

Industrial Control Power Transformers

Class MT

General

Features

- Epoxy-encapsulated (50–5000VA); Completely seals the transformer coils against moisture, dust, dirt and industrial contaminants for maximum protection in hostile and industrial environments
- Fuse clips (most models). Factory mounted for integral fusing on the secondary side to save panel space, save wiring time and save the cost of buying an add-on fuse block or kit
- Integrally molded barriers. Between terminals and transformer, protect against electrical creepage. Up to 30% greater terminal contact area permits low-loss connections. Extra-deep barriers reduce the chance of shorts from frayed leads or careless wiring
- Terminals. Molded into the transformer, are difficult to break during wiring. A full quarter-inch of thread on the 10-32 terminal screws prevents stripping and pullout
- Jumpers supplied. Two jumper links are standard with all transformers which can be wired for dual primary voltages

Operation

Industrial control circuits and motor control loads typically require more current when they are initially energized than under normal operating conditions. This period of high current demand, referred to as inrush, may be as great as ten times the current required under steady state (normal) operating conditions, and can last up to 40 milliseconds. A transformer in a circuit subject to inrush will typically attempt to provide the load with the required current during the inrush period. However, it will be at the expense of the secondary voltage stability by allowing the voltage to the load to decrease as the current increases. This period of secondary voltage instability, resulting from increased current, can be of such magnitude that the transformer is unable to supply sufficient voltage to energize the load. The transformer must therefore be designed and constructed to accommodate the high inrush current, while maintaining secondary voltage stability. According to NEMA standards, the secondary voltage would typically be at 85% of the rated voltage.



Industrial Control Power Transformers are specifically designed and built to provide adequate voltage to the load while accommodating the high current levels present at inrush. These transformers deliver excellent secondary voltage regulation and meet or exceed the standards established by NEMA, ANSI, UL and CSA. Their rugged construction and excellent electrical characteristics ensure reliable operation of electromagnetic devices and trouble-free performance.

Specifications

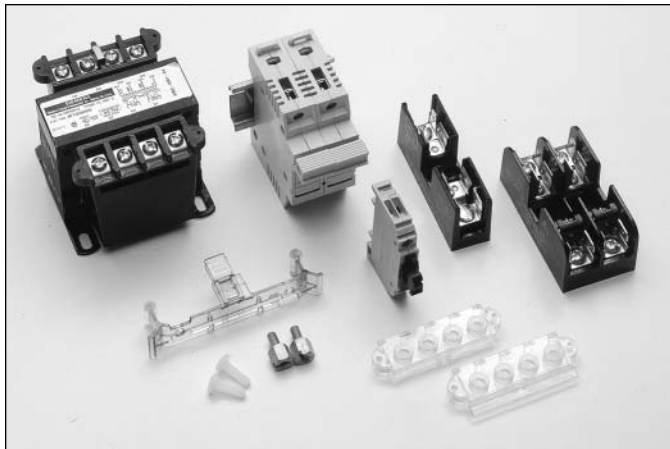
- Laminations are built with silicon steel to minimize core losses and to increase optimum performance and efficiency
- Copper magnet wire of the highest quality assures efficient operation
- Factory mounted type “K” fuse clips are standard on all secondary transformers where possible
- Two jumper links are standard with all transformers which can be wired for dual primary voltages
- UL listed and CSA certified
- 50/60 Hz rated
- Insulation materials are of the highest rating available for the temperature class

- Mounting brackets are heavy gauge steel to add strength to core construction and provide stable mounting. Slotted mounting feet permit easy installation
- Attractive black finish; easy-to-read nameplate with complete rating data and wiring diagram
- Class 105°C (221°F) insulation system. 55°C (131°F) temperature rise. (50–750VA typical)
- Class 180°C (356°F) insulation system. 120°C (248°F) temperature rise. (1000–5000VA typical)
- Optional field mounted 2-pole primary Class CC fuse block is available

Industrial Control Power Transformers

Class MTG

General



Features

- Class MTG Industrial Control Transformers are 100% certified for all domestic and International Applications
- The MTG line has full compliance with IEC Safety standards EN 61 558
- CE Mark in accordance with requirements for EN 61 558
- Meets IP-20 specifications per IEC 529 for finger-safe protection when used with Siemens Touch Safe snap on terminal cover kits. Meets IP-00 specifications when covers are not used.
- UL Listed (File # E46323)
- CSA Certified (File #LR27533)
- Exceeds applicable requirements for control transformers as determined by NEMA and ANSI
- Insulation requirements is twice that of UL506
- Proven Epoxy-encapsulated coils operate cooler and completely seal the transformer coils against moisture, dust, dirt and industrial contaminants for maximum protection in hostile and industrial environments
- Available in 50 to 750 VA sizes, in all standard voltage combinations
- Class 105°C (221°F) insulation system. 55°C (131°F) temperature rise. (50–750VA typical)
- Class 180°C (356°F) insulation system. 120°C (248°F) temperature rise. (1000–5000VA typical)
- Primary and secondary fusing capability available as field installed kits for domestic or international fusing
- Integrally-molded terminals and barriers between terminals make breakage virtually impossible during wiring. The MTG transformer construction is the same as our high quality Class MT transformers

