CONTROL VOLTAGE TRANSFORMER SELECTION GUIDE

To make the proper transformer selection, the load must be completely analyzed. Every electrically energized component in the control circuit must be considered. Electromagnetic control devices have two current requirements. The first current requirement is called inrush volt-amperes (VA) and is the current required to energize the coil of the device. Inrush VA typically lasts anywhere from 5-20 ms and can be as much as 10 to 20 times the normal sealed VA. Sealed VA is the normal current required to maintain the energized coil in steady state for a period of time.

STEP 1

Determine the total sealed (steady state) VA load of the control circuit. Add the continuous VA requirements of the maximum number of components that will be energized at any given time. Include both electromagnetic (coils, solenoids, etc.) and non-electromagnetic components (pilot lights, timers, etc.). Sealed VA data is available from the component manufacturers. If only current is known, simply multiply current by voltage to get VA.

STEP 2

Determine the total inrush VA load of the control circuit. Add together the inrush VA ratings of the electromagnetic components (coils, solenoids, etc.) that will be energized simultaneously. Inrush VA data is usually available from the component manufacturers. Also, add the normal VA requirements of non-electromagnetic components (pilot lights, timers, etc.) that will be energized at the same time.

STEP 3

Refer to the Regulation Data Chart below. If the supply circuit (primary) voltage is reasonably stable and fluctuates no more than ±5%, refer to the 90% Secondary Voltage column. If it fluctuates as much as ±10%, refer to the 95% Secondary Voltage column. NEMA standards require all electromagnetic devices to operate successfully at 85% of rated voltage. The 90% Secondary Voltage column is most commonly used for transformer selection.

STEP 4

In the selected column of the Regulation Data Chart, locate the inrush VA closest to, but not less than, the inrush VA of the control circuit. Read to the far left side of the chart to determine the continuous nominal VA nameplate rating of the transformer needed. The secondary voltage delivered under inrush conditions will be a minimum of 85%, 90%, or 95% of rated secondary voltage, depending on the column selected from the Regulation Data Chart. The total sealed VA of the control circuit must not exceed the nominal VA rating of the transformer selected.

REGULATION DATA CHART

Continuous Nominal VA (Name Plate Rating)	Inrush VA @ 20% PF		
	95% Sec. Voltage	90% Sec. Voltage	85% Sec. Voltage
50	200	240	280
75	350	470	580
100	400	575	770
150	800	950	1250
250	1500	2200	2750
300	2000	2800	3900
350	3200	3700	4900
500	4200	5800	8000
750	8000	11000	15000
1000	13000	18000	23000
1500	15000	24000	31000
2000	20000	32000	41000
3000	39000	60000	77000
5000	75000	120000	150000

Selection Example (Steps 1-4)

Determine the size transformer required to power the following list of components, assuming stable line voltage.

Qty	Components Description	Manufacturer's Data	
		Sealed VA	Inrush VA
3	Size 1 Contactors	63	555
2	Size 3 Contactors	86	1156
3	Relays	33	126
2	Indicating Lamps	14	14
	TOTALS	**196**	**1851**

Using the chart, we find the inrush VA of 1851 will require a 250 VA transformer, even though the sealed VA is only 196.

STEP 5

Determine the proper transformer model number from the Kele catalog. Make sure your selection meets the following conditions:

1. Has the proper primary and secondary voltage
2. Exceeds the inrush VA demands
3. Has a nameplate VA that exceeds the sealed VA requirements