Contents

Size 3 and 4 Starter

Product Description

Catalog Number W201 — Non-reversing Contactors

Catalog Number W211 — Horizontal Reversing Contactors (shown above) — long axis horizontal

Catalog Number W251 — Vertical Reversing Contactors (not illustrated) — long axis vertical

Features

- Small physical size
- Brownout protection
- Communications capability
- Long electrical life
- Higher contact force

Product Selection

When Ordering Specify

- Non-reversing Catalog Number as specified in table below.
- Reversing Catalog Number as specified in table below.

Table 33-302. Advantage Contactors — 3-Pole Non-reversing and Reversing — NEMA Sizes 1 – 6

NEMA Size	Motor Voltage	Max. hp	Continuous Amperes (Enclosed)	Coil Voltage/Hz	Non-reversing		Reversing (Horizontal)		Reversing (Vertical)	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1	200 230 460 575	7-1/2 7-1/2 10 10	27	120/60 110/50	**W201K1CF** **W201K1CN**		**W211K1CF** **W211K1CN**		**W251K1CF** **W251K1CN**	
2	200 230 460 575	10 15 25 25	45	120/60 110/50	**W201K2CF** **W201K2CN**		**W211K2CF** **W211K2CN**		**W251K2CF** **W251K2CN**	
3	200 230 460 575	25 30 50 50	90	120/60 110/50	**W201K3CF** **W201K3CN**		**W211K3CF** **W211K3CN**		**W251K3CF** **W251K3CN**	
4	200 230 460 575	40 50 100 100	135	120/60 110/50	**W201K4CF** **W201K4CN**		**W211K4CF** **W211K4CN**		**W251K4CF** **W251K4CN**	
5	200 230 460 575	75 100 200 200	270	120/60 110/50	**W201K5CF** **W201K5CN**		**W211K5CF** **W211K5CN**		**W251K5CF** **W251K5CN**	
6	200 230 460 575	150 200 400 400	540	120/60 110/50	**W201K6CF** **W201K6CN**		**W211K6CF** **W211K6CN**		**W251K6CF** **W251K6CN**	

Discount Symbol **1CD1**

Contents

Size 5 and 6 Starter

Product Description

Catalog Number W200 — Non-reversing Starters (shown above)

Catalog Number W210 — Horizontal Reversing Starters — long axis horizontal.

Catalog Number W250 — Vertical Reversing Starters (not illustrated) — long axis vertical.

Features

Starter

- Small physical size
- Brownout protection
- Communications capability
- Minimized bounce times
- Higher contact force
- Common auxiliary contacts

Motor Protection

- Heaters not required — selectable settings
- Overload protection — accuracy 2%
- Phase loss and phase unbalance protection
- Ground current protection

OL Protection Settings

- Selectable automatic/manual reset
- Selectable trip class — 10, 20, 30 or no protection (disables overload)
- Selectable trip current

Technical Data

Table 33-303. Motor FLA Ranges

NEMA Size	1.15 to 1.25 Service Factor	1.0 Service Factor
1 ①	.47 – 3.81	.51 – 4.14
1	3.15 – 27.0	3.43 – 27.0
2	3.15 – 45.0	3.43 – 45.0
3	9.90 – 90.0	10.8 – 90.0
4	9.90 – 135	10.8 – 135
5	38.3 – 270	41.7 – 270
6	38.3 – 540	41.7 – 540

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

Options

Table 33-304. Optional Features

Description	Catalog Number Suffix
Omit Class II Ground-Current Protection	**Y7**
Omit Phase-Loss Protection	**Y4**
Omit both Class II Ground-Current Protection and Phase-Loss Protection	**Y4Y7**

Product Selection

When Ordering Specify

- Non-reversing Catalog Number as specified in table below.
- Reversing Catalog Number as specified in table below.

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Table 33-305. Advantage Starters — 3-Pole Non-reversing and Reversing — Wired for Separate Control — Heaters Not Required — NEMA Sizes 1 – 6

NEMA Size	Motor Voltage	Max. hp	Continuous Amperes (Enclosed)	Coil Voltage/Hz	Non-reversing		Reversing (Horizontal)		Reversing (Vertical)	
					Catalog Number	Price U.S. $	Catalog Number	Price U.S. $	Catalog Number	Price U.S. $
1 ①	200 230 460 575	1 1 2 2	27	120/60 110/50	**W200MLCFC** **W200MLCNC**		**W210MLCFC** **W210MLCNC**		**W250MLCFC** **W250MLCNC**	
1	200 230 460 575	7-1/2 7-1/2 10 10	27	120/60 110/50	**W200M1CFC** **W200M1CNC**		**W210M1CFC** **W210M1CNC**		**W250M1CFC** **W250M1CNC**	
2	200 230 460 575	10 15 25 25	45	120/60 110/50	**W200M2CFC** **W200M2CNC**		**W210M2CFC** **W210M2CNC**		**W250M2CFC** **W250M2CNC**	
3	200 230 460 575	25 30 50 50	90	120/60 110/50	**W200M3CFC** **W200M3CNC**		**W210M3CFC** **W210M3CNC**		**W250M3CFC** **W250M3CNC**	
4	200 230 460 575	40 50 100 100	135	120/60 110/50	**W200M4CFC** **W200M4CNC**		**W210M4CFC** **W210M4CNC**		**W250M4CFC** **W250M4CNC**	
5	200 230 460 575	75 100 200 200	270	120/60 110/50	**W200M5CFC** **W200M5CNC**		**W210M5CFC** **W210M5CNC**		**W250M5CFC** **W250M5CNC**	
6	200 230 460 575	150 200 400 400	540	120/60 110/50	**W200M6CFC** **W200M6CNC**		**W210M6CFC** **W210M6CNC**		**W250M6CFC** **W250M6CNC**	

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

Discount Symbol **1CD1**

Contents

Product Selection

When Ordering Specify

- Catalog Number as shown in table below.

Table 33-306. Two-Speed Advantage Starters — Wired for Separate Control — Heaters Not Required — NEMA Sizes 1 – 6

NEMA Size	Motor Voltage	Max. Horsepower		Continuous Amperes (Enclosed)	Coil Voltage/ Hz	Open Type (Horizontal)	
		Constant or Variable Torque	Constant hp			Catalog Number	Price U.S. $
For Separate (2) Winding Type Motors — Wye Wye							
1 ①	200 230 460 575	1 1 2 2	1 1 2 2	27	120/60 110/50	**W960MLCFCM3** **W960MLCNCM3**	
1	200 230 460 575	7-1/2 7-1/2 10 10	5 5 7-1/2 7-1/2	27	120/60 110/50	**W960M1CFCM3** **W960M1CNCM3**	
2	200 230 460 575	10 15 25 25	7-1/2 10 20 20	45	120/60 110/50	**W960M2CFCM3** **W960M2CNCM3**	
3	200 230 460 575	25 30 50 50	20 25 40 40	90	120/60 110/50	**W960M3CFCM3** **W960M3CNCM3**	
4	200 230 460 575	40 50 100 100	30 40 75 75	135	120/60 110/50	**W960M4CFCM3** **W960M4CNCM3**	
5	200 230 460 575	75 100 200 200	60 75 150 150	270	120/60 110/50	**W960M5CFCM3** **W960M5CNCM3**	
6	200 230 460 575	150 200 400 400	100 150 300 300	540	120/60 110/50	**W960M6CFCM3** **W960M6CNCM3**	