Optional Field Installed Fuse Clip Kits For Panel Mounting

- 2-Pole primary Class CC fuse block
- 1-Pole secondary midget fuse block for $1\frac{3}{32} \times 1\frac{1}{2}$ fuses
- 2-Pole primary international type fuse blocks
- 1-Pole secondary international type fuse blocks

Optional Touch-Safe Snap-On Terminal Cover Kits

The Touch-Safe terminal covers are designed to comply with IEC 742 and IP 20 requirements. When installed,

the covers prevent contact with current carrying parts on the transformer and are available for 4 terminal configurations. The international fuse block kits have inherent touch safe terminals and fuse clips.

Siemens Meets International Standards

CSA (Canadian Standards Association) was utilized as a Competent Body in reviewing, interpreting and properly complying with the requirements of IEC-742 to place a CE mark on its MTG Series product. As a National Certification Body, CSA also has the proper documentation and reports on file for MTG Series to utilize the CB Scheme ensuring acceptance throughout the world.

The standard Siemens MTG product is available with terminal covers which meets the requirements of IEC-529, IP20 degree of protection and meets the applicable requirements for covers per IEC-742.

IEC-742

The requirements for industrial control circuit transformers to be used in the European Common Market are identified by the International Electrotechnical Commission (IEC) and specified under IEC-742, Non-Short Circuit Proof Isolating Transformers, under the Low Voltage Directive 73/23/EEC. Manufacturers of control transformers indicate compliance with these requirements by placing a CE mark on the product.

- Winding to winding insulation requirements may be twice that for IEC-742 compared to UL506
- The electrical clearances between current carrying parts are one-third greater to comply with IEC-742 requirements for units up to 250VA with voltages up to 440 volts ac
- Transformers manufactured to IEC-742 requirements will have a minimum of 10% higher overload capacity than those manufactured only to UL506 requirements

While no requirement exists in IEC-742 for the electrical connections to be either finger safe or touch proof, the specification does state that IF a transformer is supplied with a cover to prevent incidental contact with current carrying parts, that cover must utilize two separate methods or places of securing it to the component, with neither being dependent upon the other. Additionally, one of these methods MUST require a tool to remove it.

IEC-529

The requirements for finger-safe or touch-proof electrical connections are identified by the International Electrotechnical Commission (IEC) under specification 529, Classification of Degrees of Protection Provided by Enclosures. These various degrees of protection are identified and differentiated by IP ratings.

The IP specification which most closely approximates protection to a human finger is IP20. This IP rating would be the most common degree of touch-proof connection for electrical components such as transformers.

EN 61 558

The requirements for industrial control transformers to be used in the European Common Market are identified by the IEC and specified in EN 61 558, Safety of Power Control Transformers, under Low Voltage Directive 73/23/EEC. CE mark on the product indicates compliance.

Industrial Control Power Transformers

Class MT, MTG

General

Transformer Selection Process

Selecting a transformer for industrial control circuit applications requires knowledge of the following terms:

Inrush VA is the product of load voltage (V) multiplied by the current (A) that is required during circuit start-up. It is calculated by adding the inrush VA requirements of all devices (contactors, timers, relays, pilot lights, solenoids, etc.), which will be energized together. Inrush VA requirements are best obtained from the component manufacturer.

Sealed VA is the product of load voltage (V) multiplied by the current (A) that is required to operate the circuit after initial start-up or under normal operating conditions. It is calculated by adding the sealed VA requirements of all electrical components of the circuit that will be energized at any given time. Sealed VA requirements are best obtained from the component manufacturer. Sealed VA is also referred to as steady state VA.

Primary Voltage is the voltage available from the electrical distribution system and its operational frequency, which is connected to the transformer supply voltage terminals.

Secondary Voltage is the voltage required for load operation which is connected to the transformer load voltage terminals.



