PRODUCT BROCHURE

Crane Control Class 6121

Frontline® DC Crane Control

Hoist Service

Class 6121 reversing dynamic lowering controllers are recommended for use with DC series motors on crane hoist drives without mechanical load brakes. These controllers are frequently used on such special mill equipment as charging machines, ore bridges, etc. All controllers are arranged for use with series brakes.

- Mill Duty Class 7004 Type M Line-Arc® contactors & Class 7001 Type K relays
- Class 7001 Type ST-1 static acceleration timer

The standard single motor reversing dynamic lowering controller consists of:

(1) Two pole fused control circuit knife switch (CSW)

(1) Two pole unfused main line knife switch with padlock clip (LSW)

(4) Type M single-pole contactors with mechanical interlocks for hoisting and lowering circuits (H, 1L, 2L, 3L)

(1) Type M single-pole negative line contactor (M)

(4 or 5) Type M single-pole acceleration contactors (1A, 2A, 3A, 4A, 5A)

(3 or 4) Type ST-1 static acceleration timers (1AR, 2AR, 3AR, 4AR)

(1) Type KE voltage relay for acceleration lowering (VR)

(1) Type KE limit switch relay (LSR)

(1) Type M single pole spring-closed dynamic lowering contactor (DB)

(1) Undervoltage relay (UV)

Magnetic overload relays (one instantaneous and one inverse time) (1OL, 2OL)

The duplex controller consists of the equipment for a single motor controller with the exception that all contactors are double pole devices and the following equipment is added:

(1) Two pole main line knife switch with padlock clip (2LSW)

(1) Type KE limit switch relay (2LSR)

(2) Magnetic overload relays (one instantaneous and one inverse time) (21OL, 22OL)

Class 6121 Type EGH3

Hoist Service - Crane Control Class 6121 Specifications

VDC	Max. HP Crane Rating	Contactors NEMA Size	No. of Speed Points	Open Type	General Purpose Enclosure NEMA Type 1 Gasketed	Outdoor Enclosure NEMA Type 3R	Industrial Enclosure NEMA type 12[1]
				Controller Type	Controller Type	Controller Type	Controller Type
Single Motor Control[2]							
230	35	3	5	EOH3	ESH3	EWH3	EAH3
	55	4	5	FOH3	FSH3	FWH3	FAH3
	110	5	5	GOH3	GSH3	GWH3	GAH3
	150	5A[3]	5[4]	GAOH3	GASH3	GAWH3	GAAH3
	225	6	6	HOH3	HSH3	HWH3	HAH3
	275	6A[3]	6	HAO3	HASH3	HAWH3	HAAH3
	500	8	6	KOH3	KSH3	WH3	KAH3
Duplex Motor Control (2 Motors Connected in Parallel)[2]							
230	220 (2-110)	5	5	GOH4	GSH4	GWH4	GAH4
	300 (2-150)	5A[3]	5[4]	GAOH4	GASH4	GAWH4	GAAH4
	450 (2-225)	6	6	HOH4	HSH4	HWH4	HAH4
	550 (2-275)	6A[3]	6	HAOH	HASH4	HAWH4	HAAH4
	1000 (2-500)	8	6	KOH4	KSH4	KWH4	KAH4

NOTES:

1. *Non-ventilated NEMA Type 12 enclosures are not recommended for CMAA Service Classifications E and F and for applications which have frequent jogging and inching operations because a corrosive atmosphere, detrimental to the component parts, can develop. For these applications, NEMA 1 gasketed enclosures are recommended.*
2. *For explanation and pricing of multi-motor controls, refer to multi-motor drives section of application data*
3. *Not a NEMA Size/Rating*
4. *NEMA standards require 6 speed points above 110HP. Add 1 speed point if required.*

Order Information Required:

1. Class
2. Type
3. Motor Horsepower at 230 VDC
4. Motor Duty Rating
5. Controller Modifications: Specify Form Numbers
6. Resistor Service Classification
7. Master Switch Class, Type and Form

Hoist Service Application Data

A complete set of motor control equipment consists of a controller, separately mounted Tab-Weld® resistors and a master switch.

Class 6715 Tab-Weld® Resistor

Class 9004 Type CG12 Master Switch

Class 9004 Type VG12 Master Switch

Tab-Weld® Resistor Selection

Class 6121 Hoist controller systems require a separately mounted set of Tab-Weld resistors which define motor performance and operation. Pre-designed resistor sets exist for 5-500HP DC series motors applied at 230VDC. Performance is defined per the Hook Speed vs. Load Performance Curves found on page 15.

Optional Teaser Field Resistors may be added to the acceleration resistor set to reduce motor overspeed under light load conditions. Teaser Field resistors limit no load hoisting speed to 250% of motor rated speed. No modification of the controller is required.

Selection Notes

- It is recommended that hoist resistors be selected based on the 1/2-hour motor horsepower rating unless specified otherwise.
- For resistors mounted in racks, refer to Class 6715 catalog
- Duplex controllers require two sets of resistors, one set for each motor.
- Class 162 (Heavy Duty) is recommended for standard motor / crane duty
- Class 172 (Severe Duty) is recommended for severe motor / crane duty
- Consult factory for other NEMA Classes.

For explanation of NEMA Resistor Classifications, refer to Class 6715 Catalog Application Data.

Master Switch Selection for Class 9004 NEMA 1 Enclosed

Drive	Speed Points	Control Type	Vertical Mounted Master Switch	Console Mounted Master Switch
Hoist	5	W	VG12	GG12
	6	W	VG16	CG16

Master Switch Modifications

Description	Optional Features Form Letter
Spring Return to Off Point	S

Accessories

Item	Description
Brakes	See Class 5010 or 5015
Manual-Magnetic Disconnected Switch	See Class 6140
YOUNGSTOWN® Power Limit Switch	See Class 6170

Bridge or Trolley Service

Class 6121 reversing plugging controllers are recommended for use with DC series motors on crane travel drives. These controllers are frequently used on such special mill equipment as charging machines, as highway lift bridge controls, etc. All controllers are arranged for use with the series brakes. Shunt brakes can be used when a brake relay is added to the controller.

- Mill Duty Class 7004 type M Line-Arc® contactors & Class 7001 Type K relays
- Class 7001 type ST-1 static acceleration timers

The standard single motor reversing dynamic lowering control consists of:

(1) Two pole fused control circuit knife switch (CSW)

(1) Two pole unfused main line knife switch with padlock clip (LSW)

(4) Type M single-pole directional contactors with mechanical interlocks (1F, 2F, 1R, 2R)

(1) Type M single-pole negative line contactor (M)

(4 or 5) Type M single-pole acceleration contactors (including one for plugging (1A, 2A, 3A, P)

(3 or 4) Type ST-1 static acceleration timers (1AR, 2AR, 3AR, 4AR)

(1) Type KP rectifier-plugging relay (PR)

(1) Undervoltage relay (UV)

Magnetic overload relays (one instantaneous and one inverse time) (1OL, 2OL)

The duplex controller consists of the equipment for a single motor controller with the exception that all contactors are double pole devices and the following equipment is added:

(1) Two pole main line knife switch with padlock clip (2LSW)

(1) Type KP rectifier-plugging relay (2PR)

(2) Magnetic overload relays (one instantaneous and one inverse time) (21OL, 22OL)

Class 6121 Type EGR3

Bridge or Trolley Service - Crane Control Class 6121 Specifications

VDC	Max. HP Crane Rating[5]	Contactors NEMA Size	No. of Speed Points	Open Type	General Purpose Enclosure NEMA Type 1 Gasketed	Rainproof and Sleet-resistant Enclosure NEMA Type 3R	Industrial Enclosure NEMA Type 12[1]
				Controller Type	Controller Type	Controller Type	Controller Type
Single Motor Control[2]							
230	35	3	5	EOR	ESR3	EWR3	EAR3
	55	4	5	FOR3	FSR3	FWR3	FAR3
	110	5	5	GOR3	GSR3	GWR3	GAR3
	150	5A[3]	5[4]	GAOR3	GASR3	GAWR3	GAAR3
	225	6	6	HOR3	HSR3	HWR3	HAR3
Duplex Motor Control (2 Motors Connected in Parallel)[2]							
230	70 (2-35)	3	5	EOR4	ESR4	EWR4	EAH4
	110 (2-55)	4	5	FOR4	FSR4	FWR4	FAH4
	220 (2-110)	5	5	GOR4	GSR4	GWR4	GAH4
	300 (2-150)	5A[3]	5[4]	GAOR4	GASR4	GAWR4	GAAH4
	450 (2-225)	6	6	HOR4	GSR4	HWR4	HAH4

NOTES:

1. *Non-ventilated NEMA Type 12 enclosures are not recommended for CMAA service classifications E and F and for applications which have frequent jogging and inching operations because a corrosive atmosphere, detrimental to the component parts, can develop. For these applications, NEMA 1 gasketed enclosures are recommended.*
2. *For explanation and pricing of multi-motor controls, refer to multi-motor drives section of application data*
3. *Not a NEMA Size/Rating*
4. *NEMA standards require 6 speed points above 110HP. Add 1 speed point if required.*
5. *For higher horsepowers, consult factory*

Order Information Required:

1. Class
2. Type
3. Motor Horsepower at 230 VDC
4. Motor Duty Rating
5. Controller Modifications: Specify Form Numbers
6. Resistor Service Classification
7. Master Switch Class, Type and Form

Bridge or Trolley Service

A complete set of motor control equipment consists of a controller, separately mounted Tab-Weld® resistors and a master switch. The following tables are for selecting the resistors and master switches used with Class 6121 Bridge or Trolley controllers.

