Operation and Installation

Automatic Transfer Switch

Model:

RXT

100- 400 Amp Automatic Transfer Switches

For use with Kohler® generator sets equipped with
RDC2 generator/transfer switch controllers

KOHLER®

TP-7193 4/21

Product Identification Information

Product identification numbers determine service parts. Record the product identification numbers in the spaces below immediately after unpacking the products so that the numbers are readily available for future reference. Record field-installed kit numbers after installing the kits.

Transfer Switch Identification Numbers

Record the product identification numbers from the transfer switch nameplate.

Model Designation ______________________________

Serial Number __________________________________

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IMPORTANT SAFETY INSTRUCTIONS. Electromechanical equipment, including generator sets, transfer switches, switchgear, and accessories, can cause bodily harm and pose life-threatening danger when improperly installed, operated, or maintained. To prevent accidents be aware of potential dangers and act safely. Read and follow all safety precautions and instructions. SAVE THESE INSTRUCTIONS.

This manual has several types of safety precautions and instructions: Danger, Warning, Caution, and Notice.

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Safety decals affixed to the equipment in prominent places alert the operator or service technician to potential hazards and explain how to act safely. The decals are shown throughout this publication to improve operator recognition. Replace missing or damaged decals.

Accidental Starting

WARNING

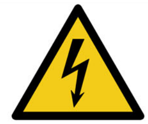
Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or equipment connected to the set, disable the generator set as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect the power to the battery charger, if equipped. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent the starting of the generator set by the remote start/stop switch.

Hazardous Voltage/ Moving Parts

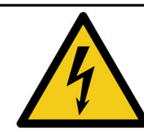
DANGER



Hazardous voltage.
Will cause severe injury or death.

Disconnect all power sources before opening the enclosure.

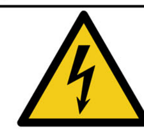
DANGER



Hazardous voltage. Electric shock.
Will cause severe injury or death.

Close and secure the enclosure door before energizing the transfer switch.

DANGER



Hazardous voltage.
Will cause severe injury or death.

Only authorized personnel should open the enclosure.

DANGER

Hazardous voltage.
Will cause severe injury or death.

This equipment must be installed and serviced by qualified electrical personnel.

Grounding electrical equipment. Hazardous voltage will cause severe injury or death. Electrocution is possible whenever electricity is present. Ensure you comply with all applicable codes and standards. Electrically ground the generator set, transfer switch, and related equipment and electrical circuits. Turn off the main circuit breakers of all power sources before servicing the equipment. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

Short circuits. Hazardous voltage/current will cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage. Do not contact electrical connections with tools or jewelry while making adjustments or repairs. Remove all jewelry before servicing the equipment.

Making line or auxiliary connections. Hazardous voltage will cause severe injury or death. To prevent electrical shock deenergize the normal power source before making any line or auxiliary connections.

Servicing the transfer switch. Hazardous voltage will cause severe injury or death. Deenergize all power sources before servicing. Turn off the main circuit breakers of all transfer switch power sources and disable all generator sets as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect power to all battery chargers. (3) Disconnect all battery cables, negative (-) leads first. Reconnect negative (-) leads last when reconnecting the battery cables after servicing. Follow these precautions to prevent the starting of generator sets by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer. Before servicing any components inside the enclosure: (1) Remove all jewelry. (2) Stand on a dry, approved electrically insulated mat. (3) Test circuits with a voltmeter to verify that they are deenergized.

Heavy Equipment

WARNING

Unbalanced weight.
Improper lifting can cause severe injury or death and equipment damage.

Use adequate lifting capacity.
Never leave the transfer switch standing upright unless it is securely bolted in place or stabilized.

Notice

NOTICE

Foreign material contamination. Cover the transfer switch during installation to keep dirt, grit, metal drill chips, and other debris out of the components. Cover the solenoid mechanism during installation. After installation, use the manual operating handle to cycle the contactor to verify that it operates freely. Do not use a screwdriver to force the contactor mechanism.

NOTICE

Electrostatic discharge damage. Electrostatic discharge (ESD) damages electronic circuit boards. Prevent electrostatic discharge damage by wearing an approved grounding wrist strap when handling electronic circuit boards or integrated circuits. An approved grounding wrist strap provides a high resistance (about 1 megohm), *not a direct short*, to ground.

Introduction

This manual provides operation and installation instructions for Kohler® Model RXT automatic transfer switches. See Figure 2 for typical Model RXT transfer switches.

The Model RXT transfer switch must be connected to a Kohler® generator set equipped with the RDC2 or DC2 generator/transfer switch controller. See Figure 1 for controller identification. The transfer switch is equipped with either a standard interface board or a combined interface/load management board. The interface board communicates with the RDC2 controller on the generator set.

Note: The DC2 controller was discontinued in 2019.

Information in this publication represents data available at the time of print. Kohler Co. reserves the right to change this literature and the products represented without notice and without any obligation or liability whatsoever.

Read this manual and carefully follow all procedures and safety precautions to ensure proper equipment operation and to avoid bodily injury. Read and follow the Safety Precautions and Instructions section at the beginning of this manual. Keep this manual with the equipment for future reference.

The equipment service requirements are very important to safe and efficient operation. Contact an authorized distributor/dealer to inspect and service the transfer switch annually and also when any wear, damage, deterioration, or malfunction of the transfer switch or its components is evident or suspected.

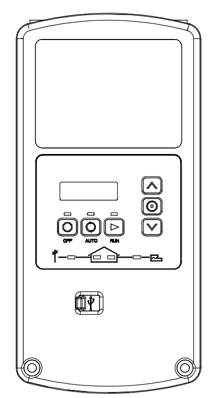


Figure 1 RDC2 Generator/Transfer Switch Controller (mounted on the generator set)

Figure 2 Typical Model RXT Transfer Switches (shown with optional status indicators)

List of Related Literature

Figure 3 identifies related literature available for the automatic transfer switches and accessories covered in this manual. Only trained and qualified personnel should install or service the transfer switch and accessories.

Literature Type	Part Number
Specification Sheet, Model RXT	G11-152
Operation, RDC2 Controller	See Generator Set Operation Manual
Operation Manual, SiteTech™ Software	TP-6701
Installation Instructions, Status Indicator	TT-1585
Installation Instructions, Load Shed Kit	TT-1609
Installation Instructions, Power Relay Module	TT-1646
Installation Instructions, Auxiliary Switch	TT-1694
Installation Instructions, Auxiliary Circuit Breaker	TT-1758

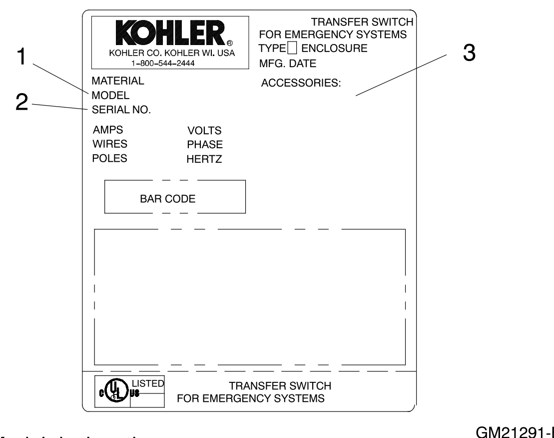
Figure 3 Related Literature

Nameplate

A nameplate attached to the inside of the enclosure cover or on the upper right side wall includes a model designation, a serial number, ratings, and other information about the transfer switch. See Figure 4.

Check the transfer switch model number from the transfer switch nameplate and verify that it matches the model shown on the front cover of this manual before proceeding with installation.

Copy the model designation, serial number, and accessory information from the nameplate to the spaces provided in the Product Identification Information section located inside the front cover of this manual for use when requesting service or parts.

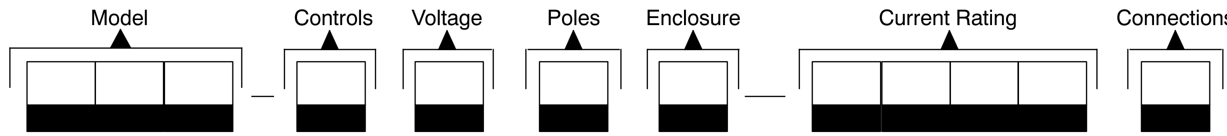


1. Model designation
2. Serial number
3. Factory-installed accessory numbers

Figure 4 Typical Transfer Switch Nameplate

Model Designation

Figure 5 explains the model designation.



Record the transfer switch model designation in the boxes. The transfer switch model designation defines ratings and characteristics as explained below.

Sample Model Designation: RXT-JFNC-0200A

Model
RXT: Kohler Automatic Transfer Switch

Controls
J: Interface board (standard or combined) for RDC2/DC2 Controller

Voltage/Frequency
C: 208 Volts/60 Hz (3-phase only)
F: 240 Volts/60 Hz
M: 480 Volts/60 Hz (3-phase only)

Number of Poles/Wires
N: 2-pole, 3-wire, solid neutral (120/240 V only)
T: 3-pole, 4-wire, solid neutral
V: 4-pole, 4-wire, switched neutral

Enclosure
A: NEMA 1
C: NEMA 3R

Current Rating: Numbers indicate the current rating of the switch in amperes:

0100	0300
0150	0400
0200	

Connections
A: No load center
B: With load center (100 amp single-phase only)
ASE: Service entrance rated
CSE: Service entrance rated with CSA certification (not available for 150 amp models)

Figure 5 Model Designation

For professional advice on generator set power requirements and conscientious service, please contact your nearest Kohler distributor or dealer.

- Visit the Kohler Co. website at KOHLERPower.com.
- Look at the labels and decals on your Kohler product or review the appropriate literature or documents included with the product.
- Call toll free in the US and Canada 1-800-544-2444.
- Outside the US and Canada, call the nearest regional office.

Headquarters Europe, Middle East, Africa (EMEA)
Kohler EMEA Headquarters
Netherlands B.V.
Kristallaan 1
4761 ZC Zevenbergen
The Netherlands
Phone: (31) 168 331630
Fax: (31) 168 331631

Asia Pacific
Kohler Asia Pacific Headquarters
Singapore, Republic of Singapore
Phone: (65) 6264-6422
Fax: (65) 6264-6455

China
North China Regional Office, Beijing
Phone: (86) 10 6518 7950
(86) 10 6518 7951
(86) 10 6518 7952
Fax: (86) 10 6518 7955

East China Regional Office, Shanghai
Phone: (86) 21 6288 0500
Fax: (86) 21 6288 0550

India, Bangladesh, Sri Lanka
India Regional Office
Bangalore, India
Phone: (91) 80 3366208
(91) 80 3366231
Fax: (91) 80 3315972

Japan, Korea
North Asia Regional Office
Tokyo, Japan
Phone: (813) 3440-4515
Fax: (813) 3440-2727

1.1 Transfer Switch Description

An automatic transfer switch (ATS) transfers electrical loads from a normal source of electrical power to an emergency source when the normal source voltage or frequency falls below an acceptable level. The normal source is typically utility power. The emergency source is usually a generator set.

Model RXT transfer switches must be connected to a generator set equipped with the Kohler® RDC2 generator/transfer switch controller.

Voltage sensing data from the ATS is continuously transmitted to the RDC2 controller mounted on the generator set. When the normal source fails, the RDC2 controller signals the emergency source generator set to start. When the emergency source reaches acceptable levels and stabilizes, the ATS transfers the electrical load to the emergency source.

The RDC2 controller signals the ATS to transfer the load back when the normal source returns and stabilizes. See Section 3 for detailed operation descriptions.

Figure 1-1 shows a typical installation block diagram.

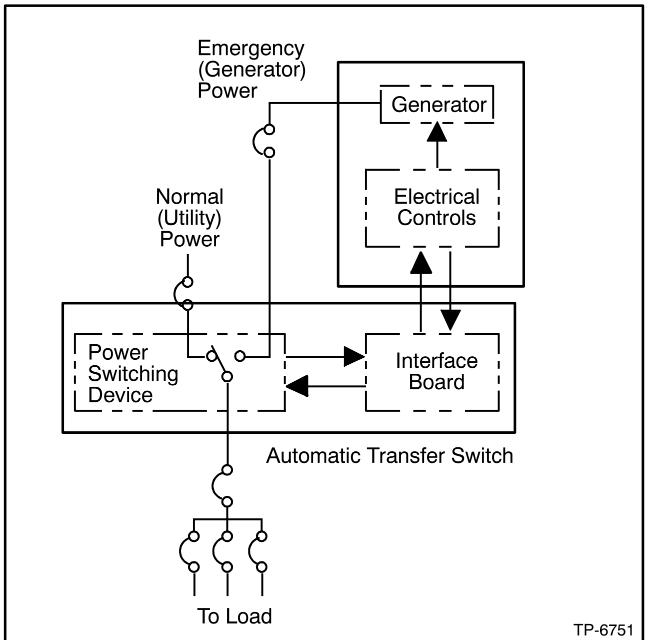
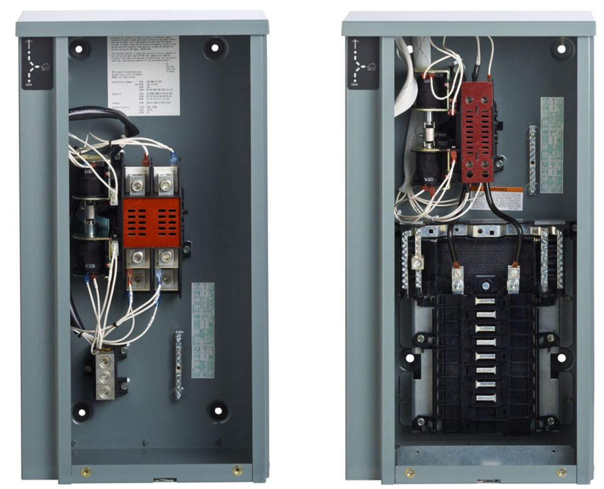


Figure 1-1 Typical ATS Block Diagram



Standard Model, 200 Amps

Load Center Model, 100A

NOTE: Typical models shown. Parts may vary.

Figure 1-2 Selected Transfer Switches (covers removed)

1.2 Service Entrance Models

Service entrance models use a circuit breaker to provide the service disconnect for the utility source.

1.3 Load Centers

Model RXT 100 amp transfer switches are available with a built-in load center. A model with a built-in load center is shown in Figure 1-2. Models without load centers require the installation of a separate load panel.

Loads. The transfer switch can be connected to supply all of the electrical loads in the home, or only the essential loads such as the furnace, refrigerator, well pump, and selected light circuits. Identify the essential circuits that must be supplied during a power outage. Verify that the generator set and transfer switch are adequately rated to supply all of the selected loads.

Circuit breakers. Because the size and number of circuit breakers required will vary with each application, circuit breakers are not provided with the transfer switch load center.

Determine the circuits that will be connected to the transfer switch (essential loads). Identify the breakers for those circuits in the main distribution panel.

The ATS load center uses the Square D circuit breakers shown in Figure 1-3. If the main distribution panel uses the same type of breakers, the breakers can be moved from the main panel to the load center. Otherwise, obtain new Square D circuit breakers. For each circuit, the rating of the load center circuit breaker must match the rating of the existing breaker in the main panel.

See the transfer switch dimension drawings for more information.

Model	Load Center Spaces	Max. Number of Tandem Breakers	Square D Circuit Breaker Types
100B	12	12	QO, QOA, QOC, QOP, or QOT (20A Max. Non- CTL)
100B	16	8	

Figure 1-3 Load Center Circuit Breakers

1.4 Controller Interface Board

The Model RXT transfer switch is available with either the standard interface board or the combined interface/load management board. Both interface boards connect to the RDC2 controller on the generator set.

1.4.1 Standard Interface Board

All ATS control functions are performed by the RDC2 controller mounted on the generator set and communicated through the interface board. The controller interface board sends voltage sensing data to the RDC2 controller and receives transfer and load control signals from the RDC2 controller.

1.4.2 Combined Interface/Load Management Board

The combined interface/load management board performs all of the functions of the standard interface board and also provides load add and shed based on generator capacity. The combined interface/load management board can be used with single-phase generator sets equipped with the RDC2 controller only.

Note: Do not install a load shed kit or a load control module (LCM) on a system that includes the combined interface/load management board.

Many appliances do not run continuously. Air conditioners and furnaces, refrigerators, sump pumps, and other appliances cycle on and off as needed. With load management, less critical appliances can be powered by the generator set when the more important appliances are not running, allowing the use of a smaller generator set than would be needed to run all of the building's electrical equipment at the same time.

The combined interface/load management board provides an automatic load management system to comply with NEC requirements. The installer is responsible for ensuring that the power system installation complies with all applicable state and local codes.

The combined interface/load management board automatically manages up to six residential loads.

- Two relays are included to control two independent heating, ventilation, and air conditioning (HVAC) loads.
- Four (4) pilot relays are provided on the combined interface board for connection of load-switching contactors/relays. See Figure 1-4 for the specifications of the circuit board relays.

Up to four (4) Kohler® 50 amp power relay modules (GM92001-KP1-QS) or normally closed power relays can be connected through normally open relay contacts on the circuit board. See Figure 1-5 for specifications for customer-supplied relays. Customer-supplied relays must be either normally closed or double-pole double-throw (DPDT). Note that the load must be connected to the normally closed contacts of the relay. Kohler® Power Relay Modules are recommended.

Note: Connect only non-essential loads to the load shed kit.

Circuit Board Relays	Contact Rating
Pilot Relays and HVAC Relays (qty. 2)	125VAC, 10 A (general purpose) 120VAC, 125VA (pilot duty)

Figure 1-4 Combined Interface Board Relay Specifications

Power Relay Specifications	
Relay Rating	50 A @ 240 VAC
Relay Type	DPST - NC or DPDT
Coil Voltage	120 VAC

Figure 1-5 Customer-Supplied Power Relay Specifications

Figure 1-6 shows a simple diagram of a power system with load management. For detailed installation and connection instructions, refer to Section 2.7 and the instructions provided with the power relay modules.

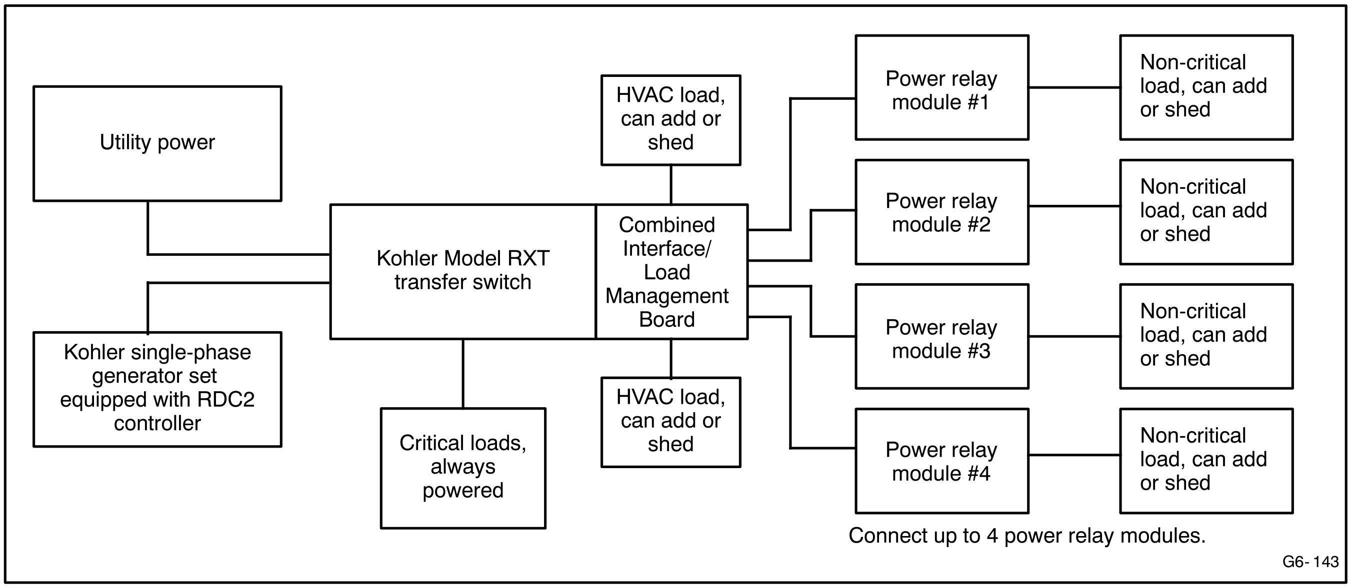


Figure 1-6 Power System with Load Management

1.5 Optional Status Indicator Panels

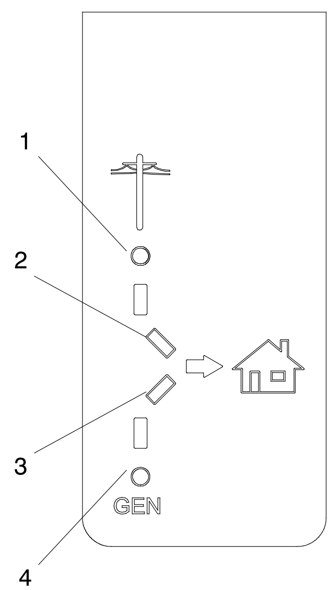
Two status indicator panels are available. One is for RXTs with the standard interface board, and the other is for the RXT with the combined interface/load management board.

The two types of indicator panels use different connectors and are not interchangeable. The standard indicator panel connects only to the standard board. The combined indicator panel connects only to the combined interface/load management board.

Refer to the installation instructions provided with the kit, TT-1585.

1.5.1 Standard Status Indicator Panel

A user interface panel that contains status-indicating LEDs is available. See Figure 1-7. Source available LEDs light to indicate that the utility and/or generator sources are available. The utility or generator source supplying load LED lights to show which source is connected to the building load (i.e. contactor position, normal or emergency).



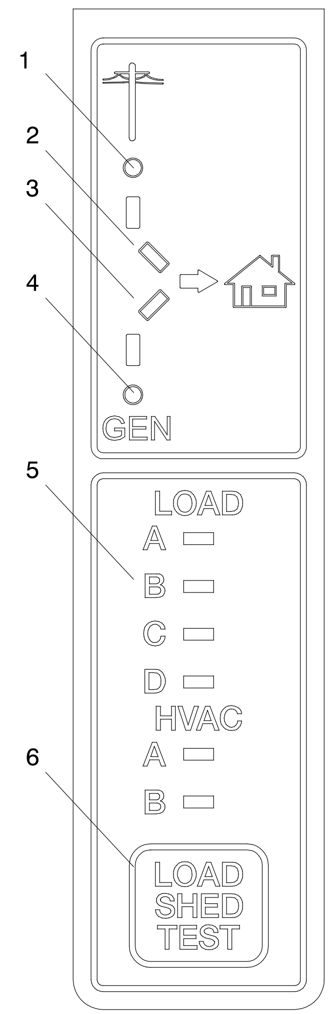
GM78649

1. Utility power available
2. Utility source supplying load
3. Generator source supplying load
4. Generator power available

Figure 1-7 Optional Status Indicator Panel

1.5.2 Status Indicator Panel for Combined Interface/Load Management Board

The LED Indicator panel includes the source available and source connection LEDs that are included on the standard indicator panel. The combined panel also includes load status LEDs and a Test button that cycles the load management relays. See Figure 1-8. See Section 3.4 for load management operation and test information.



GM90763

1. Utility power available
2. Utility source supplying load
3. Generator source supplying load
4. Generator power available
5. Load add/shed relay status indicators
6. Load shed test button (cycles relays)

Figure 1-8 Optional Status Indicator Panel for Combined Board

2.1 Introduction

Kohler® transfer switches are shipped factory-wired, factory-tested, and ready for installation. Have the equipment installed only by trained and qualified personnel, and verify that the installation complies with applicable codes and standards. Protect the switch against damage before and during installation.

2.2 Receipt of Unit

2.2.1 Inspection

At the time of delivery, inspect the packaging and the transfer switch for signs of shipping damage. Unpack the transfer switch as soon as possible and inspect the exterior and interior for shipping damage. If damage and/or rough handling is evident, immediately file a damage claim with the transportation company.

2.2.2 Storage

Store the transfer switch in its protective packing until final installation. Protect the transfer switch at all times from moisture, construction grit, and metal chips. Avoid storage in cold or damp areas where moisture could condense on the unit. See Figure 2-1 for acceptable storage temperatures.

Item	Specification
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Operating Temperature	-20°C to 70°C (-4°F to 158°F)
Humidity	5% to 95% noncondensing
Altitude	0 to 3050 m (10000 ft.) without derating

Figure 2-1 Environmental Specifications

2.2.3 Unpacking

Allow the equipment to warm to room temperature for at least 24 hours before unpacking to prevent condensation on the electrical apparatus. Use care when unpacking to avoid damaging transfer switch components. Use a vacuum cleaner or a dry cloth to remove dirt and packing material that may have accumulated in the transfer switch or any of its components.

Note: Do not use compressed air to clean the switch. Cleaning with compressed air can cause debris to lodge in the components and damage the switch.

2.2.4 Lifting

WARNING

Unbalanced weight.
Improper lifting can cause severe injury or death and equipment damage.

Use adequate lifting capacity.
Never leave the transfer switch standing upright unless it is securely bolted in place or stabilized.

See Figure 2-2 or the dimensional drawing for the approximate weight of the transfer switch. Use a spreader bar to lift the transfer switch. Attach the bar only to the enclosure's mounting holes or lifting brackets; do not lift the unit any other way. Close and latch the enclosure door before moving the unit.

Amps	Description	Weight * kg	(lb.)
100	Single phase	7	(15)
	With 12- or 16-space load center (NEMA 1)	12	(26)
	With 16-space load center (NEMA 3R)	8	(18)
	Three phase, 3 and 4 pole	15	(33)
	Service entrance (ASE)	10	(22)
	Service entrance (CSE)	14	(30)
150	Service entrance (ASE)	12	(26)
200	Service entrance (ASE)	12	(26)
	Service entrance (CSE)	16	(36)
	Single phase	7	(15)
	Three phase	15	(33)
300	Service entrance	59	(130)
400	Single phase	45	(100)
	3-Pole	47	(104)
	4-Pole	188	(414)
	Service entrance	59	(130)

* Weights are approximate and do not include packaging.

Note: Enclosures are type NEMA 3R except as noted.

Figure 2-2 Approximate Weights

2.3 Installation

NOTICE

Foreign material contamination. Cover the transfer switch during installation to keep dirt, grit, metal drill chips, and other debris out of the components. Cover the solenoid mechanism during installation. After installation, use the manual operating handle to cycle the contactor to verify that it operates freely. Do not use a screwdriver to force the contactor mechanism.

