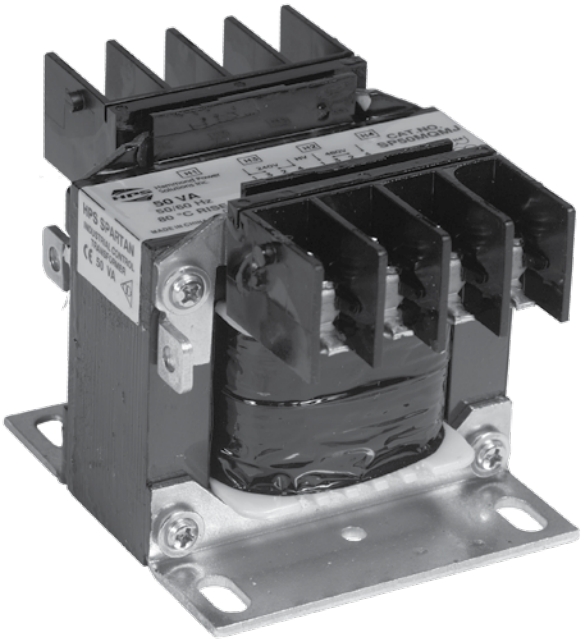
HPS Spartan® Industrial Open-Style Control Transformer

The Economical Solution

The HPS Spartan® line of industrial control transformers are ideally suited for general purpose, industrial and light duty loads. Designed for applications where high inrush or machine tool duty are not necessary, the HPS Spartan industrial open-style control transformer offers an efficient and economical solution. These units are well suited for HVAC applications, signal and alarm systems, motor control circuits, lighting and circuit isolation.

The HPS Spartan control transformer is an open style unit with molded terminal blocks up to 3000 VA or 30 amps. Optional Finger guards and a fuse block adapter kit are available upon request.

For an economical approach to control transformers, the HPS Spartan is the transformer of choice.



STANDARDS

The HPS Spartan Control Transformers meet or exceed the standards established by UL, CSA, IEC and NEMA.

Standard	File #	VA Size
UL (ANSI/UL506)	E50394	All
CSA	LR3902	All
IEC 61558		All
NEMA (ST-1)		All

INDUSTRIAL OPEN-STYLE CONTROL TRANSFORMER SELECTION

Selecting a control transformer requires that you have first hand knowledge of the application for the transformer and that you understand some basic terms related to the selection process. By using the following information, you will be sure to select the HPS Spartan® control transformer which best meets your application.

The HPS Spartan line of industrial control transformers are ideally suited for general purpose, industrial and light duty loads. Designed for applications where inrush requirements are not as high.

To select the proper transformer, three characteristics of the load circuit must first be determined. They are total steady-state (sealed) VA, total inrush VA, and inrush load power factor.

(A) The total steady state "sealed" VA is the amount of VA that the transformer must supply to the load circuit for an extended length of time. Simply add the total steady-state VA of all devices in your control circuit. The operating VA data of these components is available from the manufacturers.

(B) The total inrush VA is the amount of VA that the transformer must supply for all components in the control circuit which are energized together. Some consideration to the start-up sequence may be required. Inrush VA should be obtained from the device manufacturer.

(C) The inrush load power factor is difficult to determine without detailed vector analysis of all the control circuit components. Such information is not generally available. Therefore, HPS is recommending that a 40% power factor be utilized. Although some other control transformer manufacturers still recommend a power factor of only 20%, HPS, through recent tests conducted on many popular brands of control devices, has determined that the 40% power factor value is more accurate.

Once the above circuit variables have been determined, transformer selection is a six step process.

SIX EASY STEPS

1. Determine what your Primary (supply) and Secondary (output) voltage requirements are, as well as your required frequency (i.e. 60 Hz)

2. Calculate the Total Sealed VA of your circuit. (See Step A)

3. Calculate the Inrush VA by adding the inrush VA of all components being energized together. Remember to add the sealed VA of all components that do not have inrush VA, (lamps, timers etc.) as they present a load to the transformer during maximum inrush. If the inrush for the components in your circuit are not known, assume a 40% Inrush Power Factor.

4. Calculate the Total Inrush VA using one of the two methods:

A. Total Inrush VA =

$$\sqrt{(\text{VA sealed})^2 + (\text{VA inrush})^2}$$

OR

B. Total Inrush VA =
VA Sealed + VA Inrush

Note: method B will result in a slightly larger transformer being selected.

For VA sealed definition please refer to 1 (A).
For VA inrush definition please refer to 1 (B).

5. If the nominal supply voltage does not fluctuate more than 5%, then reference the 90% secondary voltage column in the Regulation Data Table for the correct VA rating.

If the supply voltage varies upwards of 10%, the 95% secondary voltage column should be used to size the transformer.

Current standards require electromagnetic devices to operate reliably at a minimum of 85% of their rated voltage. However, contact life may be affected with continuous start-ups at that voltage level. Therefore, the minimum 85% secondary voltage column should only be used as a reference.

6. Using the regulation data tables below, select the appropriate VA rated transformer:

A) With a continuous VA rating that is equal to or greater than the value in Step 2.

