



# Control Power Transformers

## Product Selection

### Selecting a Control Power Transformer

For proper transformer selection, three characteristics of the load circuit must be determined in addition to the minimum voltage required to operate the circuit. These are total steady-state (sealed) VA, total inrush VA, and inrush load power factor.

- Total steady-state (sealed) VA is the volt-amperes that the transformer must deliver to the load circuit for an extended period of time — the amount of current required to hold the contact in the circuit.
- Total inrush VA is the volt amperes that the transformer must deliver upon initial energization of the control circuit. Energization of electromagnetic devices takes 30...50 milliseconds. During this inrush period, the electromagnetic control devices draw many times normal current — 3...10 times normal is typical.
- Inrush load power factor is difficult to determine without detailed vector analysis of all the load components. Such an analysis is generally not feasible. Therefore, a safe assumption is 40% power factor.

### Selection Process

1. Determine the total inrush VA of the control circuits from the table below, *Typical Magnetic Motor Starter and Contactor Data 60 Hz, 120 Volt, 3-Pole*. Do not neglect the current requirements of indicating lights and other devices that do not have an inrush VA but are re-energized at the same time as the other components in the circuit. Their total VA should be added to the total inrush VA.
2. Refer to the table below, *Regulation Data — Inrush VA*. If the supply circuit voltage (Step 1) is reasonably stable and fluctuates not more than ± 5%, refer to the 90% secondary voltage column. If it fluctuates as much as ± 10%, refer to the 95% secondary voltage column. Go down the column selected until at the inrush VA closest to, but not less than, the inrush VA of the control circuit.
3. Read to the far left side of the chart. The transformer's continuous nominal VA rating is now selected. The secondary voltage that will be delivered under inrush conditions will be either 85%, 90%, or 95% of the rated secondary voltage, depending on the column selected from the table below, *Regulation Data — Inrush VA*. The total sealed VA of the control circuit must not exceed the nominal VA rating of the transformer selected from the table below, *Typical Magnetic Motor Starter and Contactor Data 60 Hz, 120 Volt, 3-Pole*.
4. Refer to the specification tables on the following pages to select a transformer according to the required continuous nominal VA, and primary and secondary voltage combinations.

### Regulation Data — Inrush VA

Inrush VA at 40% Power Factor				Power Factor Adjustments	
Nominal VA Rating	85%	90%	95%	Power Factor	Multiply By
50	158	139	116	100%	0.63
75	242	213	177	90%	0.65
100	346	302	249	80%	0.70
150	528	461	379	70%	0.75
200	869	743	585	60%	0.82
250	1057	904	719	50%	0.90
300	1418	1200	937	40%	1.00
500	2681	2221	1648	20%	1.27
750	4560	3718	2700	10%	1.45
1000	7568	6118	4185	—	—
1500	15724	12423	8203	—	—
2000	16941	13660	9484	—	—
3000	25680	20180	13797	—	—

### Transformers without Fusing Block/Clip

Continuous VA	Primary — 600/575/550V (60 Hz)	Primary — 120x240V (60 Hz)
	Cat. No.	Cat. No.
100	1497B-A3-M11-0-N	1497B-A3-M12-0-N
200	1497B-A5-M11-0-N	1497B-A5-M12-0-N
300	1497B-A7-M11-0-N	1497B-A7-M12-0-N
500	<b>1497B-A9-M11-0-N</b>	1497B-A9-M12-0-N
750	—	1497B-A10-M12-0-N
1000	1497B-A11-M11-0-N	1497B-A11-M12-0-N
2000	1497B-A13-M11-0-N	<b>1497B-A13-M12-0-N</b>
3000	1497B-A14-M11-0-N	1497B-A14-M12-0-N

Continuous VA	Primary — 120x240V (60 Hz)	Primary — 240x480V (60 Hz)	Primary — 208/240V (60 Hz)
	Cat. No.	Cat. No.	Cat. No.
50	<b>1497B-A1-M13-0-N</b>	1497B-A1-M16-0-N	1497B-A1-M17-0-N
75	1497B-A2-M13-0-N	—	—
100	<b>1497B-A3-M13-0-N</b>	1497B-A3-M16-0-N	1497B-A3-M17-0-N
150	1497B-A4-M13-0-N	1497B-A4-M16-0-N	1497B-A4-M17-0-N
200	<b>1497B-A5-M13-0-N</b>	—	—
250	1497B-A6-M13-0-N	1497B-A6-M16-0-N	1497B-A6-M17-0-N
300	1497B-A7-M13-0-N	—	—