Class 6715 Tab-Weld® Resistor

Class 9004 Type CG12 Master Switch

Class 9004 Type VG12 Master Switch

Tab-Weld® Resistor Selection

Class 6121 Bridge or Trolley controller systems require a separately mounted set of Tab-Weld resistors which define motor performance and operation. Pre-designed resistor sets exist for 5-200HP DC series motors, applied at 230VDC. Performance is defined by the Hook Speed vs. Load Performance Curves found on page 15.

Optional Permanent Slowdown Armature Shunt Resistors may be added to the acceleration resistor set to reduce motor overspeed under light load conditions. Slowdown resistors are typically designed to limit Bridge drives to approximately 50% of their present free running speed. No modification of the controller is required.

Selection Notes

- It is recommended that bridge or trolley resistors be selected based on the 1-hour motor horsepower rating unless specified otherwise.
- For resistors mounted in racks, refer to Class 6715.
- Duplex controllers require two sets of resistors, one set for each motor.
- Class 162 is recommended for standard motor / crane duty.
- Class 172 is recommended for severe motor / crane duty.
- Consult factory for other NEMA Classes.

For explanation of NEMA Resistor Classifications, refer to Class 6715 Catalog Application Data

Master Switch Selection for Class 9004 NEMA 1 Enclosure

Drive	Speed Points	Control Type	Vertical Mounted Master Switch	Console Mounted Master Switch
Bridge or Trolley	5	U	VG12	CG8
	6	U	VG16	—
	6	U	—	CG12

Master Switch Modifications

Description	Optional Features Form Letter	Vertical Mounted Master Switch	Console Mounted Master Switch
Spring Return to Off Point	S	X	X

Accessories

Item	Description
Brakes	See Class 5010 or 5015
Manual-Magnetic Disconnected Switch	See Class 6140
Youngstown® Power Limit Switch	See Class 6170

Controller Modifications

Form	Description		Hoist	Travel
B1	Shunt Brake Relay			X
B3	Shunt Brake Relay			X
B4	Shunt Brake Relay			X
B9	Service Dynamic Braking			X
B10	Emergency Dynamic Braking, Single Point	Single Motor Two Motors in Parallel Two Motors in Series		X
B11[1]	Emergency Dynamic Braking, Auto Deceleration			X
D1	Substitute Main Line Knife Switch with DC Rated Fuses for Unfused Main Line Knife Switch		X	X
D7[1]	Series Brake Transfer Knife Switches		X	
E19	Low Headroom		X	X
G8	Power Terminal Board (includes power lugs)		X	X
G15	Ammeter Shunt, 100MV		X	X
G16	Miniature Ammeter Panel Mounted		X	X
G22	Cabinet Inspection Light and Toggle Switch		X	X
H18	Cabinet Space Heater Controlled by Interlock from M Contactor		X	X
M3[2]	Additional Acceleration Point		X	X
M4	Second Plugging Step			X
M24	Substitute Type SSI Time Current Acceleration Module for Type ST-1 Static Acceleration Times		X	X
M52	Armature Shunt Contactor (Controls Slowdown for Floor/Cab Operation)			X
R1	Auto-Stop Rectifier Circuit		X	
Y17	Arc Suppressors (Required on Pendant and Radio Operated Controllers		X	X

Notes:

1. For Duplex Controllers Using Series Brakes

2. Additional master switch contacts will be required. See Brochure 9004 for correct master switch

Application Data - Multi-Motor Drives

Two-motors connected in series

The armatures and fields of each motor are connected in series and treated as a single motor. If the voltage rating of each motor is 230 VDC and the supply voltage is 230 VDC, the horsepower rating is equal to the rating of one motor. If the voltage rating of each motor is 115 VDC and the supply voltage is 230 VDC, the horsepower rating is equal to the sum of the ratings of both motors. Controller and resistor pricing is based on the horsepower rating. A single set of motor power resistors is required.

Two-motors connected in parallel (Duplex)

One set of control equipment and power resistors is required for each motor. Controller modification prices are double those for a single motor scheme.

Four motors connected in parallel (Quadruplex)

It is necessary to double the duplex controller price given for two motors in parallel. Four sets of motor power resistors are required.

Four motors connected in series-parallel

Two sets of series motors with their armatures and fields connected in parallel. Controllers and modifications for this connection should be priced based on two motors in parallel. Two sets of motor power resistors are required.

Controller Modifications

Special Panel Construction

Standard controllers come equipped with the components listed. Special features to be added to standard controllers are identified by Form number. Most of these modifications are self-explanatory. Others, however, require some additional explanation.

Forms B1, B3, and B4 cover various shunt brake relay applications. These modifications are for Bridge and Trolley controllers only and in each case a double-pole, 25-ampere brake relay is supplied. The three modifications differ from each other in the way the relay is wired and controlled. Each is as follows:

B1

Relay connected in parallel with main (M) contactor coil. With this arrangement, the shunt brake will set whenever the master switch is moved to the off point.

B3

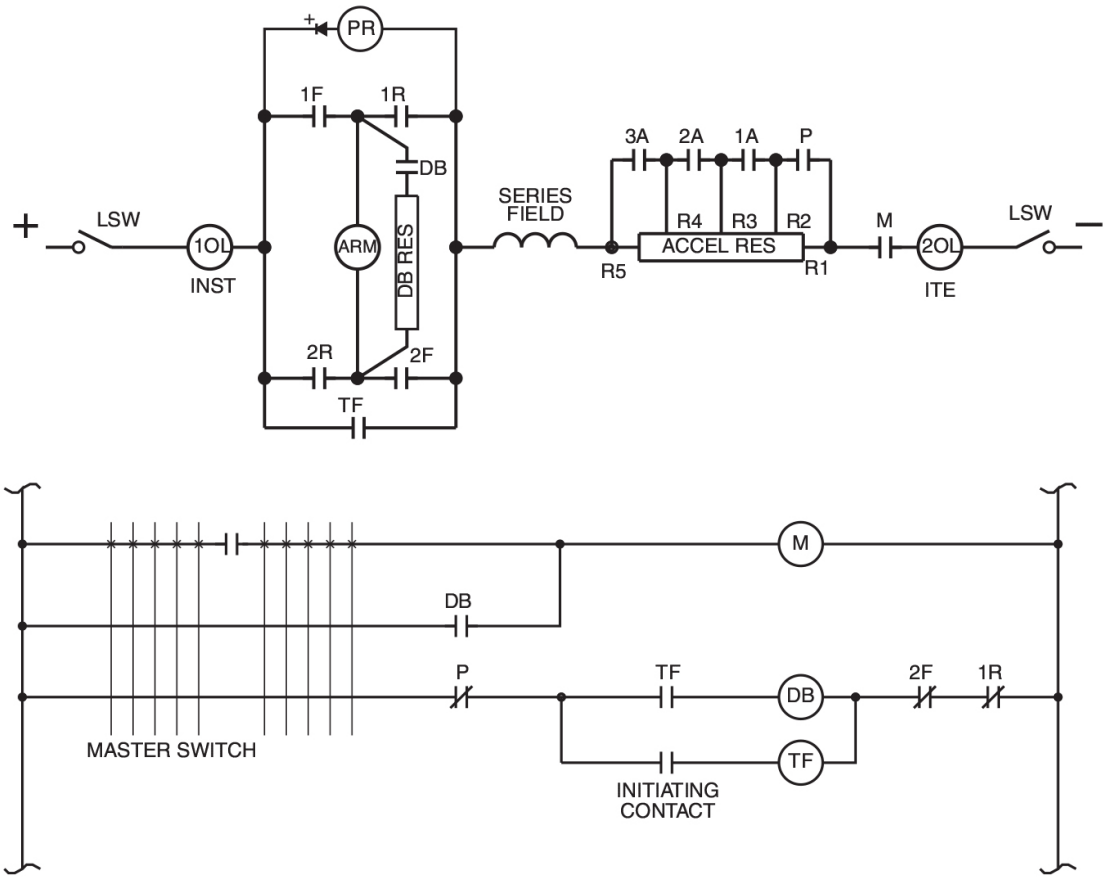
Relay controlled from external push button, foot switch, etc. This arrangement allows the shunt brake to be manually applied by the crane operator whenever necessary.