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

Discount Symbol **1CD1**

Table 33-306. Two-Speed Advantage Starters — Wired for Separate Control — Heaters Not Required — NEMA Sizes 1– 6 (Continued)

NEMA Size	Motor Voltage	Max. Horsepower		Continuous Amperes (Enclosed)	Coil Voltage/ Hz	Open Type (Horizontal)	
		Constant or Variable Torque	Constant hp			Catalog Number	Price U.S. $
For Single Winding Type Motors Constant Horsepower							
1 ①	200 230 460 575	—	1 1 2 2	27	120/60 110/50	**W970MLCFCM3** **W970MLCNCM3**	
1	200 230 460 575	—	5 5 7-1/2 7-1/2	27	120/60 110/50	**W970M1CFCM3** **W970M1CNCM3**	
2	200 230 460 575	—	7-1/2 10 20 20	45	120/60 110/50	**W970M2CFCM3** **W970M2CNCM3**	
3	200 230 460 575	—	20 25 40 40	90	120/60 110/50	**W970M3CFCM3** **W970M3CNCM3**	
4	200 230 460 575	—	30 40 75 75	135	120/60 110/50	**W970M4CFCM3** **W970M4CNCM3**	
5	200 230 460 575	—	60 75 150 150	270	120/60 110/50	**W970M5CFCM3** **W970M5CNCM3**	
6	200 230 460 575	—	100 150 300 300	540	120/60 110/50	**W970M6CFCM3** **W970M6CNCM3**	
For Single Winding Type Motors (Constant or Variable Torque)							
1 ①	200 230 460 575	1 1 2 2	—	27	120/60 110/50	**W980MLCFCM3** **W980MLCNCM3**	
1	200 230 460 575	7-1/2 7-1/2 10 10	—	27	120/60 110/50	**W980M1CFCM3** **W980M1CNCM3**	
2	200 230 460 575	10 15 25 25	—	45	120/60 110/50	**W980M2CFCM3** **W980M2CNCM3**	
3	200 230 460 575	25 30 50 50	—	90	120/60 110/50	**W980M3CFCM3** **W980M3CNCM3**	
4	200 230 460 575	40 50 100 100	—	135	120/60 110/50	**W980M4CFCM3** **W980M4CNCM3**	
5	200 230 460 575	75 100 200 200	—	270	120/60 110/50	**W980M5CFCM3** **W980M5CNCM3**	
6	200 230 460 575	150 150 400 400	—	540	120/60 110/50	**W980M6CFCM3** **W980M6CNCM3**	

① For motor full load current (FLA) range of .47A – 3.81A with a 1.15 to 1.25 service factor and for motor hp range of 1/4 hp to 2 hp at 460V.

Discount Symbol **1CD1**

Table 33-307. Electrical Characteristics, Sizes 1 – 6

Description	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Maximum Voltage Rating	600V	600V	600V	600V	600V	600V
Ampere Rating — Open	30A	50A	100A	150A	300A	600A
— Enclosed	27A	45A	90A	135A	270A	540A
Maximum Horsepower — Squirrel Cage Motor						
200V, 60 Hz	7-1/2 hp	10 hp	25 hp	40 hp	75 hp	150 hp
230V, 60 Hz	7-1/2 hp	15 hp	30 hp	50 hp	100 hp	200 hp
380V, 50 Hz	10 hp	25 hp	50 hp	75 hp	150 hp	300 hp
460 – 575V, 60 Hz	10 hp	25 hp	50 hp	100 hp	200 hp	400 hp
Resistive Heating, kW ① — Three-Phase, 3-Pole						
120V	5 kW	8.5 kW	17 kW	26 kW	52 kW	105 kW
240V	10 kW	17 kW	34 kW	68 kW	105 kW	210 kW
480V	20 kW	34 kW	68 kW	105 kW	210 kW	415 kW
600V	25 kW	43 kW	86 kW	130 kW	260 kW	515 kW
Capacitor Switching kVAR — Three-Phase						
240V	—	12 kVAR	27 kVAR	40 kVAR	80 kVAR	160 kVAR
480V	—	25 kVAR	53 kVAR	80 kVAR	160 kVAR	320 kVAR
600V	—	32 kVAR	67 kVAR	100 kVAR	200 kVAR	400 kVAR
Transformer Switching, kVA ② — Three-Phase, 3-Pole						
208V	3.6 kVA	6.3 kVA	12 kVA	20 kVA	41 kVA	81 kVA
240V	4.3 kVA	7.2 kVA	14 kVA	23 kVA	47 kVA	94 kVA
480V	8.5 kVA	14 kVA	28 kVA	47 kVA	94 kVA	188 kVA
600V	11 kVA	18 kVA	35 kVA	59 kVA	117 kVA	234 kVA

① Resistive loads having inrush currents not exceeding 1.5 times continuous rating.
② Transformers having inrush currents not more than 20 times peak of continuous current ratings.

Table 33-308. 380V, 50 Hz Starters — Maximum Horsepower Ratings

NEMA Size	1	2	3	4	5	6
Maximum hp	10	25	50	75	150	300

Ground Current Sensing Protection

Eaton's Cutler-Hammer Advantage starters with ground current sensing protection feature provide equipment protection against ground currents between a factory-set low level and a lockout current. It is designed to open the circuit when it senses the low-level and arcing ground currents often occurring in motor branch circuits. This feature is standard with Cutler-Hammer Advantage starters. The ground current sensing protection feature can either be omitted from devices supplied by the factory, or omitted in the field by modifying the device with an Advantage Programming Module (WAPM).

Note: These devices are NOT Ground Fault Interrupters (GFIs) designed to protect people. Additionally, branch circuit short-circuit protective devices are to be used to clear faults that exceed the interrupting rating of the starter.

Table 33-309. Ground Current Sensing

Size	Trip Current	Lockout Current	Trip Time
IL	10	24	.4 sec.
1	10	48	.4 sec.
2	20	86	.4 sec.
3	40	171	.4 sec.
4	60	256	.4 sec.
5	240	1045	.4 sec.
6	240	1045	.4 sec.

The table above gives trip amperes and lockout amperes for each size of the starter. Lockout current is the sum of the phase current and ground current.

Phase Unbalance

If the unbalance of any two phases is greater than 30% of the DIP switch selected trip rating of the starter, a phase unbalance is declared and a trip occurs. No time delay is required for reset. This feature is standard in the Cutler-Hammer Advantage starter. To customize your protection, phase unbalance can be omitted by disabling the protection using an Advantage Programming Module (WAPM).

Phase Loss

The Advantage starter will trip on phase loss, after two seconds, if the current in any one phase is lower than the currents listed in the table below. No time delay is required for reset. Phase loss protection is standard on the Cutler-Hammer Advantage starter. The phase loss protection feature can either be omitted from devices supplied by the factory, or omitted in the field by modifying the device with an Advantage Programming Module (WAPM).