The transfer switch may use both American Standard and metric hardware. Use the correct size tools to prevent rounding of the bolt heads and nuts.

Check the system voltage and frequency. Compare the voltage and frequency shown on the transfer switch nameplate to the source voltage and frequency. Do not install the transfer switch if the voltage and frequency are different from the normal (utility) source voltage and frequency or the emergency source voltage and frequency shown on the generator set nameplate. Do not use a single-phase transfer switch in a three-phase application. Do not use a three-phase transfer switch in a single-phase system.

Note: Installing the transfer switch in an application that does not match the voltage and phase rating listed on the nameplate can cause non-warrantable damage to the ATS and/or operational problems.

Plan the installation. Use the dimensions given on the enclosure dimension (ADV) drawings in Section 6. Select a mounting site that complies with local electrical code restrictions for the enclosure type. Mount the transfer switch as close to the load and power sources as possible. Allow adequate space to open the enclosure and service the switch.

NEMA 3R enclosures. To remove the enclosure's front panel, support the panel while removing the screws. Pull the bottom of the panel out and down until the top clears the enclosure. Remove the inner panel to access the transfer switch components.

NEMA 3R enclosures have locking tabs at the bottom of the enclosure and the door. Use a padlock to lock the door after installation is complete.

Wall mounting. Mount the transfer switch to a wall or other rigid vertical supporting structure. Refer to the dimension drawings in Section 6 for hole locations. Use shims to plumb the enclosure.

Cover the transfer switch's internal components to protect them from drill chips or debris during installation. Use a vacuum cleaner to remove debris from the enclosure.

Note: Do not use compressed air to clean the switch. Cleaning with compressed air can cause debris to lodge in the components and cause damage.

Clearance holes through the back of each enclosure are provided for mounting. The mounting holes on NEMA 3R enclosures have gaskets to seal out moisture. Use washers with the mounting screws to protect the gaskets.

2.4 Manual Operation Check

DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect all power sources before opening the enclosure.

Check the manual operation before energizing the transfer switch. Verify that the contactor operates smoothly without binding. Do not place the transfer switch into service if the contactor does not operate smoothly.

After checking the manual operation, place the contactor in the Normal (utility) position.

Manual Operation Procedure

Note: Never manually operate the transfer switch when the power is connected. Disconnect both power sources before manually operating the switch.

1. See Figure 2-3 and compare your transfer switch to the illustrations in Figure 2-4 through Figure 2-8.

   a. Switches shown in Figure 2-4 have an attached handle that is not removable.

   b. For switches shown in Figure 2-5, insert a screwdriver or similar tool into the opening in the manual operating lever.

   c. For switches shown in Figure 2-6, Figure 2-8, and Figure 2-9, use the maintenance handle provided with the transfer switch. Insert the maintenance handle into the hole in the shaft on the left side of the operator.

   d. For switches shown in Figure 2-7, use the maintenance handle provided with the transfer switch or an appropriately sized wrench. Slide the detachable handle or wrench over the shaft.

2. Move the manual operating handle up or down to place the contactor into the desired position.

   a. Figure 2-4 or Figure 2-7: Move the handle up to place the transfer switch in the Normal Source position or down to place the contactor in the Emergency Source position. See Figure 2-4 or Figure 2-7.

   b. Other styles (Figure 2-8 and Figure 2-9): Move the maintenance handle (or tool) up or down as shown to manually operate the transfer switch to the N or E position as labelled on the mechanism.

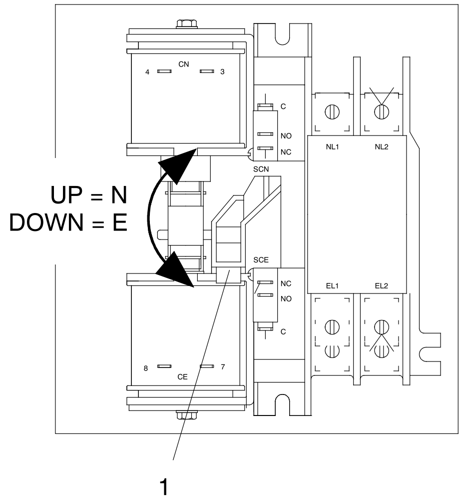
3. Verify that the transfer switch operates smoothly without any binding. If it does not, check for shipping damage or construction debris. Do not place the transfer switch into service if the contactor does not operate smoothly.

4. Move the manual operating handle to return the transfer switch to the Normal position.

5. Remove the maintenance handle or tool, if used, and return it to the storage location.

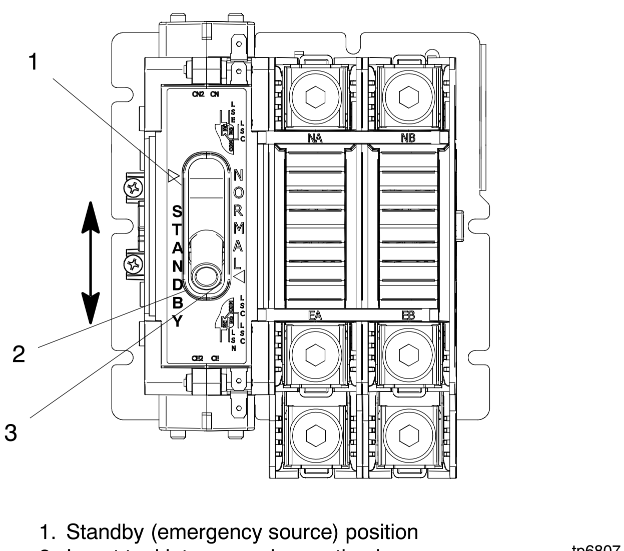
ATS	Figure
100- 200 amps, 1-phase	Figure 2-4 or Figure 2-5
100- 200 amps, 3-phase	Figure 2-6
300 amps, 1-phase	Figure 2-7
400 amps, 1-phase	
400 amps, 3-phase, 3-pole, 208- 240 Volts	
400 Amp 1-phase and 3-Phase, 3-Pole Switches	Figure 2-8
400 Amp 3-Phase 4-Pole Switches	Figure 2-9

Figure 2-3 Manual Operation Illustrations



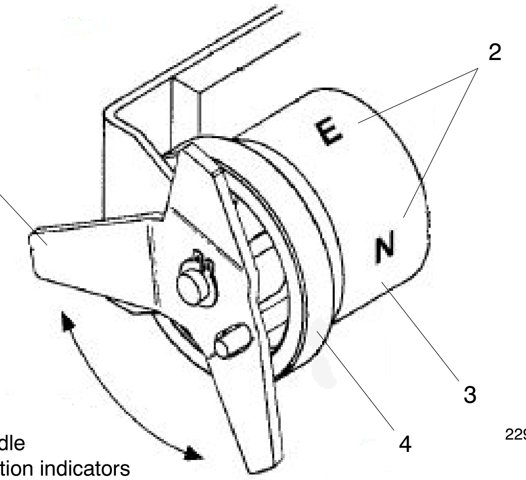
1. Handle (not detachable)

Figure 2-4 Manual Operation, 100 - 200 Amp Single-Phase Switches



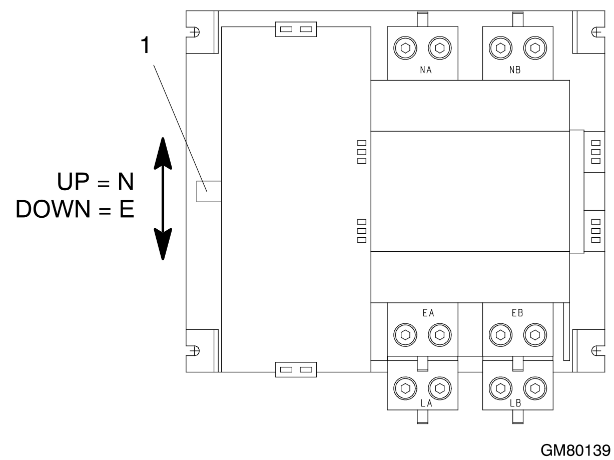
1. Standby (emergency source) position
2. Insert tool into manual operating lever
3. Normal (utility source) position

Figure 2-5 Manual Operation, 100 - 200 Amp Single-Phase Switches, (alternate design)



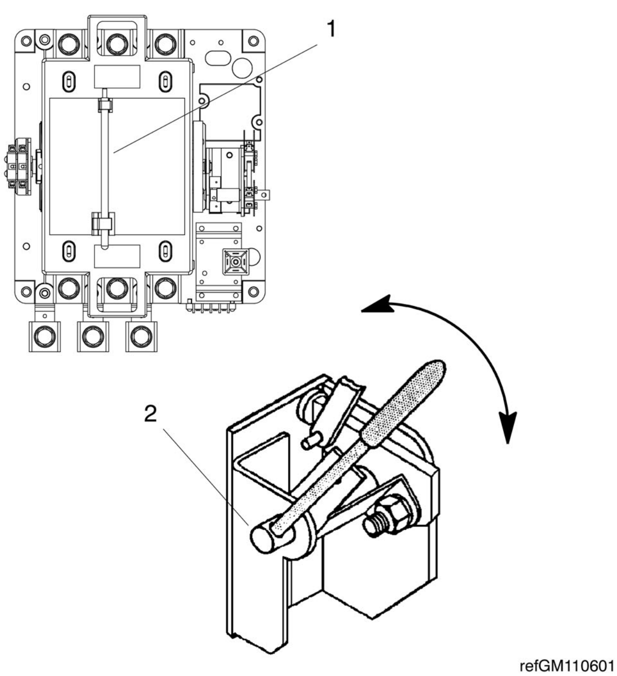
1. Handle
2. Position indicators
3. Weight
4. Floating Weight

Figure 2-6 Manual Operation, 100- 200 Amp 3-Phase Switches



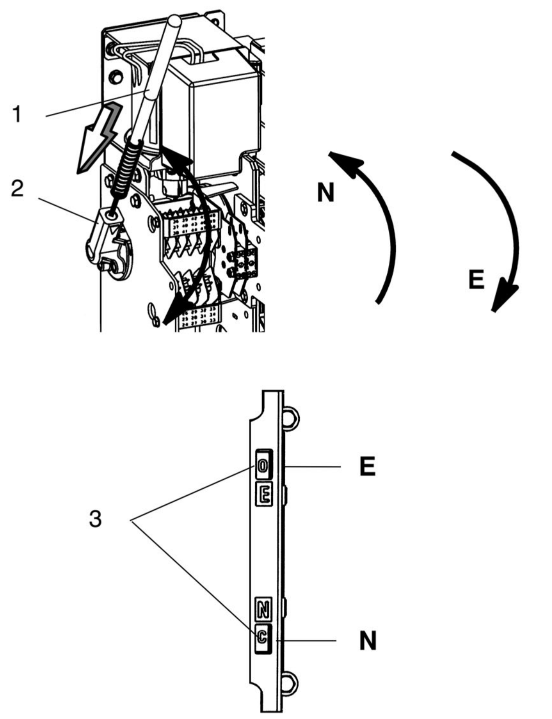
1. Shaft (attach handle or wrench here)

Figure 2-7 Manual Operation, 208- 240 Volt 1 Ph. and 3 Ph., and 300- 400 Amp 1-Ph. Switches



1. Handle storage location
2. Insert handle here for manual operation

Figure 2-8 Manual Operation, 400 Amp 1-phase and 3-Phase, 3-Pole Switches



1. Handle
2. Hub
3. Position indicators (right side of contactor):
   O = open, C = closed

Figure 2-9 Manual Operation, 400 Amp 3-Phase 4-Pole Switches

2.5 Electrical Wiring

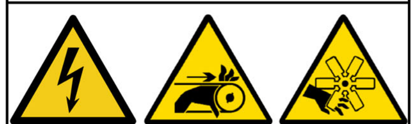
Refer to the connection diagrams on the transfer switch enclosure door and the wiring diagrams in Section 6 during installation.

Note: Do not install the transfer switch in an application that does not match the ATS phase and voltage ratings listed on transfer switch nameplate.

Compare the voltage, frequency, and phases shown on the transfer switch nameplate to the source voltage and frequency. Do not install the transfer switch if the voltage and frequency are different from the normal (utility) source voltage and frequency or the emergency source voltage and frequency shown on the generator set nameplate.

All wiring must comply with applicable national, state, and local electrical codes. Use separate conduit for AC power wiring and low-voltage DC, control, and communication system wiring.

WARNING

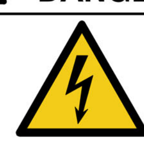


Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or equipment connected to the set, disable the generator set as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect the power to the battery charger, if equipped. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent the starting of the generator set by the remote start/stop switch.

DANGER



Hazardous voltage.
Will cause severe injury or death.

Disconnect all power sources before opening the enclosure.

Making line or auxiliary connections. Hazardous voltage will cause severe injury or death. To prevent electrical shock deenergize the normal power source before making any line or auxiliary connections.

Grounding electrical equipment. Hazardous voltage will cause severe injury or death. Electrocution is possible whenever electricity is present. Ensure you comply with all applicable codes and standards. Electrically ground the generator set and related equipment and electrical circuits. Turn off the main circuit breakers of all power sources before servicing the equipment. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

2.5.1 Load Center Circuit Breakers

The 100 amp Model RXT transfer switch is available with a built-in 12-space or 16-space load center. The load center uses the Square D circuit breakers shown in Figure 2-10. In an essential load application, the breakers can be moved from the main panel to the load center if the main distribution panel uses the same type of breakers. Otherwise, obtain new Square D circuit breakers. The rating of the load center circuit breaker must match the rating of the existing breaker in the main panel for each circuit.

If circuit breakers are removed from the load panel, install cover plates over the vacant positions. Cover plates can be obtained from a local Square D supplier.

Model	Load Center Spaces	Max. Number of Tandem Breakers	Square D Circuit Breaker Types
100B	12	12	QO, QOA, QOC, QOP, or QOT (20A Max. Non- CTL)
100B	16	8	

Figure 2-10 Load Center Circuit Breakers

2.5.2 AC Power Connections

Determine the cable size. Refer to the ADV drawings in Section 6 to determine the cable size required for the transfer switch. Make sure the lugs provided are suitable for use with the cables being installed.

Conduit. Use separate conduit for AC power wiring and low-voltage DC, control, and communication system wiring. Watertight conduit hubs may be required for outdoor use.

Select the proper cable clamp or use other approved methods for securing the cable or conduit to the enclosure.

Source and load connections. Clean cables with a wire brush to remove surface oxides before connecting them to the terminals. Apply joint compound to the connections of any aluminum conductors.

Refer to the connection diagrams on the transfer switch enclosure door and the wiring diagrams in Section 6. The connection points on the transfer switch contactor are labelled Normal, Emergency, and Load. Connect the utility power to Normal. Connect the generator set to Emergency.

For three-phase models, be sure to follow the phase markings (A, B, C, and N).

Note: Connect the source and load phases as indicated by the markings and drawings to prevent short circuits and to prevent phase-sensitive devices from malfunctioning or operating in reverse.

Service entrance models. Connect the utility source to the lugs on the normal source disconnect circuit breakers as shown in the service entrance switch wiring diagram in Section 6.

On models with built-in load centers, the load lugs are factory-wired to the load center. Connect the load leads to the circuits in the load center and tighten the connections. Check the labels on the breakers for the tightening torques.

2.5.3 Neutral Connection

Connect the neutral from the main panel to the neutral lug in the ATS enclosure.

Ground the system according to NEC and applicable state and local codes.

2.5.4 Neutral Bonding Jumper, Service Entrance Models

The transfer switch is shipped with the neutral-to-ground jumper installed. For non-service entrance applications, disconnect the neutral-to-ground bonding jumper. See the transfer switch dimension drawing.

2.5.5 Tighten the Connections

Verify that all connections are consistent with drawings before tightening the lugs. Tighten all cable lug connections to the torque values shown on the label on the switch or see Figure 2-11 through Figure 2-13. Carefully wipe off any excess joint compound after tightening the terminal lugs.

Tightening Torque Values for Dual-Rated (AL-CU) Screw Connectors

AWG or Circular MIL Size	Screwdriver Tightening Torque	
	Inch-Pounds	(Nm)
#14 to #10	35	(4.0)
#8	40	(4.5)
#6 to #4	45	(5.1)
#2 to 2/0	50	(5.7)

Figure 2-11 Screwdriver Tightening Torques

Internal Socket Size Across Flats (in.)	Internal Socket Tightening Torque	
	Inch-Pounds	(Nm)
1/8 (0.125)	45	(5.1)
5/32 (0.156)	100	(11.3)
3/16 (0.188)	120	(13.6)
7/32 (0.219)	150	(16.9)
1/4 (0.250)	200	(22.6)
5/16 (0.313)	275	(31.1)
3/8 (0.375)	375	(42.4)
1/2 (0.500)	500	(56.5)
9/16 (0.563)	600	(67.8)

Figure 2-12 Internal Socket Tightening Torques

Internal Socket Tightening Torque			
Cable Range	In. Lbs	Ft. Lbs.	(Nm)
#14 to #10	60	5	(6.8)
#8 to #3	120	10	(13.6)
#2 to 2/0	240	20	(27.1)
3/0 to 350MCM	300	25	(33.9)
400 MCM to 600 MCM	360	30	(40.7)
700 MCM to 1000 MCM	480	40	(54.2)

Figure 2-13 Alternate Internal Socket Set Screw Lug Torque Based on Wire Size

2.5.6 Engine Start Function

The engine start function is controlled by the RDC2/DC2 controller on the generator set. There are no engine start terminals on the Model RXT ATS.

2.6 Interface Module Connection

Note: The transfer switch is equipped with either a standard interface module or a combined interface/load management board. For instructions to connect the combined interface/load management board, see Section 2.7.

The interface module must be connected to a Kohler® generator set equipped with the RDC2 or DC2 controller. Connect P10 on the interface module to the A, B, PWR, and COM connections on the generator set's field-connection terminal block. See the generator set Installation Manual for the location of the terminal block. See Figure 2-14 for P10 connection identification.

Note: Engine start connections 3 and 4 on the generator set are not used with the Model RXT transfer switch.

This document gives connection information for one Model RXT transfer switch connected to a generator set equipped with an RDC2 or DC2 controller. If additional accessory modules such as a programmable interface module (PIM) are connected, refer to the generator set installation manual for additional connection instructions.

⚠ WARNING

Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or equipment connected to the set, disable the generator set as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect the power to the battery charger, if equipped. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent the starting of the generator set by the remote start/stop switch.

DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect all power sources before opening the enclosure.

Making line or auxiliary connections. Hazardous voltage will cause severe injury or death. To prevent electrical shock deenergize the normal power source before making any line or auxiliary connections.

Connection	Designation	Description
P10-1	A	Communication Line
P10-2	B	Communication Line
P10-3	PWR	12 VDC
P10-4	COM	12 VDC

Figure 2-14 Controller Interface Connections

2.6.1 Required Connections

RBUS Connections A and B

See Figure 2-15 and Figure 2-16.

For the RBUS communication connections A and B to the Model RXT transfer switch, optional PIM and/or load shed kit, use 20 AWG shielded, twisted-pair communication cable. Belden #9402 (two-pair) or Belden #8762 (single-pair) or equivalent cable is recommended.

For outdoor installations, including those with buried cables and/or conduit, use outdoor-rated Belden #1075A or equivalent 20 AWG shielded, twisted-pair communication cable.

PWR and COM Connections

For the PWR and COM connections, the cable size and maximum cable length depends on the number of modules connected. See Figure 2-15.

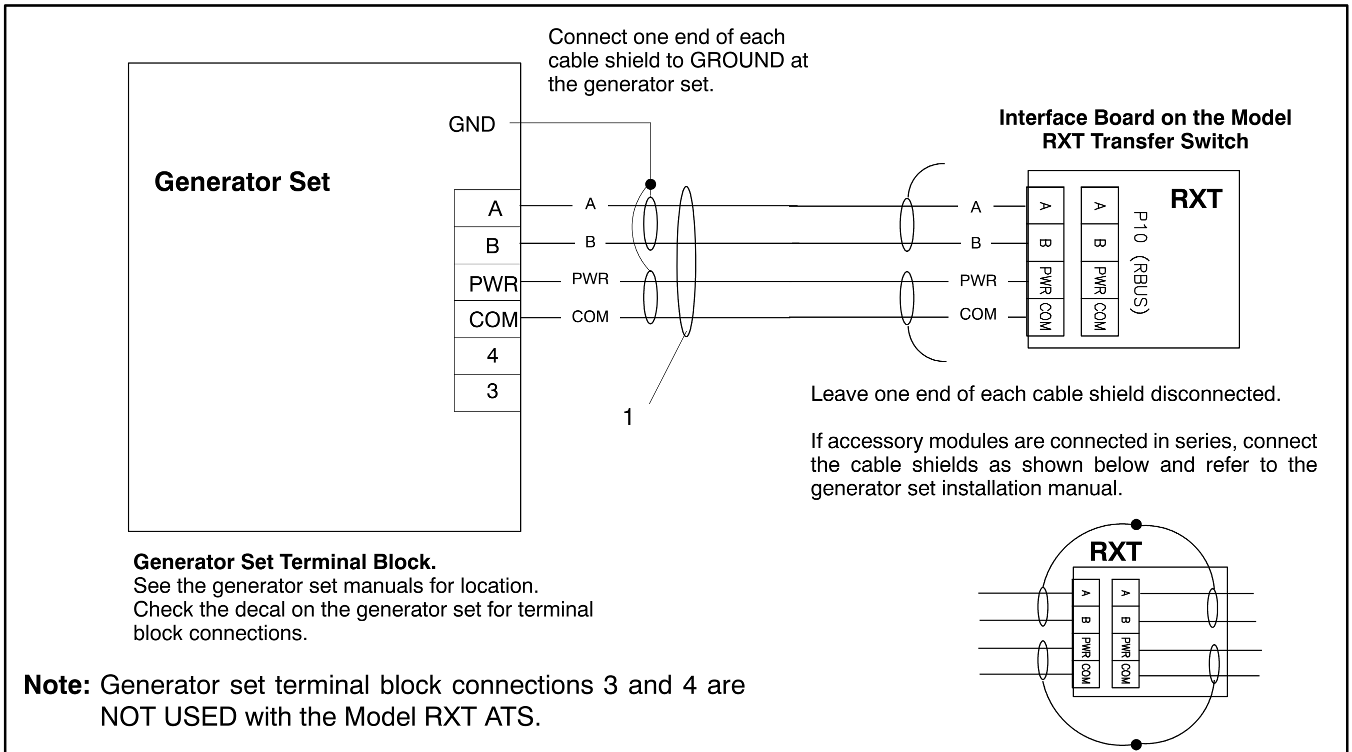
- For short cable runs shown in the first two rows of Figure 2-15, use one pair in the two-pair communication cable for the A and B connections, and use the second pair for the PWR and COM connections.
- For the longer cable runs shown in the last two rows of Figure 2-15, use 12 or 14 AWG cable for PWR and COM, and use the 20 AWG communication cable specified above for the A and B connections only. In this case, single-pair communication cable such as Belden #8762 can be used for the A and B connections.

The maximum cable length depends on the number of modules connected. See Figure 2-15 for the maximum cable lengths with 1 to 4 modules per cable run.

Cable (TB1- PWR and COM)	Maximum length per run, meters (ft.) Number of Modules (RXT, APM, PIM, and/or load management device) per Run			
	1 Module	2 Modules	3 Modules	4 Modules
Belden #9402 or equivalent 20AWG for indoor installations	46 (150)	15 (50)	5 (17)	Do not use 20AWG for PWR and COM
Belden #1075A or equivalent 20AWG for outdoor installations or buried cables	46 (150)	15 (50)	5 (17)	Do not use 20AWG for PWR and COM
14 AWG *	137 (450)	137 (450)	107 (350)	107 (350)
12 AWG *	137 (450)	137 (450)	137 (450)	137 (450)

* Use 12 or 14 AWG cable for PWR and COM connections only. For RBUS connections A and B, use shielded, twisted pair communication cable specified above.

Figure 2-15 Cable Specifications for PWR and COM Connections



Note: Generator set terminal block connections 3 and 4 are NOT USED with the Model RXT ATS.

1. See Figure 2-15 for cable specifications. Use outdoor-rated cable for outdoor installations.

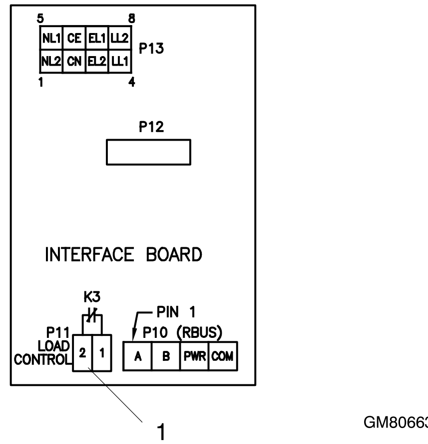
Figure 2-16 Interface Module Connection to Generator Set Field-Connection Terminal Block

2.6.2 Load Control Connection (Optional)

Connector P11 on the standard interface module provides a connection point for optional load control circuits. The load control contact provides a delayed contact closure to allow startup of selected loads 5 minutes after transfer to the emergency power source (generator set). Use this contact to delay startup of equipment with large motor-starting loads such as air conditioners.

See Figure 2-17 for the location of load control connector P11. See Figure 2-18 for contact ratings, connection, and wire size information.

Note: For load add and load shed operation based on generator capacity, use the load shed kit or the combined interface/load management board. See Sections 1.4.2, 2.7, and 3.4 for more information about load management.



1. Load control connection P11

Figure 2-17 Load Control Connection, Standard Interface Board Only

Terminal Block	Connection	Designation	Description	Contact Rating	Wire Size
P11	P11-1	LC1	Load Control Output	10 A @ 250 VAC 1 A @ 30 VDC	#12- 18 AWG
	P11-2	LC2			

Figure 2-18 Load Control Contact P11 Connections

2.7 Combined Interface/Load Management Board

Note: The transfer switch is equipped with either a standard interface module or a combined interface/load management board. For instructions to connect the standard interface board, see Section 2.6. If the interface board connection is complete, proceed to Section 2.8.

The combined interface/load management board can be used with single-phase generator sets equipped with the RDC2 or DC2 controller only. Follow the instructions in this section to install the current transformer and connect the load management relays. Then connect the interface/load management board to a Kohler® generator set equipped with the RDC2 or DC2 controller.

Up to four load relays and two HVAC relays can be connected. The load management operation will cycle through all six connections regardless of the number of loads connected. The load management timing is affected by the generator's capacity as described in Section 3.5.

Note: Only one load management option can be used with the generator. If a load shed kit is connected, disable the load management function on the combined interface/load management board as described in Section 2.8.