B4

Relay connected in parallel with undervoltage relay. The arrangement allows the shunt brake to set only when the main disconnect for the crane is opened or upon power failure.

B9

Service dynamic braking is used for decelerating travel drives under normal operation. Service dynamic braking is occasionally used in place of plugging on a travel drive. The common arrangement is to use an initiating switch in conjunction with electric adjustable torque or hydraulic brake pedal such that initial depression of the brake pedal provides service dynamic braking and further depression actuates the adjustable torque or hydraulic brake. Service dynamic braking assists the adjustable torque or hydraulic brake.



Service Dynamic Braking for Single Series Motor

B10

Form B10 emergency dynamic braking is used to decelerate crane travel drives, such as high speed bridge drives and manned trolleys. Dynamic braking is automatically applied upon power failure or when an overload relay trips. Emergency dynamic braking provides a simple, reliable means for braking crane bridge drives, or manned trolleys. Emergency dynamic braking is applied in about 1/5th the time required to set a shunt brake. The motors are converted to self-excited generators to provide retarding torque. The braking effect is not dependent on an outside source of power. The circuits for single step emergency dynamic braking are shown for the various motor connections.

Emergency Dynamic Braking for a Single Motor

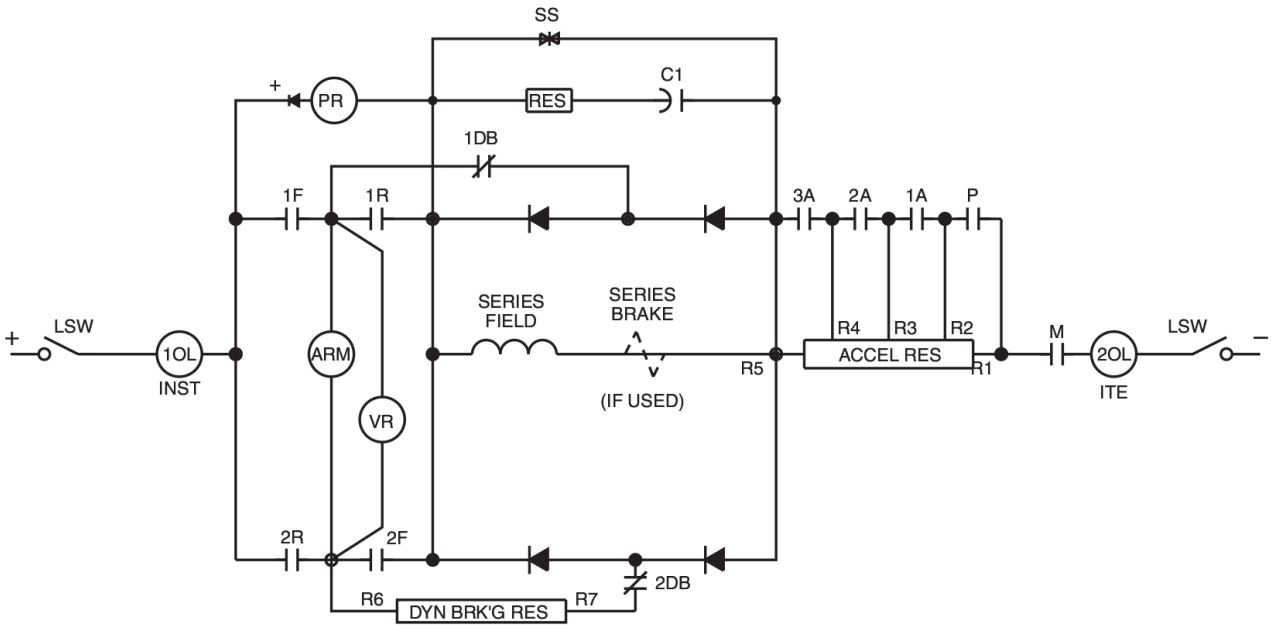
The motor is connected as self-excited generator by using a silicon rectifier bridge around the motor series field. Braking is equally effective in each direction.

Emergency Dynamic Braking for Two Motors in Series

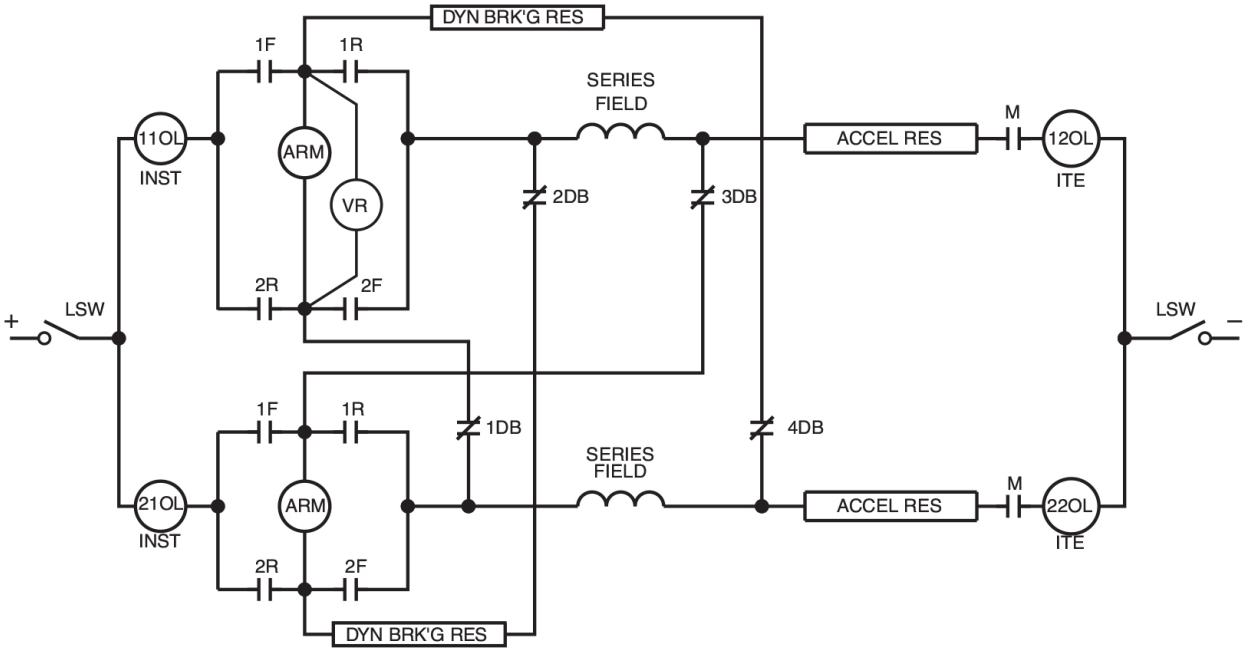
The same circuit as for a single motor is used. The armature and fields of the two motors are permanently connected in series and are treated as a single motor.

Emergency Dynamic Braking for Two Motors Connected in Parallel

The circuit shows the simple arrangement whereby the fields and the armatures of the two series motors are cross-connected to insure self-excitation for positive emergency dynamic braking from either direction of travel. Two sets of double-pole dynamic braking contactors are used.



Emergency Dynamic Braking for Single Motor



Emergency Dynamic Braking for 2 Motors in Parallel

Emergency Dynamic Braking for Four Motor Drives

For four motors connected in parallel, two sets of cross-connected motors are in parallel to provide dynamic braking for all four motors. For this motor connection, the controller modification is priced by doubling the price given for two motors in parallel.