B) With a maximum inrush VA equal to or greater than the value obtained in Step 4.

To determine the correct HPS transformer and its catalog part number, just refer to the tables in this catalog for the voltage ratings, frequency and corresponding VA required.

HPS SPARTAN® TRANSFORMERS REGULATION DATA TABLE

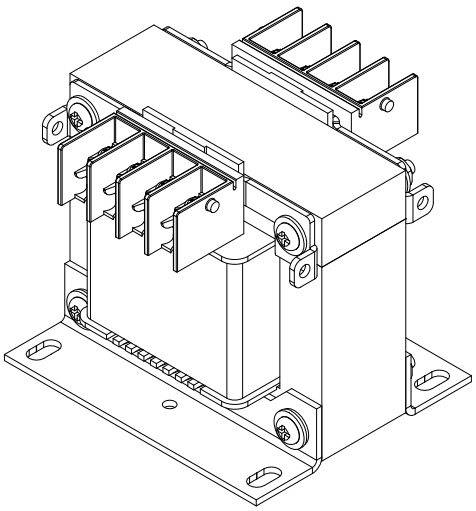
Continuous VA Transformer Nameplate Rating	Inrush VA @ 40% Power Factor		
	85% Secondary Voltage	90% Secondary Voltage	95% Secondary Voltage
50	177	139	102
100	350	275	203
150	715	554	400
250	1653	1264	895
350	2604	1947	1321
500	4004	3023	2090
750	6933	5088	3352
1000	10087	7340	4764
1500	14178	10232	6508
2000	17604	12669	8080
3000	39213	27539	16780
5000	68344	47498	28803

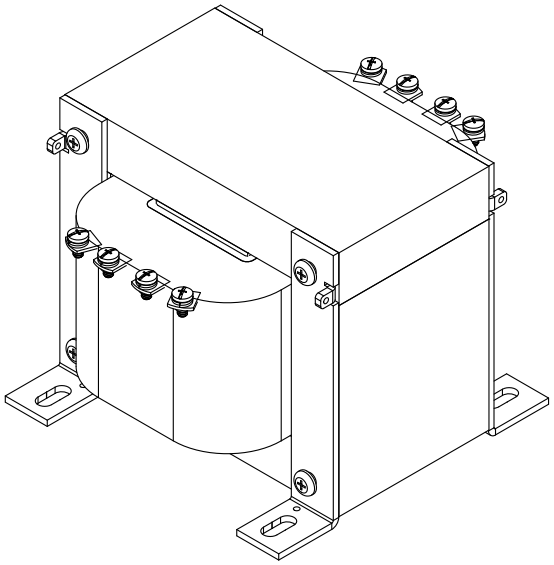
It is recommended that a control transformer be sized at a 40% Power Factor. Some components in a circuit, such as electromagnetic devices, typically operate at that level due to their inherently lower power factor. Selecting a transformer at 40% Power Factor will more than adequately size the unit for all the various loads in the circuit.

Features and Benefits

- Multi-voltage primary and secondary models increase range of application per unit
- Standard molded terminal blocks or primary and secodary up to 3000VA (30A) units
- Solid terminal block with standard combination screw connection
- 50/60 Hz (60 Hz on SP***ACP and SP***AR)
- Copper wound coils with high dielectric strength insulation
- Bolted core construction
- Bolt-on mounting brackets
- Vacuum Impregnated with Polyester Resin and oven cured
- Seismically certified in accordance with IBC 2009; Section 1613 Earthquake Loads, for S_{DS} <= 2.00g , z/h = 1.0, and I_p = 1.5
- Superior insulating materials. The HPS Spartan series transformers offer the following insulation systems:
    - 130°C (80°C rise) up to 1500 VA
    - 180°C (115°C rise) 2000 VA to 5000 VA
- All units supplied with primary and secondary voltage links/jumpers
- Optional finger guards available[1]
- Optional fuse block adapter kit available[1]
- Supplied with trilingual installation and wiring instruction sheets
- "Premium Packaging"[1] which feature:
    - Premium fluted cartons
    - Custom molded foam inserts
    - Easy removal and repacking
    - Industry's best box label
- **15 year warranty**