2.7.1 Relay Modules

Up to four power relay modules (GM92001-KP1-QS) can be connected for management of non-essential secondary loads. Two (2) 120 VAC loads (shed simultaneously) or a single 240 VAC load can be wired to each relay. Customer-supplied relays must be either normally closed or double-pole double-throw (DPDT). Note that the load must be connected to the normally closed contacts of the relay. Kohler® Power Relay Modules are recommended.

Circuit Board Relays	Contact Rating
Pilot Relays and HVAC Relays (qty. 2)	125VAC, 10 A (general purpose) 120VAC, 125VA (pilot duty)

Figure 2-19 Combined Interface Board Relay Specifications

Power Relay Specifications	
Relay Rating	50 A @ 240 VAC
Relay Type	DPST - NC or DPDT
Coil Voltage	120 VAC

Figure 2-20 Customer-Supplied Power Relay Specifications

Kohler® power relay modules include one power relay mounted inside a NEMA type 3R enclosure. Connect up to four (4) power relay modules to the load shed kit. See Figure 2-21 for an illustration of a power relay module.

Before starting the installation, confirm that the generator set is equipped with an RDC2 or DC2 controller. RDC2/DC2 controller firmware version 5.04 or higher is required. Check the version number on the controller and update the firmware, if necessary.

An adequate electrical supply is required for operation of the customer-supplied relays connected to the load shed kit. 120 VAC relays require a customer-supplied voltage source. Check the electrical requirements of the customer-provided equipment prior to installation to determine the wire size and circuit protection required. Verify that customer-provided equipment complies with applicable local and national electrical codes.

Figure 2-21 Kohler Power Relay Module

2.7.2 HVAC Loads

There are two (2) relays available to control two (2) independent heating, ventilation, and air conditioning (HVAC) control loads. The operation of the HVAC relays includes a five-minute start delay and different timing for load add compared to the power relays. See Section 3.5.1 for more details about the HVAC relay operation.

2.7.3 Load Add/Shed Priority

Loads are prioritized from priority 1 to priority 6. See Figure 2-27 on page 28. Priority 1 is considered the most critical; it will add first and shed last. Priority 6 is considered the least critical; it will add last and shed first.

2.7.4 Current Transformers (CTs)

A current transformer is required for load management. A 400 amp current transformer is included with the combined interface/load management board. If the application requires cables that are too large for the inside diameter of the CT provided, or a 500 Amp CT is needed for the 60RCL, order a current transformer or obtain a current transformer that meets the specifications shown in Figure 2-22.

	Standard CT (included)	Larger Diameter CT* (sold separately)	500 Amp CT† (sold separately)
Kit Number	GM83929	GM17250-KP1-QS	GM17250-KP2-QS
CT Service Part Number	GM83929	GM17250	GM60264
Primary Rating	400 Amps	400 Amps	500 Amps
Secondary Rating	3 VAC	3 VAC	3 VAC
Burden Resistor	16 Ohms	16 Ohms	16 Ohms
Burden Resistor Location	Internal	Internal	Internal
Outer Diameter (O.D.)	63.5 mm (2.50 in.)	111.8 mm (4.40 in.)	171.5 mm (6.75 in.)
Inner Diameter (I.D.)	28.7 mm (1.13 in.)*	57.2 mm (2.25 in.)	108.0 mm (4.25 in.)

* Order GM17250- KP1- QS for applications that use larger cables.
† Order GM17250- KP2- QS for 60RCL only.

Figure 2-22 Current Transformer (CT) Specifications

2.7.5 Connection Procedure

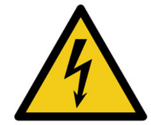
WARNING

Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or equipment connected to the set, disable the generator set as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect the power to the battery charger, if equipped. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent the starting of the generator set by the remote start/stop switch.

DANGER



Hazardous voltage.
Will cause severe injury or death.

Disconnect all power sources before opening the enclosure.

Making line or auxiliary connections. Hazardous voltage will cause severe injury or death. To prevent electrical shock deenergize the normal power source before making any line or auxiliary connections.

1. Press the OFF button on the generator set controller.
2. Disconnect the utility power to the generator set.
3. Disconnect the generator set engine starting battery(ies), negative (-) lead first.
4. Disconnect power to the transfer switch.
5. Remove the ATS enclosure cover.
6. Install the current transformer (CT) on the emergency source lines. Installation inside the transfer switch enclosure is recommended.

   Note: Be sure to route the leads through the current transformer from opposite sides as shown in Figure 2-23. The leads must cross in opposite directions as they pass through the transformer.

   Note: See Section 2.7.4 for CT specifications.

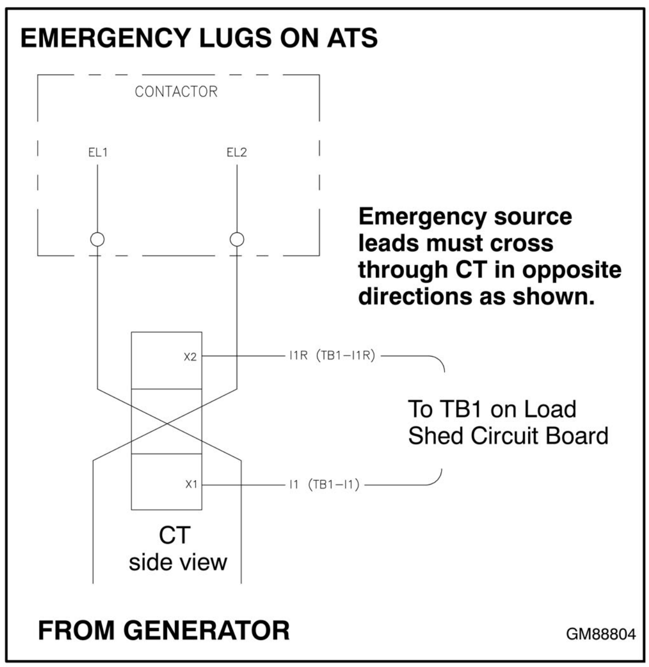


Figure 2-23 Current Transformer (CT) Wiring

7. RBUS connections: Connect the controller interface connection to A, B, PWR, and COM on terminal block P10 on the interface/load management board See Figure 2-24 and Figure 2-26. The RBUS connections to the generator set controller are the same for the standard interface board and the combined board. See Section 2.6 for interface connection instructions.

   Note: Use separate conduit for the low-voltage controller communication leads and the load connection wiring.

   Note: Refer to the wiring diagrams in Section 6.

8. Connect the CT leads to connector TB1 on the interface/load management circuit board. Extend the leads, if necessary, using customer-supplied wiring. See Figure 2-26 and/or the wiring diagram in Section 6 for the connector location.

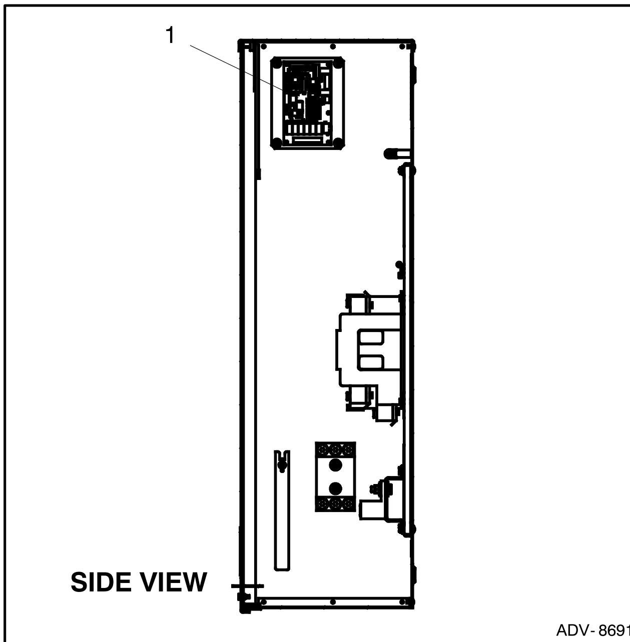
9. Note the load priorities shown in Figure 2-27. Priority 1 is considered the most critical and will add first and shed last. Priority 6 is considered the least critical and will add last and shed first.

   Connect the customer-provided load relays to terminal block TB2 for Loads A, B, C, and D. See Figure 2-25 for the connections. See Section 2.7.1 for the recommended relay specifications.

   Note: The combination of four load relay outputs cannot exceed 10 amps total current draw.

10. Connect 120 VAC power to TB2 connections AC1 and N. See Figure 2-25. Connect 120 VAC line voltage to terminal AC1. Connect the neutral to N. The power to this circuit must be backed up by the generator set and not be part of a sheddable circuit.

11. Verify that the jumper is installed across P11-2 and P11-3 on the combined interface board. See Figure 2-26.



1. Combined interface/load management board inside the enclosure

Figure 2-24 Typical Interface Board Location

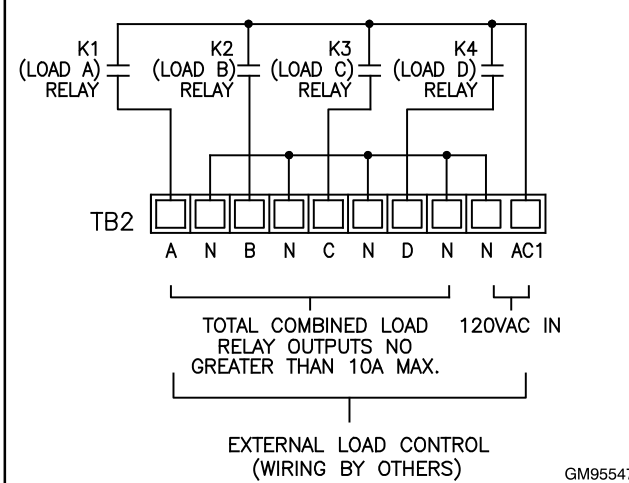
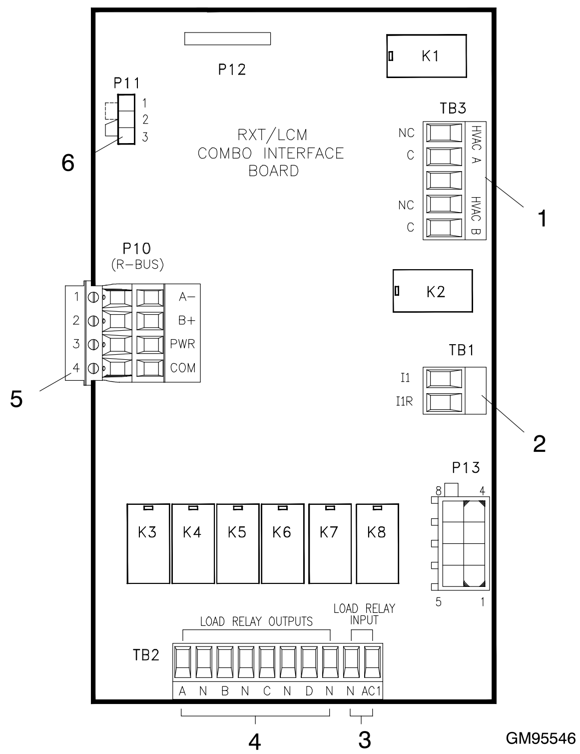


Figure 2-25 Power Relay Circuit on the Combined Interface/Load Management Board



1. TB3 HVAC relay connections
2. TB1 connection for current transformer (CT)
3. TB2 120 VAC input connection
4. TB2 connections to customer-supplied power relays (max 4 relays)
5. P10 RDC2/DC2 controller interface RBUS connections
6. P11 jumper (factory-installed across 2 and 3 for load management)

Figure 2-26 Combined Interface/Load Management Board Customer Connections

12. Connect HVAC loads to TB3. See Figure 2-26. Note the priorities of HVAC A and HVAC B relative to Loads A through D. See Figure 2-27 and Section 2.7.3.

    The air conditioner control scheme requires splicing into the existing building low voltage wiring from the thermostat to the air conditioner/furnace. In a typical four wire scheme, connect the cooling wire (Y) in series to the respective terminal block on the load shed kit.

13. Record the names of the loads connected to each relay in Figure 2-27. For example, Load A may be a sump pump, and HVAC A may be the air conditioner.

    Note: If the OnCue® Plus Generator Management System is used, the load descriptions can be changed remotely. For instructions, see TP-6928, OnCue Plus Operation Manual. To avoid confusion, make sure that the load description matches the equipment connected to the corresponding relay.

14. For service entrance models with the optional battery charger circuit breaker, see Section 2.8.3 for connections.
15. Install the ATS enclosure cover.
16. Check that the generator set is OFF.
17. Reconnect the utility power to the transfer switch.
18. Reconnect the generator set engine starting battery, negative (-) lead last.
19. Reconnect utility power to the generator set.

Priority	Relay	Record the Load Description
1	Load A	
2	HVAC A	
3	Load B	
4	Load C	
5	HVAC B	
6	Load D	
Note: Priority 1 (Load A) adds first and sheds last.		

Figure 2-27 Load Priority and Descriptions

2.8 Accessory Connections (Optional)

Factory-installed accessories may require power, input, and/or output connections. Refer to the following sections and to any instructions provided with the accessory kit for instructions to connect optional accessories.

After connecting the accessories, or if there are no accessories, proceed to Section 2.9.

2.8.1 Programmable Interface Module (PIM) Connections (Optional)

For connection of the optional programmable interface module (PIM), refer to the instructions provided with the module and to the generator set installation manual.

2.8.2 Auxiliary Contacts

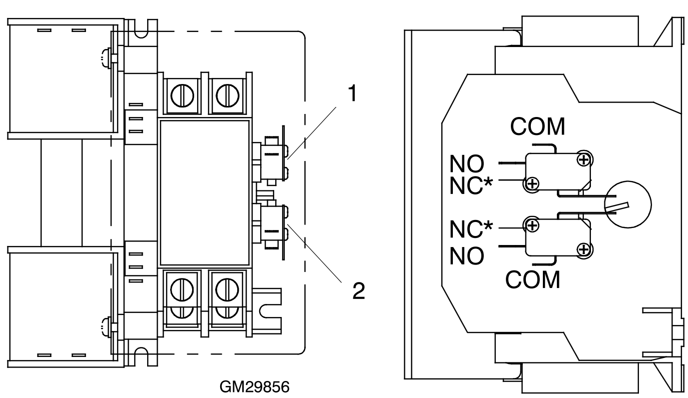
Some models have auxiliary contacts provided as standard equipment. Optional auxiliary contacts are available for other models. See Figure 2-28.

Auxiliary contacts provide one set of normally open (NO) contacts that close when the transfer switch is in the Normal position and one set of contacts that close when the transfer switch is in the Emergency position. Some auxiliary switches may also be equipped with normally closed (NC) contacts. Use 1/4 in. fast-on connectors to connect the auxiliary contacts to customer-supplied alarms, remote indicators, or other devices. See Figure 2-28 for the contact rating.

The auxiliary contacts are located on either the left side or the right side of the contactor. See Figure 2-29 and Figure 2-30 for typical locations.

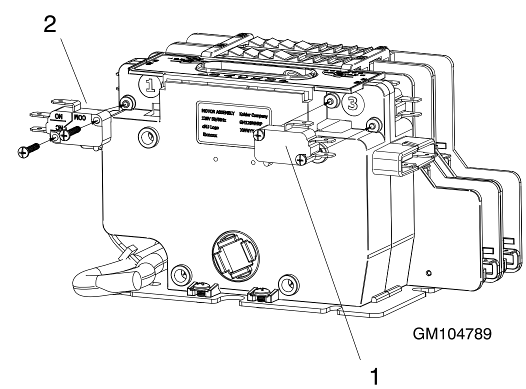
Auxiliary Position-Indicating Contacts		
Model	**Number of contacts Normal, Emergency**	**Contact Rating**
100- 200A 1 Ph	1, 1 Optional	15 A @ 250VAC
100- 200 A 1 Ph SE	1, 1 Optional	15 A @ 250VAC
300- 400 A 1 Ph SE	2, 2 Standard 1, 1 Optional	10 A @ 480 VAC
400 Amp 1 Ph and 3Ph/3P	2, 2 Standard 1, 1 Optional	10 A @ 480 VAC
400 Amp 3Ph/4P	8, 8 Standard	10 A @ 480 VAC

Figure 2-28 Auxiliary Contacts



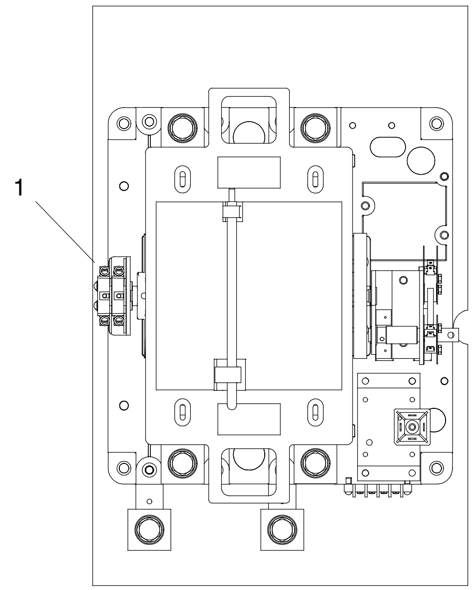
* Normally Closed contact is provided on some switches.

1. Normal position-indicating contact
2. Emergency position-indicating contact



Alternate Design

Figure 2-29 Optional Auxiliary Contacts, Typical 100- 200 Amp Models



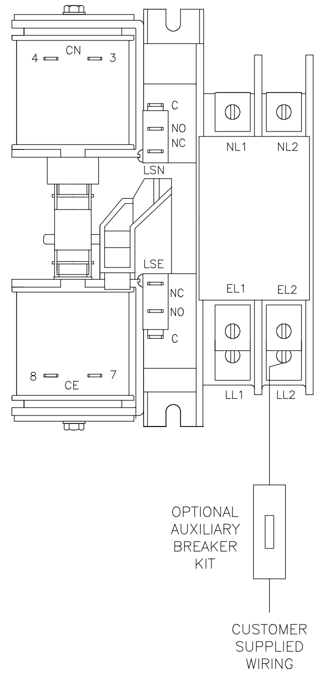
1. Auxiliary Contacts

RefGM110601

Figure 2-30 Optional Auxiliary Contacts, Typical 300- 400 Amp Models

2.8.3 SE Model Auxiliary Circuit Breaker Connection

Single-pole 15 and 20-amp auxiliary circuit breakers are available for service entrance model transfer switches. An auxiliary breaker is recommended for connection of AC power for the generator set battery charger or other AC-powered accessories. The breaker connects to the load side of the transfer switch to provide power that is backed up by the generator set. For connections, see Figure 2-31 or the wiring diagrams in Section 6, Diagrams and Drawings. See Figure 2-32 for typical circuit breaker locations.

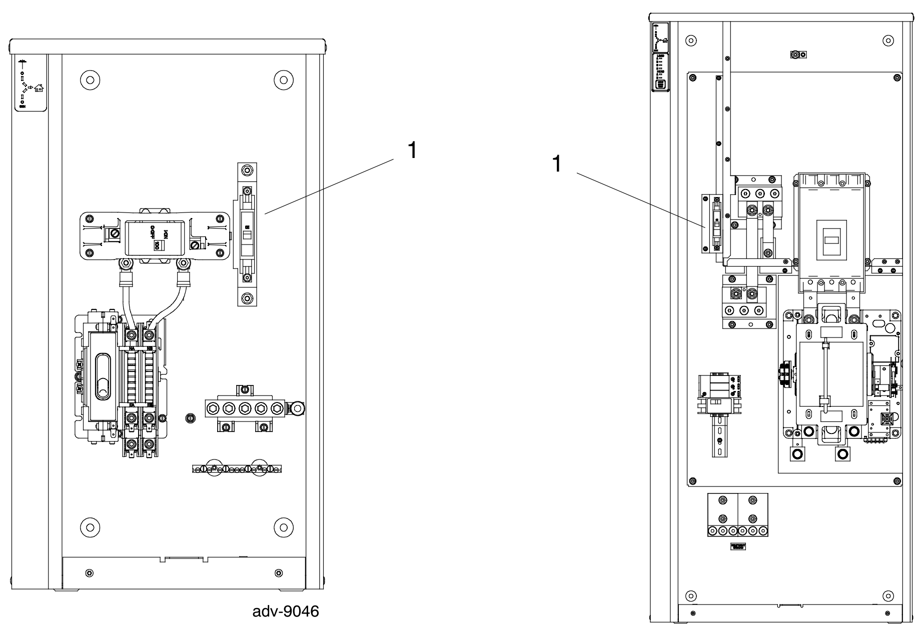


GM95548

Figure 2-31 Auxiliary Breaker Connections, SE Model Only

100 Amp Model, typical

300/400 Amp Model



adv-9046

adv-9768

1. Auxiliary circuit breaker

Images are not to scale.

Figure 2-32 Optional Auxiliary Circuit Breaker, Typical Locations (SE Models)

2.9 Set Exercise

⚠ DANGER

Hazardous voltage. Electric shock.
Will cause severe injury or death.

Close and secure the enclosure door before energizing the transfer switch.

Refer to the generator set Operation Manual for instructions to set the RDC2 or DC2 controller for weekly loaded exercise runs to keep the power system in good operating condition.

2.10 Test

Test the transfer switch's automatic control system immediately after installation and monthly thereafter. Refer to the RDC2/DC2 controller operation manual for instructions to program a loaded exercise.

During the loaded exercise:

- Verify that the expected sequence of operations occurs as the switch transfers the load to the emergency source when a preferred source failure occurs or is simulated.
- Watch and listen for signs of excessive noise or vibration during operation.
- As the exercise ends, verify that the expected sequence of operations occurs when the transfer switch retransfers to the preferred source.

2.11 Warranty Registration

Startup Notification Form. The Startup Notification Form covers all equipment in the standby system. Complete the Startup Notification Form and register the equipment in the Kohler online warranty system within 60 days of the initial startup date.

Notes

3.1 Model RXT Transfer Switch Operation

The Model RXT transfer switch must be connected to a generator set equipped with the RDC2 or DC2 controller. The RDC2/DC2 generator set/transfer switch controller manages automatic transfer switch (ATS) functions when connected to a Kohler® Model RXT transfer switch through the ATS interface board. The controller receives voltage sensing data from the Model RXT ATS and operates the generator set and transfer switch to provide standby power when utility power is lost.

See the generator set operation manual for:

- ATS status screens and configuration menus.
- Information about loaded exercise.

3.2 Source Availability

The Model RXT transfer switch supplies voltage sensing data to the RDC2 or DC2 controller through the ATS interface board. If the source voltage falls below the undervoltage dropout setting, the source is considered to have failed. See Figure 3-1.

Voltage Sensing Parameter	Setting
Accuracy	±5%
Undervoltage Dropout	90% of Pickup
Undervoltage Pickup	90% of Nominal

Figure 3-1 Voltage Sensing Parameters

3.3 ATS Control Sequence of Operation

This section describes the operation of a transfer switch equipped with the standard interface board. For more information about operation with a combined interface/load management board, please see sections 3.4 and 3.5.

See Figure 3-10 for time delay settings.

Preferred Source Fails:

1. The load control contact opens.
2. The engine start time delay times out.
3. The generator set is signaled to start.
4. The generator starts and the emergency source becomes available.
5. The normal-to-emergency time delay times out.
6. The transfer switch transfers to the emergency source.
7. The load control contact time delay times out. (standard interface board only)
8. The load control contact closes. (standard interface board only)

Normal Source Returns:

1. The emergency-to-normal time delay times out.
2. The contactor transfers to the normal source.
3. The engine cooldown time delay times out.
4. The generator is signaled to stop.

3.4 Load Management Operation

The combined interface/load management board provides load add and shed based on generator capacity as described in this section.

Many appliances do not run continuously. Air conditioners and furnaces, refrigerators, sump pumps, and other appliances cycle on and off as needed. With load management, less critical appliances can be powered by the generator set when the more important appliances are not running, allowing the use of a smaller generator set than would be needed to run all of the building's electrical equipment at the same time.

The RDC2/DC2 generator controller receives input from current transformer (provided with the combined interface/load management board for installation in the ATS) and determines whether to add or shed loads. The combined interface/load management board receives commands from the generator controller and energizes or de-energizes the appropriate load relays.

The load management function is activated by the ATS transferring from the utility (normal) source to the generator. When activated, the load management board sheds all connected loads. After transfer to the generator set, loads are added according to their priority.

If the ATS fails to transfer from the utility source to the generator, the load management board will re-add all loads. When the ATS transfers to utility, the load management board adds all loads that have been previously shed.

For more information about the load add and load shed timing, see Section 3.5, Load Management Theory of Operation.

3.4.1 Power Loads

Up to four customer-supplied power relays can be connected for management of non-essential secondary loads. If two-pole relays are used, two (2) 120 VAC loads (shed simultaneously) or a single 240 VAC load can be wired to each relay. See Section 2.7.1 for more power relay information.

3.4.2 HVAC Loads

There are two (2) relays available to control two (2) independent heating, ventilation, and air conditioning (HVAC) loads.

A 5-minute time delay prevents HVAC loads from adding too quickly. Air conditioning compressors may be damaged if they start too soon after being stopped due to the necessity of starting the compressor against a large residual pressure. Five minutes is a typically accepted time required for an AC compressor to bleed off to a pressure level that the motor can successfully start against.

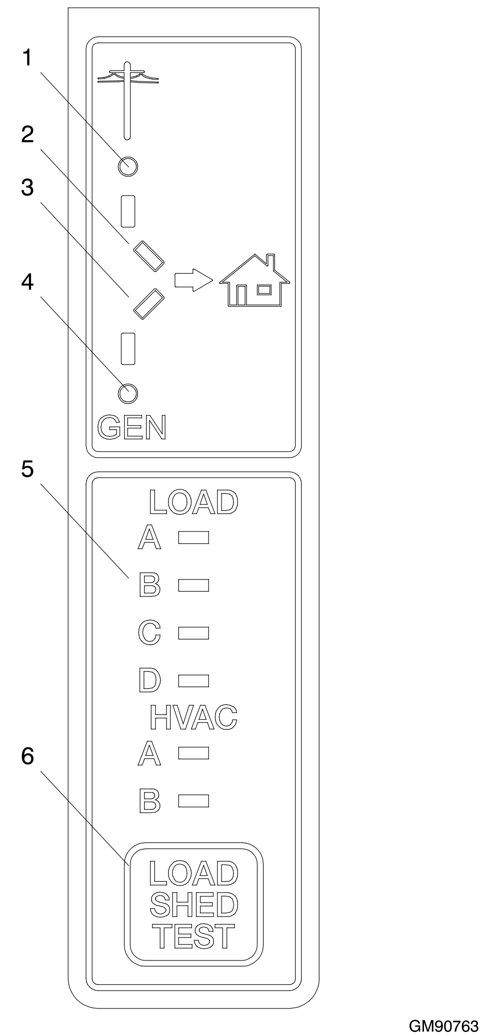
3.4.3 Load Add/Shed Priority

Loads are prioritized from priority 1 to priority 6. See Figure 2-27 on page 28. Priority 1 is considered the most critical; it will add first and shed last. Priority 6 is considered the least critical; it will add last and shed first.

