plus 20% of resistor price.	\$500 per motion plus 30% of resistor price.
Resistor Enclosure Covers		
Front and side screen covers	20% of resistor price. \$800 minimum.	30% of resistor price. \$600 minimum.
Screened indoor enclosures	40% of resistor price. \$1,600 minimum.	50% of resistor price. \$1,000 minimum.
louvered outdoor enclosures	50% of resistor price. \$2,000 minimum.	60% of resistor price. \$1,200 minimum.

Multipanel Constructon		
Description	Top Mounted Resistors	Side Mounted Resistors
Mounting and interwiring more than one controller in a common enclosure	Add 15% to the total price of the separate enclosed controllers.	
Mount and wire resistors.	\$600 per motion plus 20% of resistor price.	\$500 per motion plus 30% of resistor price.
Resistor Enclosure Covers		
Front and side screen covers	20% of resistor price. \$800 minimum.	30% of resistor price. \$600 minimum.
Screened indoor enclosures	40% of resistor price. \$1,600 minimum.	50% of resistor price. \$1,000 minimum.
louvered outdoor enclosures	50% of resistor price. \$2,000 minimum.	60% of resistor price. \$1,200 minimum.



Qty		Description
Type 4110	Type 4120	
1	1	Main knife Switch
1	1	Fused Control Knife Switch
4	4	Directional Contactors
1	1	Plugging Contactor
3 to 4	2 to 4	Accelerating Contactors
1	---	Negative Line Contactor
3 to 4	1	Static Timer
1	1	Plugging Relay
1	1	Low Voltage Relay
1	1	Electronic overload Relay w/ AMS

Qty		Description
Type 4111	Type 4121	
1	1	Main Knife Switch
1	1	Fused Control Knife Switch
2	2	Directional Contactors
1	1	Dynamic Braking Contactor
4 to 5	3 to 4	Accelerating Contactors
1	---	Negative Line Contactor
3 to 4	1	Static Timer (Accelerating)
1	1	Static Timer (Braking)
1	1	Limit Switch Relay
1	1	Low Voltage Relay
1	1	Electronic overload Relay w/ AMS

**Travel Master Switches**

Type Master Switch	List Price			Options		Discount Schedule
	4 Speed	5 Speed	6 Speed	Spring Return	Off Point Latch	
4211	\$1,260	\$1,365	N/A	Std	N/A	E20 (EA)
4216	\$2,700	\$3,300	\$3,300	\$540	\$420	E42(ES)

**Hoist Master Switches**

Type Master Switch	List Price			Options		Discount Schedule
	4 Speed	5 Speed	6 Speed	Spring Return	Off Point Latch	
4211	\$1,365	\$1,470	N/A	Std	N/A	E20 (EA)
4216	\$3,300	\$3,780	\$4,500	\$540	\$420	E42 (ES)

**Resistor Racks**

*Discount Schedule E42 (ES)*

Rack Type	Interwire	Add	Minimum
Open	No	15%	\$400
Open	Yes	30%	\$800
Enclosed	Yes	50%	\$1,300

**Resistor Information**

1	NEMA Class 152 is recommended for light crane duty. NEMA Class 162 is recommended for standard crane duty. NEMA Class 172 is recommended for severe crane duty.
2	Drives with anti-friction bearings should use Class 152, 162 or 172 resistors. Drives with plain bearings should use Class 1563, 163 or 173 resistors.
3	Duplex Controls requires (2) sets of resistors.
4	1st point armature shunt requires armature shunt contactor.
5	Service and emergency dynamic braking require panel modifications.
6	Teaser field resistor limits no load hoisting speed to 250% of motor rated speed. No panel modification required.
7	Slowdown resistors are designed to limit travel drive top speed by up to 50%.

**Resistor Types**

Motion	Horse Power Range/Resistor Type			
	Type 3003 SSR	Type 3004 H1	Type 3004/5 K1 & HHC	Type 3005 HHC
Travels	5 to 25	26 to 75	76 to 150	151 and Up
Hoists	5 to 20	21 to 75	76 to 100	101 and Up



**DC Mill Motor Data**

Motor Frame Size		Series Wound Totally Enclosed Motors				
600 Series	800 Series	Horsepower Ratings		Full Load Ratings		
		30 Minute	1 Hour	Torque (Foot-Pound)	Speed (RPM)	Amperes @ 230 VDC
	802A	6.5 ---	--- 5	45 30	750 800	29 21
602		10 ---	--- 7.5	80 50	675 800	44 31
	802B	10 ---	--- 50	80 50	675 800	45 31
603		13.5 ---	--- 10	115 70	620 725	57 41
	802C	13.5 ---	--- 10	105 65	675 800	57 41
604		19 ---	--- 15	180 120	560 650	77 59
	803	19 ---	--- 15	160 110	620 725	77 59
	804	26 ---	--- 20	235 160	530 650	98 75
606		33 ---	--- 25	340 230	515 575	129 95
	806	39 ---	--- 30	410 275	500 575	145 112
608		45 ---	--- 35	500 320	470 525	175 131
610		65 ---	--- 50	770 525	445 500	248 184
	808	65 ---	--- 50	760 500	450 525	246 184
	810	90 ---	--- 70	1070 435	440 500	335 260
612		100 ---	--- 75	1225 830	430 475	375 274
614		135 ---	--- 100	1735 1140	400 460	500 360
	812	135 ---	--- 100	1690 1110	420 475	500 360
616		200 ---	--- 150	2630 1750	400 450	760 536
	814	200 ---	--- 150	2625 1710	400 460	760 533
618		265 ---	--- 200	3810 2560	385 410	955 712
	816	265 ---	--- 200	3480 2560	400 410	955 712
	818	325 ---	--- 250	4740 3200	360 410	1140 900
620		360 ---	--- 275	5570 3700	340 370	1260 970
	820	390 ---	---			1430
622		500 ---	--- 375	8480 5790	310 340	1800 1330
	822	500 ---	---			1890
624		650 ---	--- 500	11550 8210	300 320	2370 1800

Notes:

1. NEMA standards require that crane panels be selected on the intermittent motor rating (30 minute or 1 hour rating) at which the motor is applied.
2. AISE standards require that hoist panels be selected based on the 30 minute rating of the hoist motors.
3. AISE standards require that bridge and trolley panels be selected based on the 1 hour rating of the bridge and trolley motors.

*Prices Subject to Change without Notice*



**Hubbell Industrial Controls, Inc.**

a subsidiary of Hubbell Incorporated  
 4301 Cheyenne Drive, Archdale, NC 27263  
 Telephone (336) 434-2800 Fax (336) 434-2801