

Beaver Electrical Machinery Control Transformer Numbering System and Sizing

Industrial Control Transformers are used to convert the available supply voltage to the voltage that is required to supply industrial control circuits and motor control loads. Some components of a circuit require a very high level of power at start-up which is called Inrush VA. After their initial start-up these components settle down to a lower power requirement for normal continuous operation which is called Sealed or Steady State VA. Some devices can draw up to 10 times the normal operating or sealed current for periods of up to 50 milliseconds upon start up. Control transformers are designed, constructed, and selected to ensure that they provide the output voltage stability needed for trouble free operation of all circuit components

Protected Winding Style (CPR):

CPR offer enhanced capabilities of withstanding harsh conditions. This is because the windings are resin and silica sand encapsulated for protected operation in dusty and wet environments. The coils are also covered with a rugged plastic encasement. CPR have a VA range of 25 – 1000



Ventilated Enclosure Style (CVR):

CVR is a control transformer that is put inside a rugged all-steel box which is painted with a black semi gloss finish. The transformer is easily accessible and has a generous wiring compartment. The box has easy access knockouts and the name plate on the side. CVR have a VA range of 50 – 5000



Core & Coil Style (CCR):

CCR is the standard Control Transformer that is a conservative design for cool, long lasting operation. Terminals are clearly marked for easy wiring and are a standard screw type. The coils are vacuum impregnated and baked for quiet operation. The transformer has a smooth and uniform varnish finish with a easy to read nameplate on the top. CCR have a VA range of 25 – 5000.



Catalog Numbering System

1— Type

- C— Isolation
- A— Auto

2— Construction

- C— Core & Coils
- P— Protected winding
- V— Ventilated Enclosure

3— Series

- R

4— VA Capacity

- 25-5000

5— Primary voltage(s)

6— Secondary voltage(s)

7— Options

- L— Leads (standard on CVR)
- S— Electrostatic Shield
- ST— Special taps
- 50— 50 Hz operation
- CE— "Conformité Européene"
- X— Special option

Primary and Secondary Voltages

		1	2
A	12	11	10
B	12/24	11/22	10/20
C	16/32	15/30	14/28
D	24	22	20
E	24/48	22/44	20/40
F	120	115	110
G	120/240	115/230	110/220
H	208	200	190
J	300/600	287/575	275/550
K	240	230	220
L	240/480	230/460	220/440
M	277	266	254
N	347	332	318
P	380		
Q	400		
R	415		
S	480	460	440
T	600	575	550
U	690	660	630
X	Special		
Y			
Z	Unknown		