Continuous VA	Primary — 240x480V (60 Hz)	Primary — 380/400/416V (60 Hz)
	Cat. No.	Cat. No.
100	1497B-A3-M14-0-N	—
150	1497B-A4-M14-0-N	—
200	1497B-A6-M14-0-N	—
500	1497B-A9-M14-0-N	1497B-A9-M15-0-N
750	1497B-A10-M14-0-N	1497B-A10-M15-0-N
1000	1497B-A11-M14-0-N	1497B-A11-M15-0-N
1500	1497B-A12-M14-0-N	<b>1497B-A12-M15-0-N</b>
2000	1497B-A13-M14-0-N	1497B-A13-M15-0-N
3000	1497B-A14-M14-0-N	1497B-A14-M15-0-N

‡ No secondary fusing available



**Note:** Refer to page 8-54 for information on how to select a control power transformer.

**Transformers with 2 Primary and 0 Secondary Fuse Block/Clip‡**

Continuous VA	Primary — 600/575/550V (60 Hz)	Primary — 120x240V (60 Hz)
	Secondary — 120X240V (60 Hz)	Secondary — 120X240V (60 Hz)
	Cat. No.	Cat. No.
100	1497B-A3-M11-2-N	1497B-A3-M12-2-N
200	1497B-A5-M11-2-N	1497B-A5-M12-2-N
300	1497B-A7-M11-2-N	1497B-A7-M12-2-N

**Transformers with 2 Primary and 1 Secondary Fuse Block/Clip‡**

Continuous VA	Primary — 120x240V (60 Hz)	Primary — 240x480V (60 Hz)	Primary — 208/240V (60 Hz)
	Secondary — 24V (60 Hz)	Secondary — 24V (60 Hz)	Secondary — 24V (60 Hz)
	Cat. No.	Cat. No.	Cat. No.
50	1497B-A1-M13-3-N	1497B-A1-M16-3-N	1497B-A1-M17-3-N
75	1497B-A2-M13-3-N	—	—
100	1497B-A3-M13-3-N	1497B-A3-M16-3-N	1497B-A3-M17-3-N
150	1497B-A4-M13-3-N	1497B-A4-M16-3-N	1497B-A4-M17-3-N
200	1497B-A5-M13-3-N	—	—
250	1497B-A6-M13-3-N	1497B-A6-M16-3-N	1497B-A6-M17-3-N
300	1497B-A7-M13-3-N	—	—

Continuous VA	Primary — 600/575/550V (60 Hz)	Primary — 120x240V (60 Hz)	Primary — 240x480V (60 Hz)	Primary — 380/400/416V (60 Hz)
	Secondary — 120X240V (60 Hz)	Secondary — 120X240V (60 Hz)	Secondary — 120X240V (60 Hz)	Secondary — 115X230V (60 Hz)
	Cat. No.	Cat. No.	Cat. No.	Cat. No.
500	1497B-A9-M11-3-N	1497B-A9-M12-3-N	1497B-A9-M14-3-N	1497B-A9-M15-3-N
750	—	1497B-A10-M12-3-N	1497B-A10-M14-3-N	1497B-A10-M15-3-N
1000	<b>1497B-A11-M11-3-N</b>	<b>1497B-A11-M12-3-N</b>	1497B-A11-M14-3-N	<b>1497B-A11-M15-3-N</b>
1500	—	—	1497B-A12-M14-3-N	1497B-A12-M15-3-N
2000	1497B-A13-M11-3-N	1497B-A13-M12-3-N	<b>1497B-A13-M14-3-N</b>	<b>1497B-A13-M15-3-N</b>
3000	<b>1497B-A14-M11-3-N</b>	<b>1497B-A14-M12-3-N</b>	1497B-A14-M14-3-N	1497B-A14-M15-3-N



