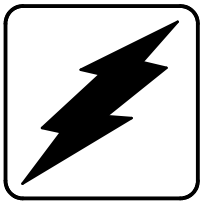
Operation and Installation Manual

Automatic Transfer Switches



Models:

MMS
MNS

Molded-Case Switches
Molded-Case Circuit Breakers

1600-4000 Amperes

KOHLER®
POWER SYSTEMS

TP-5678 11/93

Service Assistance

For service or information, check the yellow pages of the telephone directory under the heading GENERATORS-ELECTRIC for the authorized Kohler service distributor/dealer.

KOHLER CO., Kohler, Wisconsin 53044
Phone 414-565-3381
Fax 414-459-1646 (North American Sales)
414-459-1614 (International Sales)
For Sales and Service in U.S.A. and Canada
Phone 1-800-544-2444

In any communications regarding the automatic transfer switch, please include the PART and SERIAL numbers as found on the nameplate attached to the transfer switch. Enter the numbers in the spaces provided below. This information will enable the authorized Kohler service distributor/dealer to supply the correct part or data for this particular model.

Part No. _____

Serial No. _____

Table of Contents

Safety Precautions

A transfer switch, like any other electrical device, can pose potential dangers to life and limb if improperly maintained or imprudently operated. The best way to prevent accidents is to be aware of the potential dangers and to always use good common sense. In the interest of safety, some general precautions relating to operating of a transfer switch follow. Keep these in mind.

This manual contains several types of safety precautions which are explained below.

DANGER

Danger is used to indicate the presence of a hazard that *will* cause *severe* personal injury, death, or substantial property damage if the warning is ignored.

WARNING

Warning is used to indicate the presence of a hazard that *can* cause *severe* personal injury, death, or substantial property damage if the warning is ignored.

CAUTION

Caution is used to indicate the presence of a hazard that *will* or *can* cause *minor* personal injury or property damage if the warning is ignored.

NOTE

Note is used to notify people of installation, operation, or maintenance information that is important but not hazard-related.

HAZARDOUS VOLTAGE/ ELECTRICAL SHOCK

DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

NOTE

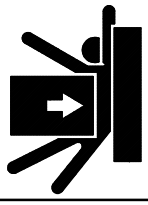
HARDWARE DAMAGE! Transfer switch may make use of both American standard and metric hardware. Be sure to use the correct size tools to prevent rounding of bolt heads and nuts.

NOTE

When replacing hardware, do not substitute with inferior grade hardware. Screws and nuts are available in different hardness ratings. American Standard hardware uses a series of markings and metric hardware uses a numeric system to indicate hardness. Check markings on bolt head and nuts for proper identification.

HEAVY EQUIPMENT

WARNING



Unbalanced weight.
Improper lift can cause severe injury, death, or equipment damage.
Do not use lifting eyes.
Use lifting bars thru holes in skid to lift set.

Glossary of Abbreviations

Abbreviations are used throughout this manual. Normally in the text they will appear in complete form with the abbreviation following in parenthesis the first time they are used. After that they will appear in the abbreviated form. The commonly used abbreviations are shown below.

Abbreviation	Description
AC	alternating current
AHWT	anticipatory high water temp.
ALOP	anticipatory low oil pressure
AM	amplitude modulation
Amp.	ampere
Amps.	amperes
ANSI	American National Standard Institute
API	American Petroleum Institute
approx.	approximate, approximately
A/R	as required, as requested
A/S	as supplied, as stated, as suggested
ASA	American Standards Association
assy.	assembly
ASTM	American Society for Testing Materials
ATDC	after top dead center
ATS	automatic transfer switch
aux.	auxiliary
AWG	American Wire Gauge
AWM	appliance wiring material
bhp	brake horsepower
bmep	brake mean effective power
Btu	British thermal unit
℃	Celsius degree
cc	cubic centimeter
CCA	cold cranking Amps.
CEC	Canadian Electrical Code
cfh	cubic feet per hour
cfm	cubic feet per minute
CID	cubic inch displacement
cm	centimeter, centimeters
cmm	cubic meters per minute
co.	company
cont'd.	continued
C.S.A.	Canadian Standards Association
cu. in.	cubic inch, cubic inches
cyl.	cylinder
dBA	decibels
DC	direct current
DCR	direct current resistance
deg.	degree
dept.	department

Abbreviation	Description
dia.	diameter
e.g.	example given
EMI	electromagnetic interference
etc.	etcetera, (and so forth)
ext.	external
℉	Fahrenheit degree
fl. oz.	fluid ounce, fluid ounces
FM	frequency modulation
fs	full scale
ft.	foot, feet
ft. lbs.	foot pound, foot pounds
ga.	gauge
gal., gals.	gallon, gallons
gal./hr.	gallons per hour
gph	gallons per hour
gpm	gallons per minute
gr.	grade
grd.	ground
HCHT	high cylinder head temperature
HET	high exhaust temperature
Hg	mercury (element)
H_2O	water
hp	horsepower
hr, hrs	hour
HWT	high water temperature
Hz	hertz (cycles per second)
ID	inside diameter
in.	inch(es)
inc.	incorporated
in. lbs.	inch pounds
int.	internal
int.-ext.	internal-external
ISO	International Standards Organization
J	joule, joules
JIS	Japanese Industry Standard
kg	kilogram, kilograms
kg/cm^2	kilograms per square centimeter
kgm	kilogram meter(s)
km	kilometer, kilometers
kPa	kiloPascal, kiloPascals
kph	kilometers per hour

Abbreviation	Description
kV	kilovolt
kVA	kilovolt amperes
kW	kilowatt, kilowatts
kWH	kilowatt hour
L	liter, liters
LxWxH	length x width x height
LED, LEDs	light emitting diode
lb., lbs.	pound, pounds
L/hr.	liter per hour, liters per hour
L/min.	liter(s) per minutes
LOP	low oil pressure
LP	liquefied petroleum
LWT	low water temperature
m	meter, meters
m^3	cubic meter, cubic meters
max.	maximum
MCM	one thousand circular mils.
mi.	mile, miles
mil	one one-thousandth of an inch
min.	minimum
mJ	millijoule, millijoules
MJ	mega joule, mega joules
mm	millimeter, millimeters
m^3/min	cubic meters per minute
MPa	megaPascal
mph	miles per hour
MS	military standard
mW	milliwatt, milliwatts
MW	megawatt, megawatts
N/A	not available
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
Nm	Newton meter, Newton meters
no., nos.	number, numbers
NPT	National Standard taper pipe thread per general use

Abbreviation	Description
N/R	not required
OC	overcrank
OD	outside diameter
OEM	original equipment manufacturer
OS	overspeed, oversize
OV	overvoltage
oz.	ounce, ounces
PF	power factor
pot.	potentiometer
ppm	parts per million
psi	pounds per square inch
pt., pts.	pint, pints
qt., qts.	quart, quarts
qty.	quantity
ref.	reference
RFI	radio frequency interference
rms	root mean square
rpm	revolutions per inch
SAE	Society of Automotive Engineers
sec.	second, seconds
SCR	silicon controlled rectifier
spec, specs	specification
sq.	square
sq. cm	square centimeters
sq. in.	square inch, square inches
tach	tachometer
TDC	top dead center
temp.	temperature
TIF	telephone influence factor
turbo	turbocharger
UNC	Unified coarse thread (was NC)
UNF	Unified fine thread (was NF)
UL	Underwriter's Laboratories, Inc.
US	undersize
V	volt, volts
VAC	Volts alternating current
VDC	volts direct current
W	watt, watts

Notes

Section 1. Introduction

Scope and Purpose of Manual

Purpose of Manual

This manual provides operation and initial installation instructions for Kohler automatic transfer switches that use 1600-4000 ampere switches or circuit breakers as the power switching device. Read through this manual and carefully follow all procedures and safety precautions to ensure safe, reliable operation of the automatic transfer switch. Be sure to keep a copy of this manual with the automatic transfer switch for future reference.

