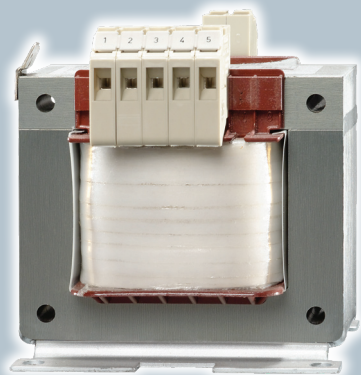




Industrial Control Power Transformers

Class MT and MTG

- 10/1 General
- 10/4 Class MT, Domestic
- 10/5 Class MTG, International
- 10/6 Field Modification Kits

Single Phase Sirius Transformers

- 10/7 Transformer Introduction & Overview
- 10/9 4AM General Data
- 10/10 4AM Selection and ordering data

Industrial Control Power Transformers

Class MT

General

Features

- Epoxy-encapsulated (50–750VA); epoxy resin impregnated (1.0–5.0 KVA). 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.

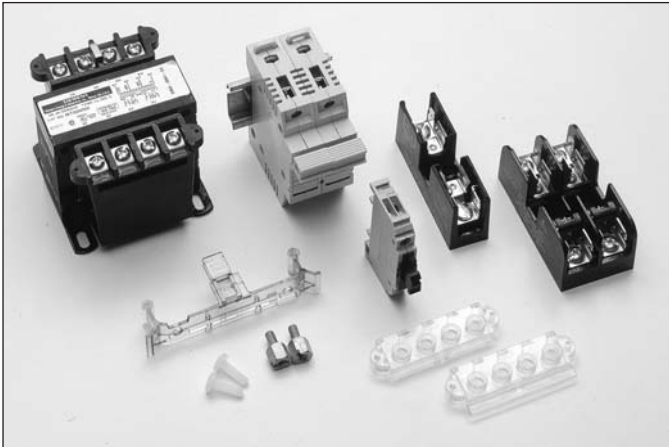


Industrial Control Power Transformers are specifically designed and built to provide adequate voltage to the load while accommodating the high current levels present at inrush. These transformers deliver excellent secondary voltage regulation and meet or exceed the standards established by NEMA, ANSI, 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.



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 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

Industrial Control Power Transformers

Domestic, Class MT

Selection

	Ordering Information	Voltage Table		
	► Use the Voltage Table to determine the primary and secondary voltage required. ► Technical data see www.sea.siemens.com ► Field Modifications see page 10/6.	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	Catalog No	Catalog No	Catalog No	Catalog No	Catalog No	Catalog No
50	MT0050A	MT0050B	MT0050C	MT0050D	MT0050E	MT0050F
75	MT0075A	MT0075B	MT0075C	MT0075D	MT0075E	MT0075F
100	MT0100A	MT0100B	MT0100C	MT0100D	MT0100E	MT0100F
150	MT0150A	MT0150B	MT0150C	MT0150D	MT0150E	MT0150F
200	MT0200A	MT0200B	MT0200C	MT0200D	MT0200E	MT0200F
250	MT0250A	MT0250B	MT0250C	MT0250D	MT0250E	MT0250F
300	MT0300A	MT0300B	MT0300C	MT0300D	MT0300E	MT0300F
350	MT0350A	MT0350B	MT0350C	MT0350D	MT0350E	MT0350F
500	MT0500A	MT0500B	MT0500C	MT0500D	MT0500E	MT0500F
750	MT0750A	MT0750B	—	—	MT0750E	MT0750F
1000	MT1000A	—	—	—	MT1000E	—
1500	MT1500A	—	—	—	—	—
2000	MT2000A	—	—	—	—	—
3000	MT3000A	—	—	—	—	—
5000	MT5000A	—	—	—	—	—

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	Catalog No	Catalog No	Catalog No	Catalog No	Catalog No	Catalog No
50	MT0050G	MT0050H	MT0050I	MT0050J	MT0050L	MT0050M
75	MT0075G	MT0075H	MT0075I	MT0075J	—	MT0075M
100	MT0100G	MT0100H	MT0100I	MT0100J	MT0100L	MT0100M
150	MT0150G	MT0150H	MT0150I	MT0150J	MT0150L	MT0150M
200	MT0200G	MT0200H	MT0200I	MT0200J	—	MT0200M
250	MT0250G	MT0250H	MT0250I	MT0250J	MT0250L	MT0250M
300	MT0300G	MT0300H	MT0300I	MT0300J	—	MT0300M
350	MT0350G	MT0350H	MT0350I	MT0350J	MT0350L	MT0350M
500	MT0500G	MT0500H	MT0500I	MT0500J	MT0500L	MT0500M
750	MT0750G	MT0750H	MT0750I	—	MT0750L	MT0750M
1000	MT1000G	MT1000H	MT1000I	—	—	—
1500	MT1500G	MT1500H	MT1500I	—	—	—
2000	MT2000G	MT2000H	MT2000I	—	—	—
3000	MT3000G	MT3000H	MT3000I	—	—	—
5000	MT5000G	MT5000H	—	—	—	—

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 10/6 for details. Catalog Number: KCCFPX2R.

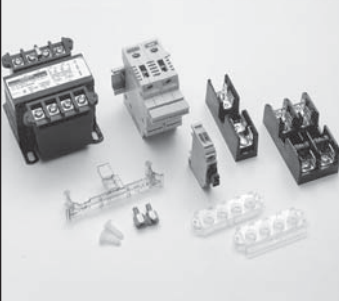
③ Includes secondary fuse clip on sizes 50–500VA

④ Does not include secondary fuse clip on any size.