**Transformers with 0 Primary and 1 Secondary Fuse Block/Clip‡**

Continuous VA	Primary — 120x240V (60 Hz)	Primary — 240x480V (60 Hz)	Primary — 208/240V (60 Hz)
	Secondary — 24V (60 Hz)	Secondary — 24V (60 Hz)	Secondary — 24V (60 Hz)
	Cat. No.	Cat. No.	Cat. No.
50	1497B-A1-M13-1-N	1497B-A1-M16-1-N	1497B-A1-M17-1-N
75	1497B-A2-M13-1-N	—	—
100	1497B-A3-M13-1-N	1497B-A3-M16-1-N	1497B-A3-M17-1-N
150	1497B-A4-M13-1-N	1497B-A4-M16-1-N	1497B-A4-M17-1-N
200	1497B-A5-M13-1-N	—	—
250	1497B-A6-M13-1-N	1497B-A6-M16-1-N	1497B-A6-M17-1-N
300	1497B-A7-M13-1-N	—	—

‡ Secondary Fuse Block/Clip: Transformers rated 350VA and below use secondary fuse clips. Transformers rated 500VA and above use secondary fuse blocks.

# Control Power Transformers

## Specifications

### Fuse Sizing Charts

**Important:** Select the fuse to protect the control circuit conductors in accordance with the National Electrical Code.

#### Primary Fuse Sizing Chart (When only primary protection is used)

Maximum Amp rating for current limiting fuses based on transformer primary voltage and the National Electrical Code

VA	115V	120V	200V	208V	220V	230V	240V	277V	380V	400V	415V	440V	460V	480V	500V	550V	575V	600V
50	1.25	1.25	0.75	0.6	0.6	0.6	0.6	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.25	0.25	0.25
75	1.8	1.8	1.125	1	1	0.75	0.75	0.75	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.3	0.3
100	2.5	2.5	1.5	1.4	1.25	1.25	1.25	1	0.75	0.75	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5
150	3.5	3.5	2.25	2	2	1.8	1.8	1.6	1.125	1.125	1	1	0.75	0.75	0.75	0.75	0.75	0.75
200	5	5	3	2.8	2.5	2.5	2.5	2	1.5	1.5	1.4	1.25	1.25	1.25	1.125	1	1	1
250	3.5	3.2	3.5	3.5	3.2	3.2	3	2.5	1.8	1.8	1.8	1.6	1.6	1.5	1.5	1.25	1.25	1.25
300	4	4	4.5	4	4	3.5	3.5	3.2	2.25	2.25	2	2	1.8	1.8	1.8	1.6	1.5	1.5
350	5	4.5	5	5	4.5	4.5	4	3.5	2.5	2.5	2.5	2.25	2.25	2	2	1.8	1.8	1.6
500	7	6.25	4	4	3.5	3.5	3.2	5	3.5	3.5	3.5	3.2	3.2	3	3	2.5	2.5	2.5
750	10	10	6.25	6	5.6	5	5	4.5	5.6	5.6	5	5	4.5	4.5	4.5	4	3.5	3.5
1000	12	12	8	8	7	7	6.25	6	4	4	4	3.5	3.5	3.2	3.2	5	5	5
1500	20	15	12	12	10	10	10	9	6.25	6.25	6	5.6	5	5	5	4.5	4	4
2000	20	20	12	12	10	12	12	12	8	8	8	7	7	6.25	6.25	6	5.6	5
3000	30	30	15	15	15	15	15	12	12	12	12	10	10	10	10	9	8	8

#### Primary Fuse Sizing Chart (When primary and secondary protection is used)

Maximum Amp rating for current limiting fuses based on transformer primary voltage and the National Electrical Code