Table 33-310. Phase Trip Time

	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Phase Unbalance Level	30% Unbalance					
Phase Unbalance Trip Delay	6 sec.		9 sec.		12 sec.	
Phase Loss Trip after 2 sec. if Phase Current is below:	.15A ③ 1.15A	1.15A	2.5A	2.5A	11A	11A

③ Size 1 Lower Current Range for motor hp range of 1/4 hp to 2 hp at 460V.

Table 33-311. Operating Coil Characteristics at Rated Coil Volts, Sizes 1 – 6

Description	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
AC Coil						
Burden — Inrush VA	250 VA	250 VA	500 VA	500 VA	2600 VA	2600 VA
Closed VA	25 VA	25 VA	50 VA	50 VA	50 VA	50 VA
Closed Watts	5W	5W	10W	10W	10W	10W
Pick-Up Volts ①	78V	78V	78V	78V	78V	78V
Drop-Out Volts ①	60V	60V	60V	60V	60V	60V
Recommended VA rating for machine tool control power transformers	100 VA	100 VA	150 VA	150 VA	300 VA	300 VA

Note: The above represent typical production test values and should not be interpreted as a guarantee of actual performance.
① Values may vary based upon control power transformer capacities.

Advantage contactors will withstand 110% of their rated voltage continuously without injury to the operating coils and will close successfully at 65% of their rated voltage.

Table 33-312. Mechanical Characteristics — Sizes 1 – 6

Description	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
Dimensions in Inches (mm)						
Height	6.50 (165.1)	6.50 (165.1)	8.00 (203.2)	8.00 (203.2)	10.08 (256.0)	10.08 (256.0)
Width	2.50 (63.5)	2.50 (63.5)	3.68 (93.5)	3.68 (93.5)	7.07 (179.6)	7.07 (179.6)
Depth	4.96 (126.0)	4.96 (126.0)	6.54 (166.1)	6.54 (166.1)	7.64 (194.1)	7.64 (194.1)
Panel area, square inches	16.25	16.25	29.44	29.44	71.27	71.27
Shipping weight, lbs.	2.00	2.00	6.00	6.00	30.00	30.00
Maximum cable size/phase copper — AWG/MCM ②	8 AWG	4 AWG	250 MCM ②	250 MCM ②	(1) 500 MCM ②	(2) 500 MCM ②
Auxiliary Electrical Circuits Available	8	8	8	8	8	8
Maximum wire size for auxiliary electrical circuit — AWG	12	12	12	12	12	12
Maximum wire size for control circuit — AWG	(2) 14	(2) 14	(2) 14	(2) 14	(2) 14	(2) 14
Mechanical interlock combinations available	Vert. Horiz.	Vert. Horiz.	Vert. Horiz.	Vert. Horiz.	Vert. Horiz.	Vert. Horiz.

② Also referenced as "kcmil" (1990 NEC).

Motor FLA, Three-Phase AC

Table 33-313. Data from Table 430-150 of 1990 NEC

Horsepower	Squirrel Cage AC			
	200V	230V	460V	575V
1/4	1.15	1	.6	.5
1/2	2.3	2.0	1.0	.8
3/4	3.2	2.8	1.4	1.1
1	4.1	3.6	1.8	1.4
1-1/2	6.0	5.2	2.6	2.1
2	7.8	6.8	3.4	2.7
3	11.0	9.6	4.8	3.9
5	17.5	15.2	7.6	6.1
7-1/2	25.3	22	11	9
10	32.2	28	14	11
15	48.3	42	21	17
20	62.1	54	27	22
25	78.2	68	34	27
30	92	80	40	32
40	120	104	52	41
50	150	130	65	52
60	177	154	77	62
75	221	192	96	77
100	286	248	124	99
125	359	312	156	125
150	414	360	180	144
200	552	480	240	192

Note: These current values are for motors running at usual speeds and with normal torque characteristics. Motors for special low speed or high torque may require higher current. In all cases, OL trip current setting should be selected on basis of information on motor nameplate or motor card data.

Table 33-314. Temperature Specifications, Sizes 1 – 6

Ambient Temperature	
Storage	-40° to 100°C (-40° to 212°F)
Operating	-40° to 40°C (-40° to 104°F)
External (NEMA Enclosed)	-40° to 40°C (-40° to 104°F)

Table 33-315. DIP Switch Overload Protection Settings

Reset Method	Position 8
MANUAL (Non-automatic — wait 5 minutes)	0
AUTOMATIC (Reset time is based on protection Class)	1

Overload Class	Position 7	Position 6
10	0	0
20	0	1
30	1	0
None	1	1

Overload Trip Current Settings

Full Voltage Starters

To select the overload current trip setting, find the starter size table. Locate the full load current from motor nameplate in column A or B. Change DIP switch positions 5 – 1 to correspond to the table.

Reduced Voltage Starters

Multiply the full load current from motor nameplate by factor below for your type of reduced voltage starter. Find this adjusted full load current in starter Size table in Column A or B. Change DIP switch positions 5 – 1 to correspond to the table.

Table 33-316. Factor

Catalog Number	Multiplier Factor
W600 Autotransformer	1.0
W700 Part Winding	.5
W800, W890 Wye-Delta	.575

Table 33-317. Size 1 — Lower Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ① (Positions) (54321)
Min.	Max.	Min.	Max.		
.47 –	.51	.51 –	.56	.59	00000
.52 –	.56	.57 –	.61	.65	00001
.57 –	.61	.62 –	.67	.71	00010
.62 –	.68	.68 –	.74	.78	00011
.69 –	.75	.75 –	.82	.86	00100
.76 –	.82	.83 –	.89	.95	00101
.83 –	.90	.90 –	.98	1.04	00110
.91 –	1.00	.99 –	1.09	1.14	00111
1.01 –	1.09	1.10 –	1.19	1.26	01000
1.10 –	1.21	1.20 –	1.31	1.38	01001
1.22 –	1.33	1.32 –	1.44	1.52	01010
1.34 –	1.46	1.45 –	1.59	1.67	01011
1.47 –	1.61	1.60 –	1.75	1.84	01100
1.62 –	1.77	1.76 –	1.93	2.02	01101
1.78 –	1.95	1.94 –	2.12	2.23	01110
1.96 –	2.14	2.13 –	2.33	2.45	01111
2.15 –	2.36	2.34 –	2.56	2.69	10000
2.37 –	2.60	2.57 –	2.82	2.96	10001
2.61 –	2.85	2.83 –	3.10	3.26	10010
2.86 –	3.14	3.11 –	3.42	3.58	10011
3.15 –	3.46	3.43 –	3.76	3.94	10100
3.47 –	3.81	3.77 –	4.14	4.34	10101

① All settings not shown are equivalent to 00000.