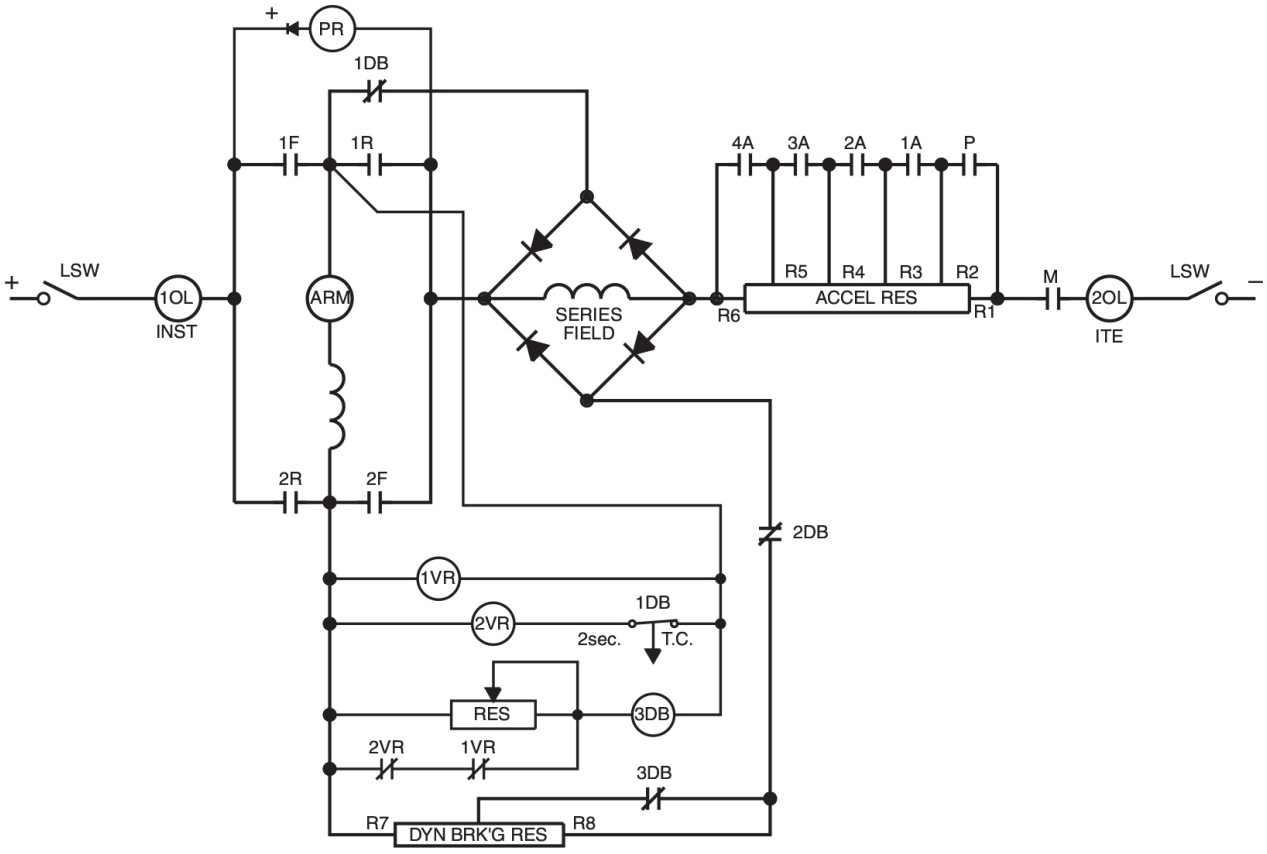
When four motors are connected in series-parallel, that is, when two sets of motors with their armatures and fields connected in series are connected in parallel, emergency dynamic braking should be priced based on the controller modification for two motors connected in parallel.

B11

Form B11 provides graduated emergency dynamic braking with automatic deceleration. The automatic deceleration provides a faster stop than single step emergency dynamic braking deceleration from high speed, without wheel slippage.

Graduated Emergency Dynamic Braking with Automatic Deceleration for a Single Motor

An additional voltage relay (2VR) and a normally closed contactor (3DB) with its main contacts shorting out a portion of the dynamic braking resistor are added to the circuit for single step emergency dynamic braking. The two voltage relays (1VR and 2VR) are used to insure proper operation of the 3DB contactor. The generated armature voltage keeps the 3DB contactor energized until the motor speed is decreased sufficiently to provide a smooth deceleration. When the 3DB contactor closes, the value of the dynamic braking resistance is decreased, and increased braking torque is provided to decelerate the motor.



Graduated Emergency Dynamic Braking with Automatic deceleration for a Single Motor

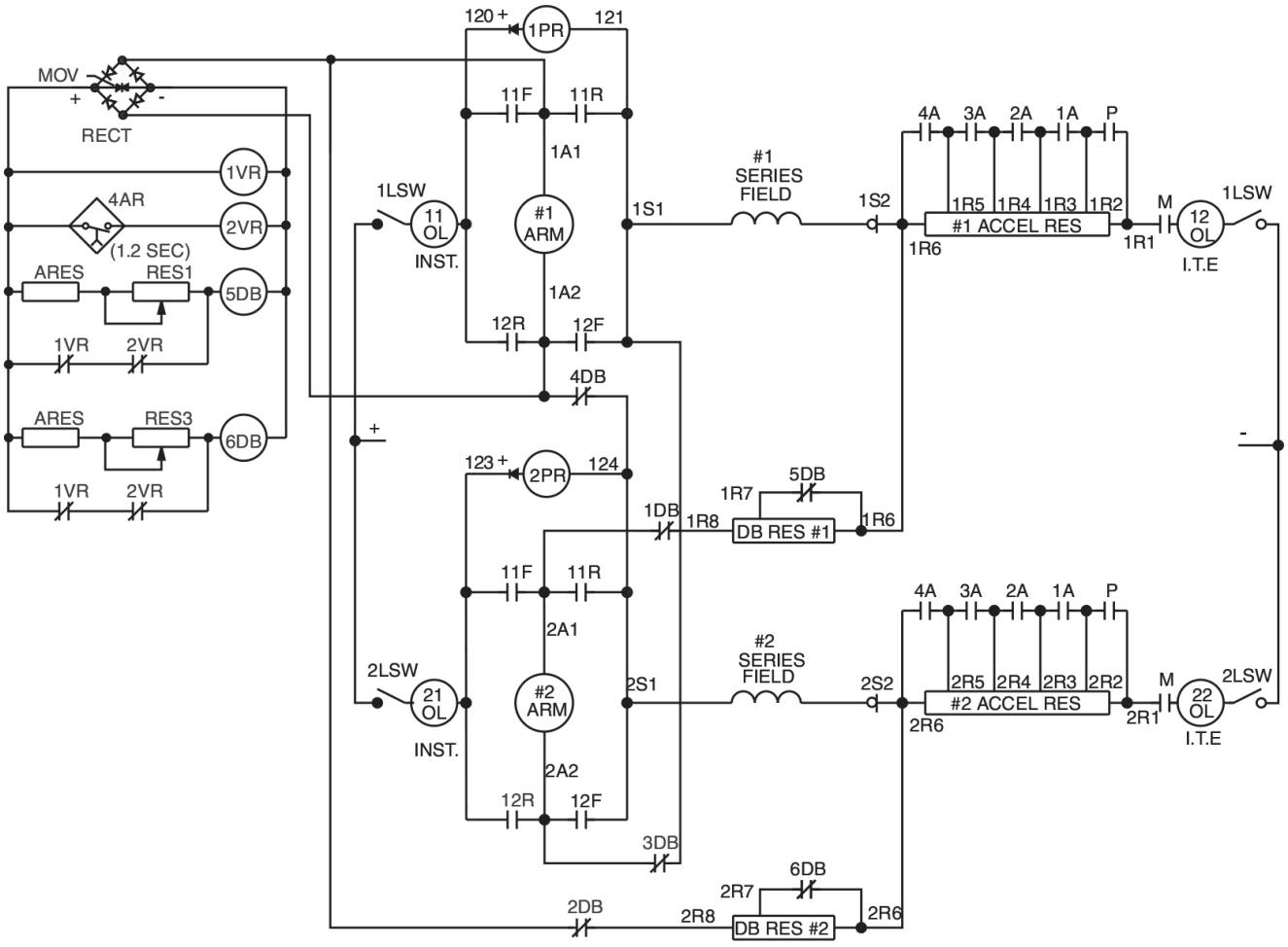
Graduated Emergency Dynamic Braking with Automatic Deceleration for a Multi-Motor Drives

For two motors connected in series, the fields of each motor are connected in series inside the rectifier bridge and are treated as a single motor.

The circuit for two motors connected in parallel is essentially the same as that for two motors in parallel with single step dynamic braking except for the addition of two voltage relays. 1VR and 2VR, and two normally closed contactors, 5DB and 6DB. The voltage relays and the normally closed contactors are operated based on the generated armature voltage of one motor, but control the braking of both motors. The two contactors are adjusted to reclose together as the motors, maintaining deceleration torque.

For quadruplex connections where four motors are connected in parallel, it is necessary to double the controller modification price shown for two motors in parallel.

For four motors used in a series-parallel connection, graduated emergency dynamic braking should be priced based on the controller modifications price for two motors connected in parallel.