List of Related Manuals

The group of power switching devices covered by this manual are part of a family of related units. Separate operation and installation manuals are available for each group within the overall family. Be sure this manual is the correct manual for this automatic transfer switch.

A controller is included in each automatic transfer switch. There are three types of controllers and each type of controller is covered in a separate operation and installation manual. To be complete, this power switching device manual must be accompanied by a copy of the operation and installation manual for the controller used in that automatic transfer switch. Available controllers and the related manual numbers are as follows:

Controller, E33+	TP-5662
Controller, S340+ (Solid State)	TP-5663
Controller, M340+ (Microprocessor)	TP-5664

Arrangement of Manual

Information in this manual is arranged in six sections as follows:

- **Section 1. Introduction,** defines the scope and purpose of this manual and lists related manuals as well as manuals for related automatic transfer switches. In addition, the introduction includes a description of an automatic transfer switch to familiarize the reader with the components that make up the switch.
- **Section 2. Specifications,** lists the important characteristics including electrical ratings of the automatic transfer switches covered by this manual.
- **Section 3. Installation,** provides installation information, including mechanical mounting considerations and electrical wiring data.
- **Section 4. Operation,** provides information about controls and indicators and describes operation, both automatic and manual, of the automatic transfer switch.
- **Section 5. Accessories,** provides information about accessories available for the automatic transfer switches.
- **Section 6. Drawings and Diagrams,** includes wiring diagrams and drawings for the automatic transfer switches covered by this manual.

Automatic Transfer Switch Description

Purpose of Switch

An automatic transfer switch is a switching device that automatically transfers critical electrical loads from a normal (preferred) power source to an emergency (standby) power source. The automatic transfer occurs when normal power fails or is substantially reduced. An automatic transfer switch also transfers the load back from emergency power to the normal power source when normal power is restored.

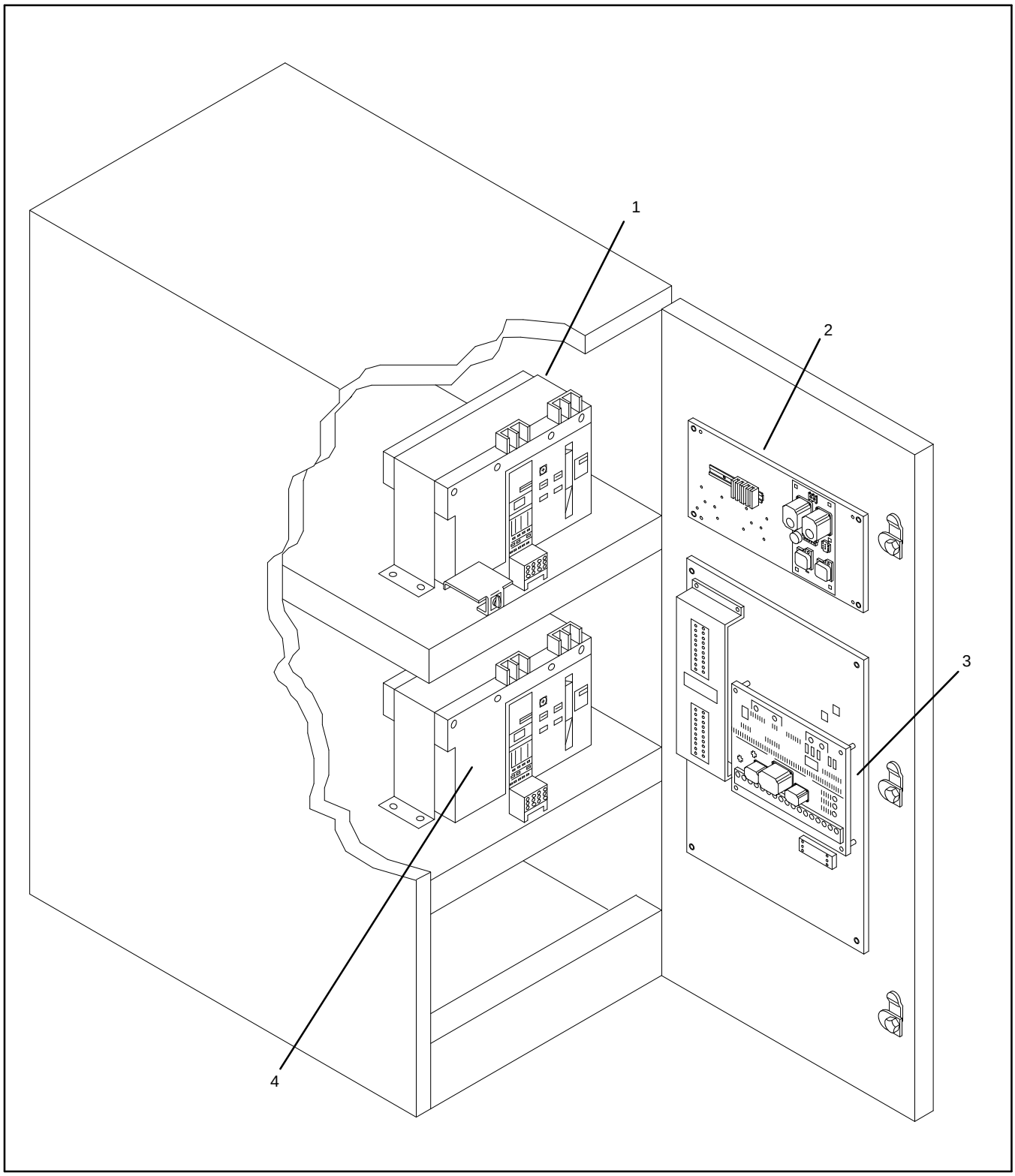
Components of Switch

A typical automatic transfer switch (Figure 1) includes the actual power switching device and the logic controller to perform power monitoring and transfer sequencing tasks. An interface board is also included to match the standard controller inputs/outputs to the levels required by a specific switching device.

The power switching device used in the models covered by this manual is made of two multi-pole switches or circuit breakers. Each switch or circuit breaker is equipped with a motor operator to allow automatic operation. The two switches or circuit breakers are mechanically and electrically interlocked together to avoid conditions where both switches or circuit breakers are closed at the same time. With this feature it is possible to select one power source to feed the load

without crosscoupling that power source to the other power source.

The three functional units that make up the automatic transfer switch are mounted in an enclosure with a hinged front door. The controller mounts on the back of the front door so its controls and indicators are available to an operator. A signal cable, with in-line connectors to facilitate component replacement and door removal, connects the controller to the interface board and the switching devices.



1. Normal Power Switching Device
2. Interface Panel
3. Logic Controller
4. Standby Power Switching Device

Figure 1. Transfer Switch Components

Sequence of Operation

Operation of the typical automatic transfer switch (Figure 2) is divided into two separate sequences: (1) failure of normal power and the resulting transfer to emergency power and (2) restoration of normal power and the resulting transfer back to normal power. A brief description of both sequences is provided below. Note that these sequences may be affected by accessories described in Section 5 of this manual or in the applicable logic controller operation and installation manual. In addition, for more specific details on circuit operation including time delays, refer to the applicable controller operation and installation manual. (See **List of Related Manuals** earlier in this Section.)

