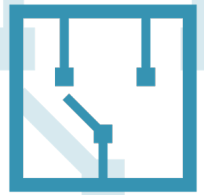


# Manual Transfer Switch MMC Molded Case Dual Operator



Model: 150A-400A

Technical Data	
Standard & Optional Features .....	2
150A & 225A Frame .....	3
400A & 600A Frame .....	4
800A & 1200A Frame.....	5
Selection Guide	
Characters & Designations .....	6
Model Code Configuration .....	7
Accessory Code Configuration .....	8
Overcurrent Trip Rating .....	9
Weights & Dimensions	
MMC Transfer Switch (150A - 400A).....	10
MMC Transfer Switch (600A - 1200A) .....	11
Connection Information	
Mechanical Lug Size & Quantity .....	12

TRANSFER

Lake Shore Electric's MMC Manual Transfer Switch utilizes industry-proven molded case switches to perform safe transfers under load. The MMC Transfer Switch is UL 1008 listed and offered in ampacities ranging from 150A to 1200A, up to 600VAC, and interrupting ratings starting at 35kAIC @480VAC. Service entrance rated configurations are also available.

**Standard Features:** \_\_\_\_\_

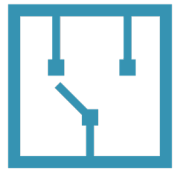
- Molded Case Switches
- 100% Rated Copper Bus
- Front Accessible
- Mechanically Interlocked Sources (Open Transition)
- Neutral Position
- NEMA 1 Enclosure with Gray Powder Coat Finish

**Optional Features:** \_\_\_\_\_

- Service Entrance Rated
- Breaker Trip Ratings
- Switch Position & Source Available Aux Contacts
- Electrical Assist
- Space Heater
- Surge Protection Device
- Mechanical Lug Sizes

# Technical Data

## Standard & Optional Features



### Molded Case Units

The MMC utilizes two UL 489-listed molded case switches and/or breakers. Switches are constructed using circuit breaker components and are of the high instantaneous automatic type, tripping at 10X the frame rating. Breakers can be configured with either thermal magnetic or electronic trip units.

### Mechanically Interlocked Sources

A walking beam-style mechanical interlock is used to prevent the unintentional paralleling of the Normal Source (Source 1) and Alternate Source (Source 2). Strategically located on the rear side of the back pan, the restricted access to the walking beam ensures a touch-free and tamper-resistant interlock.

### Neutral Position

The MMC Transfer Switch allows for both sources to be placed in the “off” or neutral position.

### NEMA 1 Enclosure with Gray Powder Coat Finish

All MMC Transfer Switch enclosures come standard with an environmental rating of NEMA Type 1, with a textured gray powder coat finish. See page 7 for additional NEMA ratings and materials that are available.

### Standard & Optional Lug Sizes

Mechanical lugs are provided for all incoming and outgoing connections. See table on page 12 for available lug sizes. Compression lugs are not available on the MMC Transfer Switch.

### Service Entrance Rated (Optional)

The service entrance rated option provides overcurrent protection on the Normal Source (Source 1), allowing it to be designated as a means of service disconnect. A neutral ground bond is also provided (where applicable). Service entrance rated MMCs that are 1000A and greater come standard with arc flash reduction features and ground fault protection when service disconnects installed on solidly grounded wye electrical systems over 150 volts to ground.

### Breaker Trip Ratings (Optional)

The MMC can be configured to include overcurrent protection on both the Normal Source (Source 1) and the Alternate Source (Source 2). The available trip sizes are based on the frame amperage of the breaker. See page 9 for a complete list of available trip sizes.

### Auxiliary Contacts & Lights (Optional)

Switch Position and Source Available Auxiliary Contacts & Lights are an optional accessory that can be added to the MMC.

Switch Position includes green indicating lights that are mounted on the exterior and illuminate when their corresponding switch is in the closed position. A Form C contact is provided on each source for remote monitoring.

Source Available includes white indicating lights that are mounted on the exterior and illuminate when their corresponding source is within the acceptable voltage range as determined by the phase monitoring relay. The pickup and drop-out ranges are adjustable. A Form C contact is provided on each source for remote monitoring.