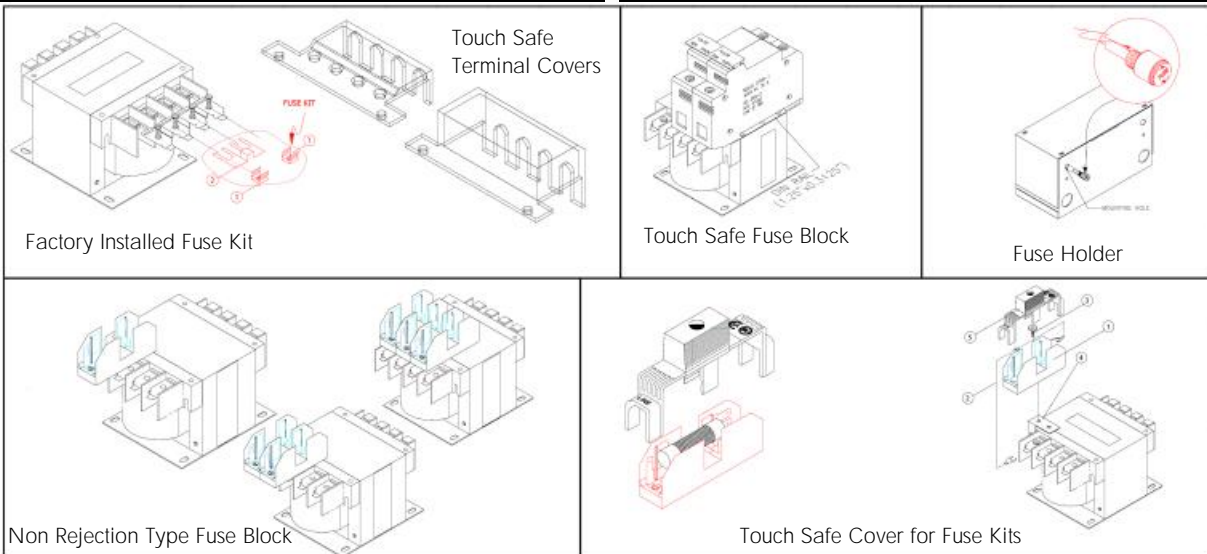
Primary Fusing accessories (600V MAX)		Secondary Fusing accessories	
Factory Installation only	<ul style="list-style-type: none"> • Non rejection type fuse block for 1 pole, 2 pole, and 2 pole primary 1 pole secondary. • Touch safe fuse block with CE mark for 2 pole and 2 pole primary 1 pole secondary. 	250 V Max	<ul style="list-style-type: none"> • Any standard unit up to 250 V comes complete with factory installed fuse kits. • Fuse holder for Ventilated Enclosure units that comes with Pigtails
Field Installation Only	<ul style="list-style-type: none"> • Fuse kit with fuse holder, leads, screws, and mounting brackets for 1-3 poles. • Optional touch safe cover for fuse kits. 	Over 250V Kits	<ul style="list-style-type: none"> • Fuse kit 1 with fuse holder, leads, screws, and mounting brackets. • Fuse kit 2 with fuse holder, leads, screws, mounting brackets, and touch safe cover.
		<ul style="list-style-type: none"> • Touch safe terminal cover for when fuse kit isn't installed • Touch safe terminal for factory installed fuse kits 	

Fusing Sizing and Accessories

Fuse Sizing for Primary and Secondary Voltages														
VA	Primary Voltage										Secondary Voltage			
	120	208	240	277	347	380	400	415	480	600	24	120	208	240
25	1	0.6	0.5	0.4	0.3	0.3	0.3	0.3	0.25	0.2	1.6	.3	.2	X
50	2	1	1	0.8	0.6	0.6	0.6	0.6	0.5	0.4	3.2	.6	.3	.3
100	4	2.25	2	1.8	1.4	1.25	1	1	1	0.8	6.25	1.25	.8	.6
150	6.25	3.5	3	2.5	2	1.8	1.8	1.8	1.5	1.25	10	2	1	1
200	8	4.5	4	3.5	2.8	2.5	2.5	2.25	2	1.6	12	2.5	1.6	1.25
250	*3.5/5	6	5	4.5	3.5	3.2	3	3	2.5	2	12	3.2	2	1.6
350	4.5/7	8	7	5.25	5	4.5	4	4	3.5	2.8	17.5	4.5	2.8	2.25
500	7/10	4/6	3.2/5	9	7	6.25	6.25	6	5	4	25	6.25	4	3.2
750	10/15	6/9	5/7.5	4.5/6.25	3.5/5	9	9	9	7.5	6.25	35	10	6	5
1000	12/20	8/12	7/10	6/9	4.5/7	4/6.25	4/6.25	4/6	3.2/5	8	50	12	8	6.25
1500	15/30	12/17.5	10/15	9/12	7/10	6.25/9	6.25/9	6/9	5/7.5	4/6.25	60	15	12	10
2000	20/40	12/20	12/20	12/17.5	9/12	8/12	8/12	8/12	6.25/10	5/8	X	20	12	12
3000	30/60	17.5/35	15/30	12/25	12/20	12/17.5	12/17.5	12/17.5	10/15	8/12	X	30	17.5	15
5000	50/x	30/60	25/50	20/40	17.5/35	15/30	15/30	15/30	12/25	12/20	X	50	30	25