3.4.4 Status Indicator and Test Button

The optional status indicator panel for the combined interface/load management board includes the source available and source connection LEDs and load status LEDs. The panel also includes a Test button that cycles the load management relays. See Figure 3-2.

LEDs provide visual indication of the status of each load. See Figure 3-2 and Figure 3-3.



1. Utility power available
2. Utility source supplying load
3. Generator source supplying load
4. Generator power available
5. Load add/shed relay status indicators (see Figure 3-3)
6. Load shed test button (cycles relays)

Figure 3-2 Optional Status Indicator Panel for Combined Board

LED	State/Color	Indicates
Utility Available	On	Utility power is available
	Off	Utility power is not available
Utility Connected	On	Utility power is connected (ATS in normal position)
	Off	Utility power is not connected
Generator Available	On	Generator set is running and producing power
	Off	Generator set power is not available
Generator Connected	On	Generator is connected to the load (ATS in Emergency position)
	Off	Generator not connected
Loads A through D	Red	Load disconnected (shed)
	Green	Load connected (added)
	Flashing red	Disconnected (test)
HVAC Loads A, B	Red	Load disconnected (shed)
	Green	Load connected (added)
	Flashing red	Disconnected (test)

Figure 3-3 Status Indicator LED Operation

Test Procedure

Use the TEST button to exercise the load shed relays in sequence according to the assigned priorities. Run the generator set in RUN mode, not AUTO, during this test. The generator set must be running, but the ATS must NOT transfer to the generator set for this test.

1. Press RUN on the RDC2 or DC2 generator set controller to start the generator set.

2. Press the TEST button on the indicator panel to exercise the first relay.

3. Press TEST again for the next relay, and repeat to cycle through all of the relays in order.

The test mode ends automatically after 15 minutes. To end the test manually, hold the TEST button for 5 seconds or press OFF or AUTO on the RDC2 or DC2 generator set controller.

3.5 Load Management Theory of Operation

3.5.1 Load Add

The load management board adds and sheds loads based on the available capacity of the generator set. When the generator has ample available capacity, loads are added quickly. When the available capacity is low, loads are added more slowly to give the generator time to recover and to allow ample time to ensure that any switching loads will come on before adding more load than the generator can handle.

The load add time ranges from 15 to 120 seconds depending on the loading of the generator set. Figure 3-4 shows an example of the load add timing for a 20 kW generator set with the maximum capacity set to the default setting of 70%. Figure 3-5 shows the HVAC load add timing for a 20 kW generator set.

When on Emergency power, there is a 5-minute delay between the addition of Load A and the HVAC load A after all loads are shed. See Section 3.4.2 for more information.

Available Capacity (%)	Load (%)	Load (kW) for a 20 kW Generator	Time (Seconds)
70%	0%	0	15
50%	20%	4	23
37%	33%	6.6	34
30%	40%	8	40
20%	50%	10	48
5%	65%	13	60
<5%	>65%	>13 kW	Never Add

Figure 3-4 Example: Power Relay Load Add Timing for a 20 kW Generator

Available Capacity (%)	Load (%)	Load (kW) for a 20 kW Generator	Time * (Seconds)
70%	0%	0	30
50%	20%	4	66
37%	33%	6.6	91
30%	40%	8	102
20%	50%	10	120
<20%	>50%	>10 kW	Never Add
* After the 5-minute HVAC delay.			

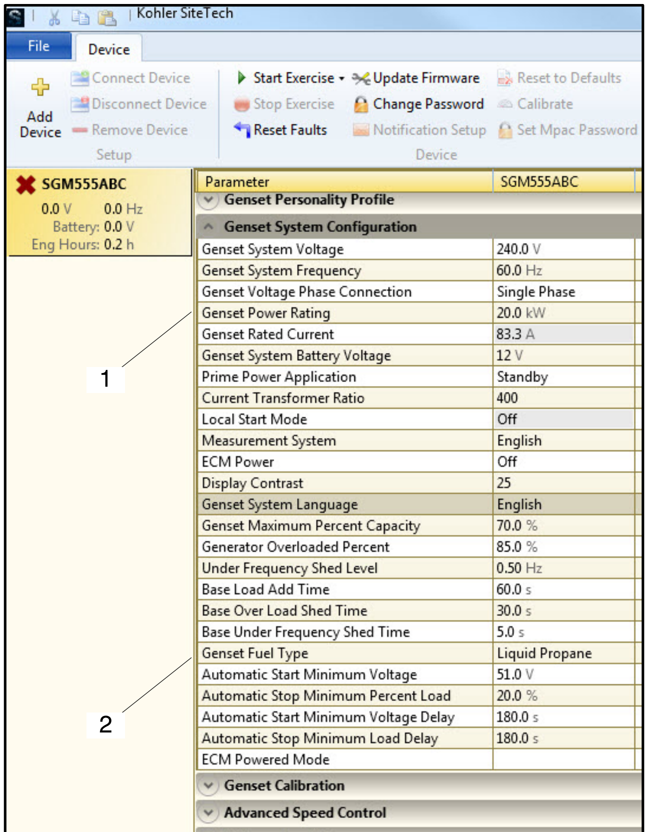
Figure 3-5 Example: HVAC Load Add Timing for a 20 kW Generator

Capacity

The Generator Maximum Percent Capacity setting dictates the maximum level that the load management board will automatically place on the generator. This setting is adjustable using a laptop computer connected to the RDC2 or DC2 controller and Kohler® SiteTech™ software. See Section 3.5.6.

The maximum load is calculated by multiplying the Generator Maximum Percent Capacity by the Genset Power Rating, which is a setting in the RDC2/DC2 controller. The Genset Power Rating, in kW, is factory-set to the natural gas rating. If the 14RESA or 20RESA has been converted to LP fuel, use SiteTech to verify that the fuel type has been changed on the controller and the Genset Power Rating is correct. Refer to the generator set specification sheet for the new rating, and change the fuel type using the controller keypad or the Genset System Configuration in SiteTech™. See Figure 3-6 and TP-6701, SiteTech Software Operation Manual.

The load management function will operate if the rating setting is not changed, but loads will be shed at a kW level based on the factory default rating, rather than the rating of the reconfigured generator set.



1. Genset Power Rating setting
2. Genset Fuel Type setting

Figure 3-6 Genset Power Rating in SiteTech

3.5.2 Load Shed

Less important (larger priority number) loads are shed when the generator is unable to support them. This permits more important loads to continue to receive power from the generator. The less important loads are re-added after the generator loading has gone down enough to support them again. The load management board sheds less important loads before the power quality of the generator suffers from the overload.

Loads are shed in two ways – Overload and Under Frequency.

3.5.3 Overload Shed

Loads are shed on a time scale which is based on the total generator overload. The loads will shed slowly when the generator is not heavily overloaded. Loads are shed much more quickly when the overload is higher. The timing variation allows consistent overloads to be removed, instantaneous excessive overloads to be very quickly removed and normal overloads (such as motor inrush) to remain online until the transient overload condition is removed.

Figure 3-7 shows the overload shed timing for a 20 kW generator set with the generator overloaded percent set to the default setting of 85%. If the overload condition persists, the load shed timing can be affected by load shed acceleration. See Section 3.5.5.

The Generator Overload Percent setting is the maximum load that the load management board will accept without shedding. The setting is adjustable using a laptop computer connected to the RDC2 or DC2 controller and Kohler SiteTech software. See Section 3.5.6. Set the Generator Overload Percent at least 10% higher than the Generator Maximum Percent Capacity.

Generator Overload (%)	Load (%)	Load (kW) for a 20 kW Generator	Time (seconds)
0%	<85%	<17 kW	Never Shed
0%	85%	17	40
10%	95%	19	28
13%	98%	19.6	24
15%	100%	20	22
20%	105%	21	17
>35%	>120%	>24 kW	0.5

Figure 3-7 Overload Shed Timing for a 20 kW Generator

3.5.4 Under Frequency Shed

Loads are shed on a time scale which is based on the generator frequency droop. The loads will shed quickly when the frequency droop is high (output frequency is lower), and more slowly when the generator is running close to rated frequency. The timing variation allows large overloads to be shed very quickly, while allowing the generator to ride through normal transients (such as starting an AC compressor).

Figure 3-8 shows the under frequency shed timing for a 60 Hz generator set. If the underfrequency condition persists, the load shed timing can be affected by load shed acceleration. See Section 3.5.5.

Frequency (Hz)	Frequency Droop (Hz)	Time (seconds)
>59 Hz	<1 Hz	Never Shed
58.5	1.5	5.4
57	3	4.3
56	4	3.4
54	6	1.8
<52.5 Hz	>7.5 Hz	0.3

Figure 3-8 Under Frequency Shed Timing for a 60Hz Generator

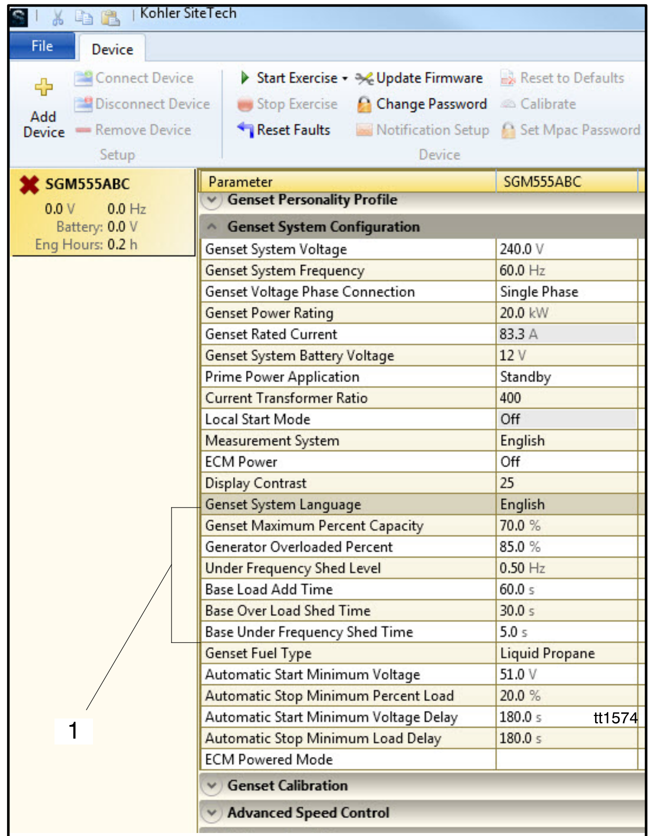
3.5.5 Load Shed Acceleration

Load shed acceleration is used to shed loads more quickly if an overload or underfrequency condition persists. If an overload condition is not cleared by shedding a load, each subsequent load will shed more quickly. The acceleration is more pronounced for an underfrequency shed.

3.5.6 Changing Settings

The settings described in sections 3.5.1 through 3.5.5, including Generator Maximum Percent Capacity and Generator Overloaded Percent, can be changed using a laptop computer connected to the RDC2 or DC2 controller and Kohler® SiteTech™ software. The load control settings are found in the Genset System Configuration group. See Figure 3-9 and TP-6701, SiteTech Software Operation Manual.

Set the Generator Overload Percent at least 10% higher than the Generator Maximum Percent Capacity.



1. Load shed settings (see Sections 3.5.1 through 3.5.4.)

Figure 3-9 SiteTech Screen

3.6 Time Delays

Time delays are factory-set to the values shown in Figure 3-10. An authorized distributor/dealer can adjust time delays using a personal computer and Kohler® SiteTech™ software.

Time delays shown in Figure 3-10 operate only when the RDC2 or DC2 generator set controller is connected to a Kohler® Model RXT transfer switch.

The engine start and load transfer time delays prevent engine start and load transfer caused by brief variations in the utility power source.

3.7 Load Control Time Delay

The standard interface board includes a load control time delay. The load control time delay allows delayed starting of large motor loads (such as air conditioners), preventing simultaneous starting of large motors after transfer to the generator set. The load control time delay is fixed at 5 minutes. It is not adjustable.

The load must be connected to the load control output on the interface board of the Model RXT transfer switch. See Section 2.6.2 for connection instructions.

Note: For load add and load shed operation based on generator capacity, use the load shed kit or the combined interface/load management board. See Sections 1.4.2, 2.7, and 3.4 for more information about load management.

Time Delay	Setting	Description
Engine Start	3 seconds	Time delay after utility source is lost until the engine start cycle begins. Guards against starting the generator set because of a brief change in the utility source.
Transfer, Normal to Emergency	3 seconds	Time delay after emergency source becomes available until transfer to emergency source.
Transfer, Emergency to Normal	2 minutes	Time delay after the utility source returns until transfer back to normal. Ensures that the the utility source is stable before transferring from the emergency source.
Load Control (standard interface board only)	5 minutes	Allows delayed connection of selected loads to the generator set. Prevents simultaneous starting of large motors after transfer to the emergency source. Recommended for delayed starting of air conditioners.

Figure 3-10 Time Delays

3.8 Accessory Circuit Breaker (SE Model)

An optional 15-amp single-pole circuit breaker for the generator set battery charger is available for the service entrance model transfer switch.

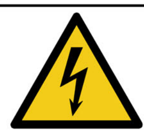
Circuit Breaker Trip/Reset

The trip indication window appears red when the breaker is tripped. Identify and correct the cause of the overcurrent trip before resetting the breaker.

To reset the circuit breaker, move the breaker handle to the O/OFF position and then back to I/ON.

Note: This section applies only to service entrance model transfer switches, which are identified with the letters SE at the end of the model designation.

DANGER



Hazardous voltage.
Will cause severe injury or death.

This equipment must be installed and serviced by qualified electrical personnel.

WARNING

Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or equipment connected to the set, disable the generator set as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect the power to the battery charger, if equipped. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent the starting of the generator set by the remote start/stop switch.

4.1 Service Disconnect Procedure

Use the following procedure to disconnect the utility source on service entrance model transfer switches.

Note: Power is still present on the input side of the utility source circuit breaker after this procedure.

1. Prevent the emergency generator set from starting:

   a. Press the OFF button on the generator set controller.

   b. Disconnect power to the generator set battery charger.

   c. Disconnect the generator set engine starting battery, negative (-) lead first.

2. On the transfer switch, remove the outer enclosure door only.

3. Move the utility source circuit breaker to the OFF position.

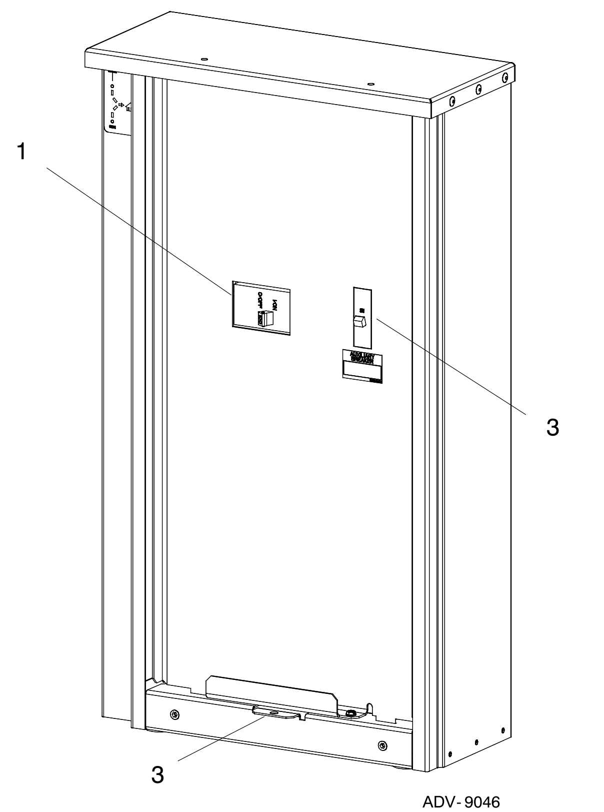
   Note: Power is still present on the input side of the utility source circuit breaker. Do not remove the protective barrier around the utility source connection lugs.

4. To lock out the transfer switch, replace the outer door and attach a padlock to the hasp. See Figure 4-1 for the location of the hasp.

4.2 Source Circuit Breaker Reset

The utility source circuit breaker can trip due to an overcurrent condition. Identify and correct the cause of the overcurrent condition before resetting the circuit breaker. Contact a local distributor/dealer for service if necessary.

When the circuit breaker trips, the handle moves to an intermediate position. To reset a tripped circuit breaker, move the handle to the extreme OFF position and then to the ON position.



1. Normal/utility circuit breaker
2. Optional auxiliary breaker for accessories
3. Padlock hasp

Figure 4-1 Service Entrance Model (typical unit, door removed)

5.1 Introduction

Regular preventive maintenance ensures safe and reliable operation and extends the life of the transfer switch. Preventive maintenance includes periodic testing, cleaning, inspection, and replacement of worn or missing components.

A local authorized distributor/dealer can provide complete preventive maintenance and service to keep the transfer switch in top condition. Unless otherwise specified, have maintenance or service performed by an authorized distributor/dealer in accordance with all applicable codes and standards. See the Service Assistance section in this manual for how to locate a local distributor/dealer.

Keep records of all maintenance or service.

Replace all barriers and close and lock the enclosure door after maintenance or service and before reapplying power.

WARNING

Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

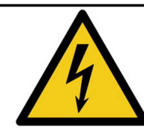
Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or equipment connected to the set, disable the generator set as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect the power to the battery charger, if equipped. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent the starting of the generator set by the remote start/stop switch.

DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect all power sources before opening the enclosure.

DANGER



Hazardous voltage.
Will cause severe injury or death.

Only authorized personnel should open the enclosure.

Grounding the transfer switch. Hazardous voltage can cause severe injury or death. Electrocution is possible whenever electricity is present. Open main circuit breakers of all power sources before servicing equipment. Configure the installation to electrically ground the transfer switch and related equipment and electrical circuits to comply with applicable codes and standards. Never contact electrical leads or appliances when standing in water or on wet ground, as the chance of electrocution increases under such conditions.

Servicing the transfer switch. Hazardous voltage will cause severe injury or death. Deenergize all power sources before servicing. Turn off the main circuit breakers of all transfer switch power sources and disable all generator sets as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect power to all battery chargers. (3) Disconnect all battery cables, negative (-) leads first. Reconnect negative (-) leads last when reconnecting the battery cables after servicing. Follow these precautions to prevent the starting of generator sets by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer. Before servicing any components inside the enclosure: (1) Remove all jewelry. (2) Stand on a dry, approved electrically insulated mat. (3) Test circuits with a voltmeter to verify that they are deenergized.

Short circuits. Hazardous voltage/current will cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage**.** Do not contact electrical connections with tools or jewelry while making adjustments or repairs. Remove all jewelry before servicing the equipment.

NOTICE

Electrostatic discharge damage. Electrostatic discharge (ESD) damages electronic circuit boards. Prevent electrostatic discharge damage by wearing an approved grounding wrist strap when handling electronic circuit boards or integrated circuits. An approved grounding wrist strap provides a high resistance (about 1 megohm), *not a direct short*, to ground*.*

5.2 Inspection and Service

Contact an authorized distributor/dealer to inspect and service the transfer switch annually and also when any wear, damage, deterioration, or malfunction of the transfer switch or its components is evident or suspected.

Have an authorized distributor/dealer perform scheduled maintenance, service, and other maintenance that ensures the safe and reliable operation of the transfer switch, including but not limited to:

- Accumulations of dirt, dust, moisture, or other contaminants
- Worn, missing, or broken components
- Loose hardware
- Wire or cable insulation deterioration, cuts, or abrasion
- Signs of overheating or loose connections
- Test the transfer switch's automatic control system.

Section 6 Diagrams and Drawings

Diagram or Drawing	Drawing Number	Page
Standard Models		
Enclosure Dimension Drawings		
100-200 Amp Single-Phase (2 pages)	ADV-8688C	44
100 Amp Single-Phase NEMA 1 with 12-Space Load Center	ADV-9186	53
100 Amp Single-Phase NEMA 1 with 16-Space Load Center	ADV-9187	54
100 Amp Single-Phase NEMA 3R with 16-Space Load Center	ADV-9188	55
100-200A Three-Phase	ADV-9755	56
400A Three-Phase 2- and 3-Pole	ADV-9756	57
400A Three-Phase 4-Pole (2 pages)	ADV-9757	58
Wiring Diagrams		
100 Amp Single-Phase with Load Center	GM80675A	62
Schematic Diagrams		
100 Amp Single-Phase with Load Center	GM80676	63
Electrical Diagrams (combined wiring diagram and schematic)		
100-200 Amp Single-Phase (3 pages)	GM115961	67
100-200A RXT 3ph (2 pages)	GM115965	79
400 Amp, Single-Phase (3 pages)	GM115960	64
400 Amp Standard, Three-Phase, 3-pole 208-240 V (3 pages)	GM115964	76
400A RXT Three-Phase, 4-pole (4 pages)	GM116242	81
Service Entrance Models		
Enclosure Dimension Drawings		
100-200 Amp Single-Phase Service Entrance (UL) (3 pages)	ADV-9046A	50
100 Amp Single-Phase Service Entrance (CSA) (2 pages)	ADV-8797C	46
200 Amp Single-Phase Service Entrance (CSA) (2 pages)	ADV-8798C	48
300-400 Amp Service Entrance (2 pages)	ADV-9768	60
Electrical Diagrams (combined wiring diagram and schematic)		
100-200 Amp Service Entrance (3 pages)	GM115963	73
300-400A RXT Single-Phase Service Entrance (3 pages)	GM115962	70

Note: The drawings are arranged in alphanumeric order on the following pages.

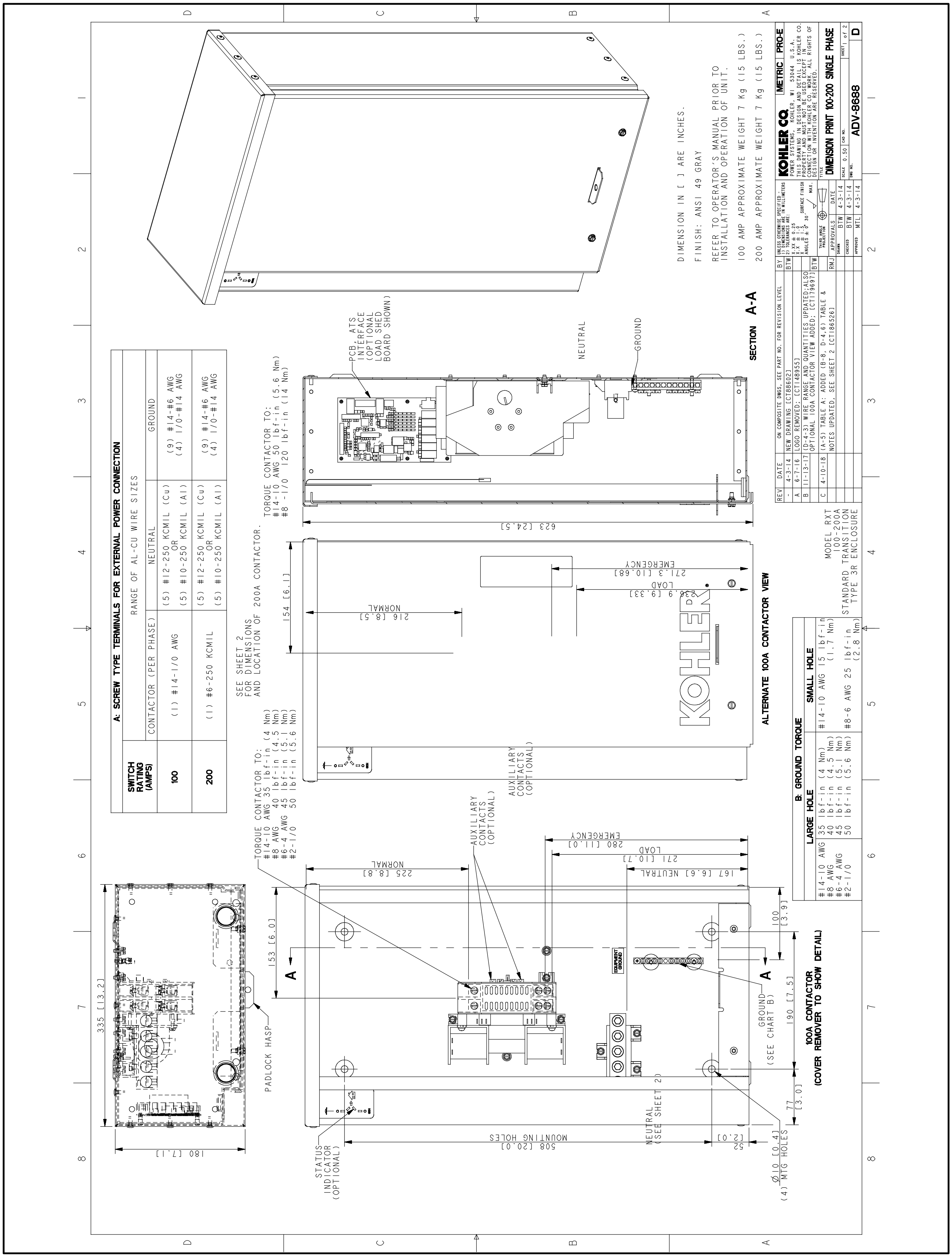


Figure 6-1 Enclosure Dimensions, 100- 200 Amp Single-Phase, ADV-8688, Sheet 1 of 2