Table 1 : Aux Contacts & Lights

Maximum Voltage	Frequency	Maximum Current	Dielectric Withstand Voltage
600	50/60 Hz	6	2500
125	DC	0.5	2500
250	DC	0.25	2500

### Electrical Assist (Optional)

The Electrical Assist option includes motors to operate both the Normal Source (Source 1) and the Alternate Source (Source 2). This option also comes with the Switch Position and Source Available Auxiliary Contacts and Lights, as mentioned above. Please note that the “Source Available” indicator is for indication purposes only and does not serve as a permissive circuit. A selector switch is provided for each source to control its operation. The switch configuration also includes a neutral position.

### Space Heater (Optional)

A 50W heater is provided on a constant circuit to aid in the regulation of the interior temperature and mitigate the formation of condensation in the enclosure and on the internal components.

### Surge Protection Device (Optional)

A surge protection device (SPD) is included on the Normal Source to protect the control circuit from transient voltage surges.

Table 2 : SPD Size

Amperage	SCCR	Line to Neutral
150A - 400A	200kA	20kA
600A - 1200A	200kA	20kA

# Technical Data

## 150A & 225A Frame

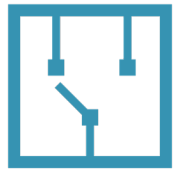


Table 3 : 150 Amp Frame Molded Case Details

kAIC @ 480V	Rated Current (A)	Breaker Model Code			Switch Model Code		
		2 Pole	3 Pole	4 Pole	2 Pole	3 Pole	4 Pole
35	50	FD2050	FD3050	FD4050			
	70	FD2070	FD3070	FD4070			
	100	FD2100	FD3100	FD4100			
	110	FD2110	FD3110	FD4110			
	125	FD2125	FD3125	FD4125			
	150	FD2150	FD3150	FD4150	FD2150K	FD3150K	FD4150K
65	50	HFD2050	HFD3050	HFD4050			
	70	HFD2070	HFD3070	HFD4070			
	100	HFD2100	HFD3100	HFD4100			
	110	HFD2110	HFD3110	HFD4110			
	125	HFD2125	HFD3125	HFD4125			
	150	HFD2150	HFD3150	HFD4150	HFD2150K	HFD3150K	HFD4150K

Table 4 : 225 Amp Frame Molded Case Details

kAIC @ 480V	Rated Current (A)	Breaker Model Code			Switch Model Code		
		2 Pole	3 Pole	4 Pole	2 Pole	3 Pole	4 Pole
35	100	KD2100	KD3100	KD4100			
	125	KD2125	KD3125	KD4125			
	150	KD2150	KD3150	KD4150			
	175	KD2175	KD3175	KD4175			
	200	KD2200	KD3200	KD4200			
	225	KD2250	KD3250	KD4250	KD2400K	KD3400K	KD4400K
65	100	HKD2100	HKD3100	HKD4100			
	125	HKD2125	HKD3125	HKD4125			
	150	HKD2150	HKD3150	HKD4150			
	175	HKD2175	HKD3175	HKD4175			
	200	HKD2200	HKD3200	HKD4200			
	225	HKD2250	HKD3250	HKD4250	HKD2400K	HKD3400K	HKD4400K

- Models stated above are Eaton C Series Molded Case Switches
- 3-pole variant with the center phase open may be used in place of a 2-pole at LSE discretion
- A higher withstand rating and/or frame rating may be used in place of a lesser rating at LSE discretion
- Contact factory for technical information on switching devices or withstand ratings not listed in Table
- Data subject to change without notice

# Technical Data

## 400A & 600A Frame

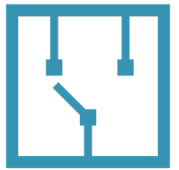


Table 5 : 400 Amp Frame Molded Case Details

kAIC @ 480V	Rated Current (A)	Breaker Model Code			Switch Model Code		
		2 Pole	3 Pole	4 Pole	2 Pole	3 Pole	4 Pole
35	200	KD2200	KD3200	KD4200			
	250	KD2250	KD3250	KD4250			
	300	KD2300	KD3300	KD4300			
	350	KD2350	KD3350	KD4350			
	400	KD2400	KD3400	KD4400	KD2400K	KD3400K	KD4400K
65	200	HKD2200	HKD3200	HKD4200			
	250	HKD2250	HKD3250	HKD4250			
	300	HKD2300	HKD3300	HKD4300			
	350	HKD2350	HKD3350	HKD4350			
	400	HKD2400	HKD3400	HKD4400	HKD2400K	HKD3400K	HKD4400K