- **Failure of Normal Power,** either loss or deterioration of one or more phases, is detected by monitors within the controller. The monitor that detects the failure starts a time delay, typically called Time Delay Engine Start. If power is restored before the time delay expires, the timer is reset. But, if the failure persists and the time delay expires, the controller issues a signal to start the standby (emergency) power generator. This time delay scheme is used to prevent unnecessary starting of the generator during short power interruptions.

  A second set of monitors within the controller check the status of the emergency power. When the voltage and frequency of the emergency (generator) power is good, these monitors start a timing cycle, typically called Time Delay Normal to Emergency. At the end of the timing cycle, which is provided to allow the generator outputs to stabilize, the controller issues a signal to the transfer switch motor operators to remove normal power and then connect emergency power to the load.

  Once it is switched, the transfer switch remains in the emergency position, supplying power to the load from the emergency source until normal power is restored.

- **Restoration of Normal Power** automatically begins a sequence that transfers the load back to the normal power source. The monitors within the controller continue to check the status of the normal power, even when the load is operating from emergency power. When these monitors detect a stable condition of the normal power, a time delay, typically called Time Delay Emergency to Normal, is started. If the normal power fails again before the time delay expires, the time delay is reset. This timing period is included to ensure that the normal power is stabilized before it is reconnected to the load.

  If the normal power remains good and the time delay expires, the controller issues signals to the transfer switch motor operators to remove emergency power and reconnect normal power to the load. Normally, at the same time as the power transfer, the controller starts a timer, typically called Time Delay Engine Cooldown. After this time delay expires, the generator engine is stopped.

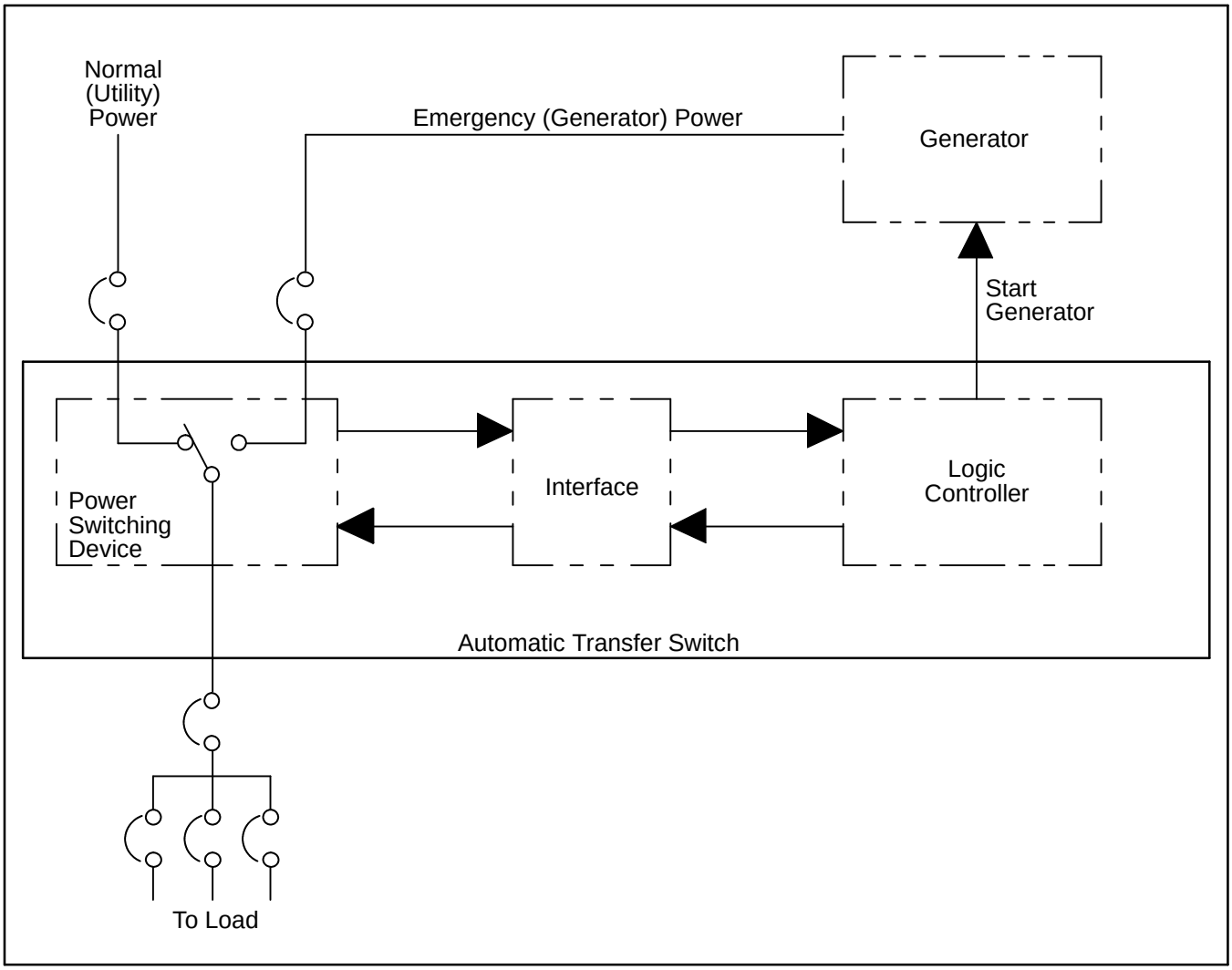


Figure 2. Transfer Switch Block Diagram

Section 2. Specifications

Ratings

A nameplate (Figure 3) is attached to the automatic transfer switch enclosure. The nameplate label includes a Kohler part number coded to provide characteristic and rating information that affects installation and operation. Copy the part number into the blank spaces provided in Figure 4 and then use the tables in Figure 4 to interpret the correct part number.

NOTE

Also copy the part number and serial number from the nameplate into the spaces provided on the inside front cover of this manual for use when requesting service or parts.

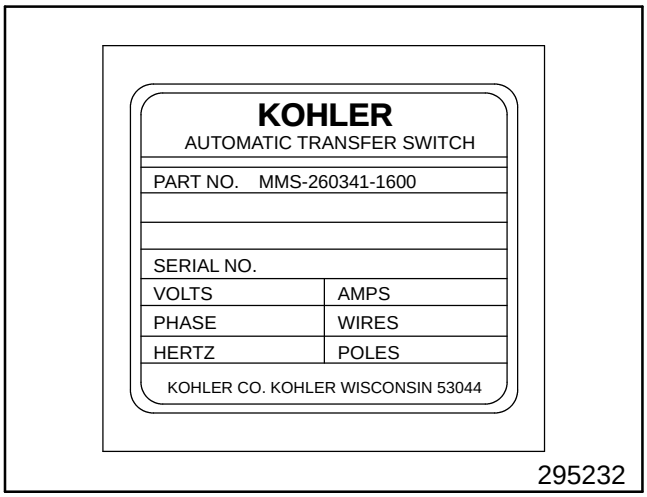
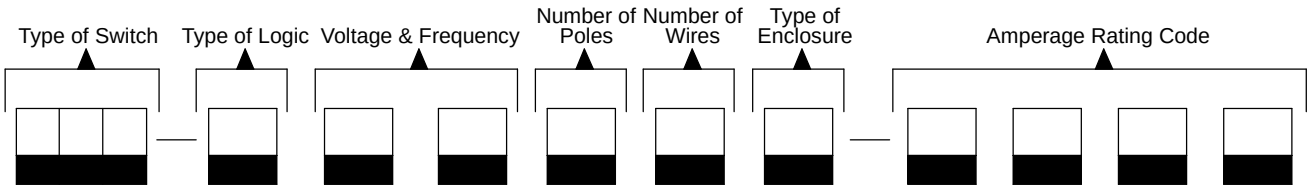


Figure 3. Transfer Switch Nameplate

Record the transfer switch part number in the boxes below. The transfer switch part number defines characteristics and ratings as explained in the accompanying chart.