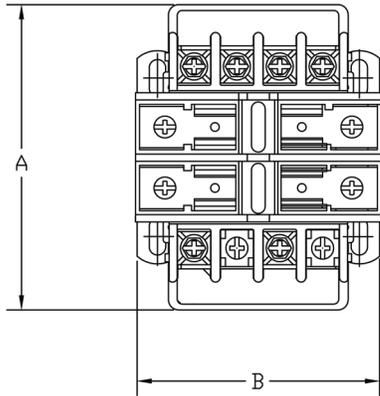
VA	115V	120V	200V	208V	220V	230V	240V	277V	380V	400V	415V	440V	460V	480V	500V	550V	575V	600V
50	1	1	0.6	0.6	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.25	0.25	0.25	0.25	0.2	0.2	0.2
75	1.6	1.5	0.75	0.75	0.75	0.75	0.75	0.6	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3
100	2	2	1.25	1.125	1.125	1	1	0.75	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4
150	3.2	3	1.8	1.8	1.6	1.6	1.5	1.25	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.6	0.6	0.6
200	4	4	2.5	2.25	2	2	2	1.8	1.25	1.25	1.125	1.125	1	1	1	0.75	0.75	0.75
250	5	5	3	3	2.8	2.5	2.5	2.25	1.6	1.5	1.5	1.4	1.25	1.25	1.25	1.125	1	1
300	6.25	6.25	3.5	3.5	3.2	3.2	3	2.5	1.8	1.8	1.8	1.6	1.6	1.5	1.5	1.25	1.25	1.25
350	7	7	4	4	3.5	3.5	3.5	3	2.25	2	2	1.8	1.8	1.8	1.6	1.5	1.5	1.4
500	10	10	6.25	6	5.6	5	5	4.5	3.2	3	3	2.8	2.5	2.5	2.5	2.25	2	2
750	15	15	9	9	8	8	7	6.25	4.5	4.5	4.5	4	4	3.5	3.5	3.2	3.2	3
1000	20	20	12	12	10	10	10	9	6.25	6.25	6	5.6	5	5	5	4.5	4	4
1500	30	30	15	15	15	15	15	12	9	9	9	8	8	7	7	6.25	6.25	6.25
2000	40	40	25	20	20	20	20	15	12	12	12	10	10	10	10	9	8	8
3000	45	45	35	35	30	30	30	25	15	15	15	15	15	15	15	12	12	12

#### Secondary Fuse Sizing Chart

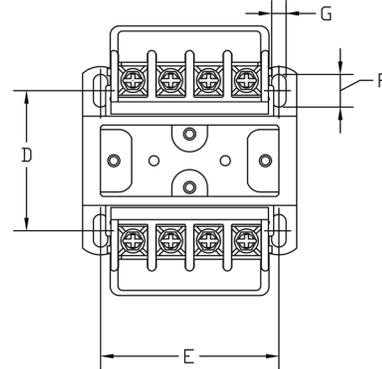
Maximum Amp rating for current limiting fuses based on the National Electrical Code

VA	23V	24V	25V	85V	90V	95V	100V	110V	115V	120V	125V	130V	220V	230V	240V
50	3.5	3.2	3.2	0.75	0.75	0.75	0.75	0.75	0.6	0.6	0.6	0.6	0.3	0.3	0.3
75	5	5	5	1.4	1.25	1.25	1.25	1.125	1	1	1	0.75	0.5	0.5	0.5
100	7	6.25	6.25	1.8	1.8	1.6	1.6	1.5	1.4	1.25	1.25	1.25	0.75	0.6	0.6
150	10	10	10	2.8	2.5	2.5	2.5	2.25	2	2	2	1.8	1.125	1	1
200	12	12	12	3.5	3.5	3.5	3.2	3	2.8	2.5	2.5	2.5	1.5	1.4	1.25
250	15	15	15	4.5	4.5	4	4	3.5	3.5	3.2	3.2	3.2	1.8	1.8	1.6
300	20	20	20	5.6	5	5	5	4.5	4	4	4	3.5	2.25	2	2
350	20	20	20	6.25	6.25	6	5.6	5	5	4.5	4.5	4	2.5	2.5	2.25
500	—	—	—	9	9	8	8	7	7	6.25	6.25	6.25	3.5	3.5	3.2
750	—	—	—	12	12	12	12	10	10	10	10	9	5.6	5	5
1000	—	—	—	15	15	15	15	15	12	12	12	12	7	7	6.25
1500	—	—	—	25	25	25	25	20	20	20	20	15	10	10	10
2000	—	—	—	35	35	35	30	30	25	25	25	25	15	12	12
3000	—	—	—	—	—	—	—	45	40	40	40	35	20	20	20

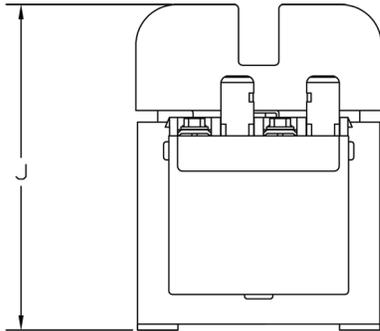
Dimensions are shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.