Table 6 : 600 Amp Frame Molded Case Details

kAIC @ 480V	Rated Current (A)	Breaker Model Code			Switch Model Code		
		2 Pole	3 Pole	4 Pole	2 Pole	3 Pole	4 Pole
35	300	LD2300	LD3300	LD4300			
	350	LD2350	LD3350	LD4350			
	400	LD2400	LD3400	LD4400			
	450	LD2450	LD3450	LD4450			
	500	LD2500	LD3500	LD4500			
	600	LD2600	LD3600	LD4600	LD2600WK	LD3600WK	LD3600WK
65	300	HLD2300	HLD3300	HLD4300			
	350	HLD2350	HLD3350	HLD4350			
	400	HLD2400	HLD3400	HLD4400			
	450	HLD2450	HLD3450	HLD4450			
	500	HLD2500	HLD3500	HLD4500			
	600	HLD2600	HLD3600	HLD4600	HLD2600WK	HLD3600WK	HLD3600WK

- Models stated above are Eaton C Series Molded Case Switches
- 3-pole variant with the center phase open may be used in place of a 2-pole at LSE discretion
- A higher withstand rating and/or frame rating may be used in place of a lesser rating at LSE discretion
- Contact factory for technical information on switching devices or withstand ratings not listed in Table
- Data subject to change without notice

# Technical Data

## 800A & 1200A Frame

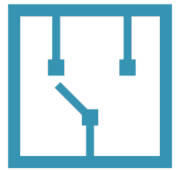


Table 7 : 800 Amp Frame Molded Case Details

kAIC @ 480V	Rated Current (A)	Breaker Model Code			Switch Model Code		
		2 Pole	3 Pole	4 Pole	2 Pole	3 Pole	4 Pole
50	800 LSI	NGS208032E	NGS308032E	NGS408032E		NGK3080KSE	NGK4080KSE
65	800 LSI	NGH208032E	NGH308032E	NGH408032E		NGK3080KSE	NGK4080KSE

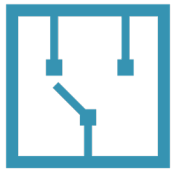
Table 8 : 1200 Amp Frame Molded Case Details

kAIC @ 480V	Rated Current (A)	Breaker Model Code			Switch Model Code		
		2 Pole	3 Pole	4 Pole	2 Pole	3 Pole	4 Pole
50	1200 LSI	NGS212032E	NGS312032E	NGS412032E			
	1200 LSI SIG	NGS212036E	NGS312036E	NGS412036E		NGK3120KSE	NGK4120KSE
65	1200 LSI	NGH212032E	NGH312032E	NGH412032E			
	1200 LSI SIG	NGH212036E	NGH312036E	NGH412036E		NGK3120KSE	NGK4120KSE

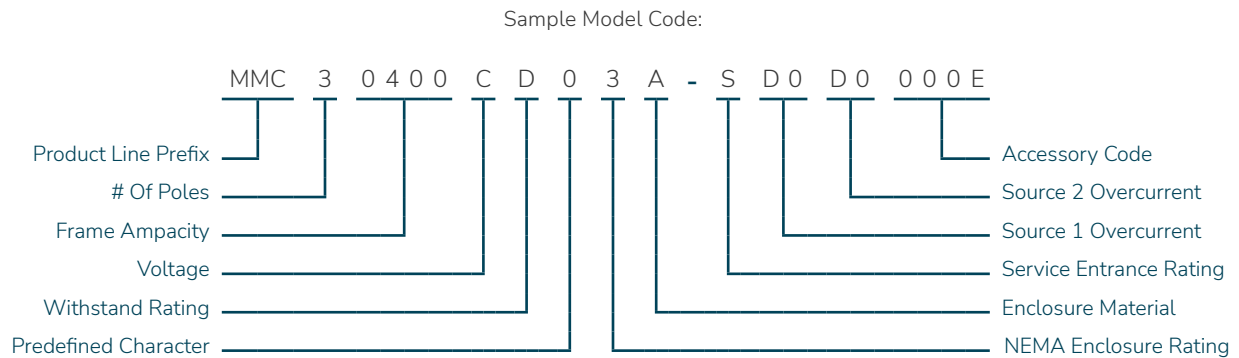
- Models stated above are Eaton C Series Molded Case Switches
- 3-pole variant with the center phase open may be used in place of a 2-pole at LSE discretion
- A higher withstand rating and/or frame rating may be used in place of a lesser rating at LSE discretion
- Contact factory for technical information on switching devices or withstand ratings not listed in Table
- Data subject to change without notice