Kohler Part Number Key

This chart explains the Kohler Transfer Switch part numbering code system. The sample part number shown is for a standard switch with E33+ Logic rated at 480 Volts, 60 Hertz, 3-phase, 3-pole, and 4 wires in a NEMA 1 enclosure with an amperage rating of 1600 amperes.

SAMPLE PART NUMBER

MNS-266341-1600

Classification of Power Switch
M: Switch or Circuit Breaker

Type of Power Switch
M: Circuit Breaker
N: Switch (No Protection)

Type of Switch
S: Standard

Type of Logic
1: S340+
2: E33+
3: S340+ with Program Transition
4: E33+ with Program Transition
5: M340+
6: M340+ with Program Transition

Voltage Code

60: 600 Volt, 60 Hz	66: 480 Volt, 60 Hz
62: 120 Volt, 60 Hz	68: 208 Volt, 60 Hz
63: 220 Volt, 50 Hz	71: 380 Volt, 50/60 Hz
64: 240 Volt, 60 Hz	

Number of Poles
3: 3 Pole, 3 Phase
6: 4 Pole-Fully Rated Poles (No Overlapping Neutral)

Number of Wires
3: 3 Wire
4: 4 Wire

Enclosure
NEMA Type 1

Amperes
Numbers Indicate Ampere Rating of Switch

Figure 4. Transfer Switch Model Designations

Specifications

Specifications for automatic transfer switches covered by this manual are listed below:

- Provided as a complete automatic transfer switch with E33+, S340+ (solid state logic) or M340+ (microprocessor logic) controller in a NEMA Type 1 enclosure
- Meets IEC standards
- Rated voltage up to 690 VAC
- Rated insulation voltage of 1000 VAC
- Amperage ratings from 1600-4000 amperes
- Available as a circuit breaker automatic transfer switch with short circuit and overload protection
- Available as a switch with no overload protection
- Switching device is electrically and mechanically interlocked
- Three pole and four pole
- Four pole fully rated (no overlapping neutral)
- Can be operated manually
- Ambient temperature range −5°C to +60°C
- Time delay neutral function available
- Circuit breaker characteristics summarized in Figure 5

Transfer Switch Rating (Amperes)	Rated Ultimate Breaking Capacity AC (kA rms)* according to IEC 947.2			Rated Short Time Withstand Current (kA) according to IEC 947.2		
	220/415V	440V	500/690V	0,5 s	1 s	3 s
1600	40	40	40	40	40	22
2000	55	55	55	55	55	50
2500	55	55	55	55	55	50
3000	75	75	75	75	75	75
4000	75	75	75	75	75	75
*Defined for a power factor of: 0.25 if 20 <kA rms< 50 0.2 if kA rms< 50						

Figure 5. Summary of Circuit Breaker Characteristics

Notes

Section 3. Installation

Kohler automatic transfer switches are shipped factory wired and tested, ready for installation. The actual installation process consists of mechanically mounting and electrically wiring the unit to the normal and emergency power sources, to the load, and to the generator.

Upon Receipt of Unit

Inspection

Carefully unpack or uncrate the automatic transfer switch and check for shipping damage. If damage is discovered, file damage claims with the shipping company immediately and also notify the distributor/dealer.

Storage

Do not remove the protective packing until ready for final installation. Protect the automatic transfer switch at all times from excessive moisture, construction grit, and metal chips. Avoid storage in low-temperature, high-humidity areas where moisture could condense on the unit.

Mechanical Installation

To plan the installation, use the dimensions given on the enclosure dimension drawings in Section 6. Select the mounting site to match local electrical code restrictions for the enclosure type. Mount the automatic transfer switch as near the load and power sources as possible. Also be sure to allow adequate space for switch servicing and full opening of the enclosure door.

Lifting

The approximate weight of each automatic transfer switch covered by this manual is given in Figure 6. For lifting, use a spreader bar. Attach the bar only to the enclosure's lifting brackets; do not lift the unit at any other points. Ensure the front door is in place and latched closed when moving or mounting the unit.

⚠ WARNING

Unbalanced weight.
Improper lift can cause severe injury, death, or equipment damage.
Do not use lifting eyes.
Use lifting bars thru holes in skid to lift set.

Mounting

The 1600-4000 ampere automatic transfer switches covered by this manual are equipped with mounting feet for floor mounting. When floor mounting one of these units, shim the mounting feet as needed to plumb the enclosure so that the door hinges are vertical to avoid any distortion of the enclosure or door.

Automatic Transfer Switch Rating (Amps)	Approximate Weight lb (kg)
1600	965 (440)
2000	1025 (460)
2500	1125 (510)
3000	1125 (510)
4000	1210 (550)

Figure 6. Automatic Transfer Switch Weight

Electrical Wiring

All internal electrical connections are prewired. The only wiring necessary when installing the automatic transfer switch is the connections from the automatic transfer switch to the external devices.

⚠ WARNING

Hazardous voltage.
Can cause severe injury or death.

Disconnect power sources before servicing.
Barrier must be installed after adjustments, maintenance, or servicing.

(under 600 Volt)

NOTE

For easy access during installation wiring, the front door of the enclosure can be removed. Simply disconnect the cable plug that connects the front door components to the internal components and then lift the door off its hinge pins.

Power Connections

All conductors should enter the enclosure at recommended locations as noted on the enclosure dimension drawings in Section 6. When drilling entry holes for any conductors, cover the transfer switch components for protection from metal chips and construction grit. Remove any debris from the enclosure with a vacuum cleaner *(using compressed air for this purpose can lodge contaminants in components and cause damage).*

The bus bar connection points for the normal power, emergency power, and load are clearly marked on the switch or circuit breaker assembly. These bus bars are also shown and marked on the enclosure dimension drawings in Section 6. Be sure to heed the phase markings (A, B, C, and N).

NOTE

Connect source and load phases as indicated by the markings and drawings. Improper connections may cause short circuits and can cause phase-sensitive load devices to run in reverse or prevent load devices from functioning.

Start Generator Connection

The generator start signal connections are located on a terminal block on the transfer switch contactor. The location of terminal block is marked by a red decal within the enclosure. Connect the generator conductors for the start signal to terminals 3 and 4 as shown in the interconnection diagrams provided in Section 6 of this manual.

Other Accessory Connections

Any external connections necessary for accessories are described in the applicable controller manual. (See **List of Related Manuals** in Section 1 of this manual.)

Section 4. Operation

Switches and Indicators

The switches and indicators on an automatic transfer switch are determined by the logic controller. For details on this subject, refer to the appropriate controller operation and installation manual. (See **List of Related Manuals** in Section 1.)