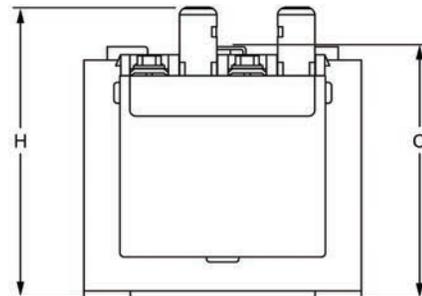
Transformer with 2 Primary Fuse Blocks and 0 or 1 Secondary Fuse Block/Clip (Top View)



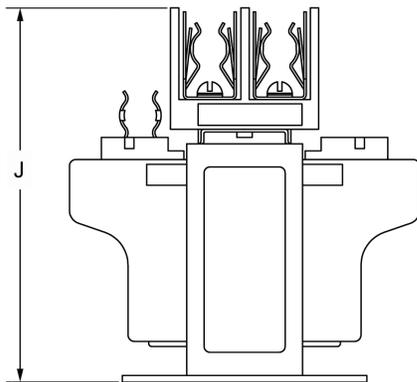
Transformer with 0 Primary Fuse Blocks and 0 or 1 Secondary Fuse Block/Clip (Top View)



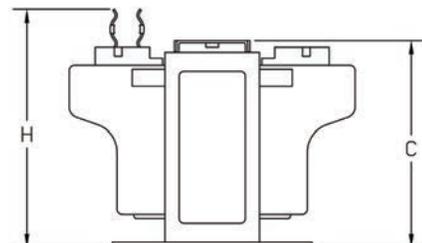
Transformer with 2 Primary Fuse Blocks and 1 Secondary Fuse Block/Clip (Side View)



Transformer with 0 Primary Fuse Block and 1 Secondary Fuse Block/Clip (Side View)



Transformer with 2 Primary Fuse Blocks and 1 Secondary Fuse Block/Clip (Side View)



Transformer with 0 Primary Fuse Blocks and 1 Secondary Fuse Clip (Side View)