Graduated Emergency Dynamic Braking for Two Motors in Parallel

D7

Form D7 lists series brake transfer knife switches for use on duplex hoist controllers. For single motor of a duplex drive system, operation, these knife switches connect both series brakes in series with one motor to permit operating the drive without having to manually release one brake.

M4

Form M4 provides a second plugging step for travel motions. An additional plugging relay (2PR) and an additional plugging contactor (2P) are supplied. A second plugging step is recommended for heavy cranes, such as ladle crane bridge drives or high speed cranes such as ore bridge trolleys or any high speed bridge drive. Two steps of plugging provide faster slowdown without spinning the wheels.

M24

Form M24 provides time delay acceleration proportional to motor currents.

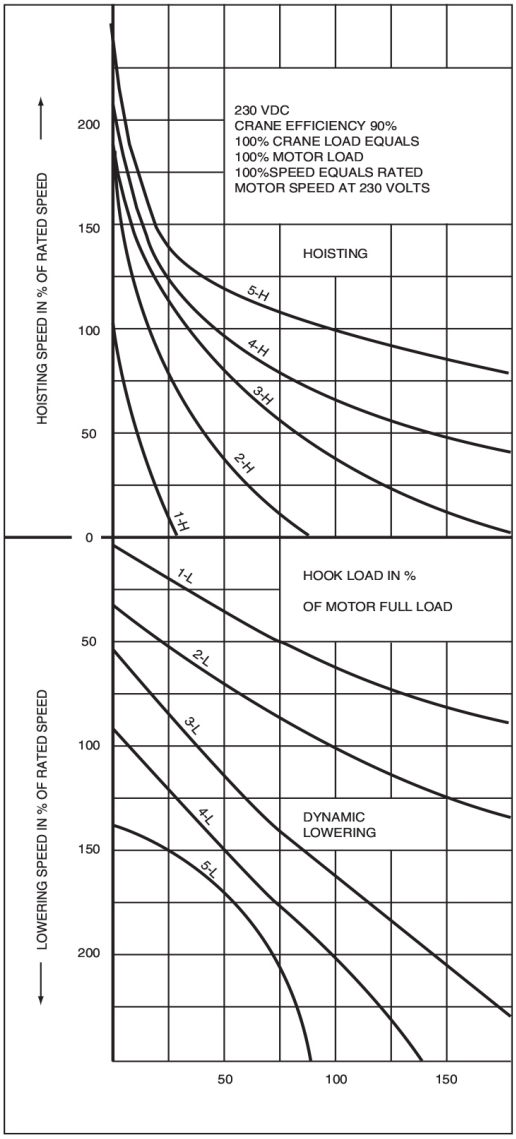
M52

Form M52 is an armature shunt contactor for use on Bridge and Trolley controllers only. This modification consists of a single pole normally open contactor of equal NEMA size to the contactors in the basic controller. The operation is as follows:

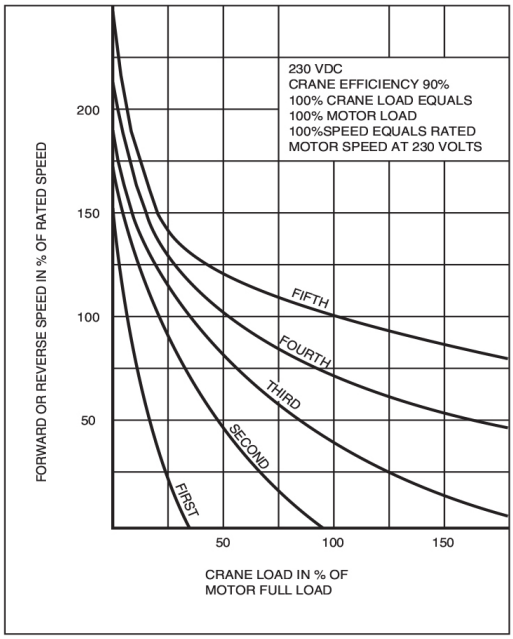
> The contactor is arranged to provide slowdown of bridge drives during the floor operation of cab/floor operated cranes. A customer supplied contact, maintained closed during floor operation, initiates the slowdown. This modification is used with NEMA Class 162P or Class 172P accelerating resistors plus a continuous duty bridge slowdown resistor.

R1

Form R1 Auto-Stop Rectifier circuit is used on hoist applications. The series DC brake is set by returning the master switch to the off position during normal running conditions. In a power failure situation the brake will set if the controller is in hoist mode. If however, the standard controller is in lower mode, regenerative power from the DC motor will keep the series brake open and allow the load to be safely lowered. With the Auto-Stop Rectifier circuit modification, the series brake will work as usual in normal running conditions. In a power failure situation, the brake will automatically set in both hoist and lowering modes. Continued lowering will not be allowed under power loss conditions.