# Selection Guide

## Characters & Designations

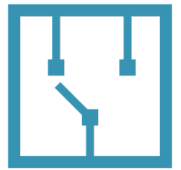


All Lake Shore Electric Transfer products are designed using a structured, smart-style model code ordering system. The complete MMC model code comprises 22 customer-selected characters, each identifying a feature or function of the design. The first thirteen characters of the model code define the basic configuration. The thirteen characters that follow identify the Controller type, service rating, and any additional accessories.



# Selection Guide

## Model Code Configuration



### Number of Poles

Following the MMC prefix of the model code is the number of poles. Available in configurations of 2–pole, 3–pole, and 4–pole, this character distinguishes between a solid or switched neutral.

Table 9 : Number of Poles

Poles	Alpha Numeric
2	2
3	3
4	4

### Frame Ampacity

The MMC product line is designed using industry-standard molded case frame sizes and is available in amperages ranging from 150A - 1200A. A breaker trip rating can be selected for both the Normal and Alternate Sources based on the frame size chosen below. See page 9 for a complete list of available trips,

Table 10 : Amperage Codes

Amp Frame	Alpha Numeric
150	0150
225	0225
400	0400
600	0600
800	0800
1200	1200

### Voltage

Identification of the system voltage determines the number of phases, as well as the presence of a neutral wire.

Table 11 : Voltage Codes

Voltage	Phase/Wire	Alpha Numeric
120/240VAC	1 Ph 3W	A
208Y/120VAC	3 Ph 4W	B
480Y/277VAC	3 Ph 4W	C
120/240VAC	3 Ph 4W	G
480VAC	3 Ph 3W	K

### Withstand Rating

The withstand rating is based on UL 489 & 1066 Switching Device Ratings at 480VAC; Lower voltages offer higher kAIC ratings within the same alphanumeric code. Contact the factory for these ratings.

Table 12 : Withstand Rating Codes

kAIC	Alpha Numeric
35kAIC @ 480V	D
50kAIC @ 480V	F
65kAIC @ 480V	G
100kAIC @ 480V	I

### Predefined Character

This space contains a fixed character. No selection required.

Table 13 : Unselectable

Description	Alpha Numeric
Fixed Character	0

### NEMA Enclosure Rating

MMC Transfer Switches are available in NEMA Type 1 or NEMA Type 3R enclosures.

Table 14 : NEMA Code

Enclosure Rating	Alpha Numeric
NEMA 1	1
NEMA 3R	3

### Enclosure Material

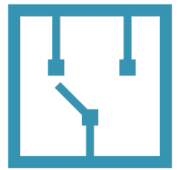
The standard enclosure material of the MMC Transfer Switch is hot rolled steel with a textured ANSI-61 gray powder coat finish. Additional material options are listed below.

Table 15 : Enclosure Code

Material	Alpha Numeric
Hot Rolled Steel (Powder Coat Finish)	A
Stainless Steel – 304 (#4 Brushed Finish)	C
Stainless Steel – 316 (#4 Brushed Finish)	D

# Selection Guide

## Accessory Code Configuration



### Service Entrance Rating Code

Following the source configuration character is the option for service entrance rated or non-service entrance rated. See page 2 for more information.

Table 16 : SER Code

Rating	Alpha Numeric
Non-Service Entrance Rated	N
Service Entrance Rated	S

### Source 1 Overcurrent

The MMC can be configured to include overcurrent protection on the Normal Source (Source 1), which is based on the frame ampacity as selected on page 7. The table below lists the default two-character trip rating offered on the Normal Source (S1) as well as the option for no overcurrent protection. Additional trip rating codes and selection instructions are available on page 9.

Table 17 : S1 Default Trip Rating

Rating	Alpha Numeric
No Source 1 Trip (Switch Only)	00
150A Thermal Magnetic	A0
225A Thermal Magnetic	C0
400A Thermal Magnetic	D0
600A Thermal Magnetic	E0
800A LSI	F0
1200A LSI	G0

### Source 2 Overcurrent

The option to include overcurrent protection on the Alternate Source (Source 2) is also available and is based on the frame ampacity as selected on page 7. The table below lists the default two-character trip rating offered on the Alternate Source (S2), as well as the option for no overcurrent protection. Additional trip rating codes and selection instructions are available on page.