Manual Operation

Manual operation of the automatic transfer switch may be of use when the controller fails or when testing/troubleshooting the unit. Manual operation of these units (Figure 7) is as follows:

⚠ DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

1. Set control switch to off (0) to disconnect motor operators from controller.

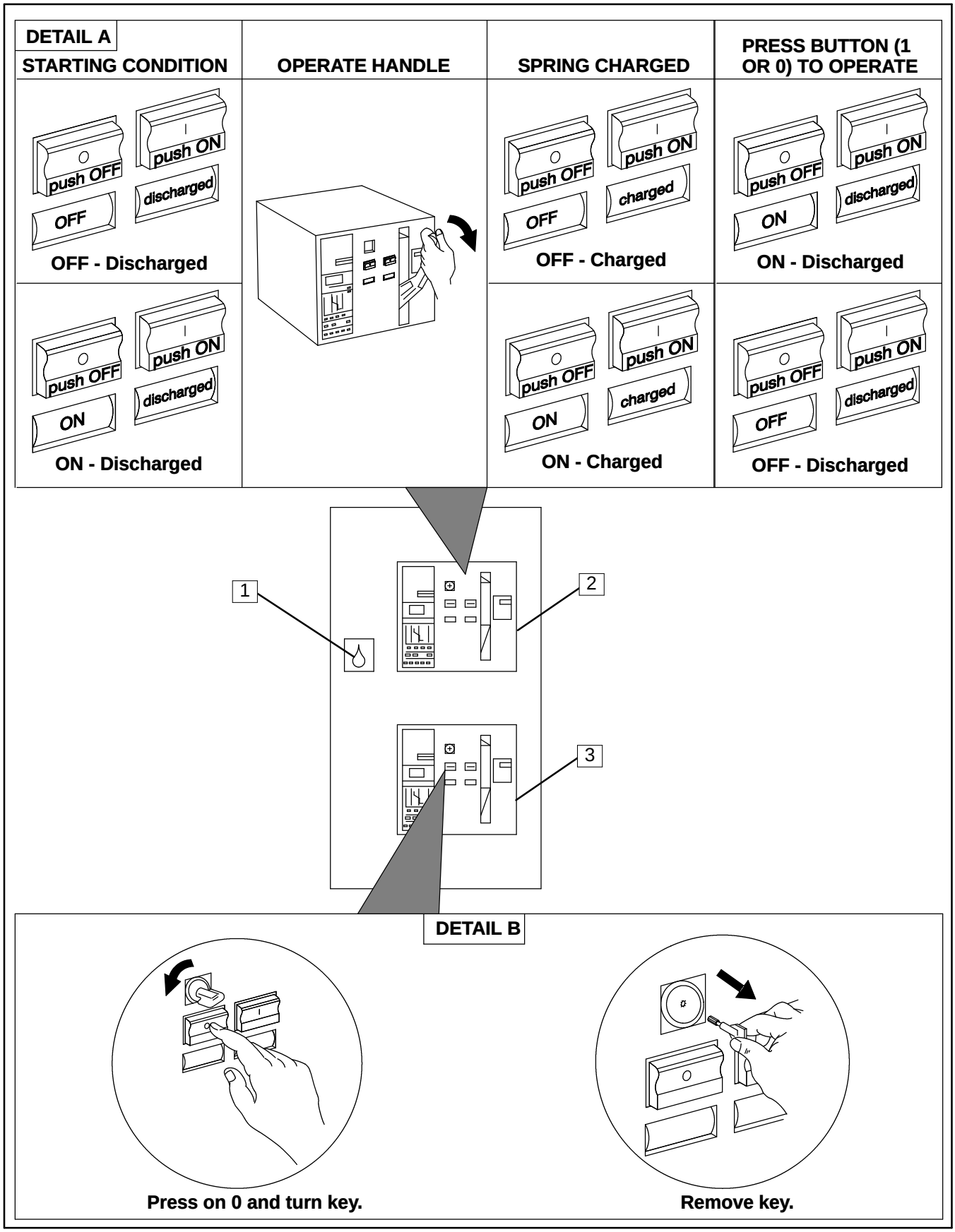
NOTE

Due to mechanical interlocking, both switches or circuit breakers cannot be on at the same time. To set one switch or circuit breaker to on, the other switch or circuit breaker must first be set to off.

2. Operate the circuit breaker's/switch's handle as shown in Detail A of Figure 7 up to seven times to tension the operating spring within that circuit breaker/switch. Indicator shows "charged".
3. Press the button (1 for on or 0 for off) for the desired position of the switch/circuit breaker. The spring then drives the switch/circuit breaker to the desired position.

NOTE

Switches/circuit breakers can be locked in the off position as shown in Detail B of Figure 7.



1. Control Switch
2. Normal Switch/Circuit Breaker
3. Standby Switch/Circuit Breaker

Figure 7. Manual Operation

Automatic Operation

Initial Settings

Before turning on the power for the first time or when returning from manual operation to automatic operation, manually operate the automatic transfer switch to select the normal power source. (See **Manual Operation** above.) Then set the control switch in the upper left corner of the switch mounting plate to its on (1) position to connect the controller to the motor operators.

Automatic Operation Procedures

Automatic operation is a function of the controller installed in the unit. For automatic operation details and procedures, refer to the appropriate controller operation and installation manual. (See **List of Related Manuals** in Section 1).

Notes

Section 5. Accessories

Program Transition

NOTE

For ATS utilizing the M340+ logic control, the program transition function is accomplished within the microprocessor and therefore no timing relays are required. See TP-5664 for operational details. DO NOT use this section.

Description

The program transition accessory consists of two timing relays that plug into the interface board. (See Figure 8.) If these relays are present, power transfers from normal to emergency or emergency to normal power sources occur in three steps: (1) the switch or circuit breaker for the previously connected power source opens, (2) there is a delay period, adjustable from 2 to 40 seconds, to allow residual voltage in the load circuit to decay, and (3) the switch or circuit breaker for the new power source is closed.

Adjustment

Two separate timing relays are used. One relay produces the time delay for the normal to emergency power transfer Time Delay OFF to Emergency (TDOE) and the other relay produces the time delay for the emergency to normal power transfer Time Delay OFF to Normal (TDON). Each relay has a separate adjustment. To make the adjustment, proceed as follows:

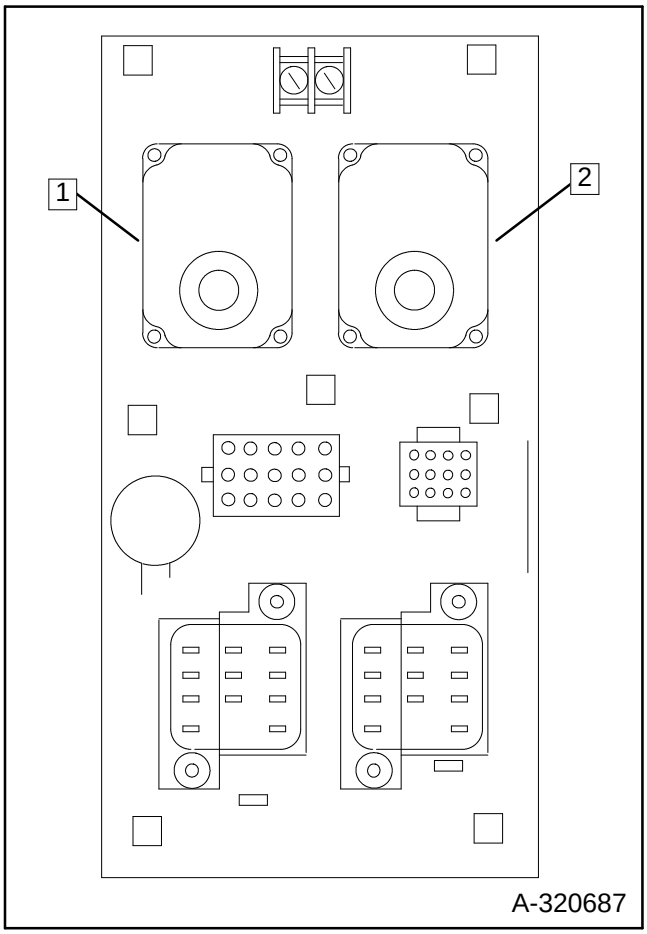
1. Disconnect or turn off both the normal and emergency power sources.

⚠ DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

2. Open enclosure door of automatic transfer switch.
3. Locate the appropriate relay on the interface board. (See Figure 8.)
4. Insert a screwdriver into the slot of the adjustment screw visible through the cover of the relay and turn the adjustment screw to the desired time delay period.
5. Close the enclosure door.
6. Reconnect or turn on the applicable (normal or emergency) power source.
7. Operate the automatic transfer switch automatically and check the time delay period to ensure that it is properly adjusted.