[1] up to and including 3000VA or 30 amps





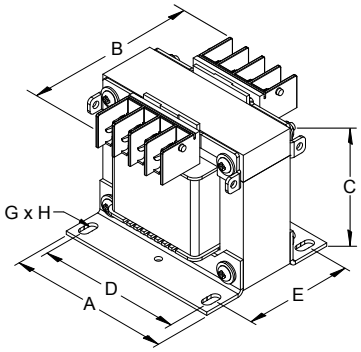


FIGURE A

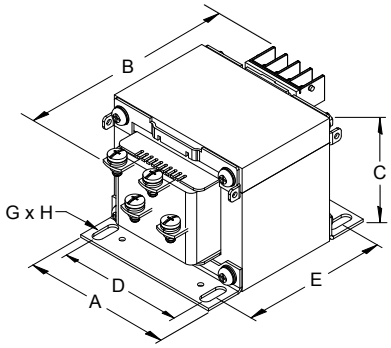


FIGURE B

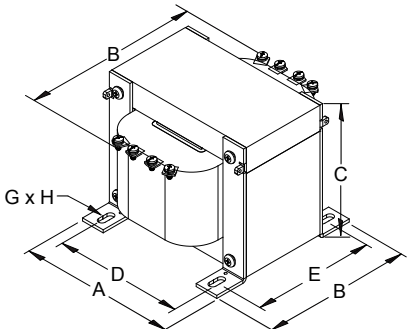


FIGURE C

Group C

Primary Voltage: **240 X 480** | 230 X 460 | 220 X 440
Secondary Voltage: **120 X 240** | 115 X 230 | 110 X 220

50/60 Hertz

VA Rating	CE VA Rating	Catalog Number	Mtg. Fig.	Output Amps	Overall Dimensions			Mounting Centers		Mounting Slot	Height with Finger Guard	Height with Fuse Block Adapter	Approx. Ship Weight Lbs.
					A	B	C	D	E	G X H			
50	50	**SP50MQMJ**	A	0.42/0.21	2.60	3.35	2.60	2.13	2.17	0.22 x 0.44	2.98	2.79	1.7
100	100	**SP100MQMJ**	A	0.83/0.42	2.99	3.74	2.85	2.52	2.60	0.22 x 0.44	3.23	3.04	3
150	150	**SP150MQMJ**	A	1.25/0.63	2.99	4.29	2.85	2.52	3.15	0.22 x 0.44	3.23	3.04	4.3
250	160	**SP250MQMJ**	A	2.08/1.04	3.78	4.09	3.40	3.31	2.99	0.22 x 0.44	3.78	3.59	6.5
350	250	**SP350MQMJ**	A	2.92/1.46	3.78	4.69	3.40	3.31	3.58	0.22 x 0.44	3.78	3.59	8.2
500	300	**SP500MQMJ**	A	4.17/2.08	4.49	4.69	3.78	3.78	3.66	0.31 x 0.81	4.16	3.97	11
750	500	**SP750MQMJ**	A	6.25/3.13	5.25	4.69[1]	4.37	4.50	3.66	0.31 x 0.81	4.75	4.56	16
1000	650	**SP1000MQMJ**	A	8.33/4.17	5.25	5.47[1]	4.37	4.50	4.45	0.31 x 0.81	4.75	4.56	21
1500	1000	**SP1500MQMJ**	A	12.5/6.25	5.25	6.85[1]	4.37	4.50	5.83	0.31 x 0.81	4.75	4.56	28
2000	1300	**SP2000MQMJ**	A	16.7/8.33	6.38	5.87[1]	5.31	5.75	4.84	0.31 x 0.81	5.50	5.31	35
3000	2000	**SP3000MQMJ**	A	25.0/12.5	7.50	7.50	6.50	6.30	7.28	0.44 x 1.00	6.50	6.50	64
5000	3000	**SP5000MQMJ**	C	41.7/20.8	8.98	9.88	7.76	7.40	7.28	0.44 x 1.00	N/A	N/A	97

Primary and Secondary voltage links/jumpers supplied standard with all transformers. **All dimensions in inches**
Refer to page 75 for wiring schematic drawing. Custom voltages and VA sizes available upon request.
[1] Note: For 750 through 2000 VA units actual overall depth is 0.24" plus the value in column B.

Group D

Primary Voltage: **240 X 480** | 230 X 460 | 220 X 440
Secondary Voltage: **12 X 24** | 11.5 X 23 | 11 X 22

50/60 Hertz

VA Rating	CE VA Rating	Catalog Number	Mtg. Fig.	Output Amps	Overall Dimensions			Mounting Centers		Mounting Slot	Height with Finger Guard	Height with Fuse Block Adapter	Approx. Ship Weight Lbs.
					A	B	C	D	E	G X H			
50	50	**SP50QR**	A	4.17/2.08	2.60	3.35	2.60	2.13	2.17	0.22 x 0.44	2.98	2.79	1.7
100	100	**SP100QR**	A	8.33/4.17	2.99	3.54	2.85	2.52	2.40	0.22 x 0.44	3.23	3.04	3
150	150	**SP150QR**	A	12.5/6.25	2.99	4.29	2.85	2.52	3.15	0.22 x 0.44	3.23	3.04	4.3
250	160	**SP250QR**	A	20.8/10.4	3.78	4.09	3.40	3.31	2.99	0.22 x 0.44	3.78	3.59	6.5
350	250	**SP350QR**	A	29.2/14.6	3.78	4.69	3.40	3.31	3.58	0.22 x 0.44	3.78	3.59	8.3
500	300	**SP500QR**	B	41.7/20.8	4.49	5.47	3.78	3.78	3.66	0.31 x 0.81	4.16	3.97	11

Primary and Secondary voltage links/jumpers supplied standard with all transformers. **All dimensions in inches**
Refer to page 75 for wiring schematic drawing. Custom voltages and VA sizes available upon request.