Table 18 : S2 Default Trip Rating

Rating	Alpha Numeric
No Source 2 Trip (Switch Only)	00
150A Thermal Magnetic	A0
225A Thermal Magnetic	C0
400A Thermal Magnetic	D0
600A Thermal Magnetic	E0
800A LSI	F0
1200A LSI	G0

### Accessory Code Position 1

The first position of the four-digit accessory code allows for the addition of Switch Position & Source Available Aux Contacts with Lights, as well as Electrical Assist.

Table 19 : Accessory Code 1

Description	Alpha Numeric
No Option	0
Switch Position & Source Available Aux Contacts with Lights	1
Electrical Assist	2

### Accessory Code Position 2

The second position of the four-digit accessory code provides the option to include a space heater.

- Space Heaters operate on 120VAC and may include a control power transformer when necessary. Overcurrent protection is also provided.

Table 20 : Accessory Code 2

Description	Alpha Numeric
No Option	0
Space Heater	1

### Accessory Code Position 3

The third position of the four-digit accessory code is used to specify the need for an Alternate lug size and/or Surge Protection Device (SPD).

- Optional Lug sizes can be found on page 12
- Surge Protection Device's are sized per the frame amperage of the MTS. See page 2 for more information.

Table 21 : Accessory Code 3

Description	Alpha Numeric
No Option (Standard Lug Size)	0
Optional Lug Size	1
Surge Protection Device	2
Optional Lug Size & Surge Protection Device	3

### Accessory Code Position 4

The fourth position of the four-digit accessory code is a fixed character with no selection required.

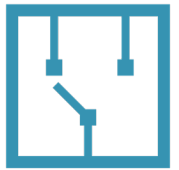
Table 22 : Accessory Code 4

Description	Alpha Numeric
Manufacturer Code	E



# Selection Guide

## Overcurrent Trip Rating



The tables below provide a list of available trip ratings based on the MMC frame ampacity as selected on page 7. Different trip ratings within the same breaker frame size can be selected for each source (example below). The default two-character trip rating of each frame size has been highlighted. Refer to tables 20 & 21 on page 8 if overcurrent protection is not needed.

### Fixed Thermal Magnetic Trip

Table 23 : 150A Frame

Trip	Alpha Numeric
150A	A0
125A	A5
110A	A4
100A	A3
70A	A2
50A	A1

Table 25 : 400A Frame

Trip	Alpha Numeric
400A	D0
350A	D4
300A	D3
250A	D2
200A	D1

Table 24 : 225A Frame

Trip	Alpha Numeric
225A	C0
200A	C5
175A	C4
150A	C3
125A	C2
100A	C1

Table 26 : 600A Frame

Trip	Alpha Numeric
600A	E0
500A	E5
450A	E4
400A	E3
350A	E2
300A	E1

### Adjustable Electronic Trip

Table 27 : 800A Frame

Trip	Alpha Numeric
800A	F0

Table 28 : 1200A Frame

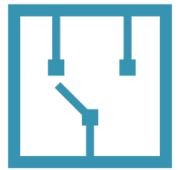
Trip	Alpha Numeric
1200A LSIG	G0
1200A LSI	G1