*Control Transformers with a Secondary fuse use second number for Primary Fuse size

Primary Fusing accessories (600V MAX)		Secondary Fusing accessories	
Factory Installation Only	<ul style="list-style-type: none"> Non rejection type fuse block for 1 pole, 2 pole, and 2 pole primary 1 pole secondary. Touch safe fuse block with CE mark for 2 pole and 2 pole primary 1 pole secondary. 	250 V Max	<ul style="list-style-type: none"> Any standard unit up to 250 V comes complete with factory installed fuse kits. Fuse holder for Ventilated Enclosure units that comes with Pigtails
Field Installation Only	<ul style="list-style-type: none"> Fuse kit with fuse holder, leads, screws, and mounting brackets for 1-3 poles. Optional touch safe cover for fuse kits. 	Over 250V Kits	<ul style="list-style-type: none"> Fuse kit 1 with fuse holder, leads, screws, and mounting brackets. Fuse kit 2 with fuse holder, leads, screws, mounting brackets, and touch safe cover.
		<ul style="list-style-type: none"> Touch safe terminal cover for when fuse kit isn't installed Touch safe terminal for factory installed fuse kits 	



Dimensions and Weights for CCR, CPR, CVR

Table of Dimensions and Weights for CPR and CCR in Inches

VA	A	B	C	Mounting Centres D x E		F	Mounting Slot	WT. (Lbs)
				D	E			
25	3.00	4.00	2.50	2.50	2.50	3.125	0.25 x 0.625	2.3
50	3.00	4.00	2.50	2.50	2.50	3.125	0.25 x 0.625	3
100	3.00	5.00	2.50	2.50	3.00	3.75	0.25 x 0.625	5
150	3.75	4.25	3.13	3.25	3.50	4.50	0.25 x 0.625	6
200	3.75	4.50	3.13	3.25	3.50	4.50	0.25 x 0.625	8
250	3.75	5.00	3.13	3.25	3.50	4.50	0.31 x 0.625	10
350	4.50	4.50	3.75	3.75	3.75	4.75	0.31 x 0.625	12
500	5.25	5.00	4.38	4.50	3.75	4.75	0.31 x 0.625	14
750	5.25	6.00	4.38	4.50	3.75	4.75	0.31 x 0.625	18
1000	5.25	7.00	4.38	4.50	4.75	5.75	0.31 x 0.625	23
1500	6.75	5.50	5.63	5.00	3.75	5.25	0.31 x 0.625	40
2000	7.50	6.50	6.25	6.00	3.75	5.25	0.31 x 0.625	50
3000	7.50	8.75	6.25	6.00	5.00	6.50	0.31 x 0.625	70
5000	9.00	10.00	8.00	8.00	7.00	8.00	0.44 x 0.750	90