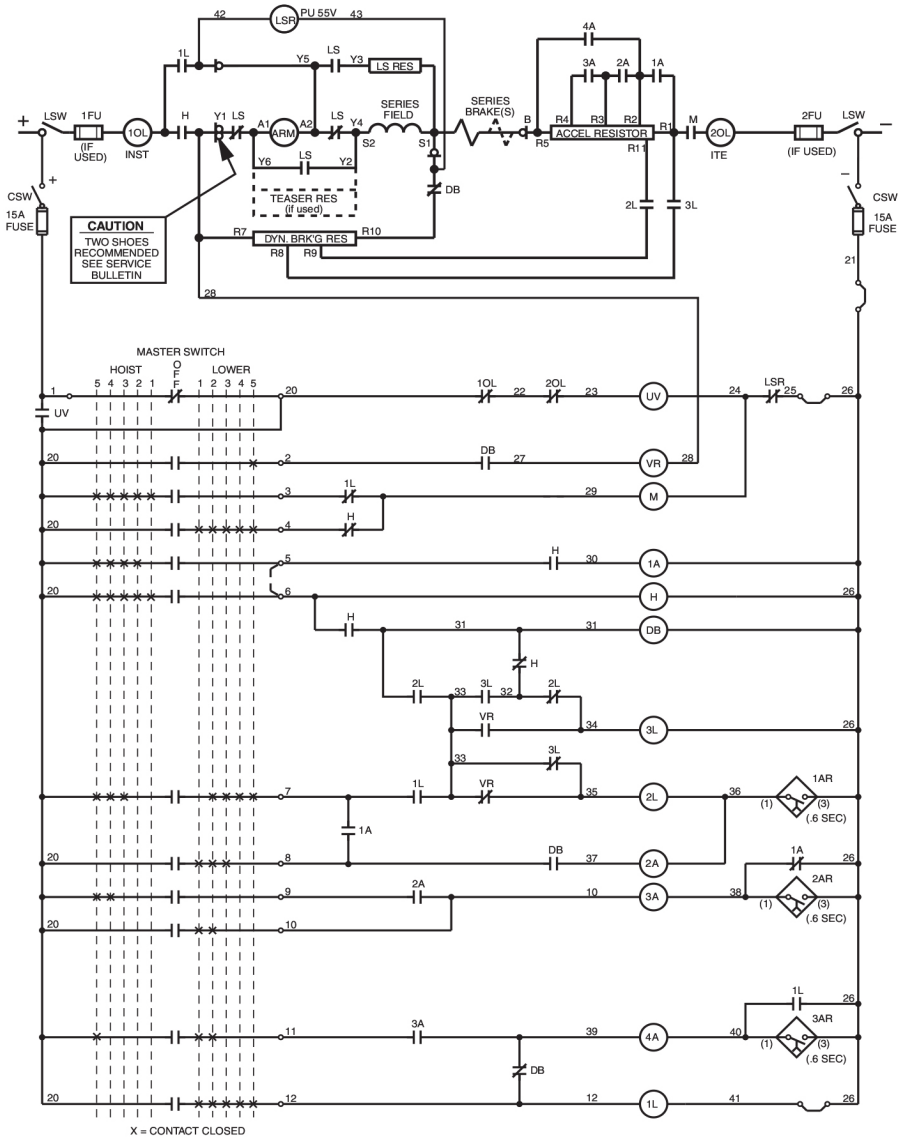


Crane Hook Speed vs. Load Performance for Class 6121 Dynamic Lower Hoist



Crane Travel Speed vs. Load Performance for Class 6121 Reversing Plugging

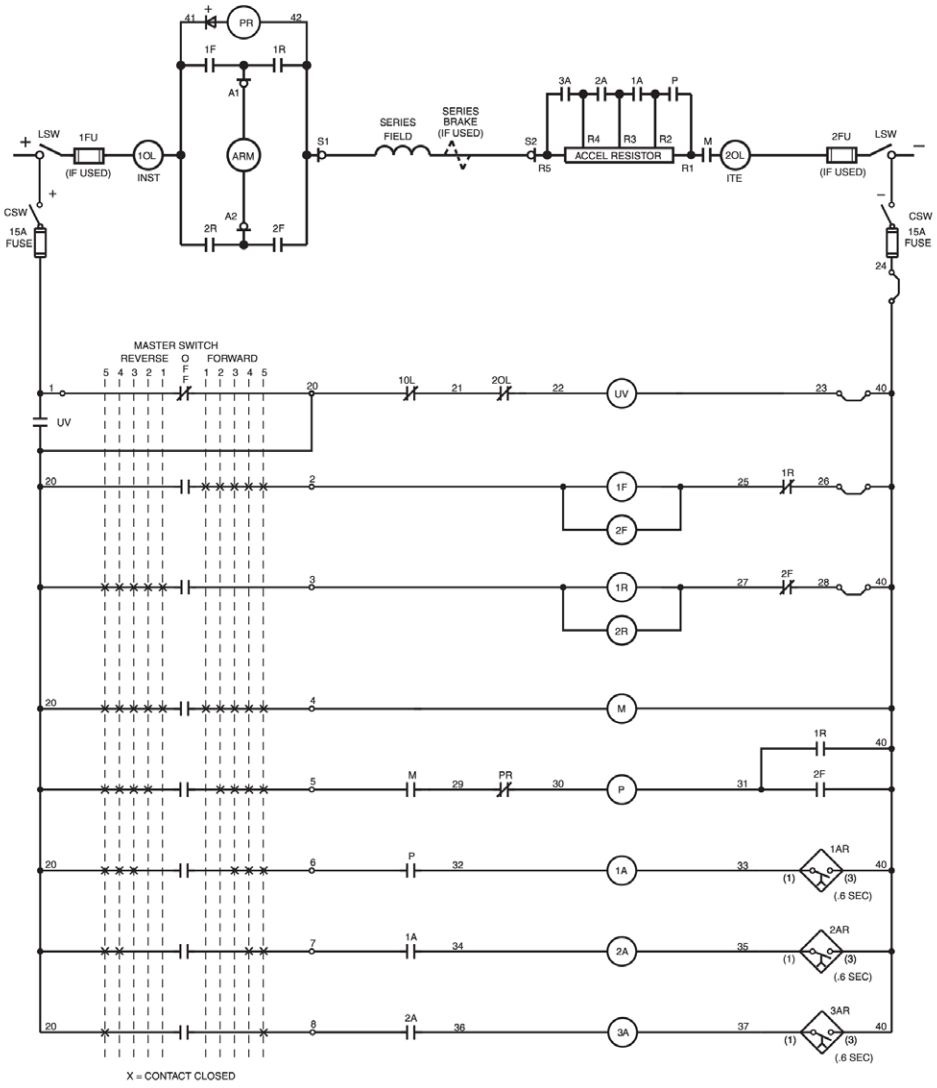
Elementary Wiring Diagram for Hoist Control



Device	Contactor Sequence (X = Power Tips Closed)												
	Hoist						Off	Lower					
		5	4	3	2	1		1	2	3	4	5	
M		X	X	X	X	X		X	X	X	X	X	
H		X	X	X	X	X							
DB							X	X					
1L								X	X	X	X	X	
2L									X	X	X		
3L												X	
1A		X	X	X	X								
2A		X	X	X					X	X			
3A		X	X					X	X				
4A		X						X	X				

Contactors 1A & 1L, 3L & H, H & 2L are mechanically interlocked.

Elementary Wiring Diagram for Bridge or Trolley Control



Device	Contactor Sequence (X = Power Tips Closed)												
	Reverse						Off	Forward					
		5	4	3	2	1		1	2	3	4	5	
1F								X	X	X	X	X	
2F								X	X	X	X	X	
1R		X	X	X	X	X							
2R		X	X	X	X	X							
M		X	X	X	X	X		X	X	X	X	X	
P		X	X	X	X				X	X	X	X	
1A		X	X	X						X	X	X	
2A		X	X								X	X	
3A		X										X	

Contactors 1R & 1F, 1F & 2R, 2R & 2F are mechanically interlocked.

Approximate Number of Separately Mounted Standard Class 6715 Tab-Weld® Resistor Sections Furnished with Class 6121 Controllers

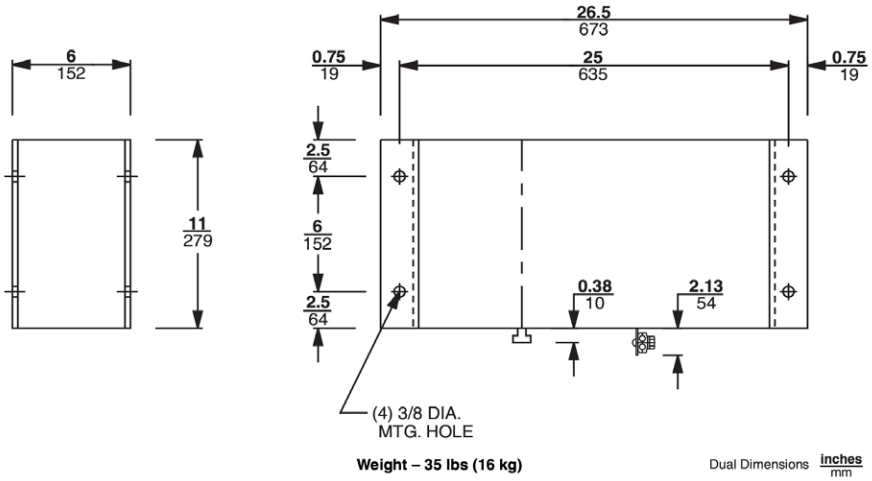
This tabulation is based on Square D resistor designs for use with Class 612 controllers only. This tabulation is for typical drive loading and may vary for any specific application.

Maximum HP Rating Single Motor (230V)	Hoist[1]			Bridge or Trolley		
	162-DL	172-DL	Teaser Field	Without Armature Shunt		Continuous Duty Slowdown Resistors[2]
				162-P	172-P	
5	5	5	3	1	1	1
7-1/2	4	2	2	1	1	1
10	3	3	2	1	2	1
15	3	3	1	2	2	2
20	3	4	1	2	3	3
25-26	4	6	1	2	3	4
30	7	8	1	3	3	4
35	6	9	1	3	4	5
39-40	6	10	1	3	4	5
45	8	11	2	4	5	6
50	10	13	2	4	6	6
60	10	15	2	4	6	7
65	11	15	2	4	6	8
70	11	14	2	5	7	11
75	11	17	2	6	7	11
90	13	17	2	6	9	13
100	16	22	2	7	9	13
135	18	30	4	9	12	—
150	21	NA	4	10	12	—
200	28	38	5	13	19	—
250	34	44	7	16	21	—
265	43	67	8	18	24	—
300	43	53	8	19	26	—
325	43	56	8	20	28	—
360-375	48	64	8	23	32	—
500	75	97	14	32	44	—

Notes:

1. Does not included YOUNGSTOWN® power limit switch resistor. Refer to Class 6170

2. Does not included acceleration resistor



Standard Class 6715 Tab-Weld® Resistor

Increase in Standard Panel Width for Commonly Used Modifications

The table below may be used to determine what increase in width in inches (mm), if any, results when modifications are added to a standard Class 6121 controller. The dimension apply only to individual modifications or combination of modifications for which they are shown.