1. K3 (TDON) 2. K4 (TDOE)

Figure 8. Interface Board with Relays

Other Accessories

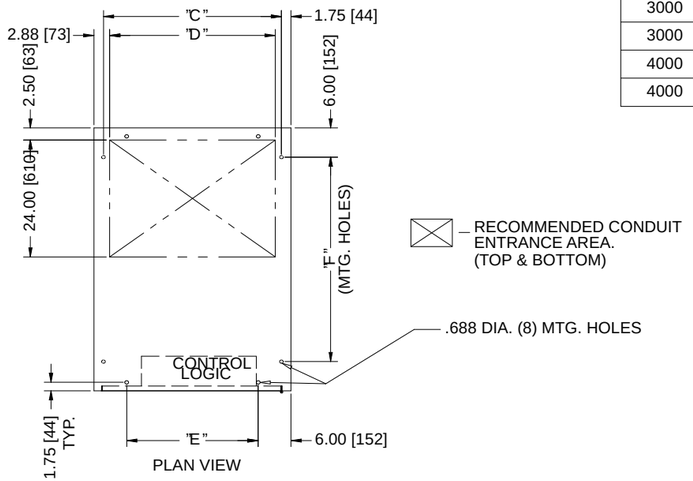
All other accessories are controller accessories. For controller accessory information and procedures, refer to the appropriate controller operation and installation manual. (See **List of Related Manuals** in Section 1.)

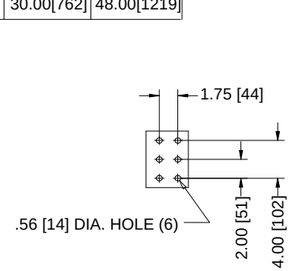
Notes

Section 6. Diagrams and Drawings

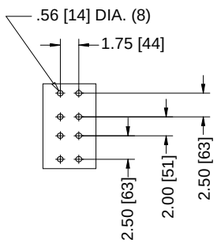
Notes

AMPERE RATING	POLES	"A" DIM	"B" DIM	"C" DIM	"D" DIM	"E" DIM	"F" DIM
1600–2000	2 & 3	30.00[762]	54.00[1372]	26.50[673]	24.25[616]	18.00[457]	42.00[1067]
1600–2000	4	36.00[914]	54.00[1372]	32.50[825]	30.25[768]	24.00[610]	42.00[1067]
3000	2 & 3	30.00[762]	54.00[1372]	26.50[673]	24.25[616]	18.00[457]	42.00[1067]
3000	4	36.00[914]	54.00[1372]	32.50[825]	30.25[768]	24.00[610]	42.00[1067]
4000	2 & 3	36.00[914]	60.00[1524]	26.50[673]	24.25[616]	24.00[610]	48.00[1219]
4000	4	42.00[1067]	60.00[1524]	32.50[825]	30.25[768]	30.00[762]	48.00[1219]

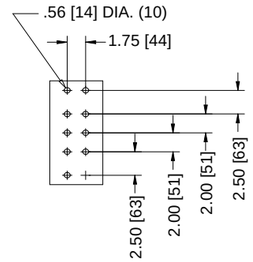




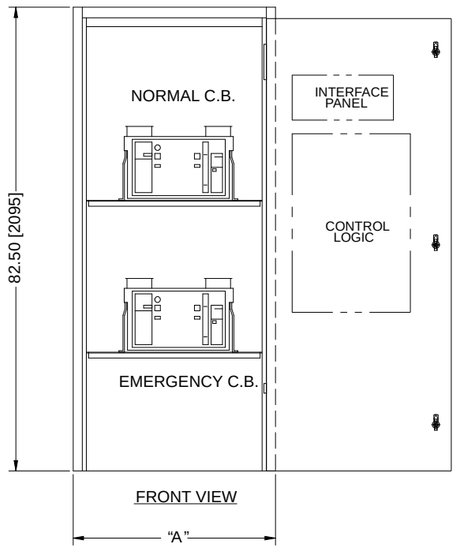
BUS DRILLING DETAIL
1600–2000 AMP SHOWN



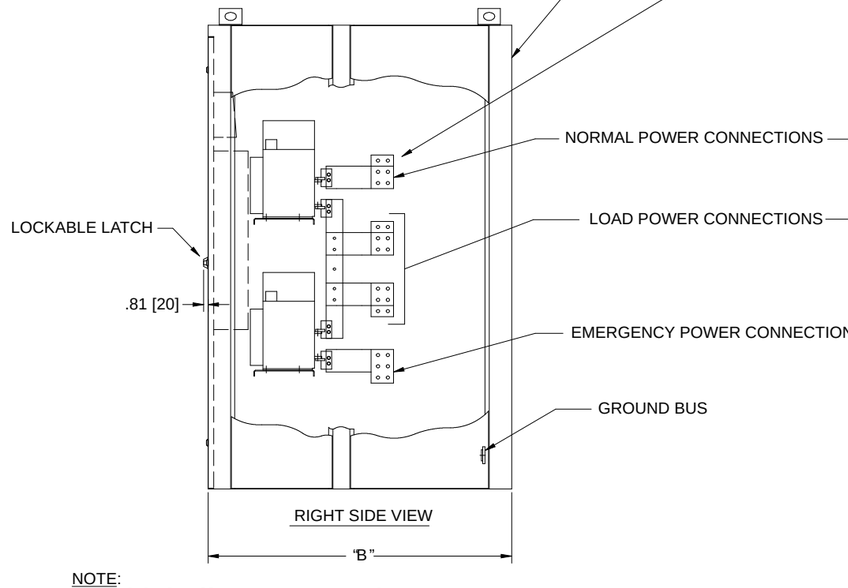
BUS DRILLING DETAIL
3000 AMP

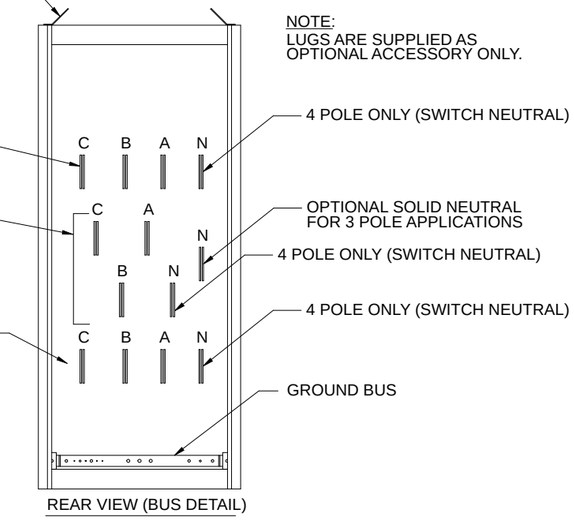


BUS DRILLING DETAIL
4000 AMP



REAR ACCESS REQUIRED
REFER TO LOCAL CODES
FOR MINIMUM WORKING
CLEARANCE.