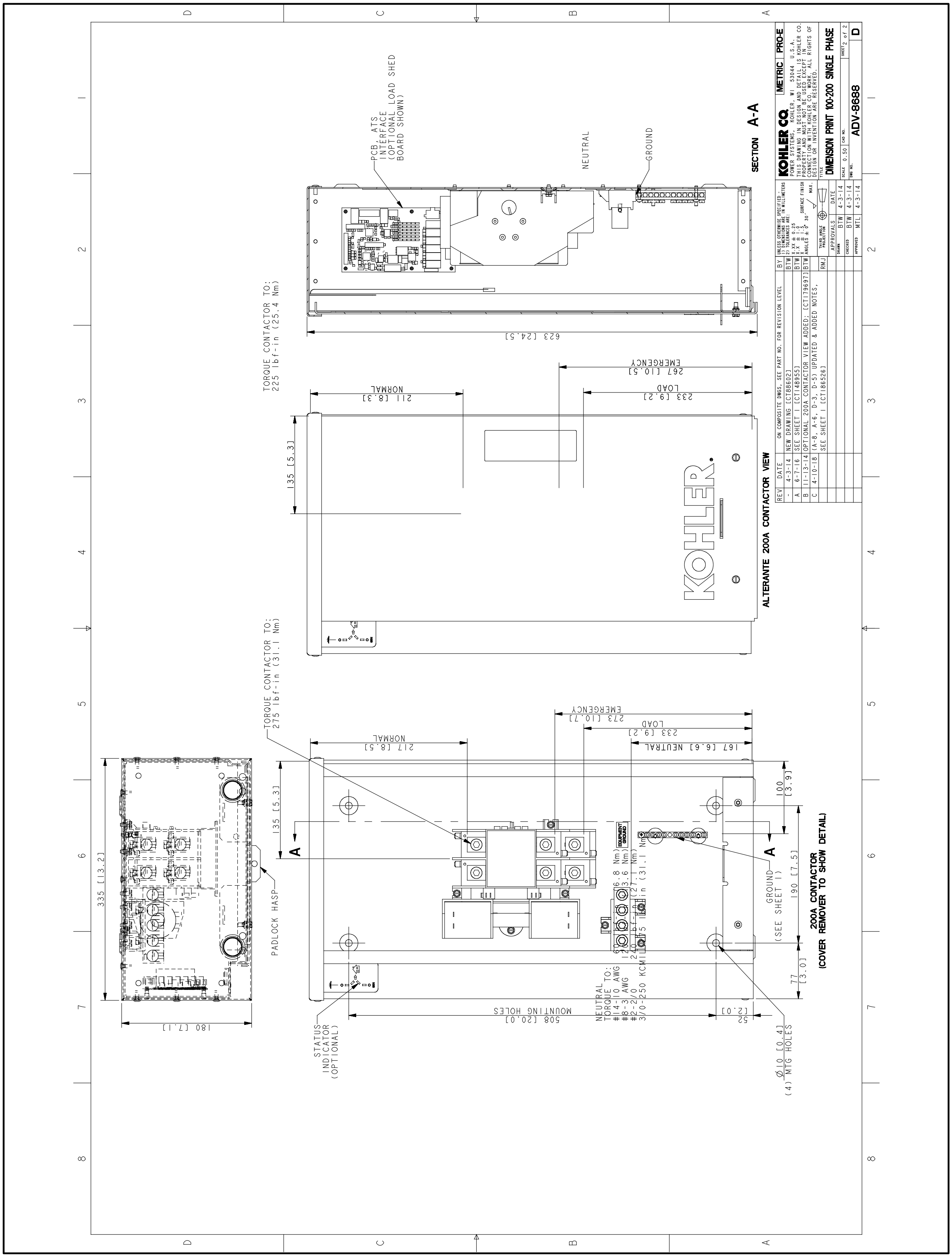


Figure 6-2 Enclosure Dimensions, 100- 200 Amp Single-Phase, ADV-8688, Sheet 2 of 2

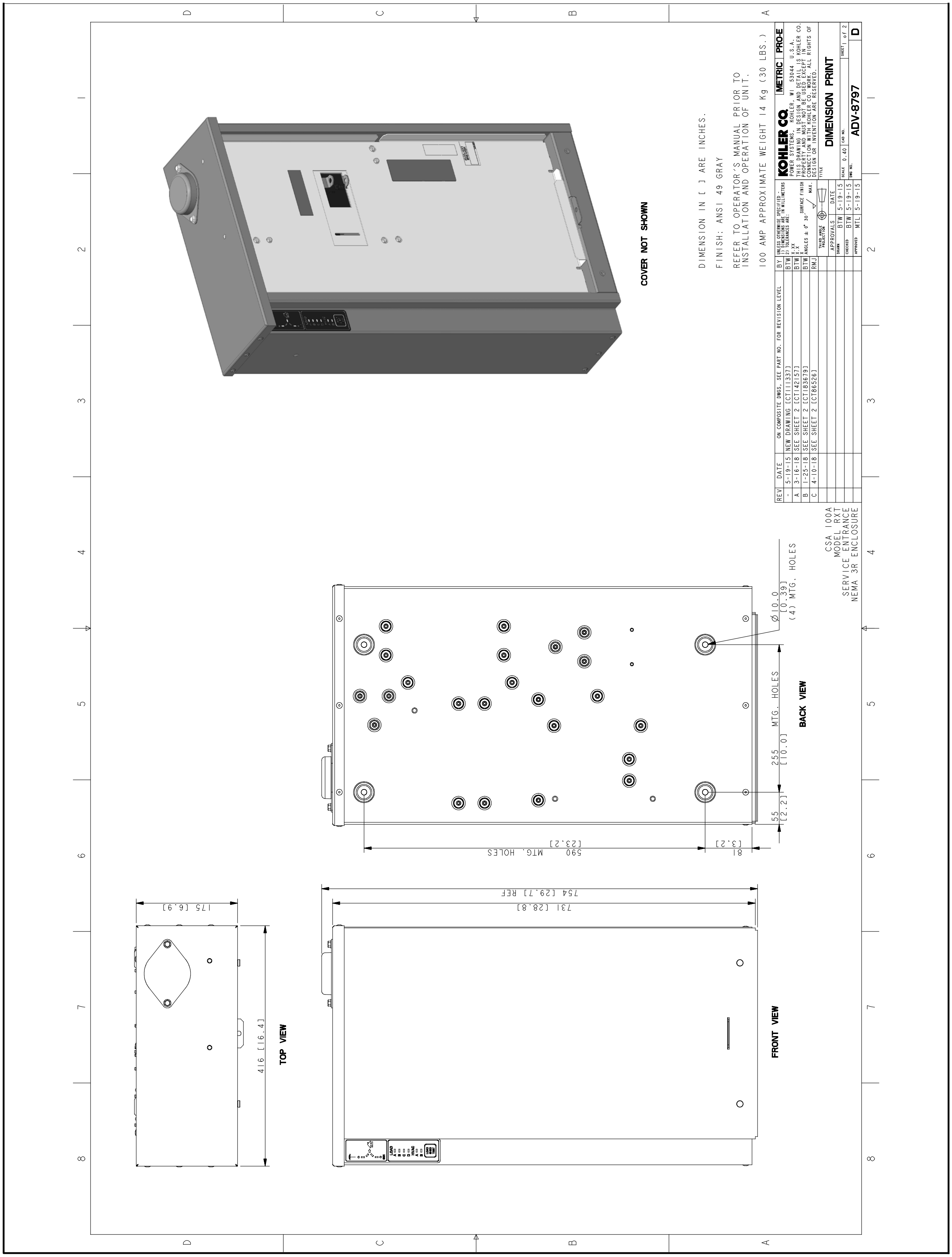


Figure 6-3 Enclosure Dimensions, 100 Amp, CSA Certified Service Entrance, ADV-8797, Sheet 1 of 2

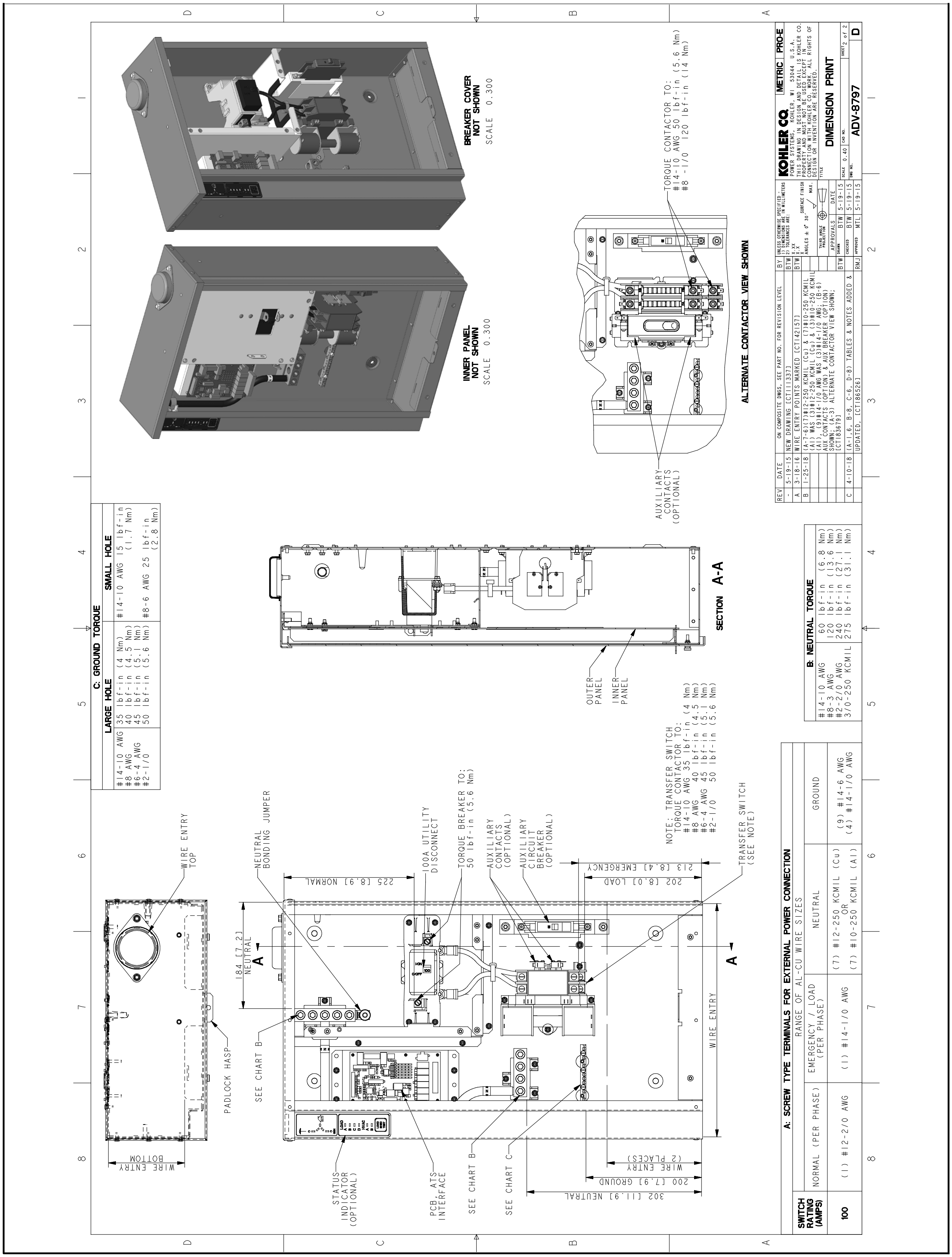


Figure 6-4 Enclosure Dimensions, 100 Amp, CSA Certified Service Entrance, ADV-8797, Sheet 2 of 2

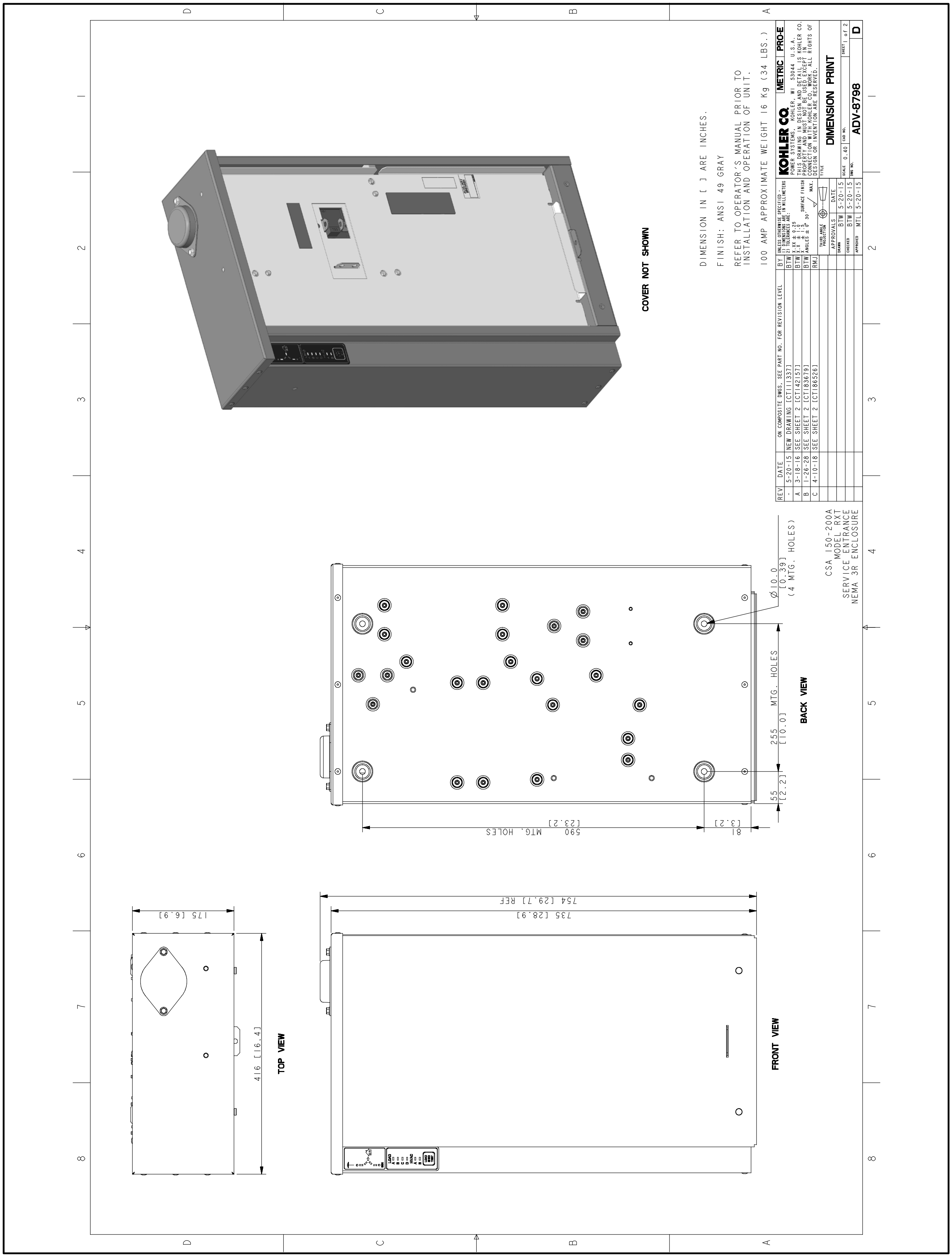


Figure 6-5 Enclosure Dimensions, 150- 200 Amp CSA Certified Service Entrance, ADV-8798, Sheet 1 of 2

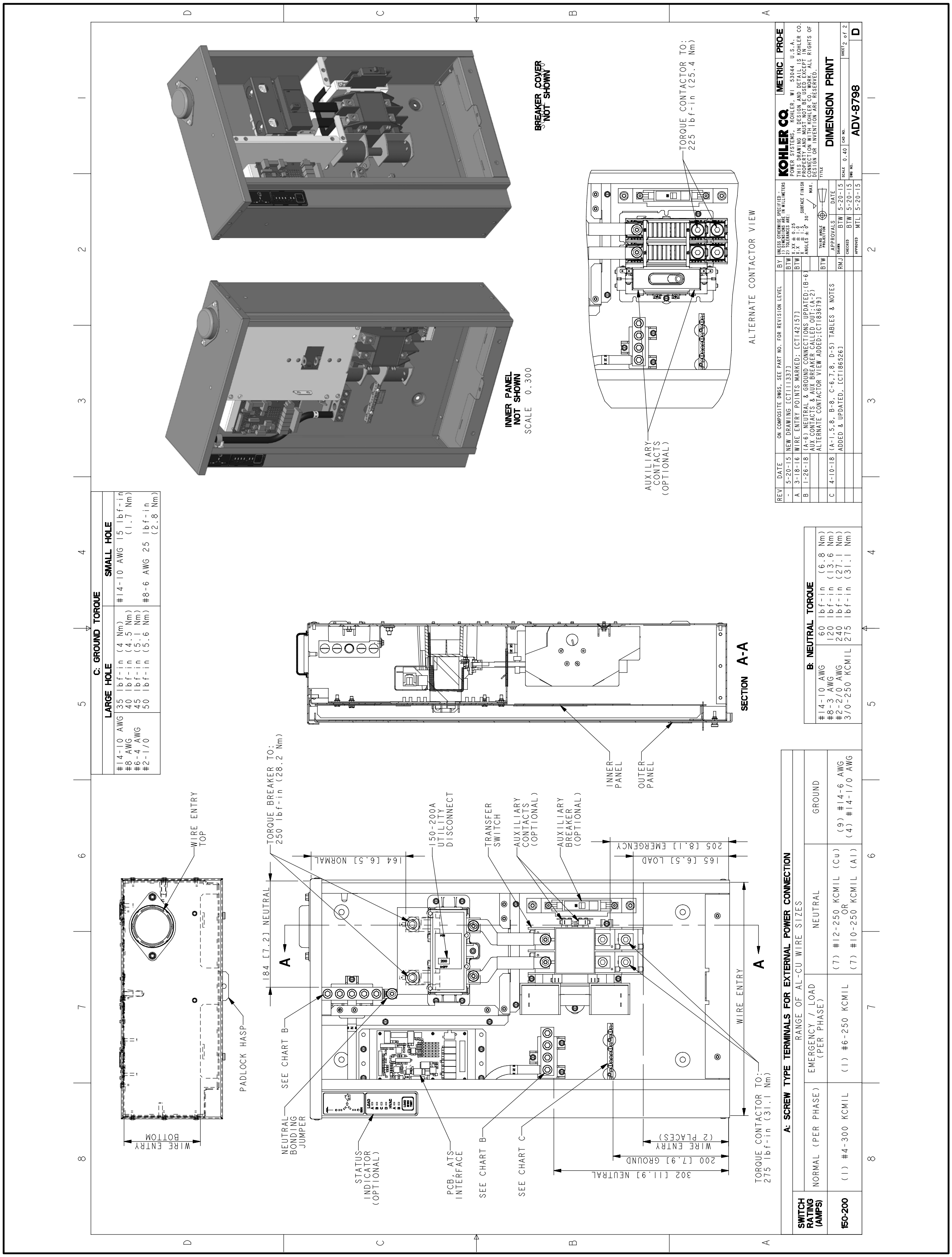


Figure 6-6 Enclosure Dimensions, 150- 200 Amp CSA Certified Service Entrance, ADV-8798, Sheet 2 of 2

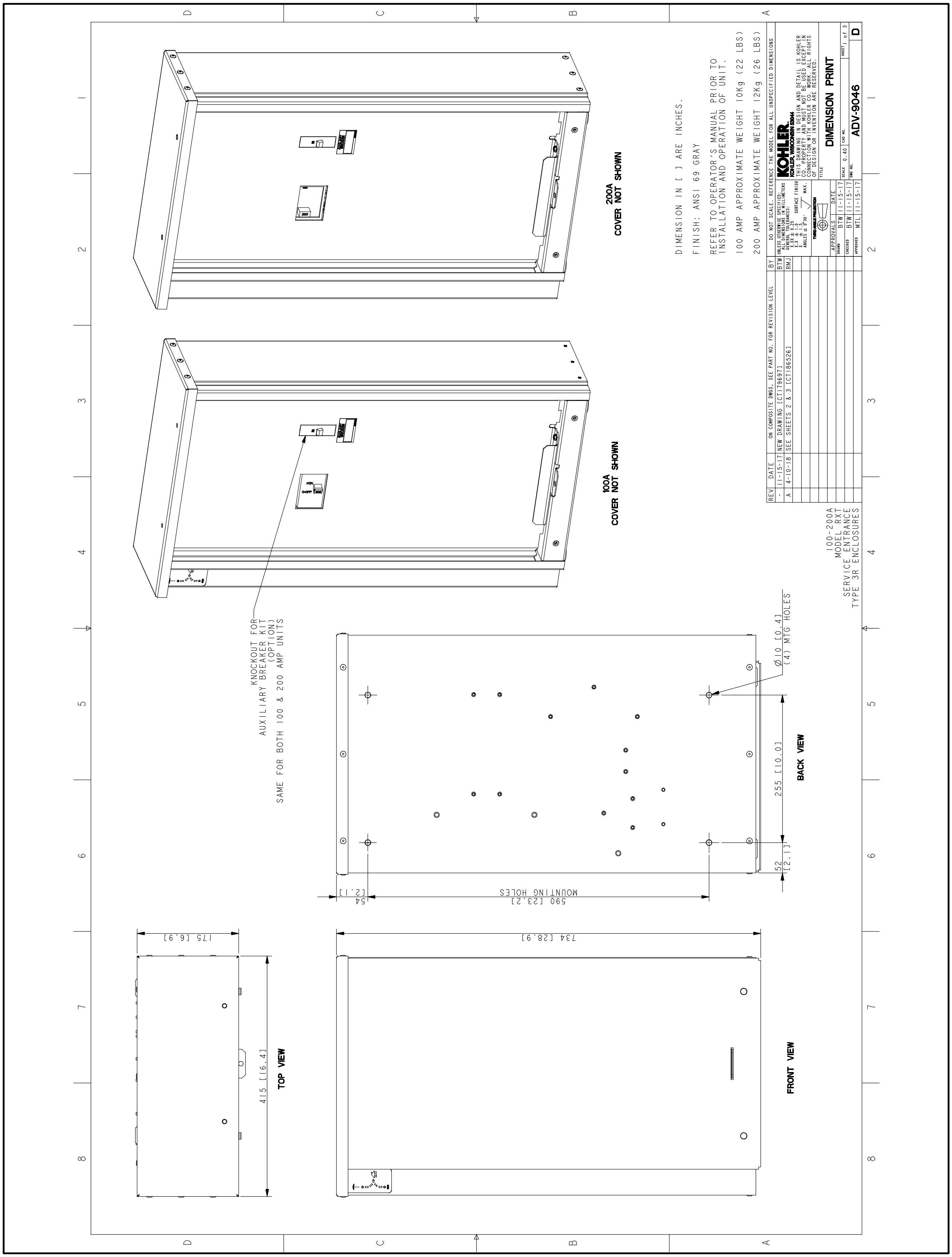


Figure 6-7 Enclosure Dimensions, 100- 200 Amp Single-Phase, Service Entrance, ADV-9046, Sheet 1 of 3

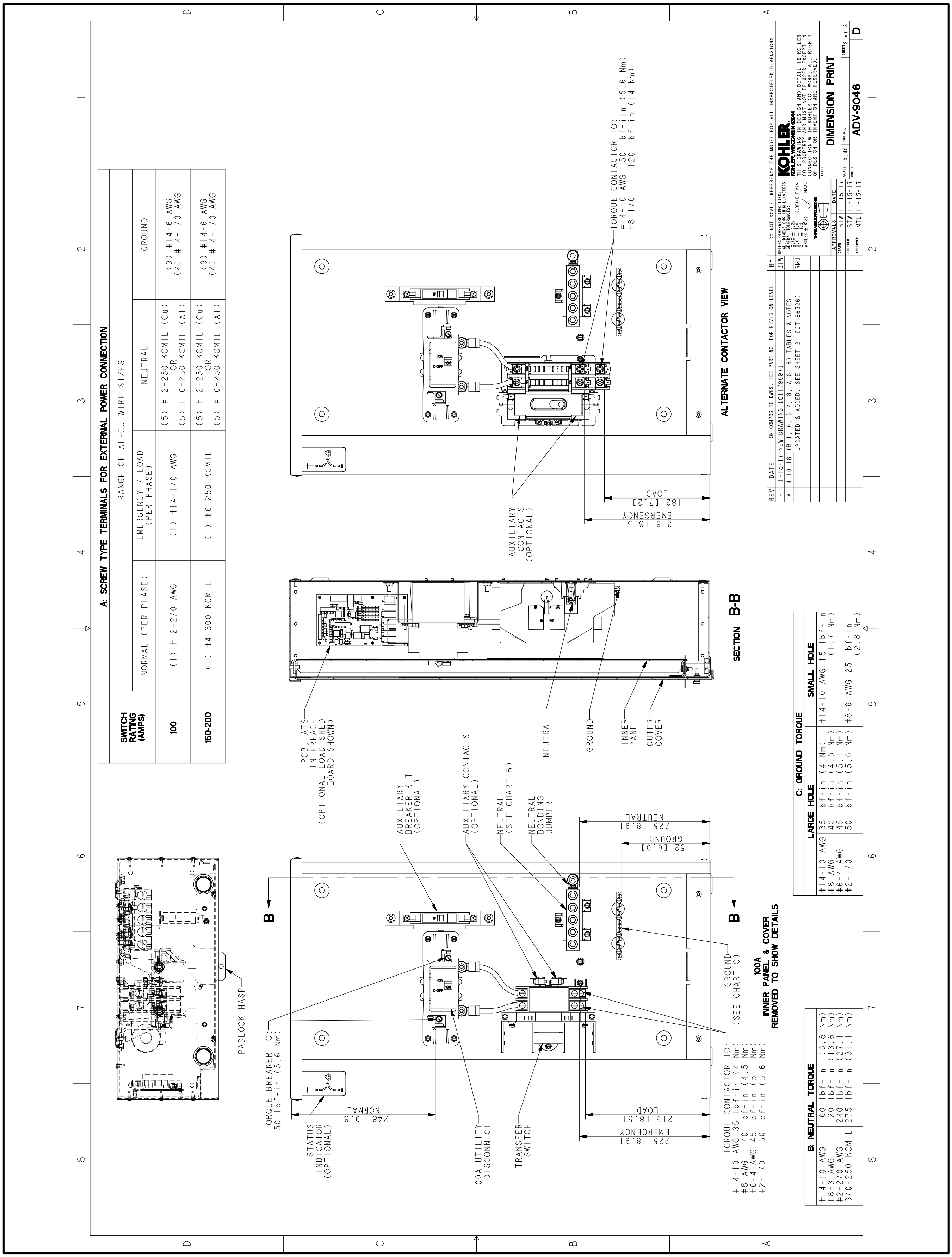


Figure 6-8 Enclosure Dimensions, 100- 200 Amp Single-Phase, Service Entrance, ADV-9046, Sheet 2 of 3