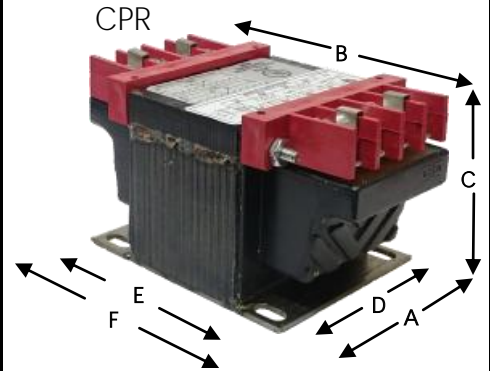
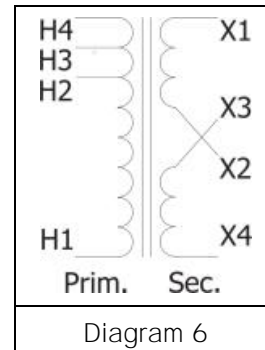
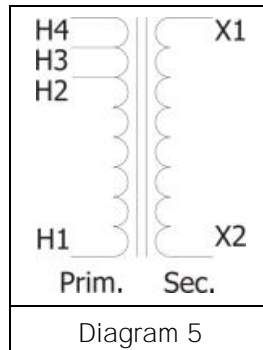
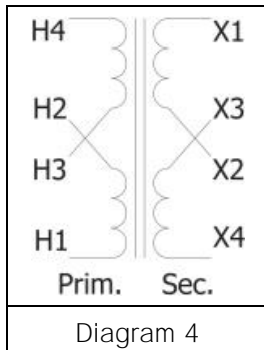
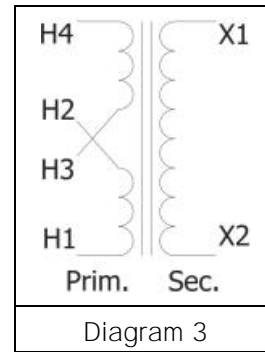
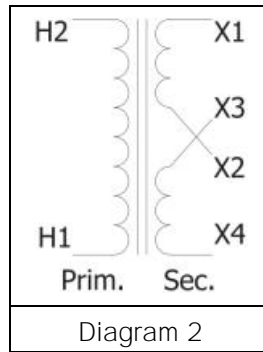
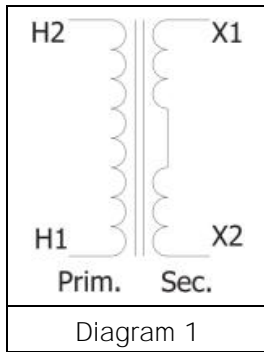


Table of Dimensions and Weights for CVR in Inches

VA	A	B	C	Mounting Centres D x E		WT. (Lbs)
				D	E	
50	3.00	6.00	3.50	1.375	4.375	3.5
100	3.00	6.00	3.50	1.375	4.375	5.5
150	3.50	6.658	4.25	2.00	5.00	7
200	3.50	6.658	4.25	2.00	5.00	9
250	3.50	6.658	4.25	2.00	5.00	11
350	4.125	6.50	5.00	2.375	4.875	13
500	4.875	7.00	5.625	3.25	5.50	15
750	4.875	7.00	5.625	3.25	5.50	19.5
1000	4.875	7.00	5.625	3.25	5.50	24.5
1500	5.75	9.00	6.625	4.00	7.25	45
2000	6.875	9.00	8.625	5.00	7.00	55
3000	6.875	9.00	8.625	5.00	7.00	75
5000	8.00	12.00	9.50	6.00	10.125	105



Schematic Diagrams



Correct VA selection guide

1. **Calculate the Total Inrush VA Required:**
From the data supplied by the manufacturers of the individual devices of the control circuit, and the inrush VA requirements of each device to be energized simultaneously.
2. **Calculate the Total Sealed VA Required:**
From the data supplied by the manufacturers of the individual devices of the control circuit, add the sealed VA requirements of all the components within the circuit.
3. **Calculate the Total Circuit Inrush VA:**
Total Circuit VA = Total Inrush VA + Total Sealed VA
4. **Select the Control Transformer VA requirement:**
For proper transformer VA selection, adjustments must be made for supply voltage variations. Should the supply voltage be relatively stable and fluctuates no more than +/- 5%, refer to the 90% secondary voltage column of the regulation data table. If the supply voltage fluctuates as much as +/-10% refer to the 95% column. go down the column until the Total Inrush VA closest to but no less than that calculated in step 3. Read to the far left column to select the continuous nominal VA rating of the control transformer required.

Continuous VA Transformer Name Plate Rating	Inrush VA at 30% Power Factor	
	90% Secondary Voltage	95% Secondary Voltage
25	145	105
50	240	190
75	450	320
100	700	470
150	1020	750
200	1700	1200
250	2150	1450
350	3800	2750
500	5500	3750
750	9800	6650
1000	15400	10300
1500	20000	12450
2000	22000	17000
3000	42000	29000