NOTE:
DIMENSIONS IN [ ] ARE IN MILLIMETERS.
FINISH – ANSI 61 GREY

MM( ) & MN( ) 1600–4000 AMP, 3 & 4 POLE
NEMA 1 ENCLOSURE

ADV-5940

Figure 9. NEMA Type 1 Enclosure

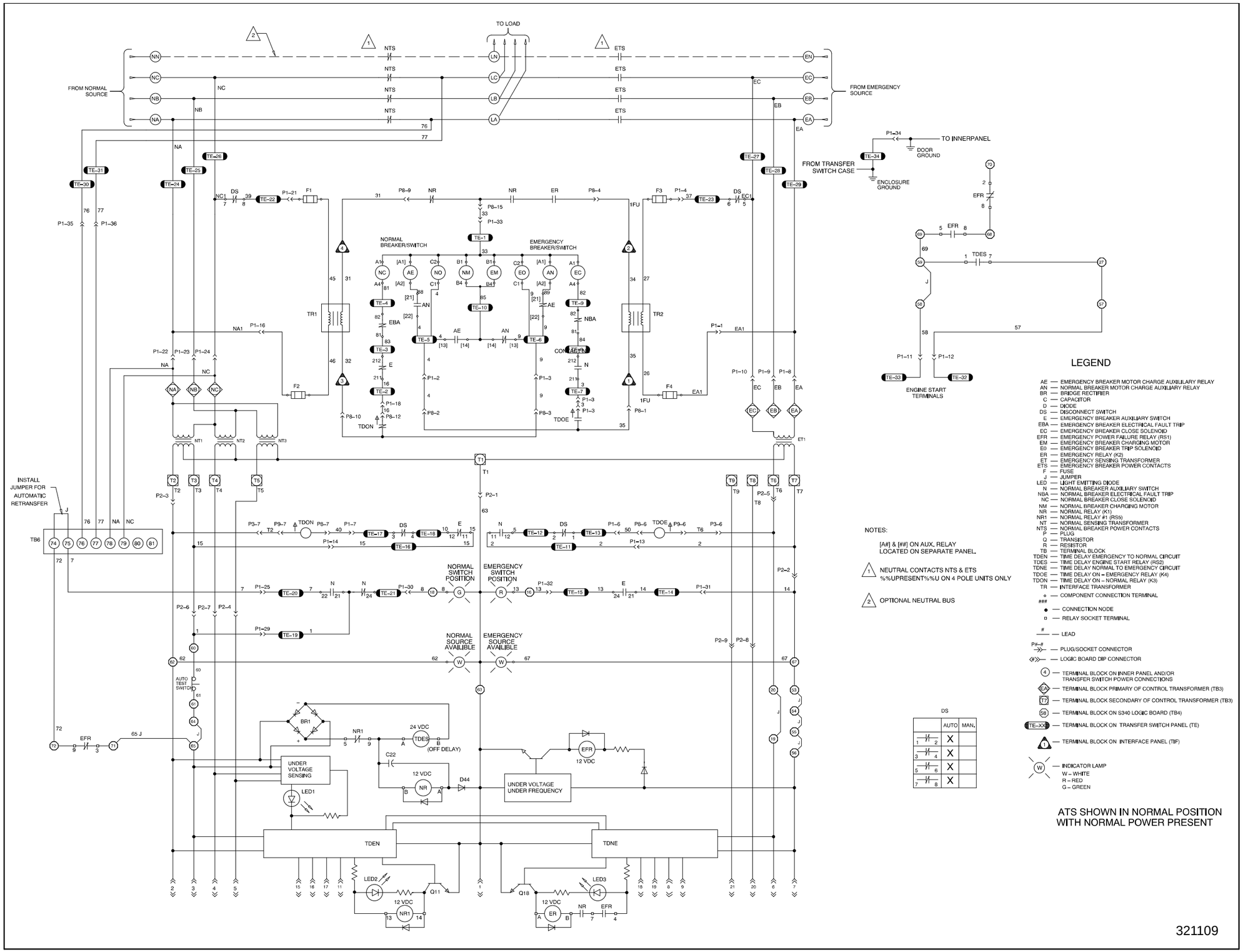


Figure 10. S340+ Logic, 120, 380, 480, 600 Volts

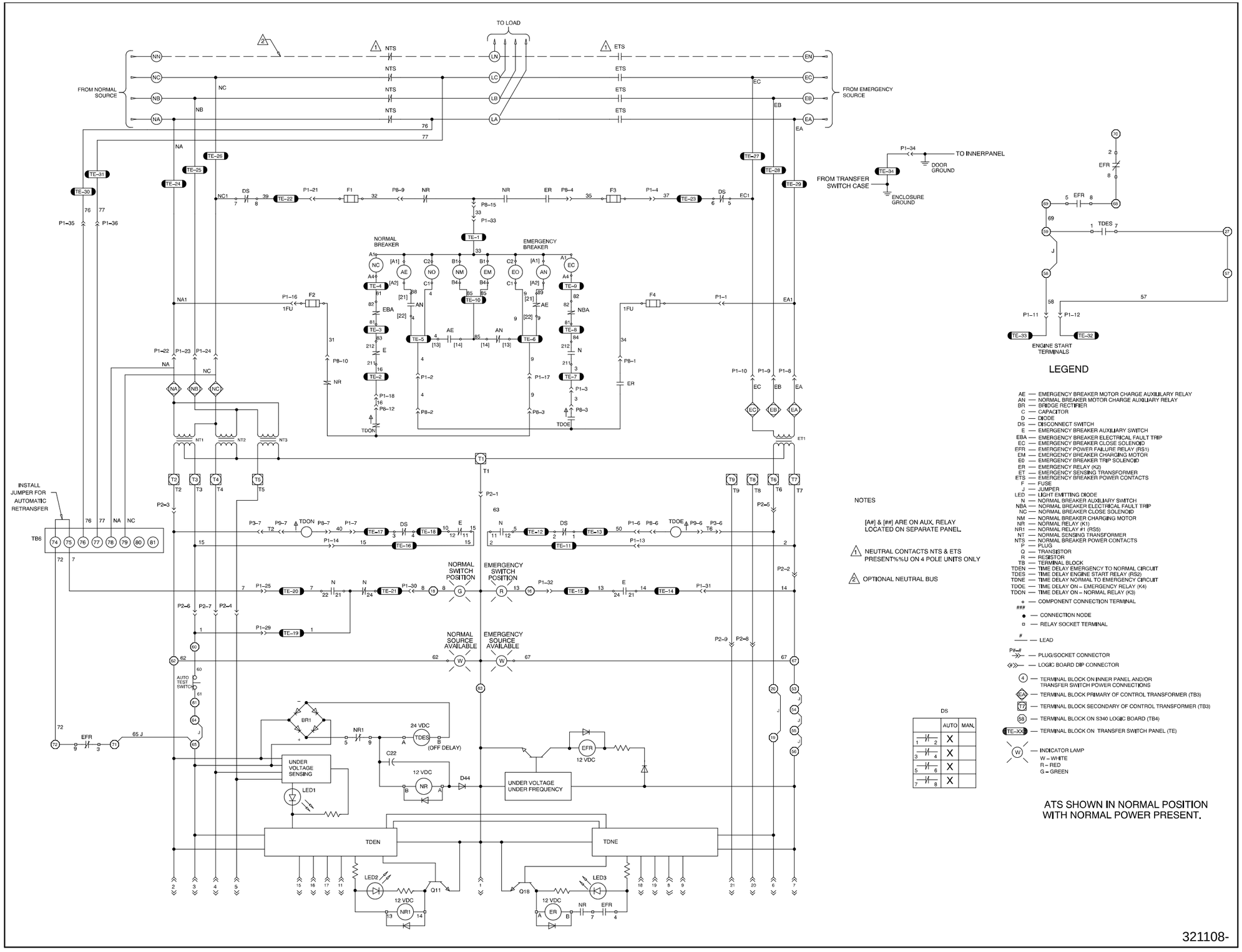