# Control Power Transformers

## Approximate Dimensions

VA	Cat. No.	A	B	C	D	E	F	G	H	J	Approx. Shipping Wt. lb (kg)
50	<b>1497B-A1-M13-0-N</b>	3-25/32 (96)	3 (76)	2-23/32 (69)	1-31/32 (50)	2-1/2 (64)	15/32 (12)	1/5 (5)	3-9/64 (80)	4-1/32 (102)	3 (1.4)
	1497B-A1-M16-0-N										
	1497B-A1-M17-0-N										
75	1497B-A2-M13-0-N	4-1/32 (102)	3 (76)	2-23/32 (69)	2-27/64 (61)	2-1/2 (64)	15/32 (12)	1/5 (5)	3-9/64 (80)	4-1/32 (102)	4 (1.8)
100	1497B-A3-M11-0-N	4-1/16 (103)	3-3/4 (95)	3-23/64 (85)	2-13/32 (61)	3-1/8 (80)	15/32 (12)	1/5 (5)	3-49/64 (96)	4-21/32 (118)	5 (2.3)
	1497B-A3-M12-0-N	4 (102)	3-3/8 (86)	3-3/64 (77)	2-27/64 (61)	2-13/16 (71)			3-15/32 (88)	4-23/64 (110)	
	<b>1497B-A3-M13-0-N</b>										
	1497B-A3-M14-0-N										
	1497B-A3-M16-0-N										
1497B-A3-M17-0-N											
150	1497B-A4-M13-0-N	4-1/16 (103)	3-3/4 (95)	3-23/64 (85)	2-13/16 (71)	3-5/16 (80)	15/32 (12)	1/5 (5)	3-49/64 (96)	4-21/32 (118)	6 (2.7)
	1497B-A4-M14-0-N										
	1497B-A4-M16-0-N										
	1497B-A4-M17-0-N										
200	1497B-A5-M11-0-N	4-3/8 (111)	4-1/2 (114)	3-31/32 (101)	2-5/8 (67)	3-3/4 (95)	15/32 (12)	1/5 (5)	4-2/5 (112)	5-9/32 (134)	10 (4.5)
	1497B-A5-M12-0-N										
	<b>1497B-A5-M13-0-N</b>										
250	1497B-A6-M13-0-N	4-3/8 (111)	4-1/2 (114)	3-31/32 (101)	2-53/64 (72)	3-3/4 (95)	15/32 (12)	1/5 (5)	4-2/5 (112)	5-9/32 (134)	10 (4.5)
	1497B-A6-M14-0-N										
	1497B-A6-M16-0-N										
	1497B-A6-M17-0-N										
300	1497B-A7-M11-0-N	4-3/4 (120)	4-1/2 (114)	3-31/32 (101)	3-3/16 (81)	3-3/4 (95)	15/32 (12)	1/5 (5)	4-2/5 (112)	5-9/32 (134)	12 (5.4)
	1497B-A7-M12-0-N										
	1497B-A7-M13-0-N										
500	<b>1497B-A9-M11-0-N</b>	6-7/64 (155)	5-1/4 (133)	4-5/8 (118)	3-7/8 (98)	4-3/8 (111)	1-1/16 (27)	5/16 (8)	—	5-15/16 (151)	18 (8.2)
	1497B-A9-M12-0-N										
	1497B-A9-M14-0-N										
	1497B-A9-M15-0-N										
750	1497B-A10-M12-0-N	7-39/64 (193)	5-1/4 (133)	4-5/8 (118)	5-7/8 (149)	4-3/8 (111)	1-1/16 (27)	5/16 (8)	—	5-15/16 (151)	28 (12.7)
	1497B-A10-M14-0-N										
	1497B-A10-M15-0-N										
1000	1497B-A11-M11-0-N	7-7/64 (181)	6-3/4 (171)	5-55/64 (149)	4-31/32 (126)	6-1/8 (155)	9/10 (23)	5/16 (8)	—	7-3/16 (183)	40 (18.1)
	1497B-A11-M12-0-N										
	1497B-A11-M14-0-N										
	1497B-A11-M15-0-N										41 (18.6)
1500	1497B-A12-M14-0-N	8-7/64 (206)	6-3/4 (171)	5-55/64 (149)	6-1/8 (155)	6-1/8 (155)	7/8 (22)	5/16 (8)	—	7-3/16 (183)	53 (24)
	<b>1497B-A12-M15-0-N</b>										
2000	1497B-A13-M11-0-N	8-7/64 (206)	6-3/4 (171)	5-55/64 (149)	6-1/8 (155)	6-1/8 (155)	7/8 (22)	5/16 (8)	—	7-3/16 (183)	61 (27.7)
	<b>1497B-A13-M12-0-N</b>										
	1497B-A13-M14-0-N	9 (229)									
	1497B-A13-M15-0-N	8-7/64 (206)									53 (24)
3000	1497B-A14-M11-0-N	8-9/16 (217)	9 (229)	7-41/64 (194)	5-13/16 (148)	7-1/2 (191)	9/10 (23)	7/16 (11)	—	8-61/64 (227)	78 (35.4)
	1497B-A14-M12-0-N										
	1497B-A14-M14-0-N										
	1497B-A14-M15-0-N										



Fuse Block Kits — For Use when Fuse Block is Not Integrated with the Transformer



Cat. No. 1491-R165  
1-Pole Fuse Block



Cat. No. 1491-R167  
2-Pole Fuse Block



Cat. No. 1491-R171  
3-Pole Fuse Block



Cat. No. 1491-R169  
3-Pole Fuse Block



Cat. No. 1491-R150  
Fuse Cover without Fuse

8

These control circuit fusing kits are intended to be used for control circuit transformer protection and protection of control circuits capable of delivering no more than 200 000 RMS symmetrical amps, 600V maximum.

Description*	Cat. No.
Fuse cover — per pole	1491-R150
One-pole kit — panel-mounted (midget fuse)*	1491-R165
Two-pole kit — panel-mounted (two Class CC fuses)*	1491-R162
Two-pole kit — panel-mounted (two midget fuses)*	1491-R167
Three-pole kit — panel-mounted (one midget fuse/two Class CC fuses)*	1491-R169
Three-pole kit — panel-mounted (three Class CC fuses)*	1491-R171
Single-pole kit — Bulletin 500 line controller mounted (Class CC fuses)‡	599-FR04
One-pole kit — panel-mounted (31...60 A Class J fuse)	1491-R173
One-pole kit — panel-mounted (61...100 A Class J fuse)	1491-R175

\* For control circuit transformers with a 350VA or larger rating, it is recommended that Bussmann Type FNQ-R, Ferraz-Shawmut Type ATDR, Littelfuse Type KLDR time delay fuses, or equivalent be used for primary fusing.