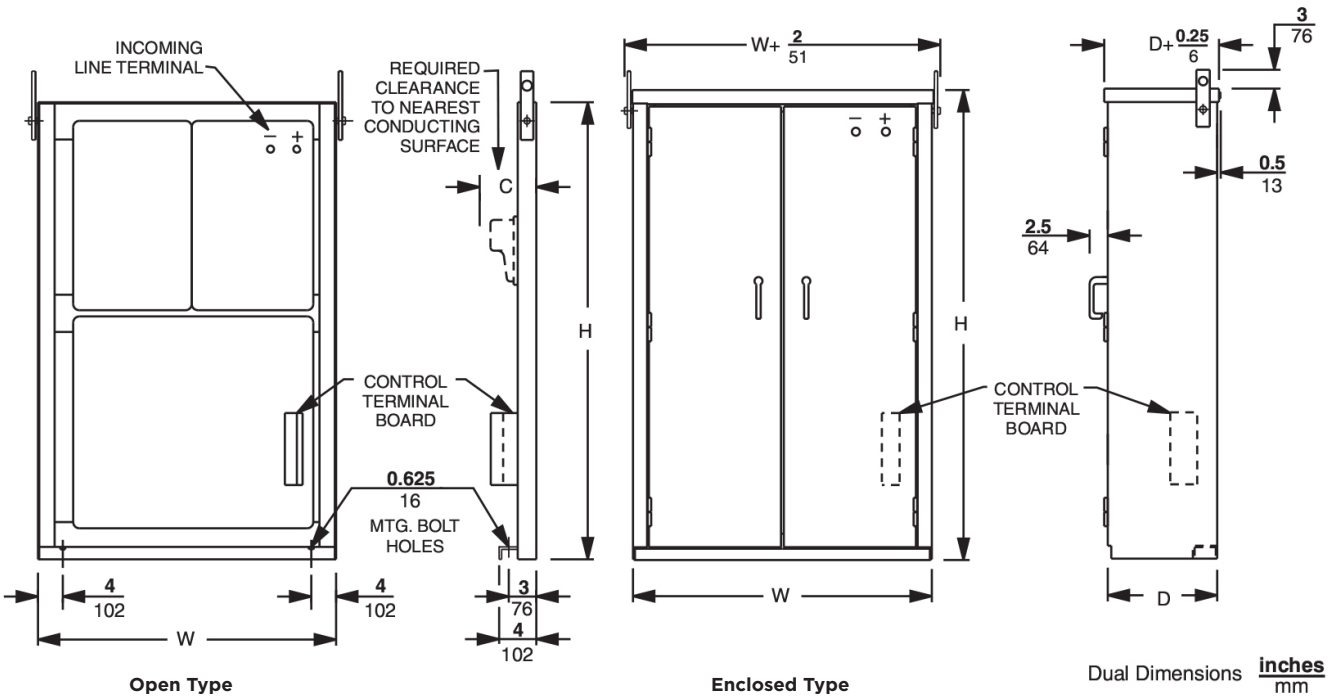
Controller Modifications

Form	Description		Maximum HP Crane Rating per Motor (230V)					
			35	55	110	225	275	500
B1[1]	Shunt Brake Relay		0	0	0	0		
B3[1]	Shunt Brake Relay		0	0	0	0		
B4[1]	Shunt Brake Relay		0	0	0	0		
B9[1]	Service Dynamic Braking		*Consult Factory*					
B10[1]	Emergency Dynamic Braking, Single Point	Single Motor Two Motors in Parallel Two Motors in Series						
B11[1]	Emergency Dynamic Braking, Auto Deceleration							
D1	Substitute fused main line knife switch for unfused main line knife switch		0	0	0	0		*Consult Factory*
G15	Ammeter Shunt, 100MV		0	0	0	0	0	0
G16	Miniature Ammeter Panel Mounted		0	0	0	0	0	0
H18	Cabinet Space Heater		0	0	0	0	0	0
M3	Additional Acceleration Point (hoist)		6 (152)	6 (152)	7 (178)	0	9 (229)	21 (533)
M3[1]	Additional Acceleration Point (bridge or trolley)		0	0	0	0		
M4[1]	Second Plugging Step		0	0	0	0		
M24	Type SSI time current acceleration module instead of Type ST timers		0	0	0	0	0	0
M52[1]	Armature Shunt Contactor (Controls Slowdown for Floor/Cab Operation)		0	0	0	0		
R1[2]	Auto-Stop Rectifier Circuit		6 (152)	6 (152)	7 (178)	0	9 (229)	21 (533)
Y17	Arc Suppressors (Required on Pendant and Radio Operated Controllers		0	0	0	0	0	0

Notes:

1. *For bridge & trolley controllers only*
2. *For hoist controllers only*

Single Motor Control Standard Floor Mounted Controllers



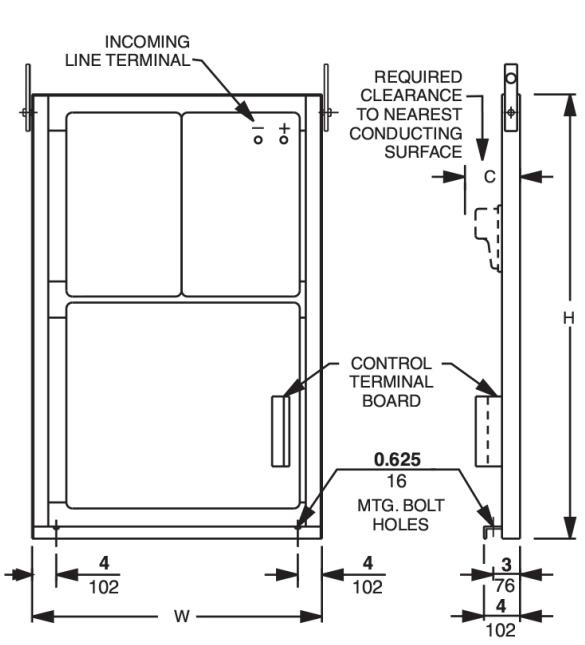
Open Type **Enclosed Type**

Drive	Maximum HP (230V)	Open Type				Enclosed Type			
		H in. (mm)	W in. (mm)	C in. (mm)	Net Weight lbs (kg)	H in. (mm)	W in. (mm)	D in. (mm)	Net Weight lbs (kg)
Hoist	35	68 (1727)	33 (838)	12 (305)	500 (227.3)	68 (1727)	33 (838)	15 (381)	700 (318.2)
	55	68 (1727)	33 (838)	12 (305)	500 (227.3)	68 (1727)	33 (838)	15 (381)	700 (318.2)
	150[1]	78 (1981)	38 (965)	15 (381)	700 (318.2)	78 (1981)	38 (965)	17 (432)	900 (409.1)
	275	72 (1829)	72 (1829)	21 (533)	1300 (590.9)	72 (1829)	72 (1829)	23 (584)	1800 (818.2)
	500	90 (2286)	99 (2515)	25 (635)	2600 (1181.8)	90 (2286)	99 (2515)	27 (686)	3700 (1681.8)
Bridge or Trolley	35	68 (1727)	33 (838)	12 (305)	500 (227.3)	68 (1727)	33 (838)	15 (381)	700 (318.2)
	55	68 (1727)	33 (838)	12 (305)	500 (227.3)	68 (1727)	33 (838)	15 (381)	700 (318.2)
	150[1]	78 (1981)	38 (965)	15 (381)	700 (318.2)	78 (1981)	38 (965)	17 (432)	900 (409.1)
	225	72 (1829)	72 (1829)	21 (533)	1200 (545.5)	72 (1829)	72 (1829)	23 (584)	1500 (681.2)

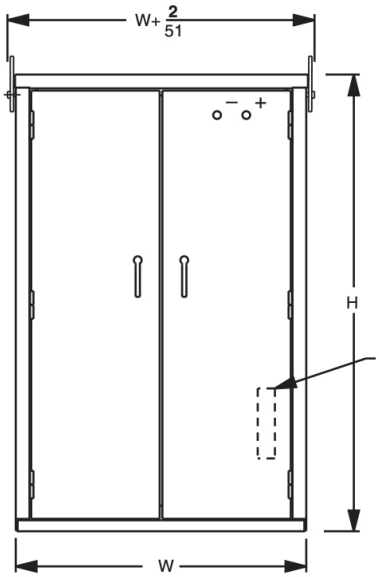
Notes:

1. Dimensions are for a 5 speed point controller. NEMA standards require 6 speeds above 110HP. Refer to form M3 for increase in panel width.