Fuse Clip Kit KCCFPX2R

Primary Fuse Kit

In addition to factory installed secondary fusing, Siemens offers a primary fuse kit for class MT transformers size 50–750 VA for field installation. The primary fuse kit includes a 2-pole Class CC fuse block, instructions and all associated mounting and wiring hardware. Additionally, this fuse kit will fit most competitors' units. To order this kit, use catalog number **KCCFPX2R**. The primary fuse kit, when installed, will add a maximum of 0.69 in. (18 mm) to the transformer "A" dimension and 1.94 in. (49 mm) to the "C" dimension.

Once the circuit variables have been determined, transformer selection is a simple 5-step process as follows:

1. Determine the Application Inrush VA by using the following industry accepted formula:
Application Inrush VA = $\sqrt{(\text{Inrush VA})^2 + (\text{Sealed VA})^2}$
2. Refer to the Regulation Data Chart. If the primary voltage is basically stable and does not vary by more than 5% from nominal, the 90% secondary voltage column should be used. If the primary voltage varies between 5% and 10% of nominal, the 95% secondary voltage column should be used.
3. After determining the proper secondary voltage column, read down until a value equal to or greater than the Application Inrush VA is found. In no case should a figure less than the Application Inrush VA be used.
4. Read left to the Transformer VA Rating column to determine the proper transformer for this application. As a final check, make sure that the Transformer VA Rating is equal to or greater than the total sealed requirements. If not, select a transformer with a VA rating equal to or greater than the total sealed VA.
5. Refer to the following pages to determine the proper catalog number based on the transformer VA, and primary and secondary voltage requirements.

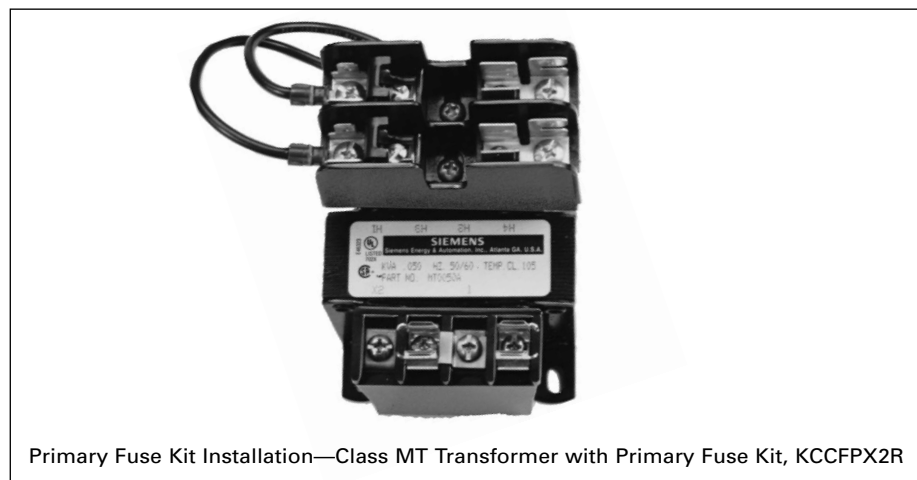
Regulation Data Chart

Transformer VA Ratings	Inrush VA At 20% Power Factor		
	NEMA/IEC 95% Sec Voltage	NEMA/IEC 90% Sec Voltage	NEMA/IEC 85% Sec Voltage
25	100/—	130/—	150/—
50	170/190	200/220	240/270
75	310/350	410/460	540/600
100	370/410	540/600	730/810
150	780/860	930/1030	1150/1270
200	810/900	1150/1270	1450/1600
250	1400/1540	1900/2090	2300/2530
300	1900/2090	2700/2970	3850/4240
350	3100/3410	3650/4020	4800/5280
500	4000/4400	5300/5830	7000/7700
750	8300/9130	11000/12100	14000/15400
1000 ^①	15000/—	21000/—	27000/—
1000 ^②	9000/—	13000/—	18500/—
1500	10500/—	15000/—	205000/—
2000	17000/—	25500/—	34000/—
3000	24000/—	36000/—	47500/—
5000	55000/—	92500/—	115000/—

To comply with NEMA standards, which require all magnetic devices to operate successfully at 85% of rated voltage, the 90% secondary voltage column is most often used in selecting a transformer.

① For units with Class 105°C insulation systems.

② For units with Class 180°C insulation systems.