### Trip Rating Selection Example

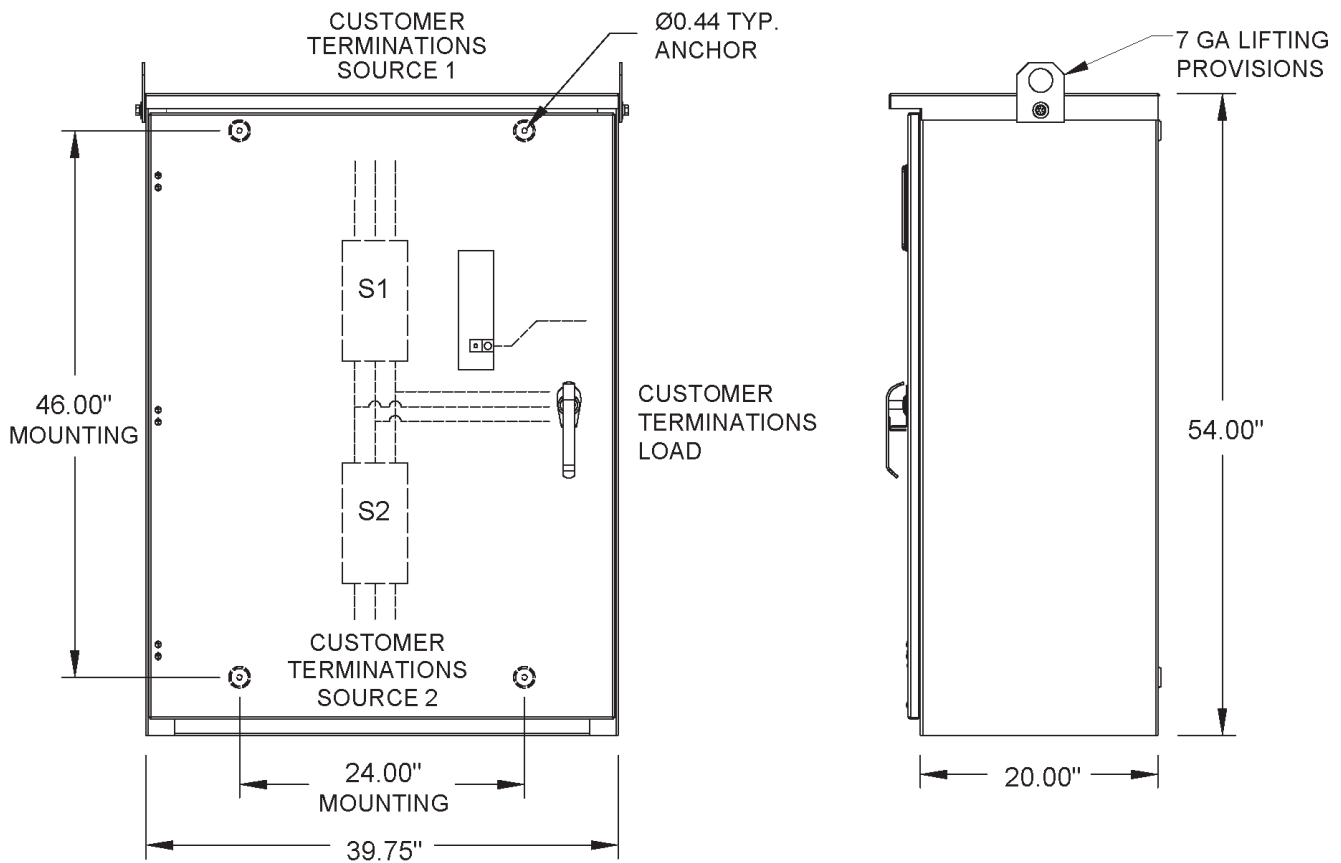


# Weights & Dimensions

## MMC Transfer Switch (150A - 400A)



### Exterior Layout & Dimensions



### Recommended Cable Entry

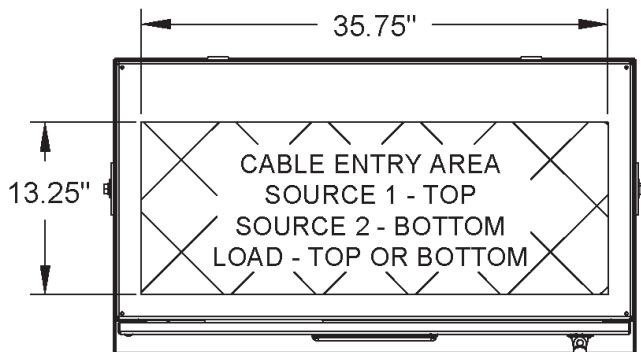
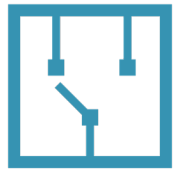