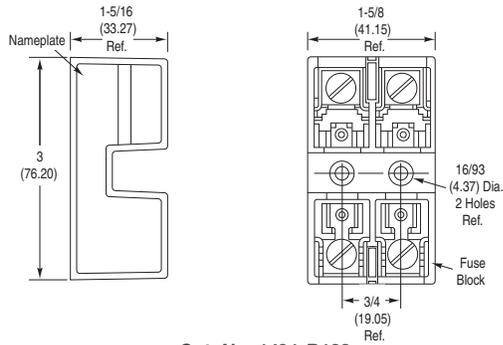
\* These kits use only Class CC or Midget fuses (rated 0.5...30 A) such as those offered by the following manufacturers:

- Bussmann KTK-R
- Ferraz-Shawmut ATM R
- Littelfuse KLK

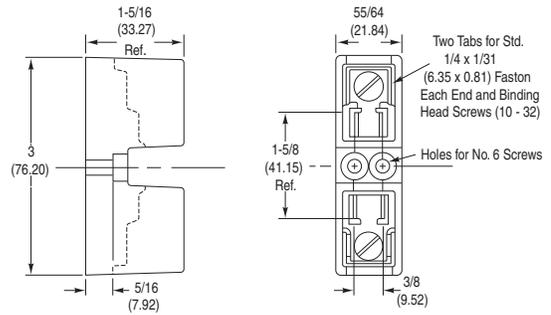
‡ Cat. No. 599-FR04 is rated for 6 A fuse maximum. Controller mounting applies to size 0...5 devices only.

Dimensions are shown in inches (millimeters). Dimensions are not intended to be used for manufacturing purposes.

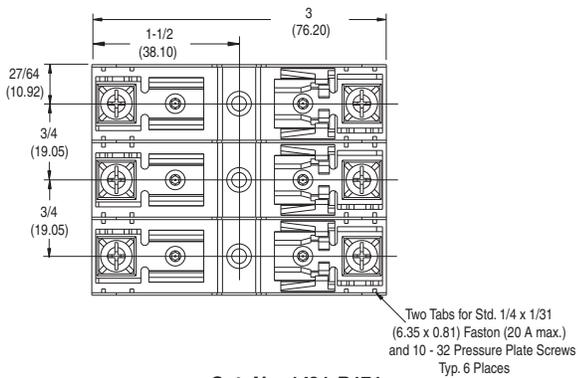
**Note:** Electrical clearance required to top of fuse block.



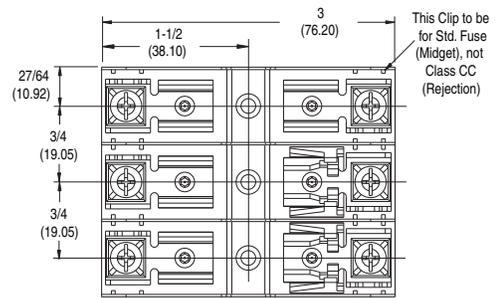
**Cat. No. 1491-R162**  
**Cat. No. 1491-R167**



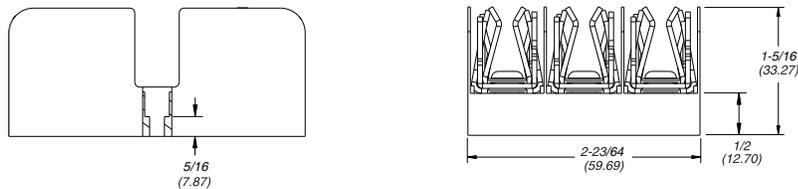
**Cat. No. 1491-R165**



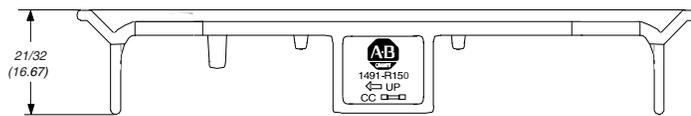
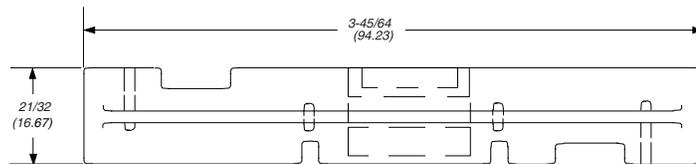
**Cat. No. 1491-R171**



**Cat. No. 1491-R169**



**Cat. No. 1491-R177**



**Cat. No. 1491-R150**