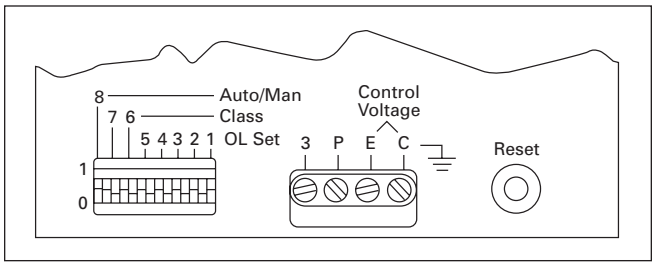


Figure 33-72. DIP Switch, Terminals and Reset

Table 33-318. Size 1 — Upper Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ② (Positions) (54321)
Min.	Max.	Min.	Max.		
3.15 –	3.46	3.43 –	3.75	3.93	00000
3.47 –	3.81	3.76 –	4.13	4.33	00001
3.82 –	4.19	4.14 –	4.55	4.77	00010
4.20 –	4.61	4.56 –	4.99	5.25	00011
4.62 –	5.0	5.00 –	5.4	5.77	00100
5.2 –	5.5	5.5 –	6.0	6.35	00101
5.6 –	6.0	6.1 –	6.5	6.9	00110
6.1 –	6.6	6.6 –	7.2	7.7	00111
6.7 –	7.3	7.3 –	8.0	8.5	01000
7.4 –	8.1	8.1 –	8.8	9.3	01001
8.2 –	8.9	8.9 –	9.6	10.2	01010
9.0 –	9.8	9.7 –	10.6	11.2	01011
9.9 –	0.8	10.7 –	11.7	12.4	01100
10.9 –	11.9	11.8 –	12.9	13.6	01101
12.0 –	13.1	13.0 –	14.2	15.0	01110
13.2 –	14.4	14.3 –	15.7	16.5	01111
14.5 –	15.8	15.8 –	17.2	18.1	10000
15.9 –	17.4	17.3 –	18.9	19.9	10001
17.5 –	19.2	19.0 –	20.9	21.9	10010
19.3 –	21.1	21.0 –	22.9	24.1	10011
21.2 –	23.3	23.0 –	25.2	26.5	10100
23.4 –	25.6	25.3 –	27.0	29.1	10101
25.7 –	27.0	—	—	32.1	10110

② All settings not shown are equivalent to 00000.

Table 33-319. Size 2 — Current Range

Column A Service Factor 1.15 to 1.25		Column B Service Factor 1.0		Trip Rating Amperes	DIP Switch Setting ③ (Positions) (54321)
Min.	Max.	Min.	Max.		
3.15 –	3.46	3.43 –	3.75	3.93	00000
3.47 –	3.81	3.76 –	4.13	4.33	00001
3.82 –	4.19	4.14 –	4.55	4.77	00010
4.20 –	4.61	4.56 –	4.99	5.25	00011
4.62 –	5.0	5.00 –	5.4	5.77	00100
5.1 –	5.5	5.5 –	6.0	6.35	00101
5.6 –	6.0	6.1 –	6.5	6.9	00110
6.1 –	6.6	6.6 –	7.2	7.7	00111
6.7 –	7.3	7.3 –	8.0	8.5	01000
7.4 –	8.1	8.1 –	8.8	9.3	01001
8.2 –	8.9	8.9 –	9.6	10.2	01010
9.0 –	9.8	9.7 –	10.6	11.2	01011
9.9 –	10.8	10.7 –	11.7	12.4	01100
10.9 –	11.9	11.8 –	12.9	13.6	01101
12.0 –	13.1	13.0 –	14.2	15.0	01110
13.2 –	14.4	14.3 –	15.7	16.5	01111
14.5 –	15.8	15.8 –	17.2	18.1	10000
15.9 –	17.4	17.3 –	18.9	19.9	10001
17.5 –	19.2	19.0 –	20.9	21.9	10010
19.3 –	21.1	21.0 –	22.9	24.1	10011
21.2 –	23.2	23.0 –	25.2	26.5	10100
23.3 –	25.6	25.3 –	27.8	29.1	10101
25.7 –	28.1	27.9 –	30.5	32.1	10110
28.2 –	31.0	30.6 –	33.7	35.3	10111
31.1 –	34.1	33.8 –	37.0	38.9	11000
34.2 –	37.5	37.1 –	40.7	42.8	11001
37.6 –	41.2	40.8 –	44.8	47.0	11010
41.3 –	45.0	44.9 –	45.0	51.6	11011

③ All settings not shown are equivalent to 00000.

Overload Trip Current Settings (Continued)

Table 33-320. Size 3 Current Range

Column A Service Factor 1.15 to 1.25 Min.	Column A Service Factor 1.15 to 1.25 Max.	Column B Service Factor 1.0 Min.	Column B Service Factor 1.0 Max.	Trip Rating Amperes	DIP Switch Setting ① (Positions) (54321)
9.9	10.8	10.8	11.7	12.4	00000
10.9	11.9	11.8	12.9	13.6	00001
12.0	13.1	13.0	14.2	15.0	00010
13.2	14.4	14.3	15.6	16.5	00011
14.5	15.8	15.7	17.2	18.1	00100
15.9	17.3	17.3	18.9	19.9	00101
17.5	19.2	19.0	20.9	21.9	00110
19.3	21.1	21.0	22.9	24.1	00111
21.2	23.2	23.0	25.2	26.5	01000
23.3	25.6	25.3	27.8	29.1	01001
25.7	28.1	27.9	30.6	32.1	01010
28.2	30.9	30.7	33.6	35.3	01011
31.0	34.1	33.7	37.0	38.8	01100
34.2	37.5	37.1	40.8	42.7	01101
37.6	41.3	40.9	44.9	47.0	01110
41.4	45.4	45.0	49.4	51.7	01111
45.5	50.0	49.5	54.3	56.9	10000
50.1	54.9	54.4	59.7	62.6	10001
55.0	60.5	59.8	65.7	68.8	10010
60.6	66.5	65.8	72.3	75.7	10011
66.6	73.2	72.4	79.6	83.3	10100
73.3	80.7	79.7	87.7	91.6	10101
80.8	88.7	87.8	90.0	101.0	10110
88.8	90.0	—	—	111.0	10111

① All settings not shown are equivalent to 00000.

Table 33-321. Size 4 Current Range

Column A Service Factor 1.15 to 1.25 Min.	Column A Service Factor 1.15 to 1.25 Max.	Column B Service Factor 1.0 Min.	Column B Service Factor 1.0 Max.	Trip Rating Amperes	DIP Switch Setting ② (Positions) (54321)
9.9	10.8	10.8	11.7	12.4	00000
10.9	11.9	11.8	12.9	13.6	00001
12.0	13.1	13.0	14.2	15.0	00010
13.2	14.4	14.3	15.6	16.5	00011
14.5	15.8	15.7	17.2	18.1	00100
15.9	17.4	17.3	18.9	19.9	00101
17.5	19.2	19.0	20.9	21.9	00110
19.3	21.1	21.0	22.9	24.1	00111
21.2	23.2	23.0	25.2	26.5	01000
23.3	25.6	25.3	27.8	29.1	01001
25.7	28.1	27.9	30.6	32.1	01010
28.2	30.9	30.7	33.6	35.3	01011
31.0	34.1	33.7	37.0	38.8	01100
34.2	37.5	37.1	40.8	42.7	01101
37.6	41.3	40.9	44.9	47.0	01110
41.4	45.4	45.0	49.4	51.7	01111
45.5	50.0	49.5	54.3	56.9	10000
50.1	54.9	54.4	59.7	62.6	10001
55.0	60.5	59.8	65.7	68.8	10010
60.6	66.5	65.8	72.3	75.7	10011
66.6	73.2	72.4	79.6	83.3	10100
73.3	80.7	79.7	87.7	91.6	10101
80.8	88.7	87.8	96.4	101	10110
88.8	97.5	96.5	105	111	10111
97.6	106	106	116	122	11000
107	117	117	127	134	11001
118	129	128	133	147	11010
130	133	—	—	162	11011

② All settings not shown are equivalent to 00000.