Table 29 : Enclosure Dimensions

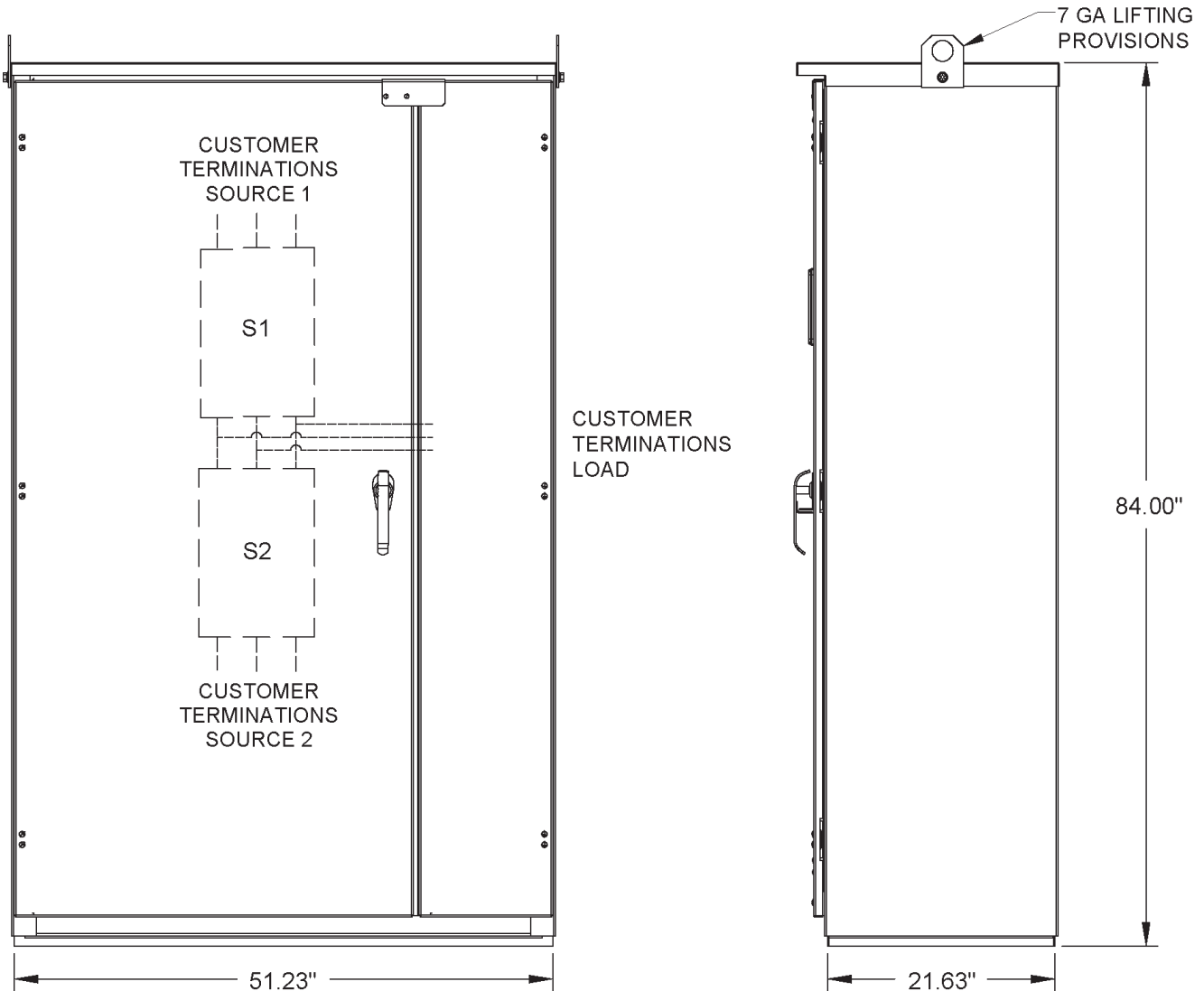
Height	54"
Width	39.75"
Depth	20"
Approximate Weight	550 lbs
Cable Entry Dimensions	35.75"W x 13.25"D

# Weights & Dimensions

## MMC Transfer Switch (600A - 1200A)



### Exterior Layout & Dimensions



### Recommended Cable Entry

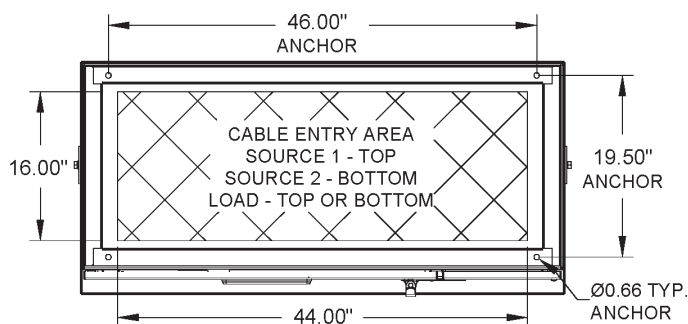


Table 30 : Enclosure Dimensions

Height	84"
Width	51.23"
Depth	21.63
Approximate Weight	750 lbs.
Cable Entry Dimensions	44"W x 16"D