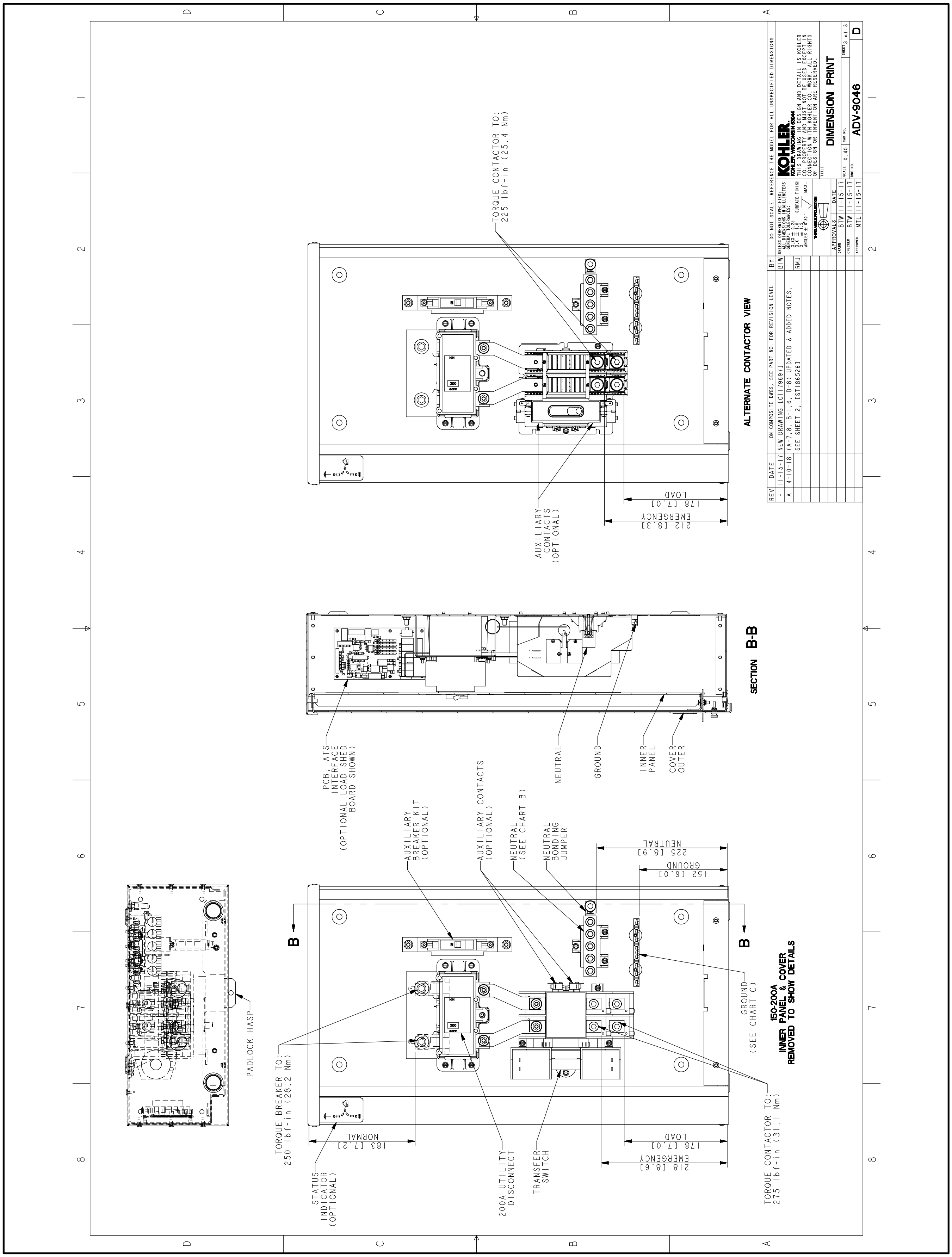


Figure 6-9 Enclosure Dimensions, 100- 200 Amp Single-Phase, Service Entrance, ADV-9046, Sheet 3 of 3

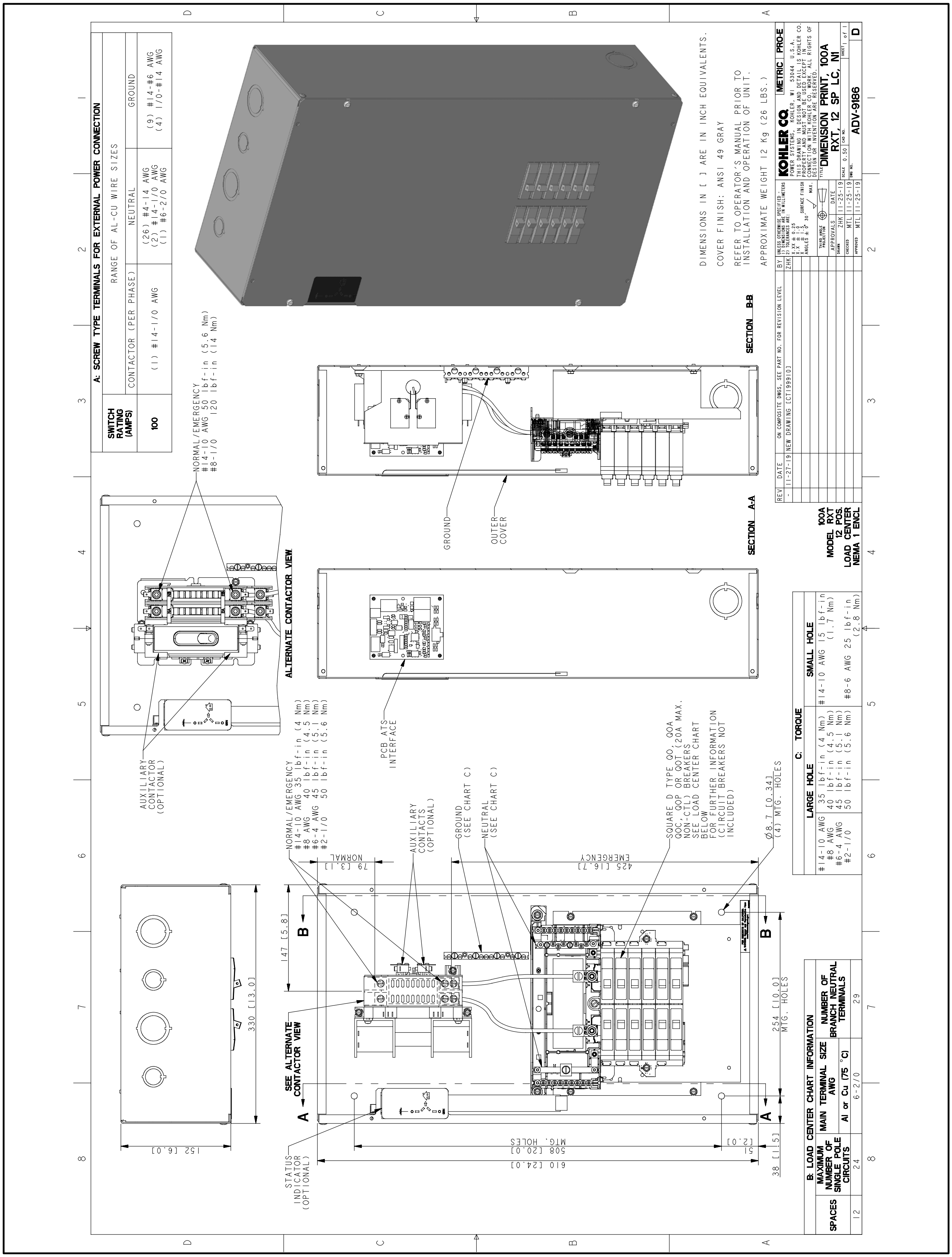


Figure 6-10 Enclosure Dimensions, 100 Amp NEMA 1 with 12-Space Load Center, ADV-9186

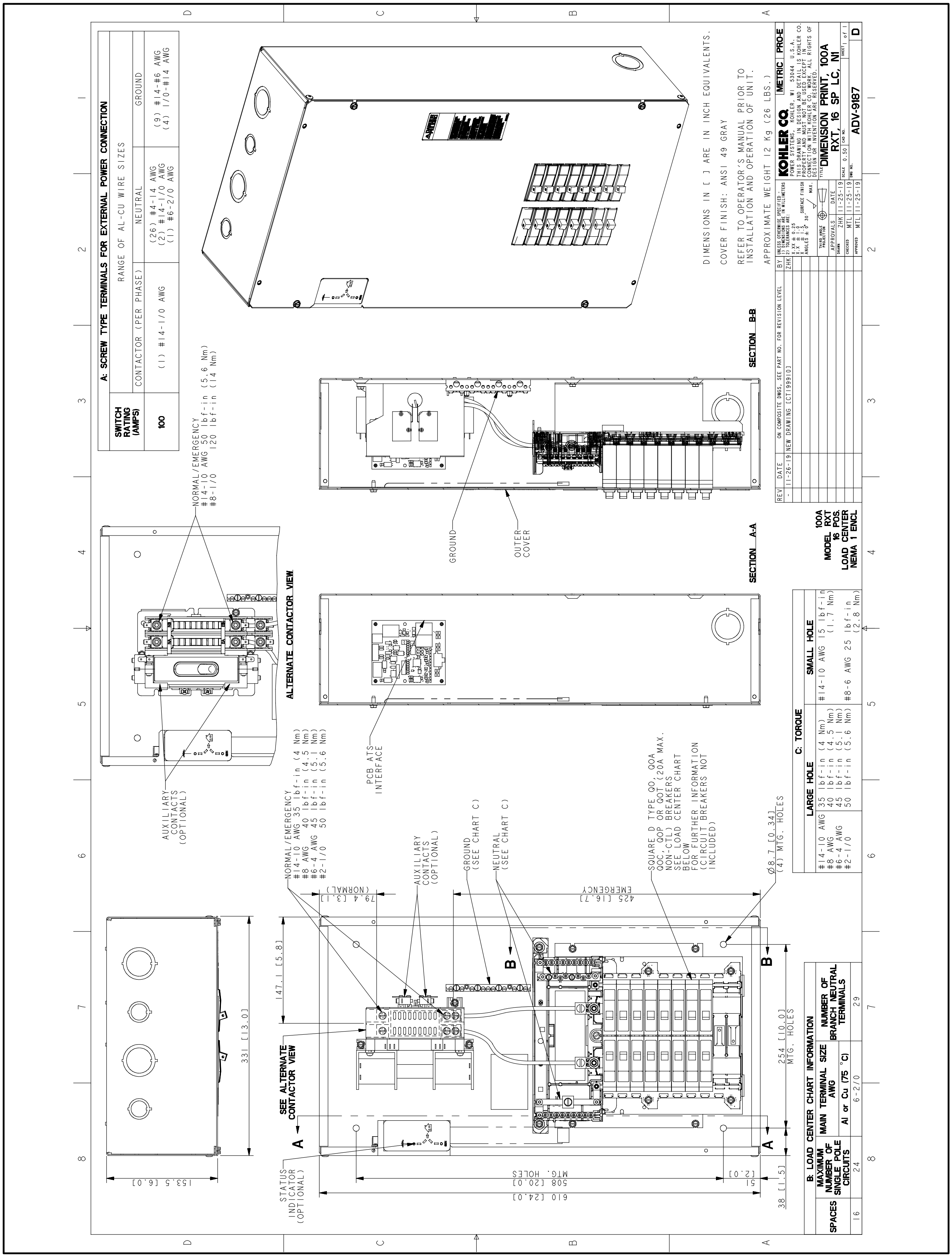


Figure 6-11 Enclosure Dimensions, 100 Amp NEMA 1 with 16-Space Load Center, ADV-9187

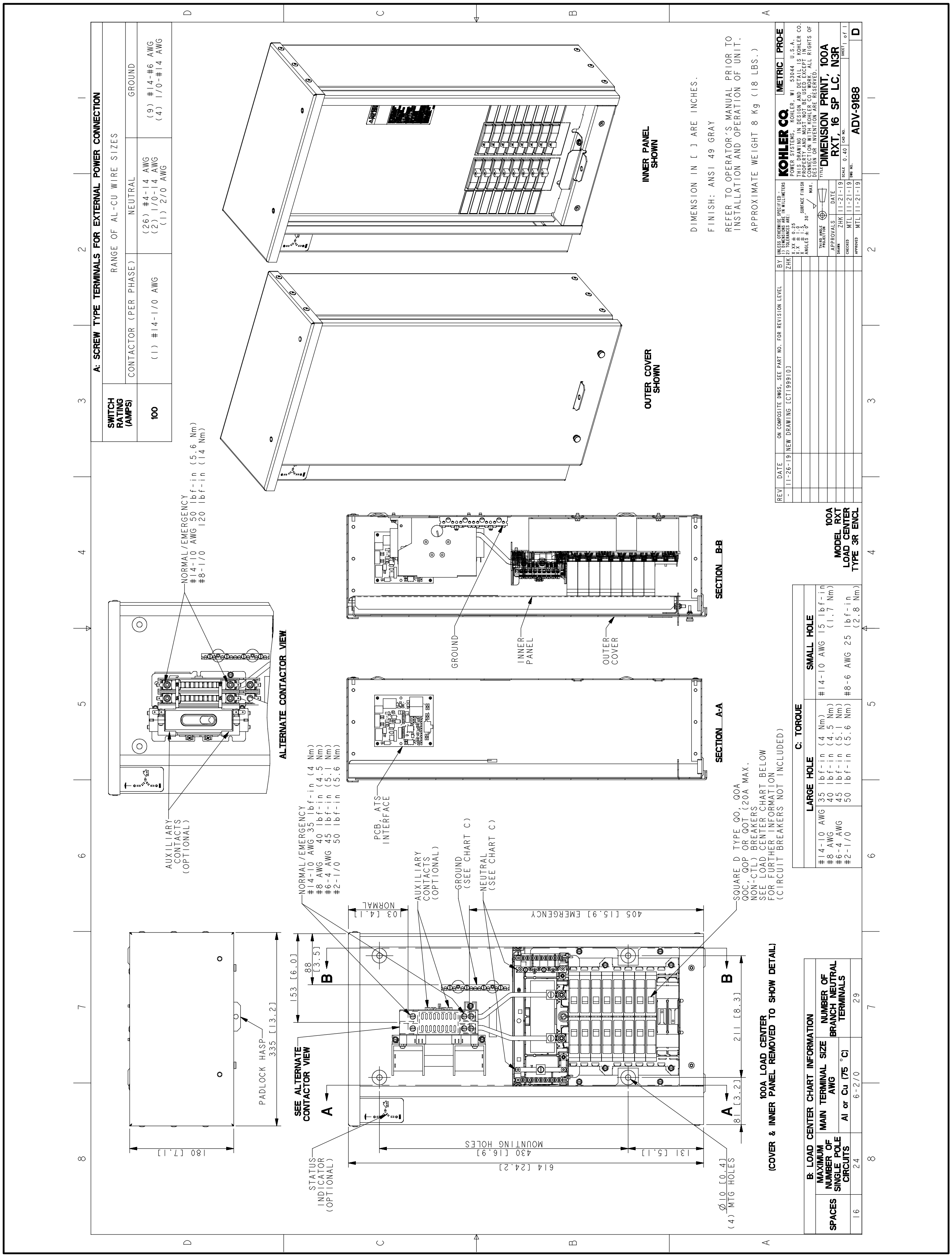


Figure 6-12 Enclosure Dimensions, 100 Amp Single-Phase with Load Center, ADV-9188

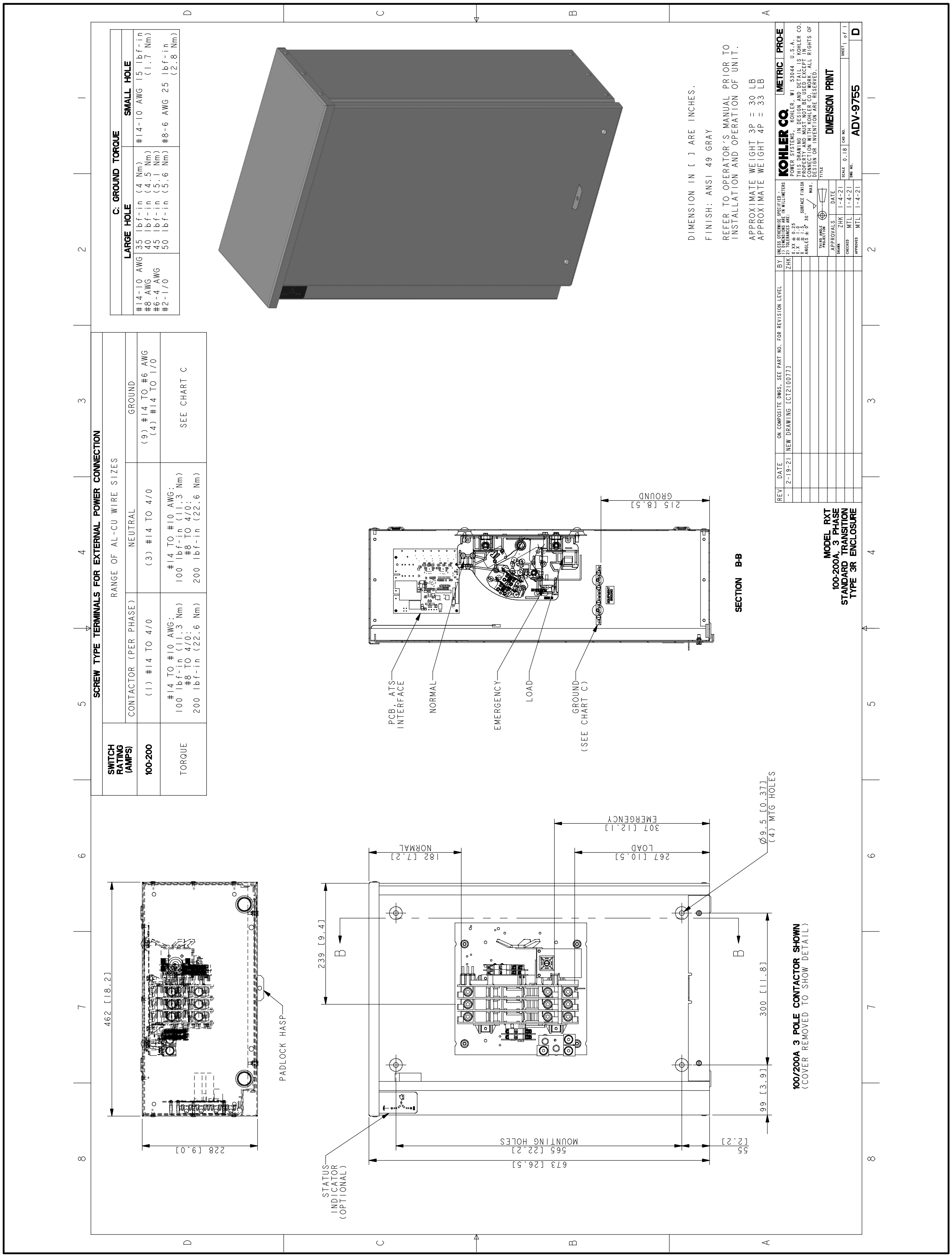


Figure 6-13 Enclosure Dimensions, 100- 200 Amps, 3-Phase, ADV-9755

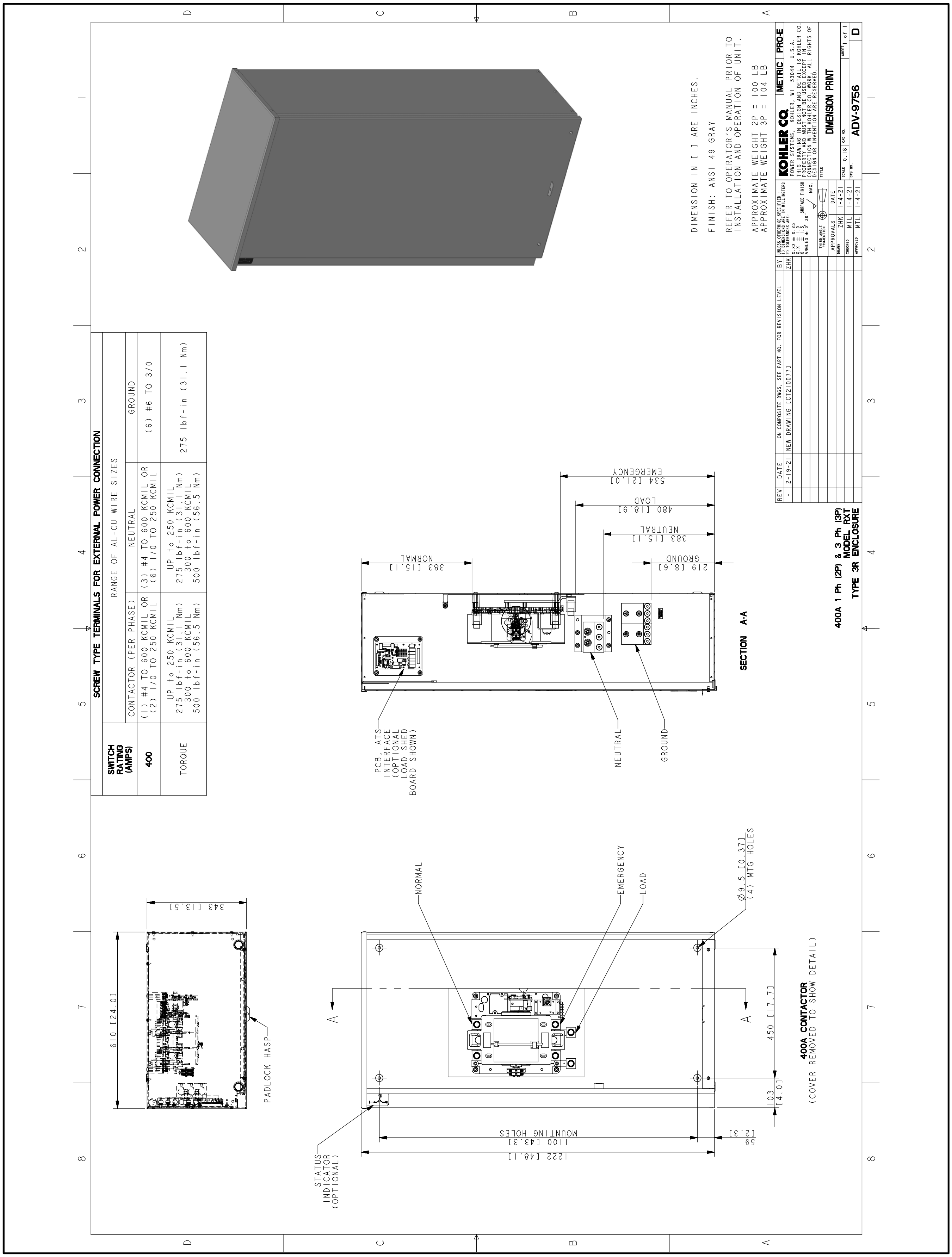


Figure 6-14 Enclosure Dimensions, 400 Amp 1-Phase/2-Pole and 3-Phase/3-Pole, ADV-9756