Primary Fuse Kit Installation—Class MT Transformer with Primary Fuse Kit, KCCFPX2R


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CONTROL
PRODUCTS

NEMA & General
Purpose Control

Industrial Control Power Transformers

Domestic, Class MT

Selection

	Ordering Information		Voltage Table		
	<ul style="list-style-type: none"> ▶ Use the Voltage Table to determine the primary and secondary voltage required. ▶ Field Modifications see page 16-90. ▶ Dimensions see page 16-114. ▶ Wiring Diagrams see page 16-149. 		Primary Volts 50/60 Hz	Secondary Volts	Letter
			240 X 480, 230 X 460, 220 X 440	120/115/110	A
			240 X 480	24	B
			120 X 240	24	C
			115 X 230	24	D
			550/575/600	110/115/120	E
			208/277	120	F
			208/230/460	115	G
			230/460/575	95/115	H
			380/400/415	110 X 220	I
			208/230/460, 200/220/440, 240/480	24 X 115, 23 X 110, 25 X 120	J
			240/416/480/600, 230/400/460/575, 220/380/440/550, 208/500	99/120/130, 95/115/125, 91/110/120, 85/100/110	L
			240 X 480	120 X 240	M

VA Rating	Voltage Letter A ^{①②}		Voltage Letter B ^{②③}		Voltage Letter C ^{②③}		Voltage Letter D ^{②③}		Voltage Letter E ^{①②}		Voltage Letter F ^{①②}	
	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$
50	MT0050A	46.00	MT0050B	54.00	MT0050C	54.00	MT0050D	54.00	MT0050E	54.00	MT0050F	54.00
75	MT0075A	55.00	MT0075B	65.00	MT0075C	65.00	MT0075D	65.00	MT0075E	63.00	MT0075F	57.00
100	MT0100A	62.00	MT0100B	71.00	MT0100C	71.00	MT0100D	71.00	MT0100E	66.00	MT0100F	66.00
150	MT0150A	66.00	MT0150B	91.00	MT0150C	91.00	MT0150D	91.00	MT0150E	79.00	MT0150F	79.00
200	MT0200A	82.00	MT0200B	116.00	MT0200C	116.00	MT0200D	116.00	MT0200E	98.00	MT0200F	98.00
250	MT0250A	96.00	MT0250B	136.00	MT0250C	136.00	MT0250D	136.00	MT0250E	121.00	MT0250F	121.00
300	MT0300A	105.00	MT0300B	143.00	MT0300C	143.00	MT0300D	143.00	MT0300E	143.00	MT0300F	143.00
350	MT0350A	113.00	MT0350B	150.00	MT0350C	150.00	MT0350D	150.00	MT0350E	153.00	MT0350F	151.00
500	MT0500A	139.00	MT0500B	188.00	MT0500C	188.00	MT0500D	188.00	MT0500E	163.00	MT0500F	163.00
750	MT0750A	192.00	MT0750B	168.00	—	—	—	—	MT0750E	186.00	MT0750F	172.00
1000	MT1000A	234.00	—	—	—	—	—	—	MT1000E	288.00	—	—
1500	MT1500A	333.00	—	—	—	—	—	—	—	—	—	—
2000	MT2000A	405.00	—	—	—	—	—	—	—	—	—	—
3000	MT3000A	563.00	—	—	—	—	—	—	—	—	—	—
5000	MT5000A	945.00	—	—	—	—	—	—	—	—	—	—

VA Rating	Voltage Letter G ^{①②}		Voltage Letter H ^{②④}		Voltage Letter I ^{②④}		Voltage Letter J ^{②③}		Voltage Letter L ^{①②}		Voltage Letter M ^{②④}	
	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$
50	MT0050G	75.00	MT0050H	75.00	MT0050I	54.00	MT0050J	75.00	MT0050L	77.00	MT0050M	77.00
75	MT0075G	80.00	MT0075H	80.00	MT0075I	65.00	MT0075J	80.00	—	—	MT0075M	82.00
100	MT0100G	84.00	MT0100H	84.00	MT0100I	71.00	MT0100J	84.00	MT0100L	86.00	MT0100M	86.00
150	MT0150G	108.00	MT0150H	108.00	MT0150I	91.00	MT0150J	108.00	MT0150L	113.00	MT0150M	113.00
200	MT0200G	140.00	MT0200H	140.00	MT0200I	116.00	MT0200J	140.00	—	—	MT0200M	145.00
250	MT0250G	148.00	MT0250H	148.00	MT0250I	136.00	MT0250J	148.00	MT0250L	153.00	MT0250M	153.00
300	MT0300G	173.00	MT0300H	173.00	MT0300I	143.00	MT0300J	173.00	—	—	MT0300M	180.00
350	MT0350G	182.00	MT0350H	—	MT0350I	150.00	MT0350J	182.00	MT0350L	188.00	MT0350M	188.00
500	MT0500G	203.00	MT0500H	203.00	MT0500I	188.00	MT0500J	203.00	MT0500L	211.00	MT0500M	211.00
750	MT0750G	281.00	MT0750H	281.00	MT0750I	236.00	—	—	MT0750L	293.00	MT0750M	293.00
1000	MT1000G	332.00	MT1000H	332.00	MT1000I	332.00	—	—	—	—	—	—
1500	MT1500G	430.00	MT1500H	430.00	MT1500I	374.00	—	—	—	—	—	—
2000	MT2000G	574.00	MT2000H	574.00	MT2000I	574.00	—	—	—	—	—	—
3000	MT3000G	718.00	MT3000H	718.00	MT3000I	718.00	—	—	—	—	—	—
5000	MT5000G	1149.00	MT5000H	1149.00	—	—	—	—	—	—	—	—