Table 33-322. Size 5 Current Range

Column A Service Factor 1.15 to 1.25 Min.	Column A Service Factor 1.15 to 1.25 Max.	Column B Service Factor 1.0 Min.	Column B Service Factor 1.0 Max.	Trip Rating Amperes	DIP Switch Setting ③ (Positions) (54321)
38.3	41.9	41.7	45.6	47.9	00000
42.0	46.1	45.7	50.1	52.5	00001
46.2	51.0	50.2	55.5	57.7	00010
51.1	55.9	55.6	60.8	63.9	00011
56.0	61.7	60.9	67.1	70.0	00100
61.8	67.5	67.2	73.4	77.3	00101
67.6	74.9	73.5	81.4	84.5	00110
75.0	82.3	81.5	89.5	93.7	00111
82.4	90.3	89.6	98.2	103	01000
90.4	99.9	98.3	108	113	01001
100	109	109	118	125	01010
110	120	119	130	137	01011
121	132	131	143	151	01100
133	145	144	157	166	01101
146	159	158	173	182	01110
160	175	174	190	200	01111
176	193	191	209	220	10000
194	213	210	231	242	10001
214	233	232	254	267	10010
234	257	255	270	293	10011
258	270	—	—	322	10100

③ All settings not shown are equivalent to 00000.

Table 33-323. Size 6 Current Range

Column A Service Factor 1.15 to 1.25 Min.	Column A Service Factor 1.15 to 1.25 Max.	Column B Service Factor 1.0 Min.	Column B Service Factor 1.0 Max.	Trip Rating Amperes	DIP Switch Setting ④ (Positions) (54321)
38.3	41.9	41.7	45.6	47.9	00000
42.0	46.1	45.7	50.1	52.5	00001
46.2	51.0	50.2	55.5	57.7	00010
51.1	55.9	55.6	60.8	63.9	00011
56.0	61.7	60.9	67.1	70.0	00100
61.8	67.5	67.2	73.4	77.3	00101
67.6	74.9	73.5	81.4	84.5	00110
75.0	82.3	81.5	89.5	93.7	00111
82.4	90.3	89.6	98.2	103	01000
90.4	99.9	98.3	108	113	01001
100	109	109	118	125	01010
110	120	119	130	137	01011
121	132	131	143	151	01100
133	145	144	157	166	01101
146	159	158	173	182	01110
160	175	174	190	200	01111
176	193	191	209	220	10000
194	213	210	231	242	10001
214	233	232	254	267	10010
234	257	255	279	293	10011
258	282	280	307	322	10100
283	311	308	338	354	10101
312	342	339	372	390	10110
343	376	373	409	429	10111
377	414	410	450	471	11000
415	456	451	496	519	11001
457	501	497	540	571	11010
502	540	—	—	628	11011

④ All settings not shown are equivalent to 00000.

Short Circuit Ratings

Table 33-324. Short-Circuit Ratings

Short-Circuit Protective Device (SCPD)	Max. Rating (SCPD)	Circuit Breaker Interrupting Rating	Short-Circuit Withstand Rating		Typical Disconnect Device
			Current	Voltage	
Size 1					
Class H Fuse	60A	—	5,000A	600V	30A DS Sw.
Class J, R or T Fuse	60A	—	100,000A 50,000A	480V 600V	30A DS Sw.
			65,000A	600V	100A FD-K Molded Case Sw.
Magnetic Only ① Type CB ②	3A	—	100,000A 25,000A	480V 600V	HMCP HMCPS
	7A	—	100,000A 25,000A	480V 600V	HMCPS
	15A	—	100,000A 25,000A	480V 600V	HMCP
	30A	—	100,000A 25,000A	480V 600V	HMCP
Thermal Magnetic Type CB ③	50A	65,000A 25,000A	65,000A 25,000A	480V 600V	HFD
		100,000A 35,000A	100,000A 35,000A	480V 600V	FDC
Magnetic Only Type CB plus CL ④	30A	—	100,000A	600V	HMCP plus CL
Thermal/Mag. Type CB plus CL ⑤	50A	150,000A	100,000A	600V	HFD plus CL
Size 2					
Class H Fuse	100A	—	5,000A	600V	60A DS Sw.
Class J, R or T Fuse	100A	—	100,000A 50,000A	480V 600V	60A DS Sw.
			65,000A	600V	100A FD-K Molded Case Sw.
Magnetic Only ① Type CB ②	50A	—	100,000A 25,000A	480V 600V	HMCP
Thermal Magnetic Type CB ③	90A	65,000A 25,000A	65,000A 25,000A	480V 600V	HFD
		100,000A 35,000A	100,000A 35,000A	480V 600V	FDC
Magnetic Only Type CB plus CL ④	50A	—	100,000A	600V	HMCP plus CL
Thermal/Mag. Type CB plus CL ⑤	90A	150,000A	100,000A	600V	HFD plus CL
Size 3					
Class H Fuse	350A	—	5,000A	600V	100A DS Sw.
Class R Fuse	200A	—	100,000A 65,000A	480V 600V	100A FD-K Molded Case Sw.
Class J or T Fuse	200A	—	100,000A 65,000A	480V 600V	100A FD-K Molded Case Sw.
Magnetic Only ① Type CB ②	200A	—	100,000A 25,000A	480V 600V	HMCP
Thermal Magnetic	150A	65,000A 25,000A	65,000A 25,000A	480V 600V	HFD
		100,000A 35,000A	100,000A 35,000A	480V 600V	FDC
Magnetic Only Type CB plus CL ④	100A	—	100,000A	600V	HMCP plus CL
Thermal/Mag. Type CB plus CL ⑤	150A	150,000A	100,000A	600V	HFD plus CL