Industrial Control Power Transformers

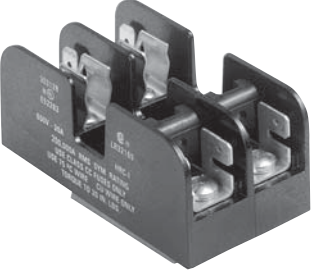
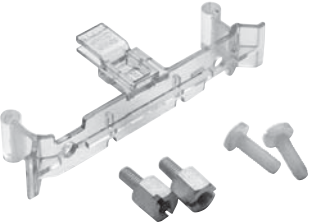
International, Class MTG

Selection

	Ordering Information	Voltage Table		
	► Use the Voltage Table to determine the primary and secondary voltage required. ► Technical data see www.sea.siemens.com ► Field Modifications see page 10/6.	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
		550/575/600	110/115/120	E
		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
		380	24	P

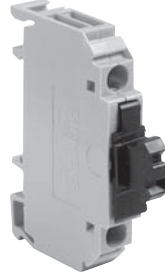
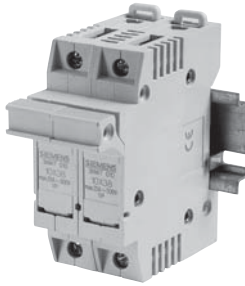
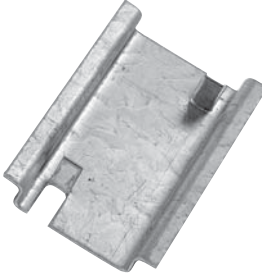
VA Rating	Voltage Letter A	Voltage Letter B	Voltage Letter C	Voltage Letter E	Voltage Letter I	Voltage Letter J	Voltage Letter P
	Catalog No	Catalog No	Catalog No	Catalog No	Catalog No	Catalog No	Catalog No
50	MTG0050A	MTG0050B	MTG0050C	MTG0050E	MTG0050I	MTG0050J	MTG0050P
75	MTG0075A	MTG0075B	MTG0075C	MTG0075E	MTG0075I	MTG0075J	MTG0075P
100	MTG0100A	MTG0100B	MTG0100C	MTG0100E	MTG0100I	MTG0100J	MTG0100P
150	MTG0150A	MTG0150B	MTG0150C	MTG0150E	MTG0150I	MTG0150J	MTG0150P
200	MTG0200A	MTG0200B	MTG0200C	MTG0200E	MTG0200I	MTG0200J	MTG0200P
250	MTG0250A	MTG0250B	MTG0250C	MTG0250E	MTG0250I	MTG0250J	MTG0250P
300	MTG0300A	MTG0300B	MTG0300C	MTG0300E	MTG0300I	MTG0300J	MTG0300P
350	MTG0350A	MTG0350B	MTG0350C	MTG0350E	MTG0350I	MTG0350J	MTG0350P
500	MTG0500A	MTG0500B	MTG0500C	MTG0500E	MTG0500I	MTG0500J	MTG0500P
750	MTG0750A	MTG0750B	MTG0750C	MTG0750E	MTG0750I	MTG0750J	MTG0750P
1000	MTG1000A	MTG1000B	MTG1000C	—	—	MTG1000J	—
1500	MTG1500A	—	—	—	—	—	—
2000	MTG2000A	—	—	—	—	—	—
3000	MTG3000A	—	—	—	—	—	—
5000	MTG5000A	—	—	—	—	—	—

Fuse Blocks, Touch-Safe Terminal Covers

Catalog Number	Description	List Price \$
 KCCFP2RG	2-Pole Primary Class CC Fuse Block for domestic fusing. Max 600V.- (Single pole cover kits, if required are listed below. One cover kit required per pole.)	
 KCCF1G	1-Pole Secondary Midget Fuse Block for 13/32 × 1½ domestic Fusing. Max 250V. (Single pole cover kits, if required are listed below.)	
 KCCFBCK	Single Pole Fuse Block cover Kit for domestic fuse blocks listed above. (For primary or secondary) 2-Kits required for 2-pole fuse block.	
 KTTSC4P	Snap-On Transformer Terminal Touch-Safe Cover Kit. (Includes primary and secondary covers.)	

Note: For complete listing of cylindrical fuses refer to section 16 Control Circuit Protection.

International Fusing

Catalog Number	Description	List Price \$
 8WA1011-1SF12	1-Pole Fuse Block, Touch-Safe. Up to 6.3A for 5 mm × 20 mm or 5 mm × 25 mm (Requires DIN Rail Mounting)	
 3NW7011	1-Pole Fuse Block, Touch-Safe 25A, for 10 × 38 mm Cylindrical Fuses. (Requires DIN Rail Mounting.)	
 3NW7021	2-Pole Fuse Block, Touch-Safe 25A, for 10 × 38 mm Cylindrical Fuses. (Requires DIN Rail Mounting.)	
 3NW7111	1-Pole Fuse Block, Touch-Safe 4-50A, for 14 × 51 mm Cylindrical Fuses. (Requires DIN Rail Mounting.)	
 8WA1815	Fuse Block DIN Rail Mounting for separate screw mounting to panel. (Max 2-pole 2-25A size per rail.) (Max 1-pole 4-50A size per rail.)	