① Includes secondary fuse clip on sizes 50–750VA.

② A 2-pole primary Class CC fuse kit is available for field installation. See page 16-77 for details. Catalog Number: KCCFPX2R.


③ Includes secondary fuse clip on sizes 50–500VA.

④ Does not include secondary fuse clip on any size.

Industrial Control Power Transformers

International, Class MTG

Selection

	Ordering Information		Voltage Table		
	<ul style="list-style-type: none"> ► Use the Voltage Table to determine the primary and secondary voltage required. ► Field Modifications see page 16-90. ► Dimensions see page 16-114. ► Wiring Diagrams see page 16-149. 		Primary Volts 50/60 Hz	Secondary Volts	Letter
			240 X 480, 230 X 460, 220 X 440 240 X 480 120 X 240 550/575/600 380/400/415 208/230/460, 200/220/440, 240/480 380	120/115/110 24 24 110/115/120 110 X 220 24 X 115, 23 X 110, 25 X 120 24	A B C E I J P

VA Rating	Voltage Letter A		Voltage Letter B		Voltage Letter C		Voltage Letter E		Voltage Letter I		Voltage Letter J		Voltage Letter P	
	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$	Catalog No	List Price \$
50	MTG0050A	62.00	MTG0050B	71.00	MTG0050C	71.00	MTG0050E	71.00	MTG0050I	100.00	MTG0050J	72.00	MTG0050P	71.00
75	MTG0075A	72.00	MTG0075B	86.00	MTG0075C	86.00	MTG0075E	80.00	MTG0075I	105.00	MTG0075J	81.00	MTG0075P	86.00
100	MTG0100A	82.00	MTG0100B	97.00	MTG0100C	97.00	MTG0100E	87.00	MTG0100I	110.00	MTG0100J	110.00	MTG0100P	97.00
150	MTG0150A	87.00	MTG0150B	122.00	MTG0150C	122.00	MTG0150E	105.00	MTG0150I	145.00	MTG0150J	153.00	MTG0150P	122.00
200	MTG0200A	109.00	MTG0200B	155.00	MTG0200C	155.00	MTG0200E	150.00	MTG0200I	158.00	MTG0200J	184.00	MTG0200P	155.00
250	MTG0250A	125.00	MTG0250B	183.00	MTG0250C	183.00	MTG0250E	187.00	MTG0250I	200.00	MTG0250J	193.00	MTG0250P	183.00
300	MTG0300A	141.00	MTG0300B	192.00	MTG0300C	192.00	MTG0300E	192.00	MTG0300I	219.00	MTG0300J	247.00	MTG0300P	192.00
350	MTG0350A	150.00	MTG0350B	218.00	MTG0350C	218.00	MTG0350E	229.00	MTG0350I	243.00	MTG0350J	258.00	MTG0350P	218.00
500	MTG0500A	186.00	MTG0500B	252.00	MTG0500C	252.00	MTG0500E	252.00	MTG0500I	272.00	MTG0500J	272.00	MTG0500P	252.00
750	MTG0750A	257.00	MTG0750B	354.00	MTG0750C	354.00	MTG0750E	354.00	MTG0750I	378.00	MTG0750J	517.00	MTG0750P	354.00
1000	MTG1000A	309.00	MTG1000B	460.00	MTG1000C	—	—	—	—	—	MTG1000J	574.00	—	—
1500	MTG1500A	424.00	—	—	—	—	—	—	—	—	—	—	—	—
2000	MTG2000A	475.00	—	—	—	—	—	—	—	—	—	—	—	—
3000	MTG3000A	689.00	—	—	—	—	—	—	—	—	—	—	—	—
5000	MTG5000A	1033.00	—	—	—	—	—	—	—	—	—	—	—	—

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CONTROL
PRODUCTS

**NEMA & General
Purpose Control**