Short-Circuit Protective Device (SCPD)	Max. Rating (SCPD)	Circuit Breaker Interrupting Rating	Short-Circuit Withstand Rating		Typical Disconnect Device
			Current	Voltage	
Size 4					
Class H Fuse	500A	—	10,000A	600V	200A DS Sw.
Class J Fuse	400A	—	100,000A 65,000A	480V 600V	250A JD-K Molded Case Sw.
Class R or Class T Fuse	400A	—	100,000A 65,000A	480V 600V	250A JD-K Molded Case Sw.
Magnetic Only ① Type CB ②	150A	—	100,000A 50,000A	480V 600V	HMCP
Thermal Magnetic Type CB ③	250A	100,000A 35,000A	100,000A 50,000A	480V 600V	JDC
		65,000A 25,000A	65,000A 25,000A	480V 600V	HJD
Magnetic Only Type CB plus CL ④	150A	—	100,000A	600V	HMCP plus CL
Size 5					
Class H Fuse	600A	—	10,000A	600V	400A KD-K Molded Case Sw.
Class J, R or T Fuse	600A	—	100,000A	600V	
Magnetic Only ① Type CB ②	250A	—	100,000A 25,000A	480V 600V	HMCP
	400A	—	100,000A 25,000A	480V 600V	
Thermal Magnetic Type CB ③	400A	65,000A 50,000A 35,000A	65,000A 100,000A 25,000A	480V 600V 600V	HFD KDC HKD
Size 6					
Class J, R or T Fuse	600A	—	100,000A 65,000A	480V 600V	600A LD-K Molded Case Sw.
Class L Fuse	800A	—	100,000A 65,000A	480V 600V	600A LD-K Molded Case Sw.
Magnetic Only ① Type CB ②	600A	—	100,000A 25,000A	480V 600V	HMCP
	800A	—	65,000A 25,000A	480V 600V	Magnetic Only HMCP
Thermal Magnetic Type CB ③	600A	65,000A 25,000A	65,000A 35,000A	480V 600V	HLD
	800A	50,000A 25,000A	65,000A 25,000A	480V 600V	Thermal Magnetic HMC
Thermal/Mag. with CL ⑤	800A	200,000A	100,000A	600V	NB Tri-Pac

① Instantaneous adjustable trip.
② Circuit breaker.
③ Inverse time circuit breaker.
④ Instantaneous adjustable trip with current limiting attachment.
⑤ Inverse time with built-in current limiting attachment.

Full Voltage Pushbutton Control Module

Metering Module

Cutler-Hammer® Advantage Control Modules (ACMs) from Eaton's electrical business provide a cost-effective alternative to pushbuttons, selector switches, indicating lights, reset mechanisms, bell alarms and panel meters when used with the Advantage product line. Typical input/output control functions provided by panel mounted devices are conveniently packaged in a series of modules depending on application and complexity.

Sixteen styles cover applications ranging from:

- Full voltage non-reversing
- Full voltage reversing
- Full voltage multispeed
- Reduced voltage
- DeviceNet compatible

Modules exist for each application to provide the functions of:

- Status only
  - ❑ Indicating lights
  - ❑ Reset
- Status, START/STOP and RESET
- Status, HOA and RESET
- Status, START/STOP/HOA and RESET

An additional Metering Module replaces conventional ammeters (three-phase), replaces reset mechanisms and displays trip cause and data, control voltage and status.

This Metering Module can be used independently or in conjunction with any of the ACMs. An extra plug connection is available on the rear of each ACM to accept the Metering Module input.

The ACM family has been designed to save:

- Panel space (versus conventional pushbuttons, selector switches and indicating lights)
- Mounting and assembly labor
- Wiring and installation time

Regardless of the configuration, installation requires mounting only one 2.25 x 3.5 inch module, substantially reducing space requirements. Fitting a standard Greenlee punch and die set, Greenlee #60071, installation is accomplished with only two screws.

ACMs provide savings in wiring costs as well. Regardless of the complexity of the application, wiring is reduced to a single plug-in cable, see photo at left.

Communication is not restricted by use of the Advantage Control Modules. An extra plug connection is available on the rear of the ACM or Metering Module to allow a WPONIDNA or WPONI Communications module to be plugged in.

Full Voltage and Reduced Voltage Control Modules

Status Only

- 4 LEDs indicate that the motor is OFF, Running, Tripped or in Alarm mode (motor current is above the trip current setting)
- Includes RESET button

START/STOP

- Motor START/STOP controlled by START and STOP buttons
- Includes all features of Status Only module

HOA Selector Switch with START/STOP

- In HAND mode, motor will start and stop in response to START/STOP pushbuttons
- In AUTO mode, motor will run in response to remote signal
- Includes all features of Status Only module

ON/OFF/AUTO Selector Switch

- Motor will run in ON mode and not in the OFF mode
- In AUTO mode the motor will run in response to a remote signal
- Includes all features of Status Only module

Reduced Voltage Control Modules

The four reduced voltage pushbutton control modules provide control using two to four starters and/or contactors. The faceplates are identical to the full voltage modules, and the pushbuttons all perform the same functions. The module is programmed for the type of reduced voltage starter which sets the sequence of contact open and closing.

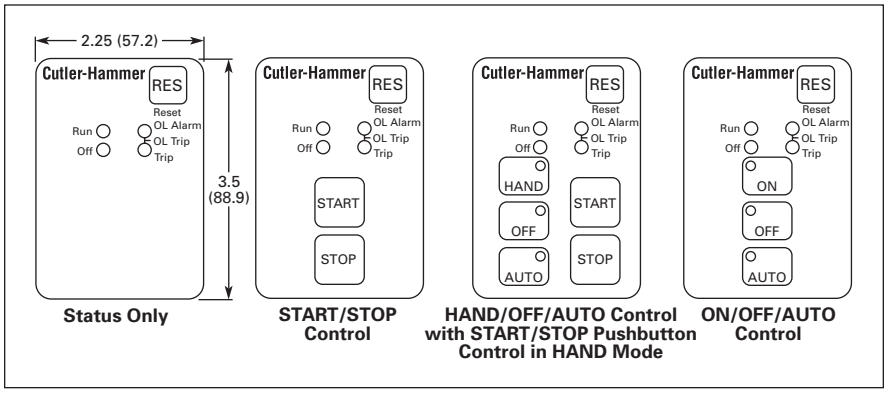


Figure 33-76. Full Voltage and Reduced Voltage Control Modules

33

Reversing and 2-Speed Pushbutton Modules

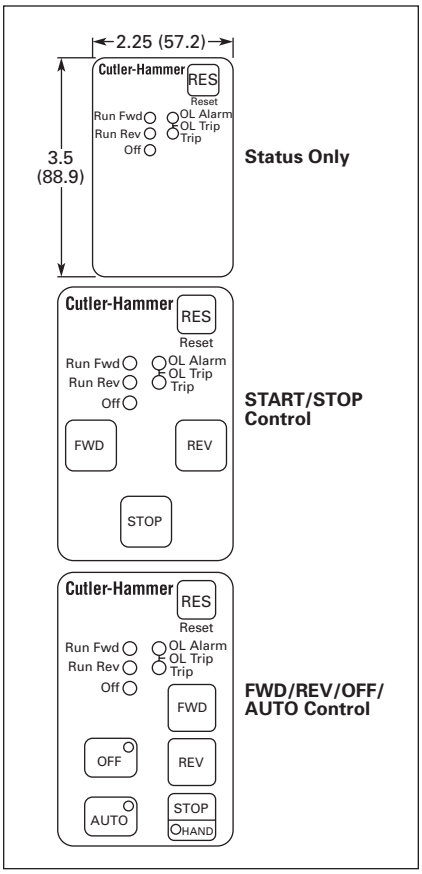


Figure 33-77. Reversing and 2-Speed Pushbutton Module

ACM Specifications

- Input supply requirements: 120V AC (supplied by the Advantage motor controller)
- Max. distance from Advantage motor controller: 6 ft. (1.83m)
- Operating frequency: 50 or 60 Hz
- Operating temperature: -20° to 70°C
- Storage temperature: -20° to 85°C
- Humidity: 0 to 95%, non-condensing
- Remote input wire size: 18 – 14 AWG
- Maximum distance between remote pushbuttons and ACM: 200 ft. (60.9m)
- Cutout dimensions: 2.25 x 3.5 inches (57.2 x 88.9 mm) (see above). The cutout can be made using a Greenlee rectangular punch #600710
- Enclosure type: NEMA 1 or 12, when properly installed