Figure 11. S340+ Logic, 208, 220, 240 Volts

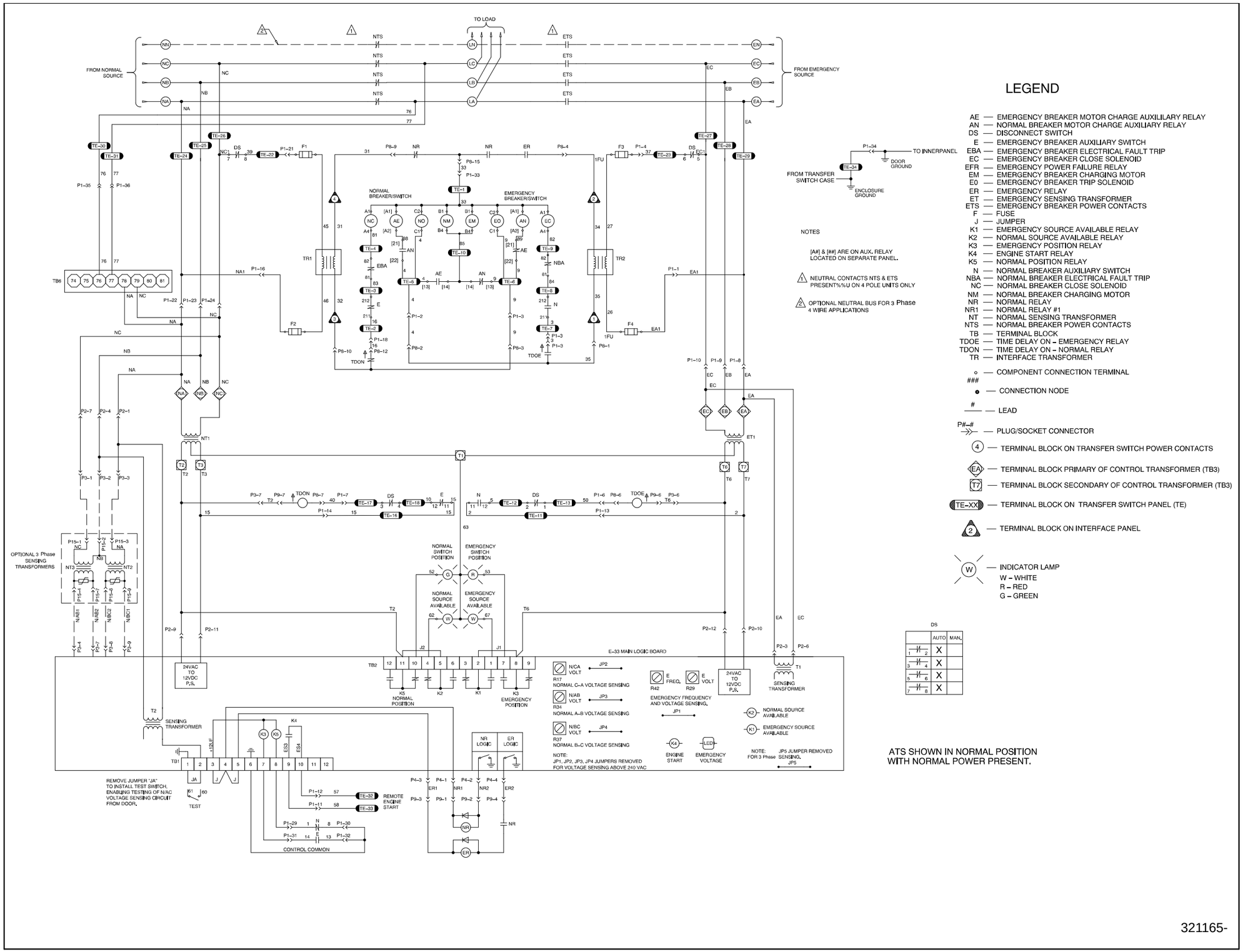


Figure 12. E33+ Logic, 120, 380, 480, 600 Volts

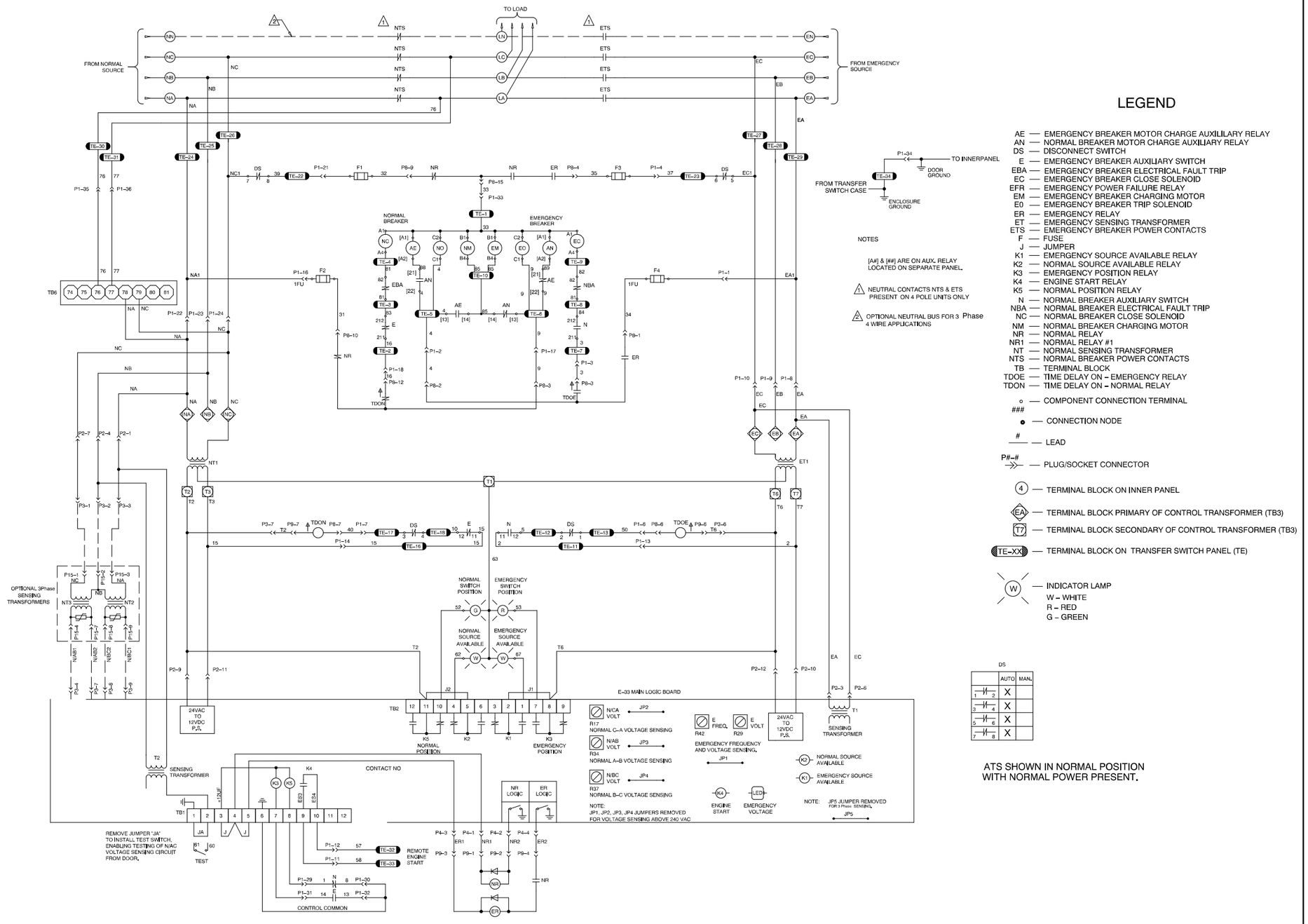


Figure 13. E33+ Logic, 208, 220, 240 Volts

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