TRANSFER

# Connection Information

## Mechanical Lug Size & Quantity

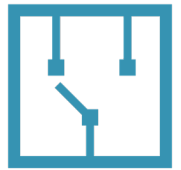
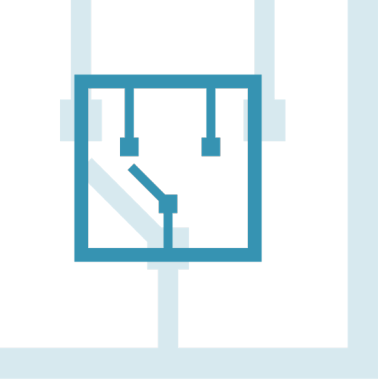


Table 31 : Lug Size & Quantity

Ampacity	Location		Standard Lug	Optional Lug	Ground
150A	Normal Source	Per Phase	(1) #14-1/0	N/A	(1) #14-1/0
		Neutral	(1) #14-1/0		
	Alternate Source	Per Phase	(1) #14-1/0		
		Neutral	(1) #14-1/0		
	Load	Per Phase	(1) #14-1/0		
		Neutral	(1) #14-1/0		
225A	Normal Source	Per Phase	(1) 2/0-500MCM or (2) 2/0-250MCM	(1) 500-750MCM	(1) #14-1/0
		Neutral	(1) 2/0-500MCM or (2) 2/0-250MCM	(1) 500-750MCM	
	Alternate Source	Per Phase	(1) 2/0-500MCM or (2) 2/0-250MCM	(1) 500-750MCM	
		Neutral	(1) 2/0-500MCM or (2) 2/0-250MCM	(1) 500-750MCM	
	Load	Per Phase	(1) 2/0-500MCM or (2) 2/0-250MCM	(1) 500-750MCM	
		Neutral	(1) 2/0-500MCM or (2) 2/0-250MCM	(1) 500-750MCM	
400A	Normal Source	Per Phase	(1) 2/0-500MCM	(1) 500-750MCM	(1) #14-1/0
		Neutral	(1) 2/0-500MCM	(1) 500-750MCM	
	Alternate Source	Per Phase	(1) 2/0-500MCM	(1) 500-750MCM	
		Neutral	(1) 2/0-500MCM	(1) 500-750MCM	
	Load	Per Phase	(1) 2/0-500MCM	(1) 500-750MCM	
		Neutral	(1) 2/0-500MCM	(1) 500-750MCM	
600A	Normal Source	Per Phase	(2) 400-500 MCM	N/A	(1) #14-1/0
		Neutral	(2) 400-500 MCM		
	Alternate Source	Per Phase	(2) 400-500 MCM		
		Neutral	(2) 400-500 MCM		
	Load	Per Phase	(2) 250 - 500 MCM		
		Neutral	2) 250 - 500 MCM		
800A	Normal Source	Per Phase	(3) 500-750 MCM	(4) 4/0-500MCM	(1) #6-350MCM
		Neutral	(3) 500-750 MCM	(4) 4/0-500MCM	
	Alternate Source	Per Phase	(3) 500-750 MCM	(4) 4/0-500MCM	
		Neutral	(3) 500-750 MCM	(4) 4/0-500MCM	
	Load	Per Phase	(3) 500-750 MCM	(4) 4/0-500MCM	
		Neutral	(3) 500-750 MCM	(4) 4/0-500MCM	
1200A	Normal Source	Per Phase	(3) 500-750 MCM	(4) 4/0-500MCM	(1) #6-350MCM
		Neutral	(3) 500-750 MCM	(4) 4/0-500MCM	
	Alternate Source	Per Phase	(3) 500-750 MCM	(4) 4/0-500MCM	
		Neutral	(3) 500-750 MCM	(4) 4/0-500MCM	
	Load	Per Phase	(3) 500-750 MCM	(4) 4/0-500MCM	
		Neutral	(3) 500-750 MCM	(4) 4/0-500MCM	



# LSE

## LAKE SHORE ELECTRIC

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