Status Only

- 5 LEDs which indicate that the motor is OFF, running forward (FAST), running reverse (SLOW), tripped or in alarm mode
- Includes RESET button

FORWARD (FAST)/REVERSE (SLOW)/STOP

- Pushbuttons control whether motor is running forward (FAST), running reverse (SLOW) or stopped
- Includes all features of Status Only module

FWD/REV/OFF/AUTO

- In AUTO mode, motor is running forward (FAST), running reverse (SLOW) or OFF in response to a remote signal
- All features of FORWARD/REVERSE/ STOP module

Note: For 2-speed modules, FAST replaces FWD and SLOW replaces REV.

Metering Module

The Advantage Metering Module monitors status of a motor along with any of the pushbutton modules. It may be plugged into the pushbutton control module, and communicates to the starter through it, or plugged directly into the starter when a pushbutton control module is not used.

The four digit display will show the current in each phase, control voltage or cause of trip. The STEP button may be pressed to step through these values, and the five LEDs will indicate which value is being displayed. It is also equipped with a reset button and Trip Lockout LED.

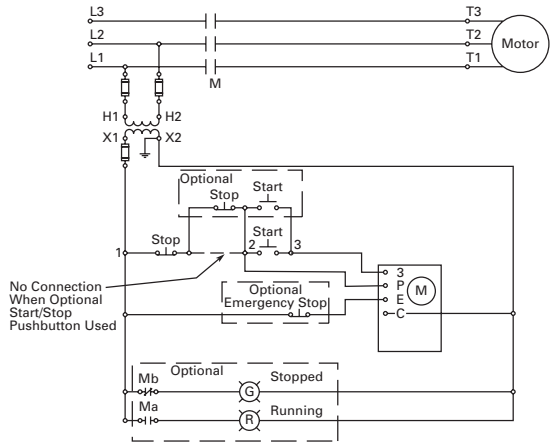
Table 33-339. Control Modules/Accessories

Description	Catalog Number	Price U.S. $
Full Voltage		
Status Only with Reset	**WPBFV1**	
START/STOP	**WPBFV2**	
START/STOP/HOA	**WPBFV3**	
ON/OFF/AUTO	**WPBFV4**	
LOCAL/OFF/REMOTE with Lockable ACM ①	**WPBFV5** ①	
LOCAL/OFF/REMOTE with Network Health ①	**WPBFV7** ①	
Reversing		
Status Only with Reset	**WPBR1**	
FWD/REV/STOP	**WPBR2**	
FWD/REV/STOP/HOA	**WPBR3**	
2-Speed		
Status Only with Reset	**WPB2S1**	
FAST/SLOW/STOP	**WPB2S2**	
FAST/SLOW/STOP/HOA	**WPB2S3**	
Reduced Voltage		
Status Only with Reset	**WPBRV1**	
START/STOP	**WPBRV2**	
START/STOP/HOA	**WPBRV3**	
ON/OFF/AUTO	**WPBRV4**	
Metering Module	**WMETER** ②	
10 ft. Interconnect Cable (3m)	**WACM10**	
6 ft. Interconnect Cable (1.8m)	**WACM6**	
3 ft. Interconnect Cable (.9m)	**WACM3**	
1 ft. Interconnect Jumper (.3m)	**WACM1**	

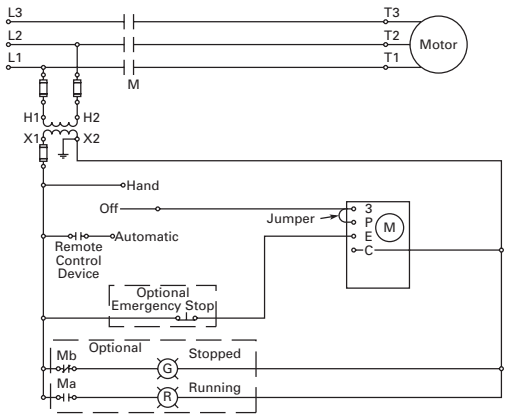
① The WPBFV5 and WPBFV7 are DeviceNet® only. They can only be used when an active network is connected.
② Harmonic distortion may cause the WMETER to display inaccurate current measurements.

Discount Symbol **1CD1C**

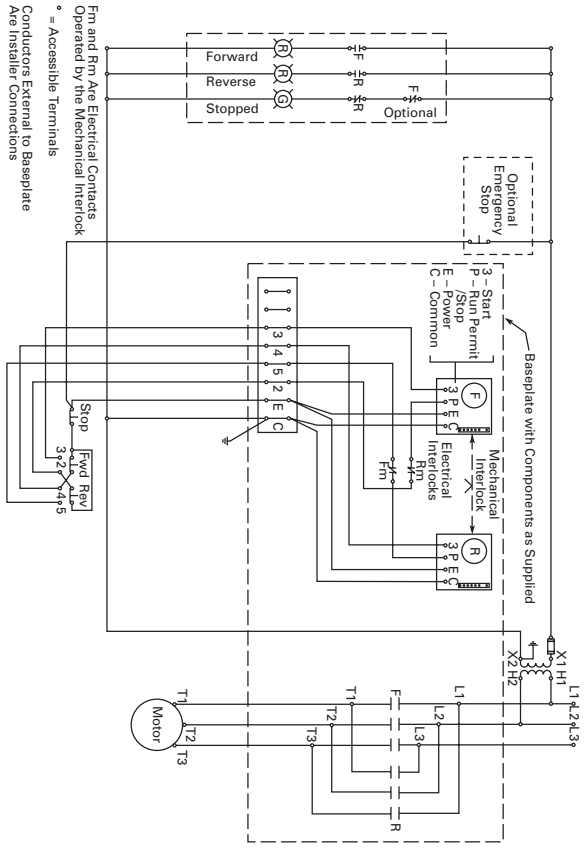
Non-reversing and Reversing Contactors, NEMA Sizes 1 – 6