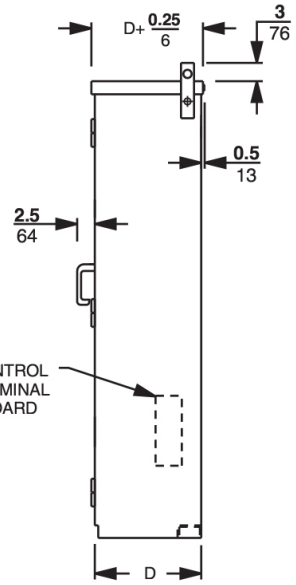
Duplex Motor Control Standard Floor Mounted Controllers



Open Type



Enclosed Type



Dual Dimensions inches / mm

Drive	Maximum HP (230V)	Open Type				Enclosed Type			
		H in. (mm)	W in. (mm)	C in. (mm)	Net Weight lbs (kg)	H in. (mm)	W in. (mm)	D in. (mm)	Net Weight lbs (kg)
Hoist	70 (2-35)	68 (1727)	66 (1676)	12 (305)	1000 (453.6)	68 (1727)	66 (1676)	15 (381)	1000 (453.6)
	110 (2-55)	68 (1727)	66 (1676)	12 (305)	1000 (453.6)	68 (1727)	66 (1676)	15 (381)	1000 (453.6)
	220 (2-110)	78 (1981)	77 (1956)	15 (381)	1400 (635.0)	78 (1981)	77 (1956)	17 (432)	1800 (818.2)
	300 (2-150)[1]	78 (1981)	56/45 (1422/1143)	15 (381)	1100 (500.0)	78 (1981)	56/45 (1422/1143)	17 (432)	1420 (645.5)
	450 (2-225)[1]	72 (1829)	72/78 (1829/1981)	21 (533)	1300 (590.9)	72 (1829)	72/78 (1829/1981)	22 (584)	1800 (818.2)
	550 (2-275)[1]	72 (1829)	72/78 (1829/1981)	21 (533)	1300 (590.9)	72 (1829)	72/78 (1829/1981)	23 (584)	1800 (818.2)
	1000 (2-500)[1]	90 (2286)	99 (2515)	25 (635)	2600 (1181.8)	90 (2286)	99 (2515)	27 (686)	3700 (1681.8)
Bridge or Trolley	70 (2-35)	68 (1727)	66 (1676)	12 (305)	1000 (453.6)	68 (1727)	66 (1676)	15 (381)	1400 (635.0)
	110 (2-55)	68 (1727)	66 (1676)	12 (305)	1000 (453.6)	68 (1727)	66 (1676)	15 (381)	1400 (635.0)
	300 (2-150)	78 (1981)	77 (1956)	15 (381)	1400 (635.0)	78 (1981)	77 (1956)	17 (432)	1800 (818.2)
	450 (2-225)[1]	72 (1829)	72 (1829)	21 (533)	1200 (545.5)	72 (1829)	72 (1829)	23 (584)	1800 (818.2)

Notes:

1. *Two control panels are required. Dimensions are given for each except:*
   The Size 5A hoist which has one panel 56" (1422 mm) wide and the second at 45" (1143 mm) wide
   The Size 6 and 6A hoists which have one panel 72" (1829 mm) wide, and one at 78" (1981 mm) wide

Rectified DC Constant Potential HWR Hoist Control

HWR hoist control is recommended for use with DC series motors on AC powered cranes requiring the speed range, accuracy and dependability of a DC powered crane hoist controller. Typically, 230 VDC rated motors are applied at either 230 VDC, 300 VDC, or 360 VDC.

The complete HWR Hoist Control system consists of:

(1) Class 6121 DC reversing dynamic lowering controller

(1) Set of Class 6715 Tab-Weld® resistors

(1) Class 9004 Master switch

(1) Rectifier power supply

Note: Consult factory for price and delivery

Comparison of Basic Characteristics of DC Series Motors and AC Wound Motors

DC Series Motor	AC Wound Rotor Motor
No Load speed is approximately two or three times full load speed	Maximum motor speed limited to hear synchronized speed for no lead and full lead
When used with a dynamic lowering controller the motor can lower rated load at a speed much greater than the rated load hoisting speed	
Maximum motor speed increases in proportion to increase in line voltage	Maximum motor speed not affected by increase in line voltage
Increased speeds result in increased horsepower without change in motor size	

HWR hoist control features a rectifier supplying 300 VDC power to a Class 6121 DC dynamic lowering hoist controller and a standard 230 VDC series wound crane hoist motor and series brake.

The 300 VDC output from the rectifier increases the developed horsepower of a 230 VDC series wound motor by 30%. Inherently, a DC series wound motor increases its hoisting speed as the load is full load speed as decreased; and with a dynamic lowering controller, has the ability to safely lower loads at greater than full load speed. As a result of the increase in developed horsepower and these inherent performance characteristics, a given hoisting cycle can be completed in the same average time by using a 230 VDC series wound motor having a horsepower rating between 50% to 65% of its AC counterpart.

Even greater performance can be obtained by increasing the voltage to the motor to 360 VDC.

Performance Comparison*

Control Type	Standard AC	Standard 230 VDC	Standard HWR 300 VDC	Optional HWR 360 VDC
Hoist Full Load	96%	100%	125%	155%
Lower Full Load	102%	230%	235%	240%
Hoist Empty Hook	99%	180%	250%	280%
Lower Empty Hook	100%	140%	175%	215%
Average	99%	148%	182%	212%

**100% speed - AC motor synchronous speed or DC rated speed at 230 VDC. A 90% efficiency is asserted.*

Number of Separately Mounted Standard Class 6715 Tab-Weld® Resistors Sections 26.5″ (673 mm) Long*

Horsepower @ 230 VDC	10	13-1/2	19	26	33	45	65	100	135	200	265	360
NEMA Class 162-DL	5	5	6	8	10	12	17	21	30	43	53	68
NEMA Class 172-DL	7	7	9	11	14	17	24	30	42	60	74	96

**Includes teaser field resistors to limit no load hoisting speed*

DC Mill Auxillary Control

DC mill auxiliary controllers are recommended for use with DC series, shunt, or compound wound motors. They are frequently used on steel mill auxiliary drives such as screwdowns, tables, sideguards, shears, and similar applications. Mill auxiliary controllers can have continuous ratings as well as intermittent and they typically include one less acceleration point than crane drives.

- Mill Duty Class 7004 type M Line-Arc® contactors & Class 7001 Type K relays
- Class 7001 Type ST-1 static acceleration timers

Five basic control types are available. The equipment supplied as standard on each of these controllers is listed below:

(1) Two pole fused control circuit knife switch (CSW)

(1) Two pole unfused main line knife switch with padlock clip (LSW)

(1) Surge suppressor for motor shunt field protection (included on panels used with shunt or compound wound motors only)

(4) Type M single-pole directional contactors with mechanical interlocks (1F, 2F, 1R, 2R)

(3 or 4) Type M single-pole acceleration contactors (including one for plugging) (1A, 2A, 3A, P)

(2 or 3) Type ST-1 static acceleration times (1AR, 2AR, 3AR)

(1) Type M single-pole negative line contactor (M)

(1) Type KP rectifier-plugging relay (PR)

(1) Undervoltage relay (UV)

(2) Magnetic overload relays (one instantaneous and one inverse time) (1OL, 2OL)

Reversing Plugging Dynamic Braking (RPD) Control

Includes the same equipment as the reversing plugging (RP) controller but with the addition of:

(1) Type M single pole spring-closed dynamic braking contactor (DB)

Non-Reversing (NR) Control

(1) Two pole fused control circuit knife switch (CSW)

(1) Two pole unfused main line knife with padlock clip (LSW)

(1) Surge suppressor for motor shunt field protection (included on panels used with shunt or compound would motors only)

(1) Type M single-pole positive line contactor (1M)

(1) Type M single-pole negative line contactor (2M)

(2 or 3) Type M single-pole acceleration contactors (1A, 2A, 3A)

(2 or 3) Type ST-1 static acceleration times (1A, 2A, 3AR)

(1) Undervoltage relay (UV)

(2) Magnetic overload relays (one instantaneous and one inverse time) (1OL, 2OL)

Non-Reversing Dynamic Braking (NRD) Control

Includes the same equipment as the non-reversing (NR) controller but with the addition of:

(1) Type M single pole spring-closed dynamic braking contactor (DB)

Reversing Plugging Dynamic Braking (RPD) Control

(1) Two pole fused control circuit knife switch (CSW)

(1) Two pole unfused main line knife with padlock clip (LSW)

(1) Surge suppressor for motor shunt field protection (included on panels used with shunt or compound would motors only)

(4) Type M single-pole directional contactors with mechanical interlocks (1F, 2F, 1R, 2R)

(2 or 3) Type M single-pole acceleration contactors with mechanical interlocks (1A, 2A, 3A)

(2 or 3) Type ST-1 static acceleration times (1AR, 2AR, 3AR)

(1) Type M single-pole negative line contactor (M)

(1) Type M single-pole spring-closed dynamic braking contactor (DB)

(1) Type KE non-plugging relay (NP)

(1) Undervoltage relay (UV)

(2) Magnetic overload relays (one instantaneous and one inverse time) (1OL, 2OL)

Duplex Motor Control - 2 Motors Connected in Parallel

The duplex controller consists of the equipment for a single motor controller with the exception that all contactors are double pole devices and one additional main line knife and two overload relays are added to the controller.

Experience you can rely on to get your crane back up to full speed quickly and easily.

GET IN TOUCH:

sales@hubbell-icd.com

(336) 434-2800

www.hubbell.com/ecm

Hubbell ICD / EC&M Brand
4301 Cheynne Drive - Archdale, NC 27263

HHI-ECM-BR-EN-02998 | 3/2025

A Hubbell brand