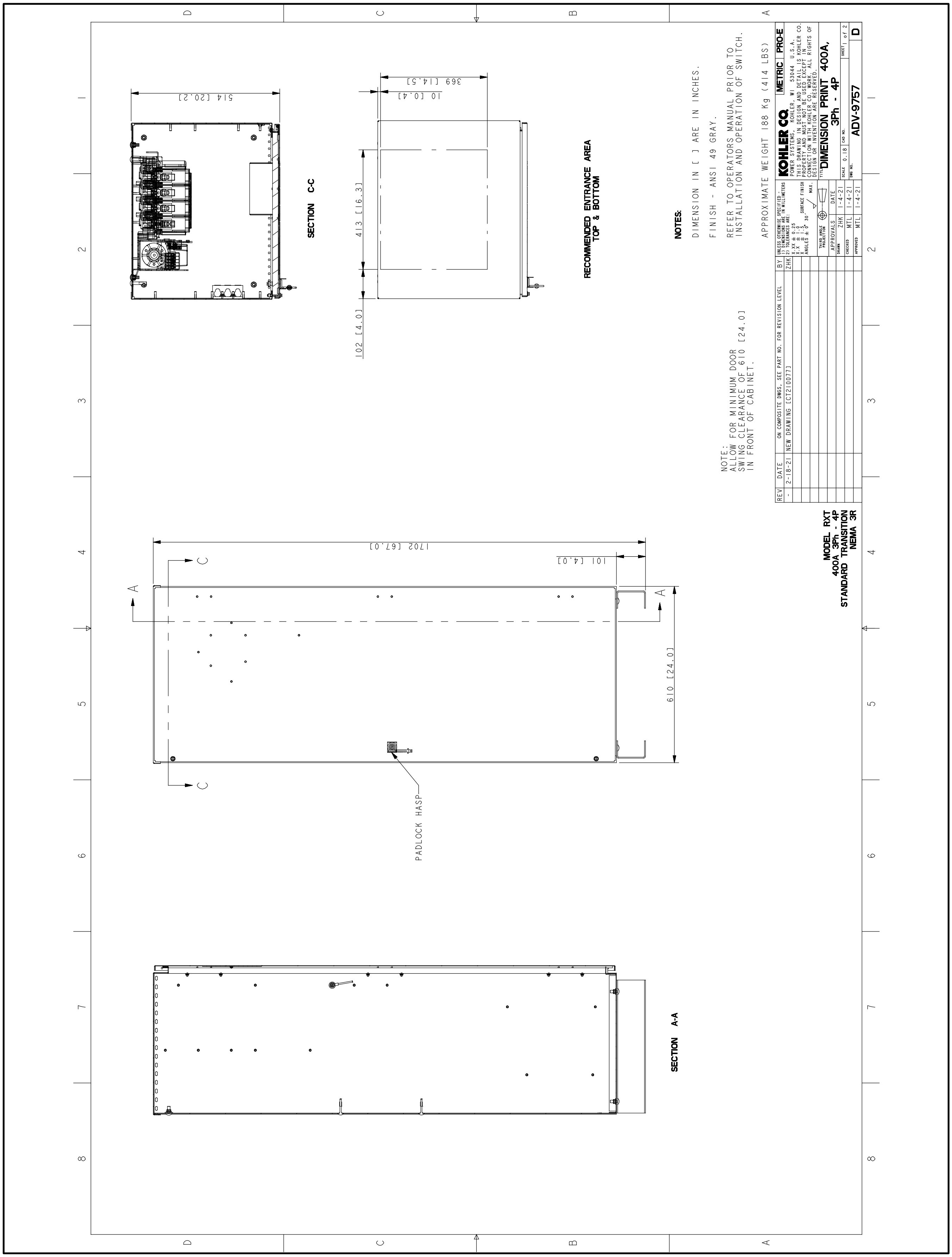


Figure 6-15 Enclosure Dimensions, 400 Amp, 3-Phase, 4- Pole, ADV-9757, Sheet 1

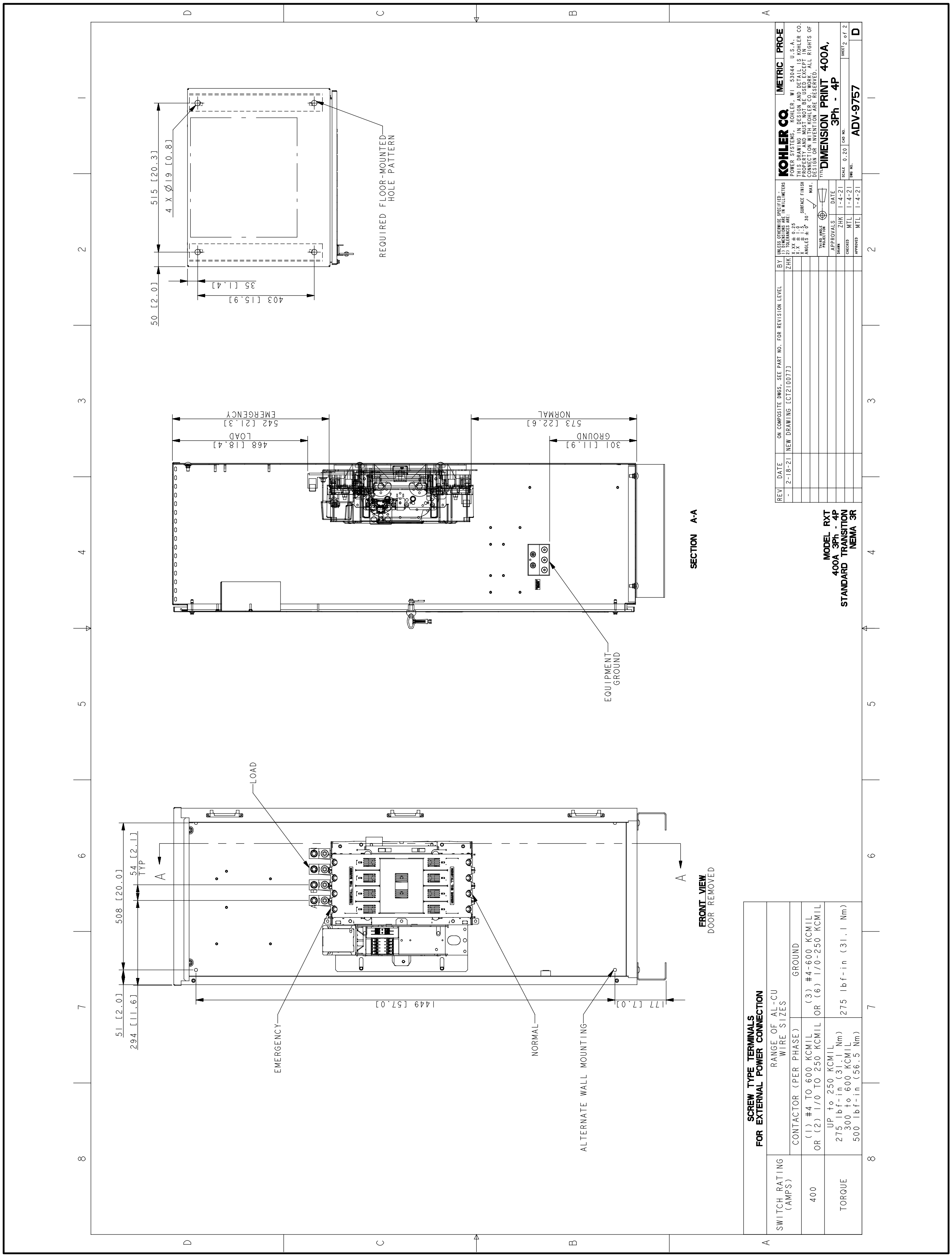


Figure 6-16 Enclosure Dimensions, 400 Amp, 3-Phase, 4- Pole, ADV-9757, Sheet 2

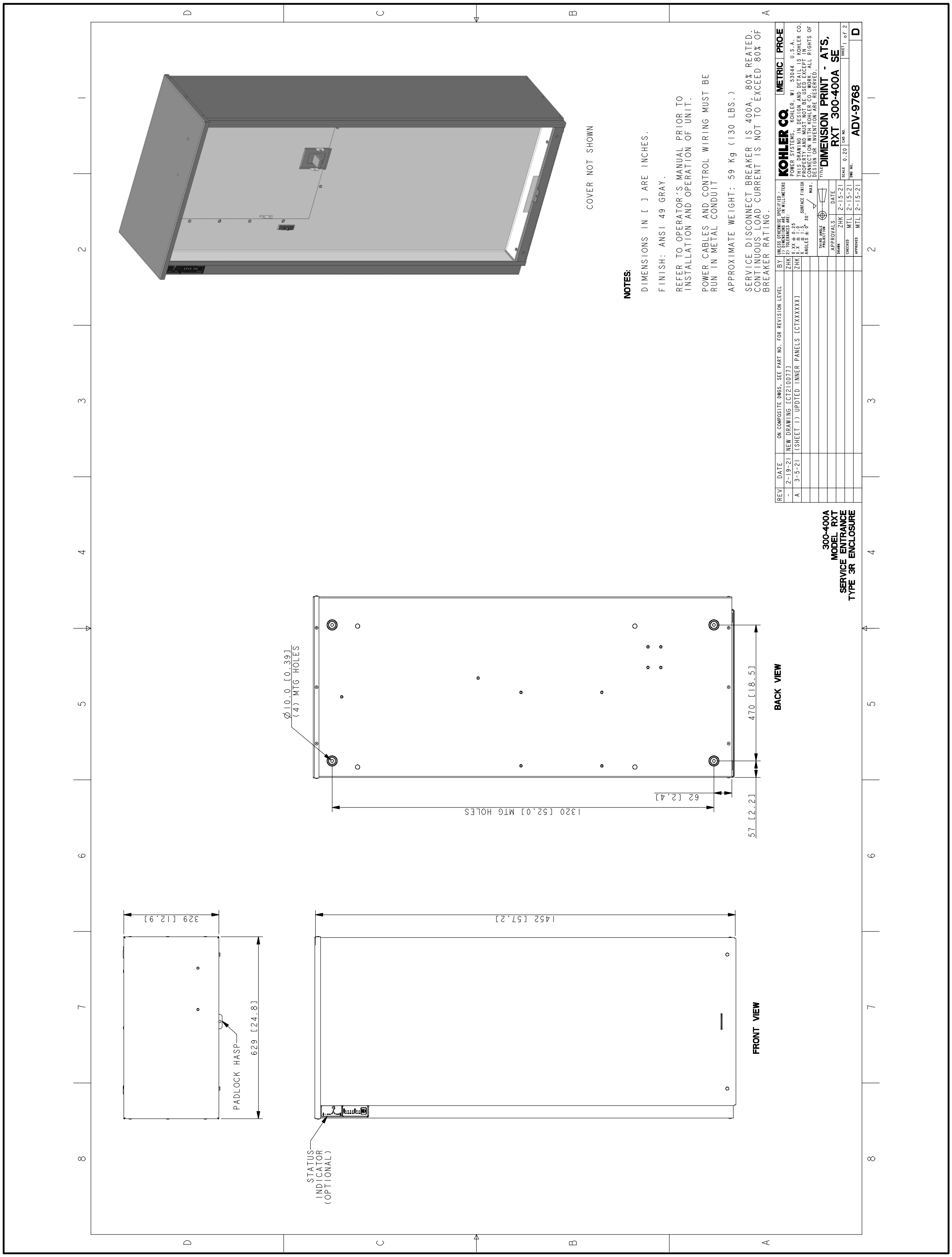


Figure 6-17 Enclosure Dimensions, 400 Amp Service Entrance, ADV-9768 Sheet 1

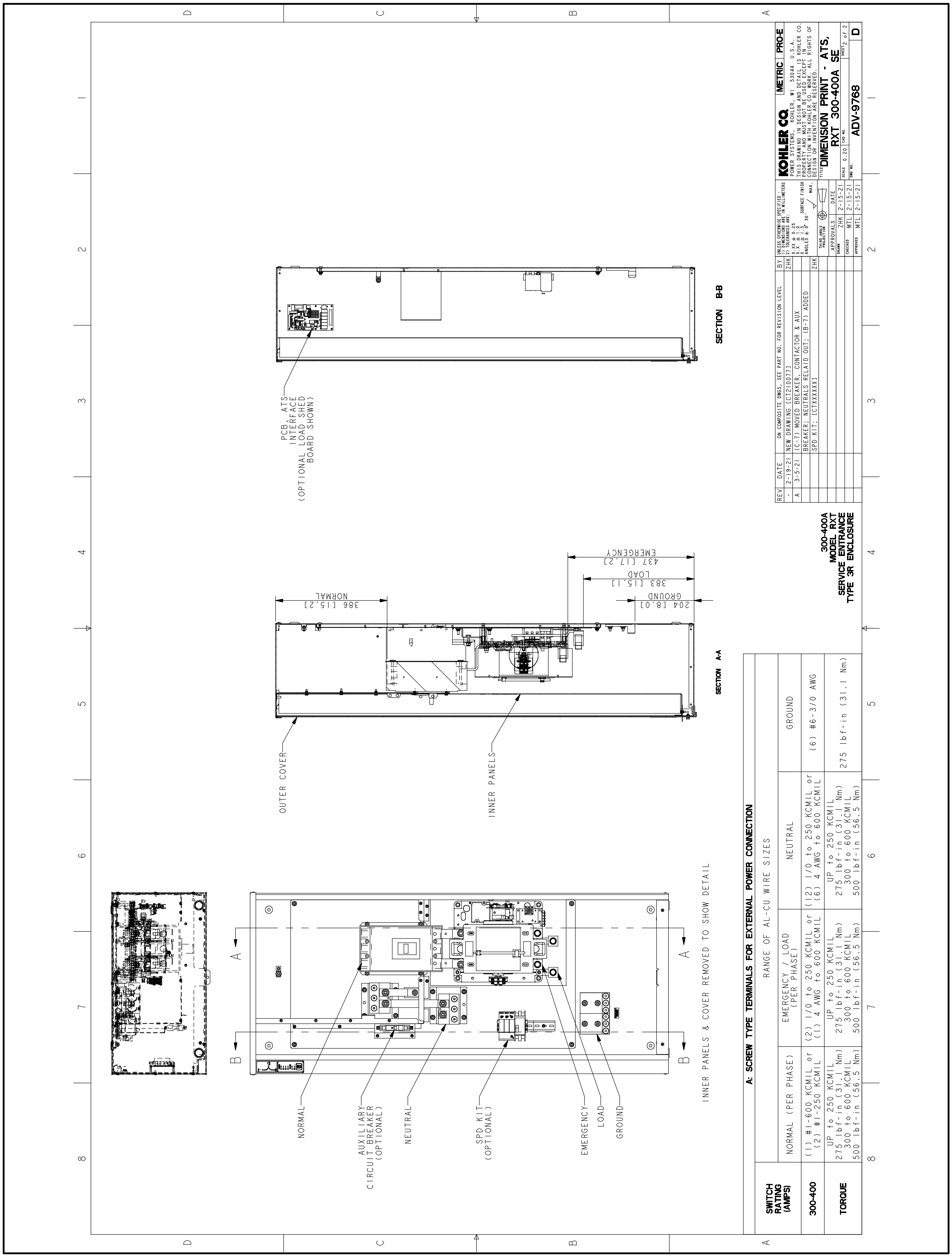


Figure 6-18 Enclosure Dimensions, 300-400 Amp, Service Entrance, ADV-9768, Sheet 2