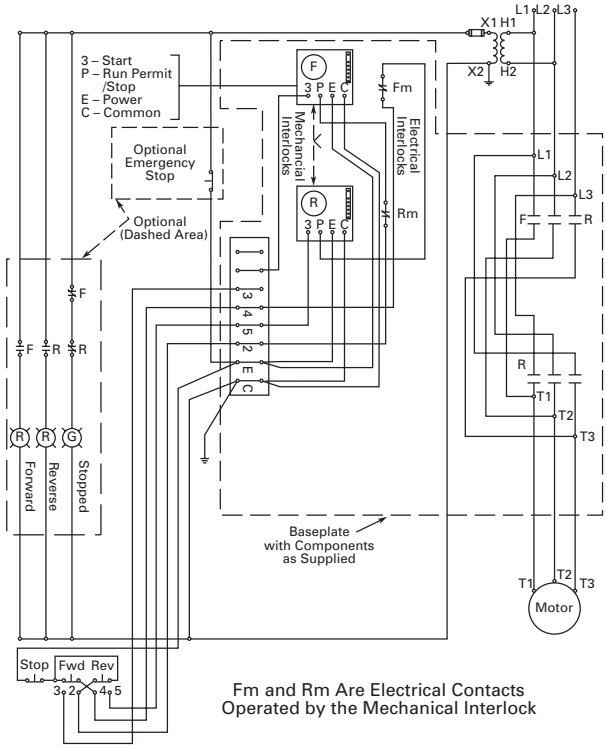
Cat. No. W201 Non-reversing Contactor
3-Wire Control with Internal Holding Circuit



Cat. No. W201 Non-reversing Contactor
2-Wire Control with Maintained HOA Switch



Cat. No. W211 Horizontal Reversing Contactor ①
3-Wire Control with Internal Holding Circuit

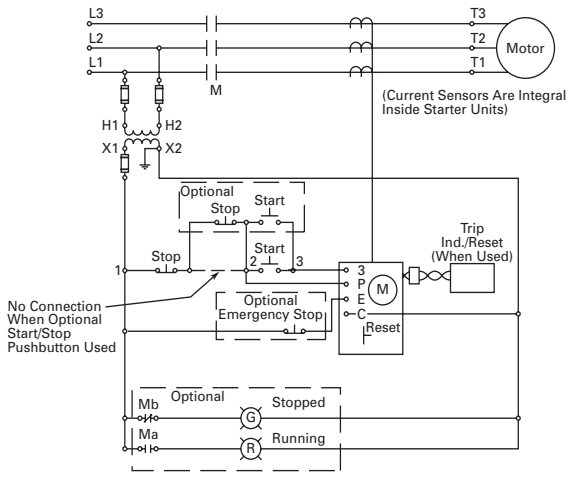


Cat. No. W251 Vertical Reversing Contactor
3-Wire Control with Internal Holding Circuit

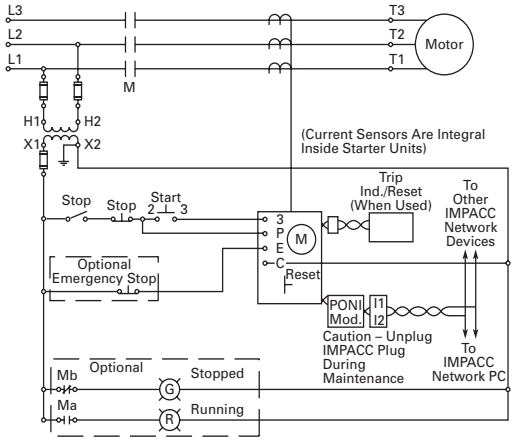
Figure 33-84. Typical Wiring Diagrams

① Sizes 5 and 6 horizontal reversing contactors have their Forward and Reverse contactor arrangement reversed. Reverse contactor is on left and Forward contactor is on right.

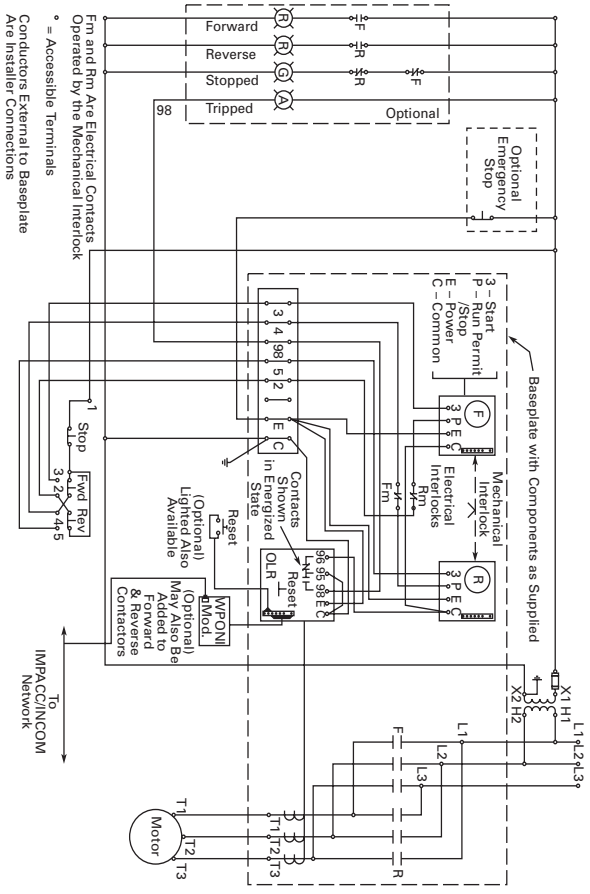
Non-reversing and Reversing Starters, NEMA Sizes 1 – 6



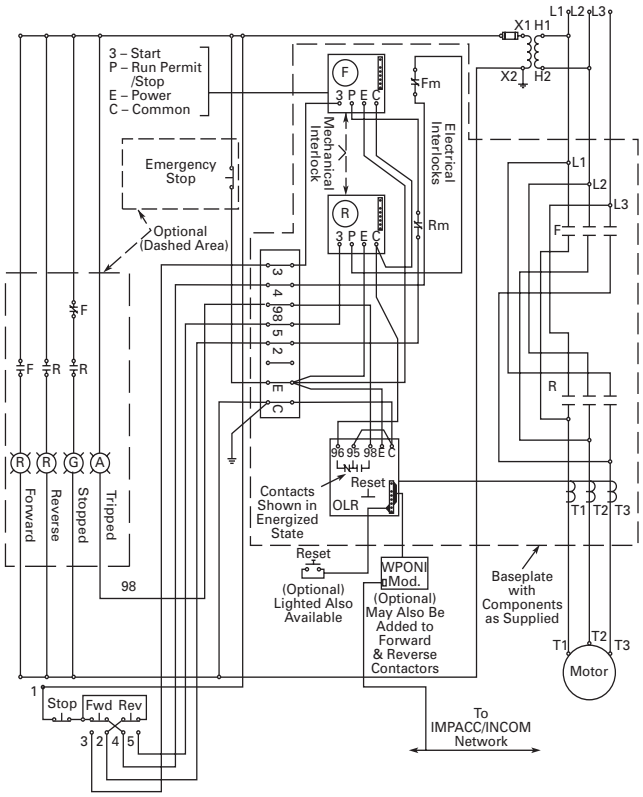
Cat. No. W200 Non-reversing Starter
3-Wire Control with Internal Holding Circuit



Cat. No. W200 Non-reversing Starter
Internal Holding Circuit, 3-Wire with IMPACC



Cat. No. W210 Horizontal Reversing Starter ①
3-Wire Control with Internal Holding Circuit



Cat. No. W250 Vertical Reversing Starter
3-Wire Control with Internal Holding Circuit

Figure 33-85. Typical Wiring Diagrams

① Sizes 5 and 6 horizontal reversing contactors have their Forward and Reverse contactor arrangement reversed. Reverse contactor is on left and Forward contactor is on right.