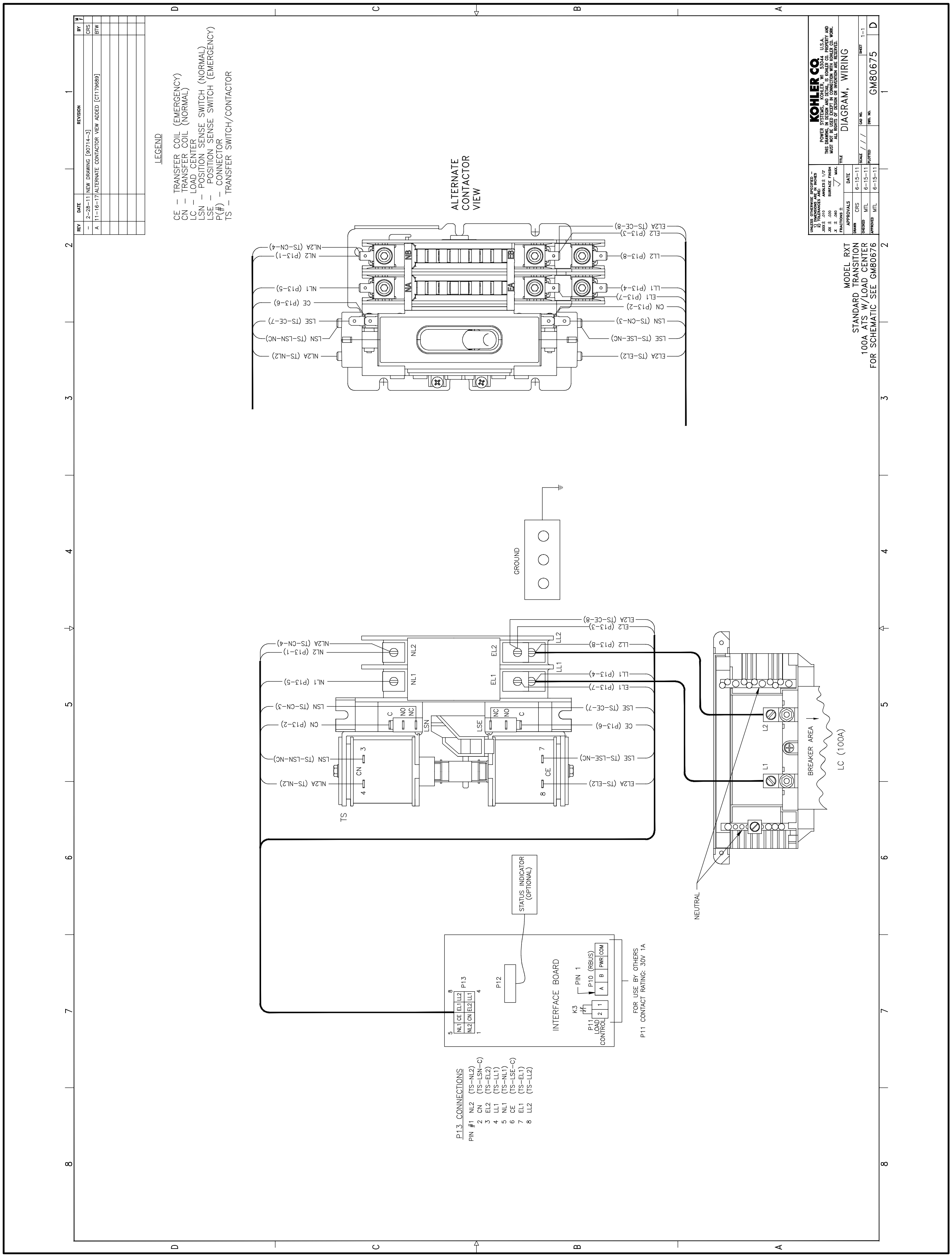


Figure 6-19 Wiring Diagram, 100 Amp Single-Phase with Load Center, GM80675

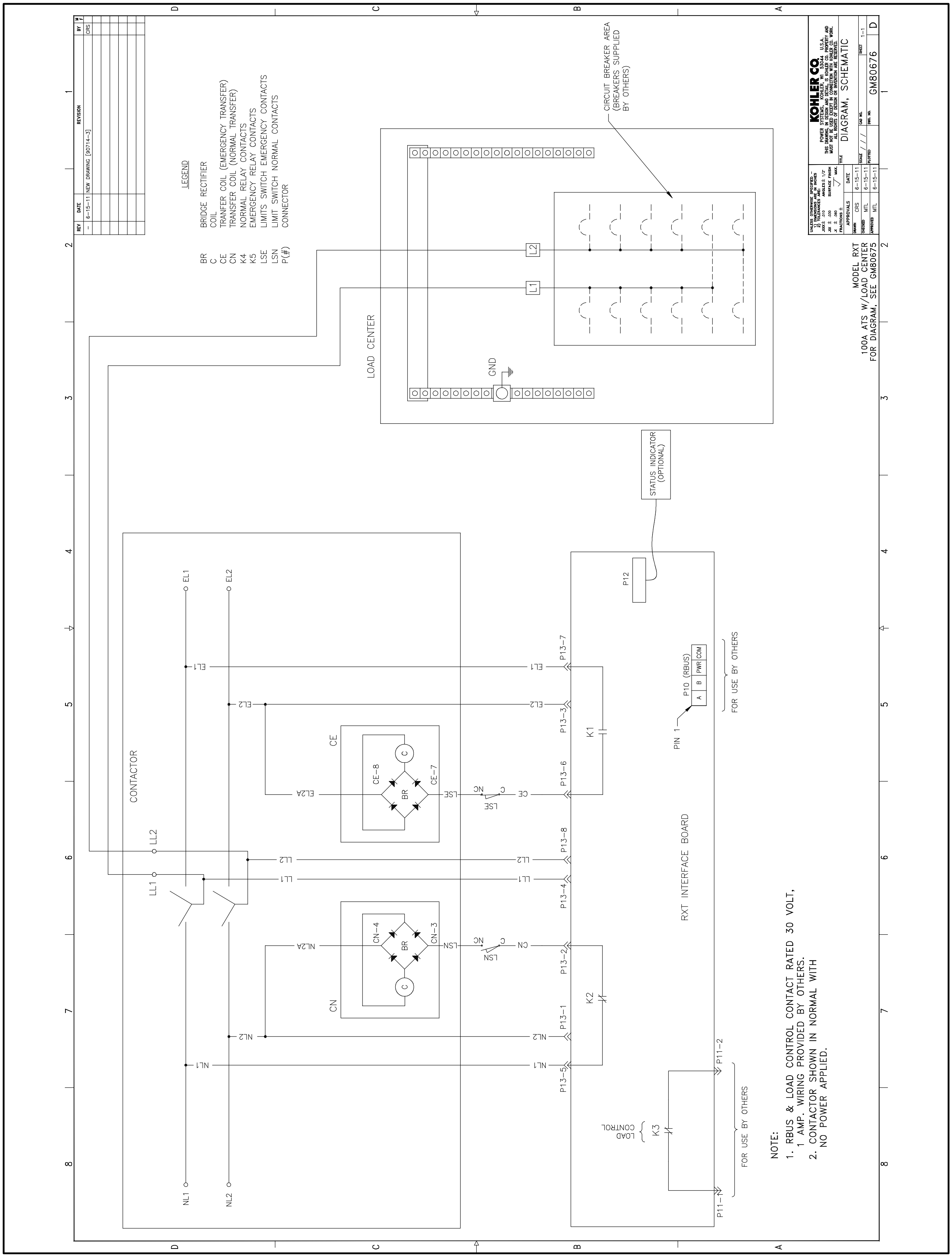


Figure 6-20 Schematic Diagram, 100 Amp Single-Phase with Load Center, GM80676

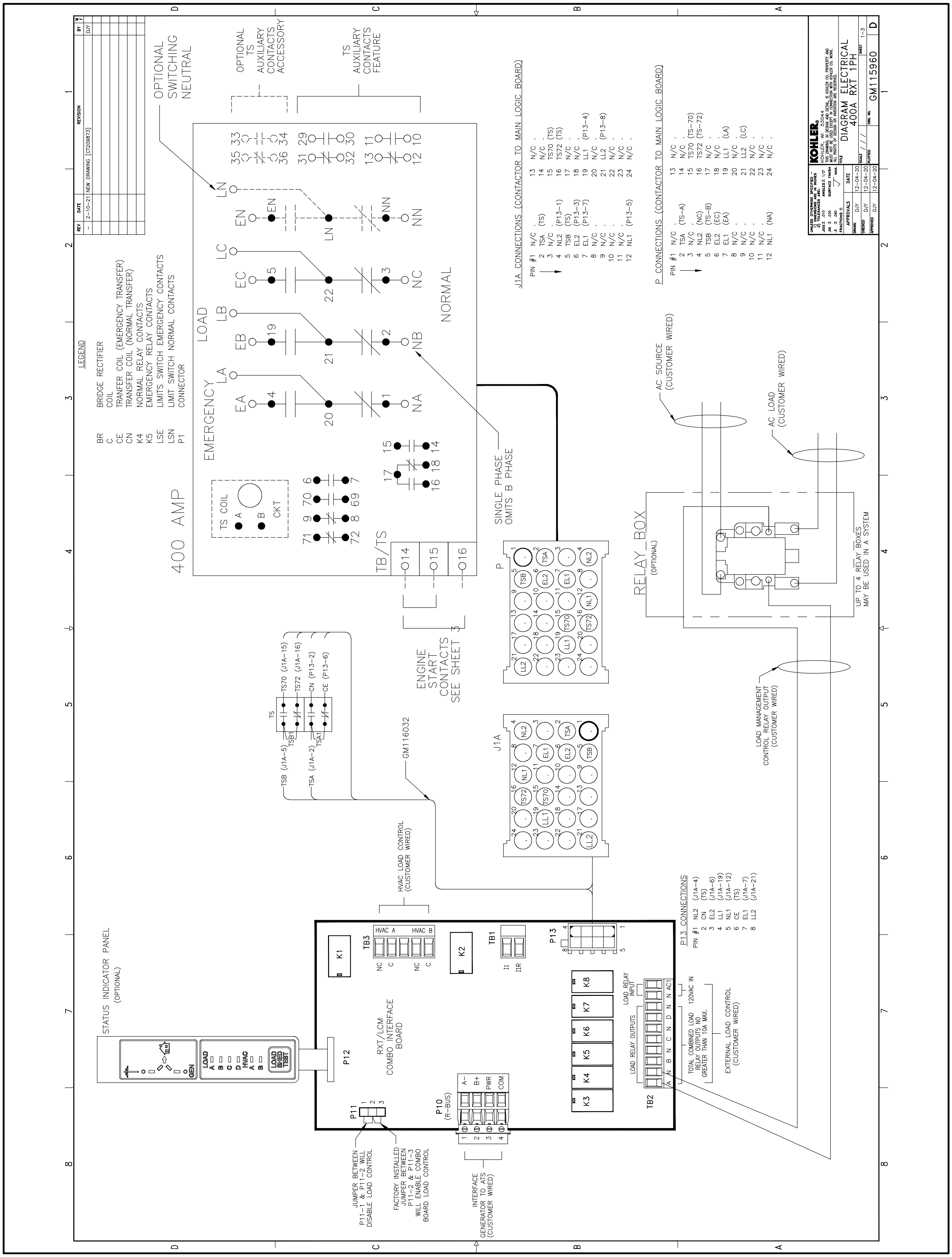


Figure 6-21 Wiring Diagram, 400 Amps, 1-Phase, GM115960, Sheet 1

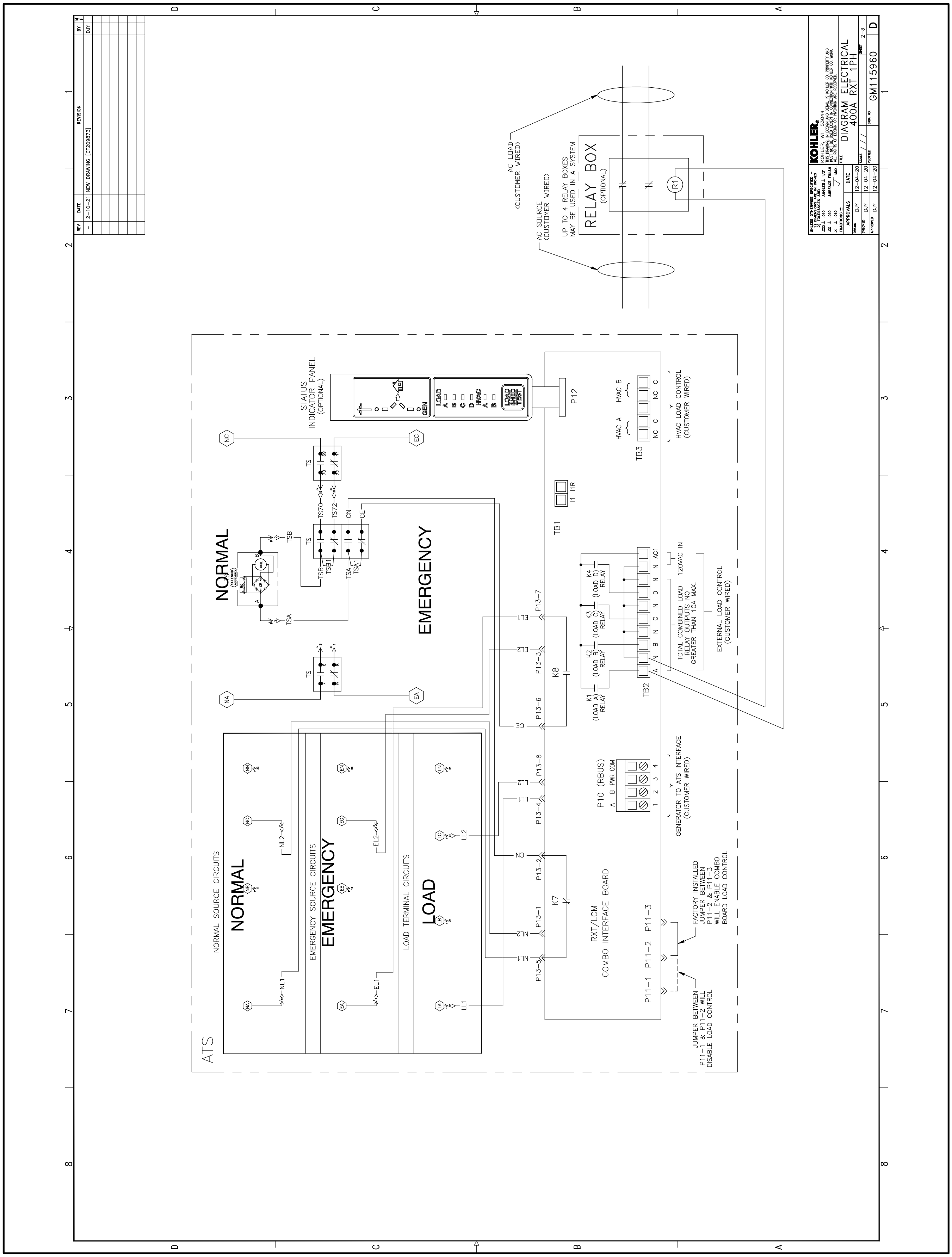


Figure 6-22 Wiring Diagram, 400 Amps, 1-Phase, GM115960, Sheet 2

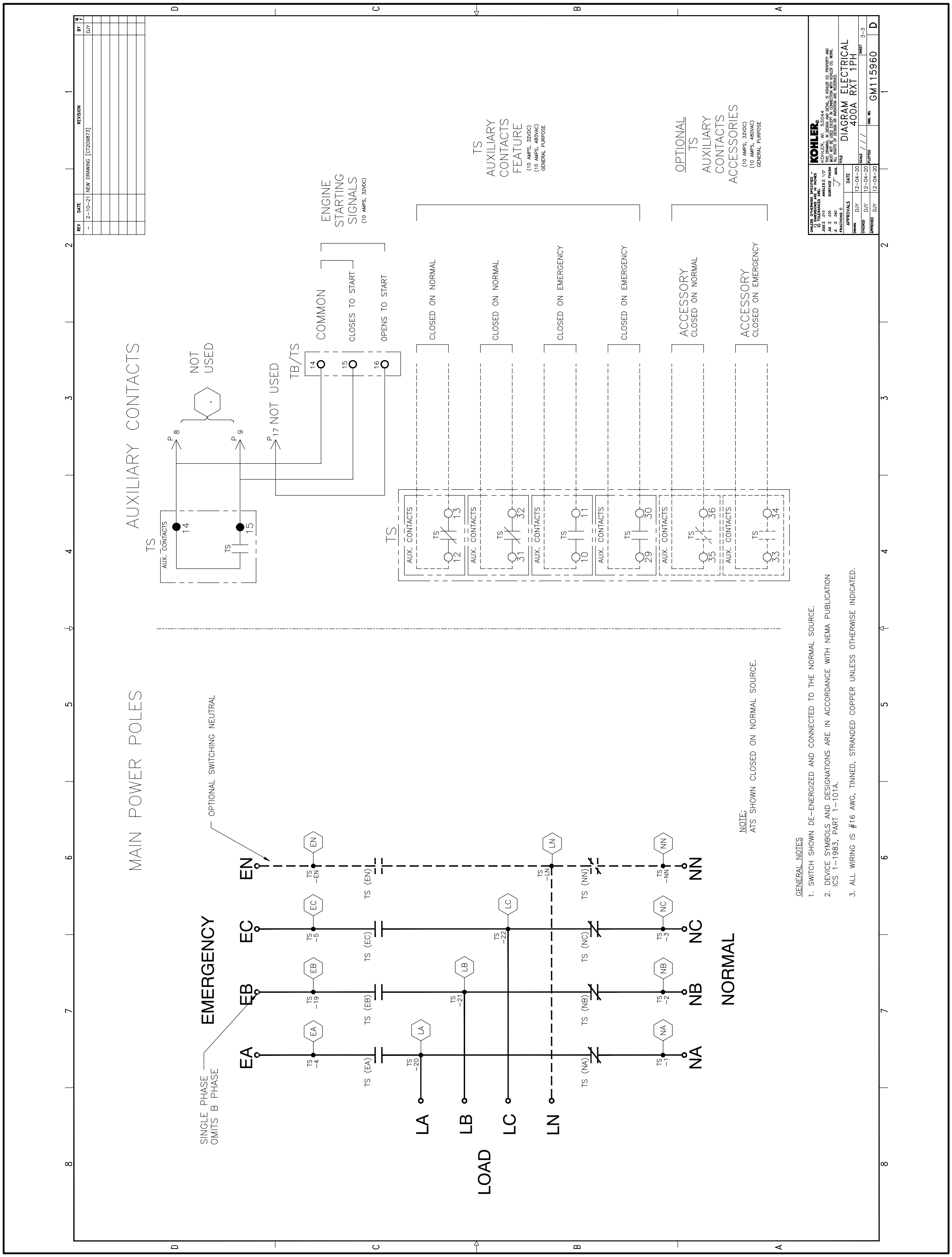


Figure 6-23 Wiring Diagram, 400 Amps, 1-Phase, GM115960, Sheet 3

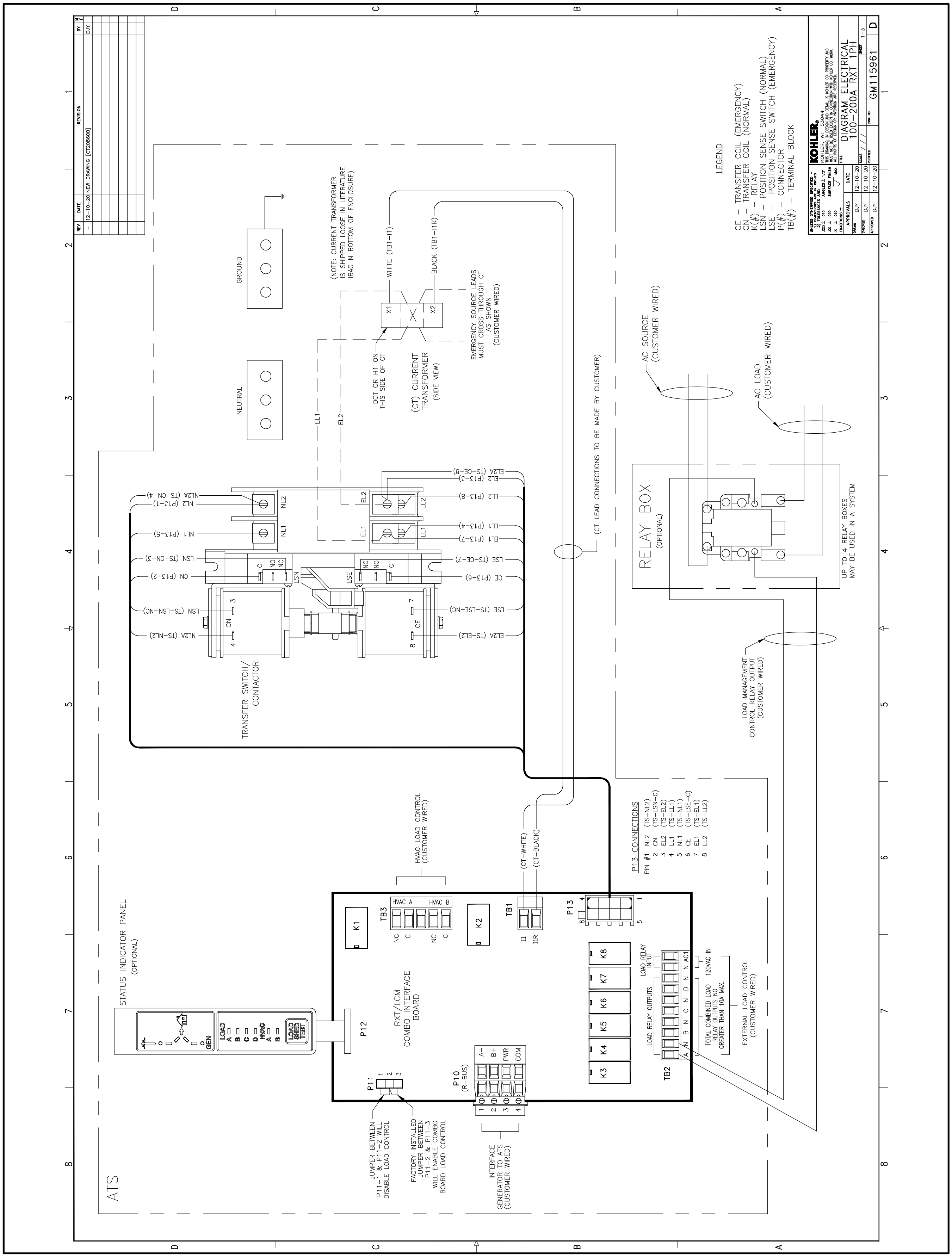


Figure 6-24 Schematic/Wiring Diagram, 100- 400 Amp Single-Phase, GM115961, Sheet 1

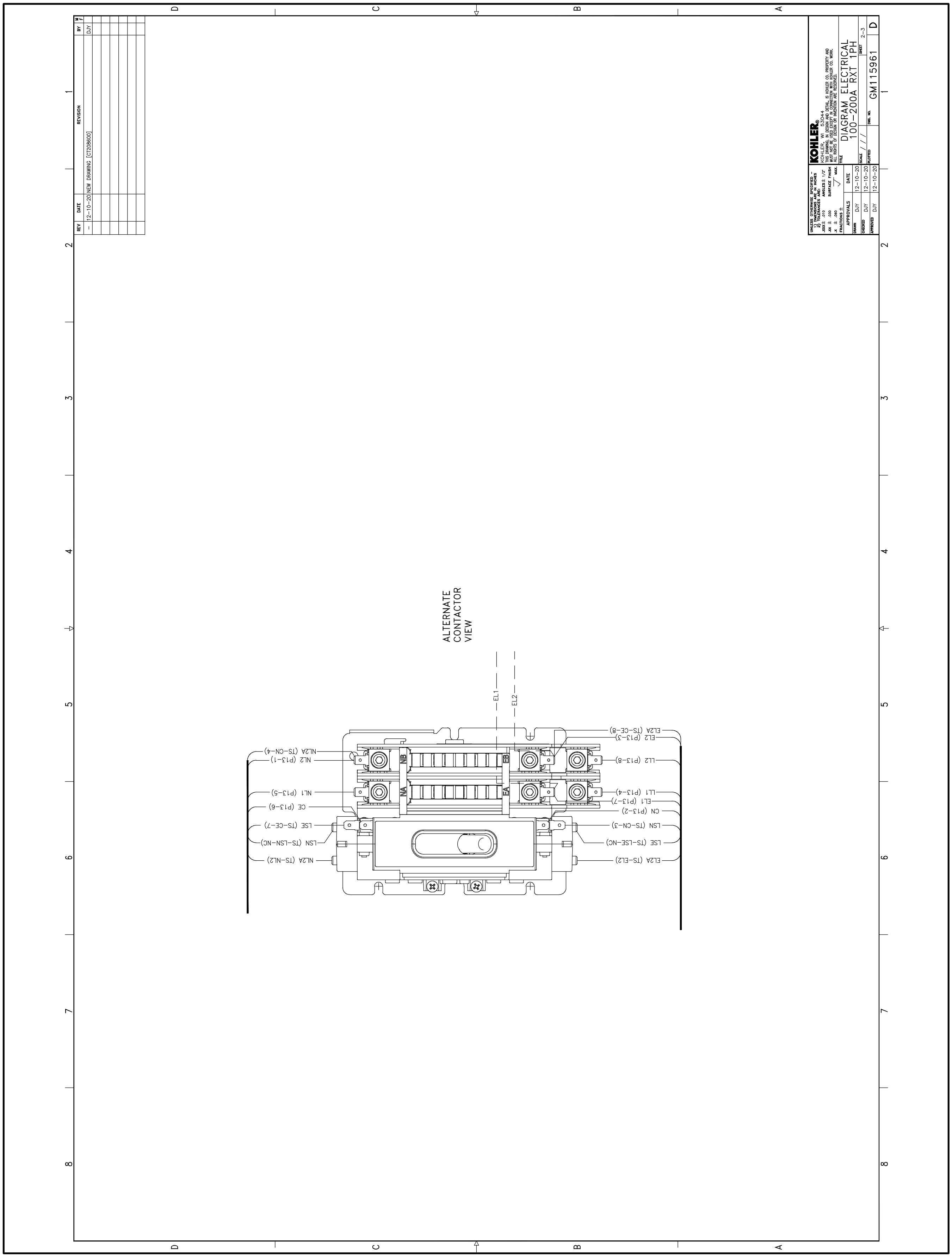


Figure 6-25 Schematic/Wiring Diagram, 100- 400 Amp Single-Phase, GM115961, Sheet 2

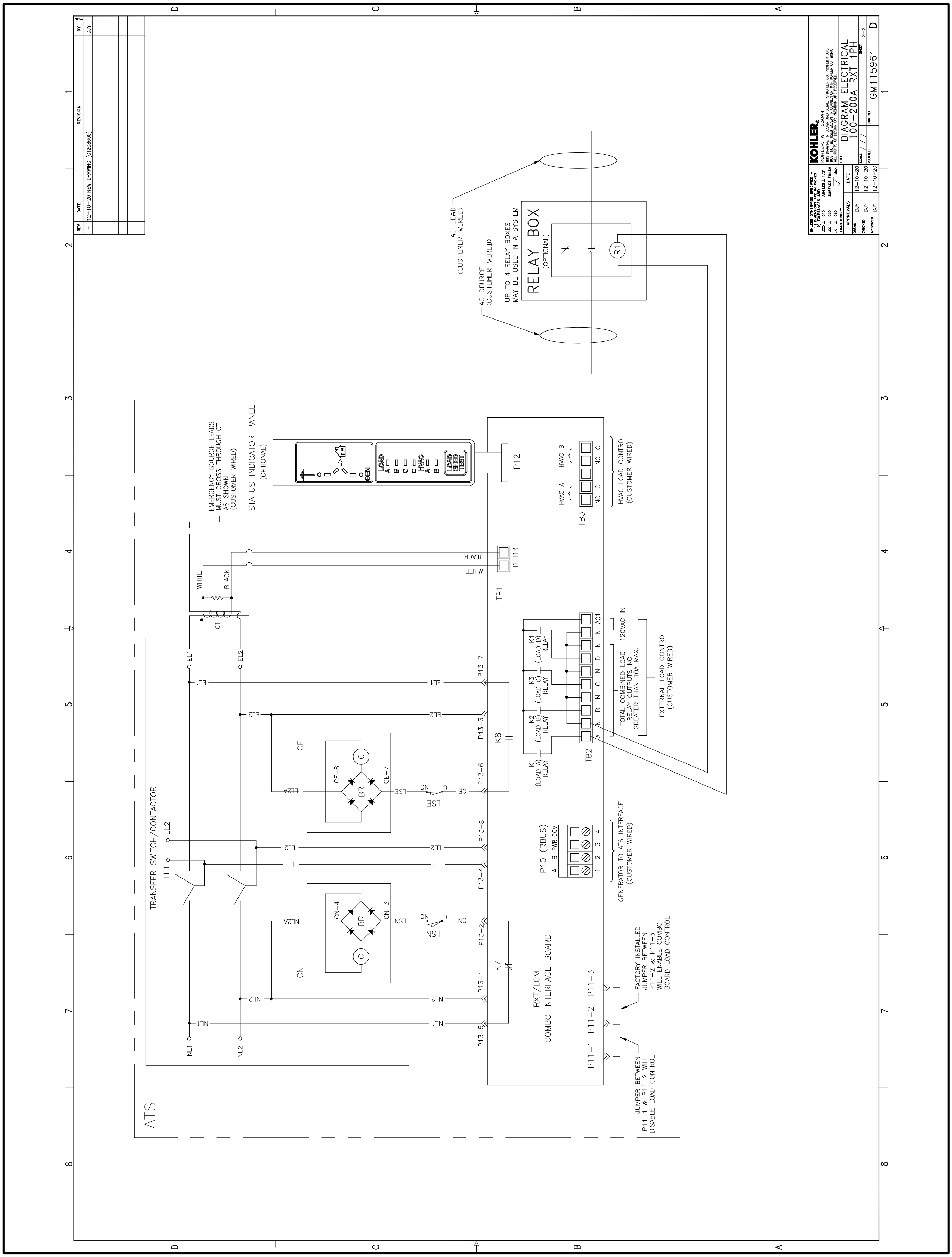


Figure 6-26 Schematic/Wiring Diagram, 100- 400 Amp Single-Phase, GM115961, Sheet 3

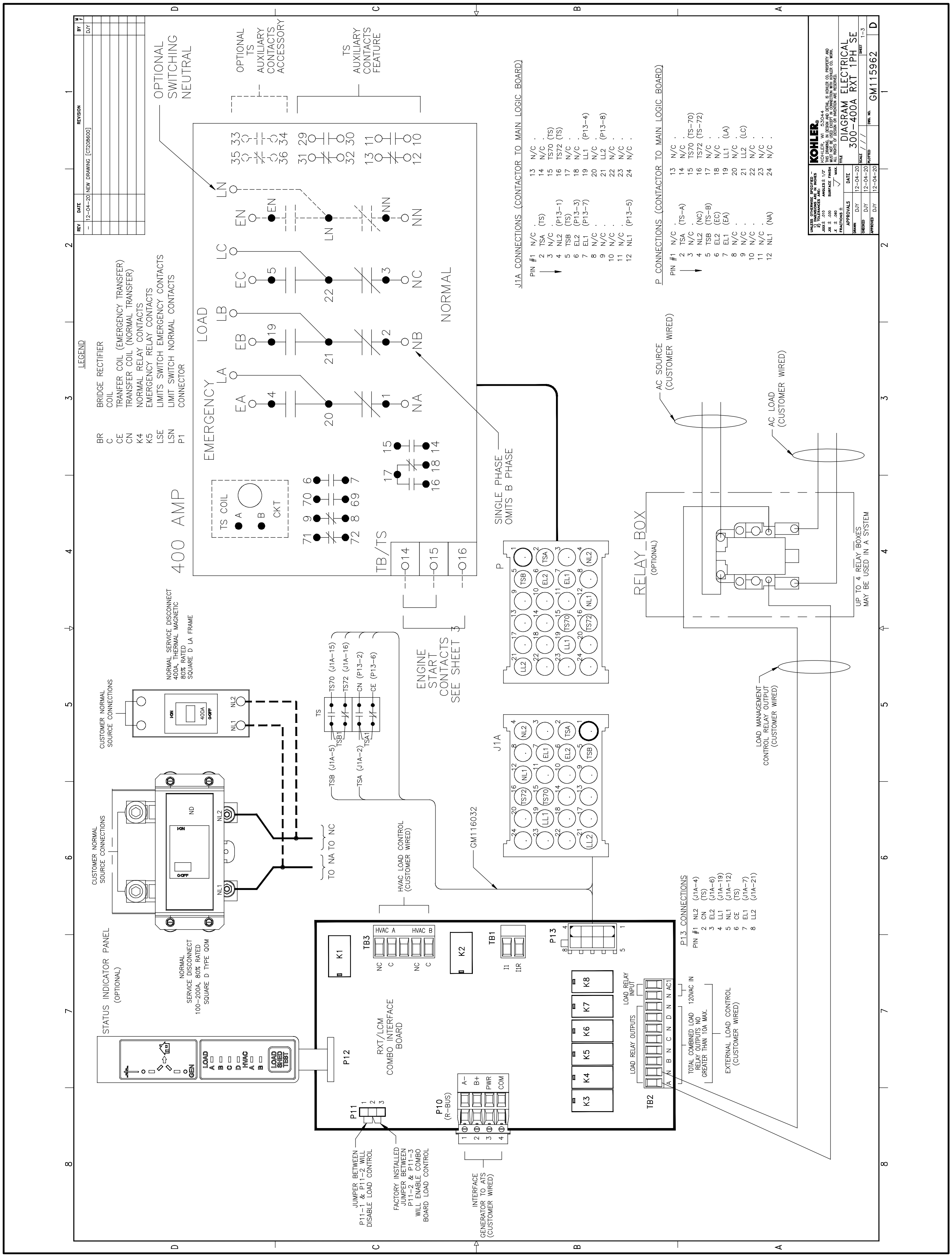


Figure 6-27 Wiring Diagram/Schematic GM115962, Sheet 1

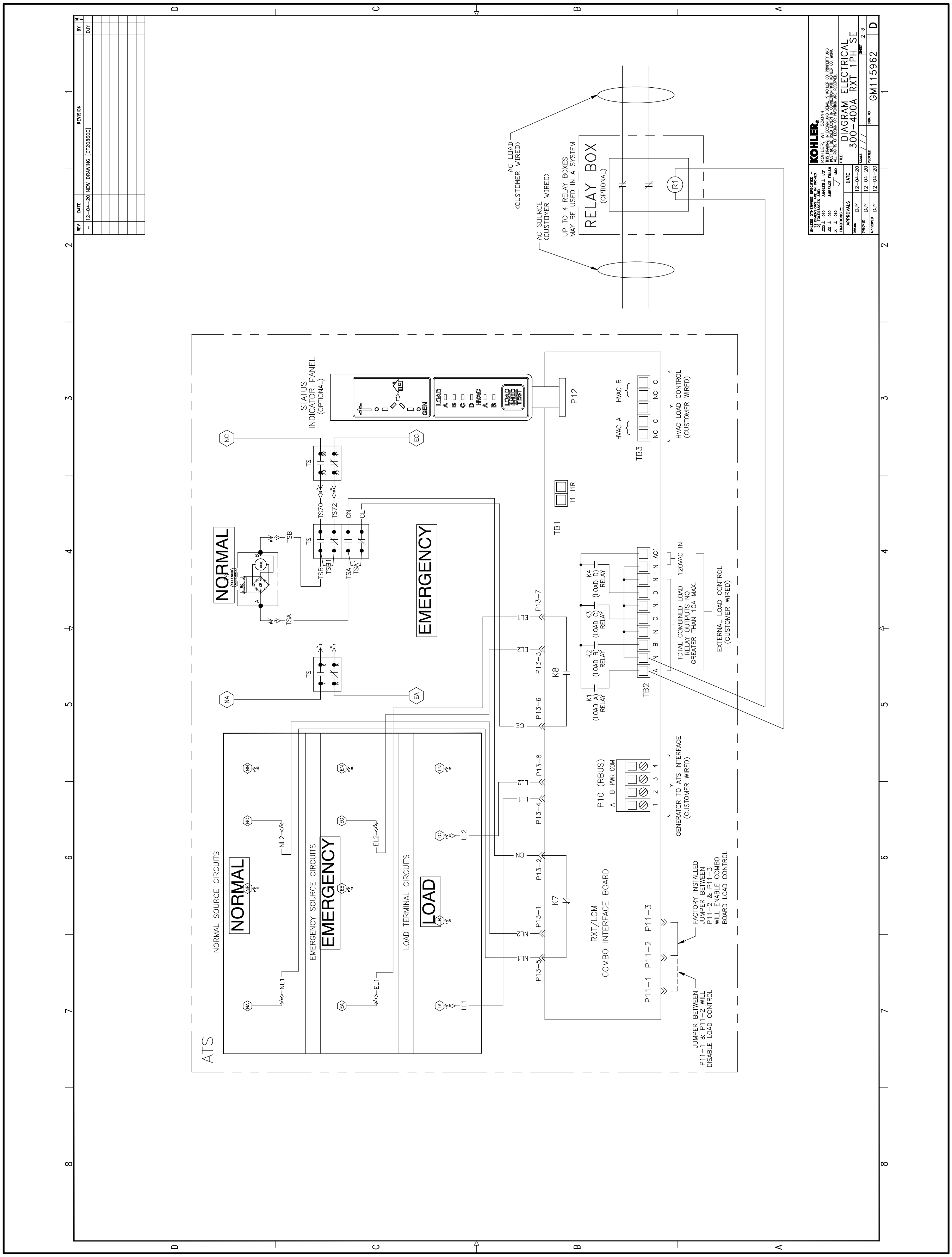


Figure 6-28 Wiring Diagram/Schematic GM115962, Sheet 2

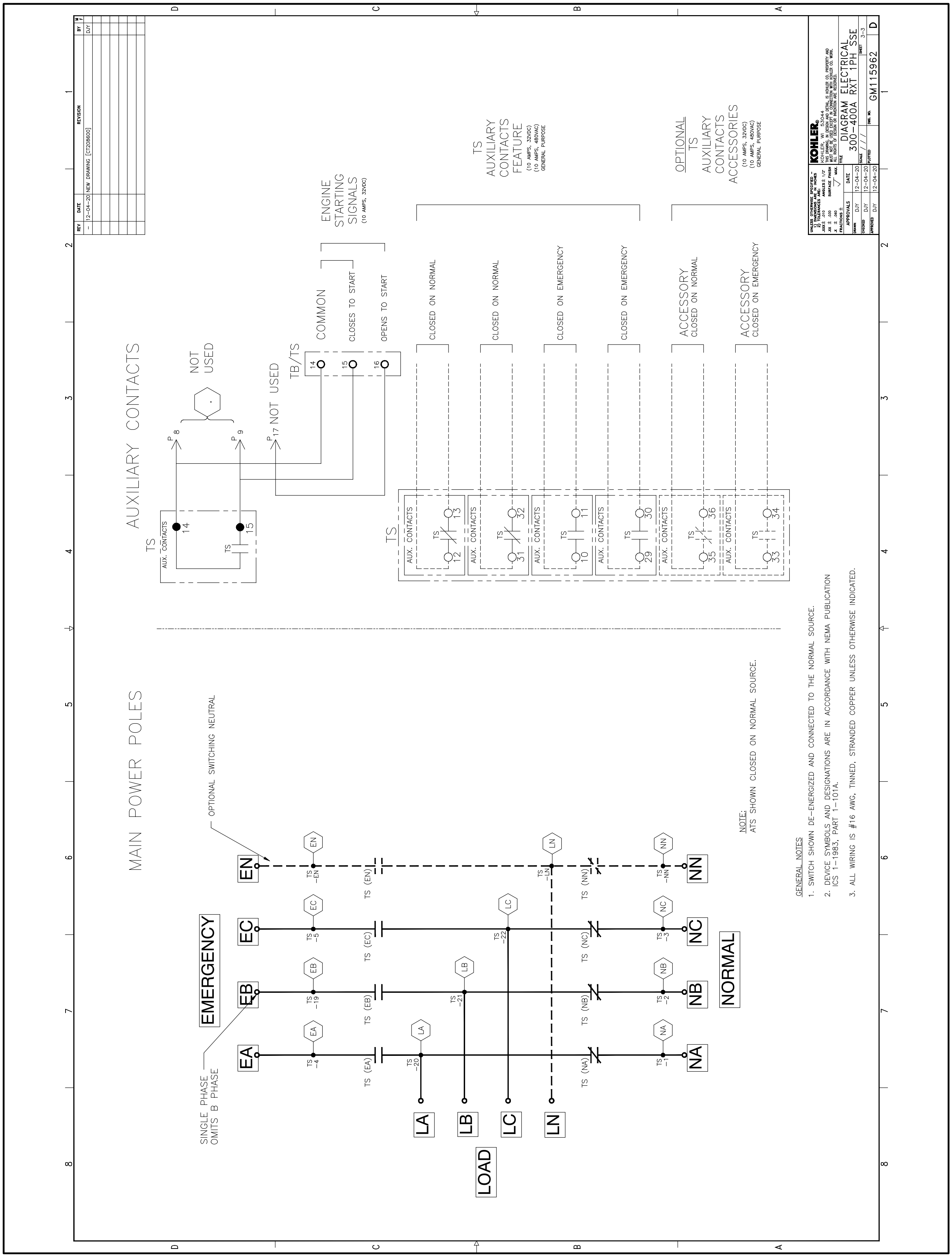


Figure 6-29 Wiring Diagram/Schematic GM115962, Sheet 3

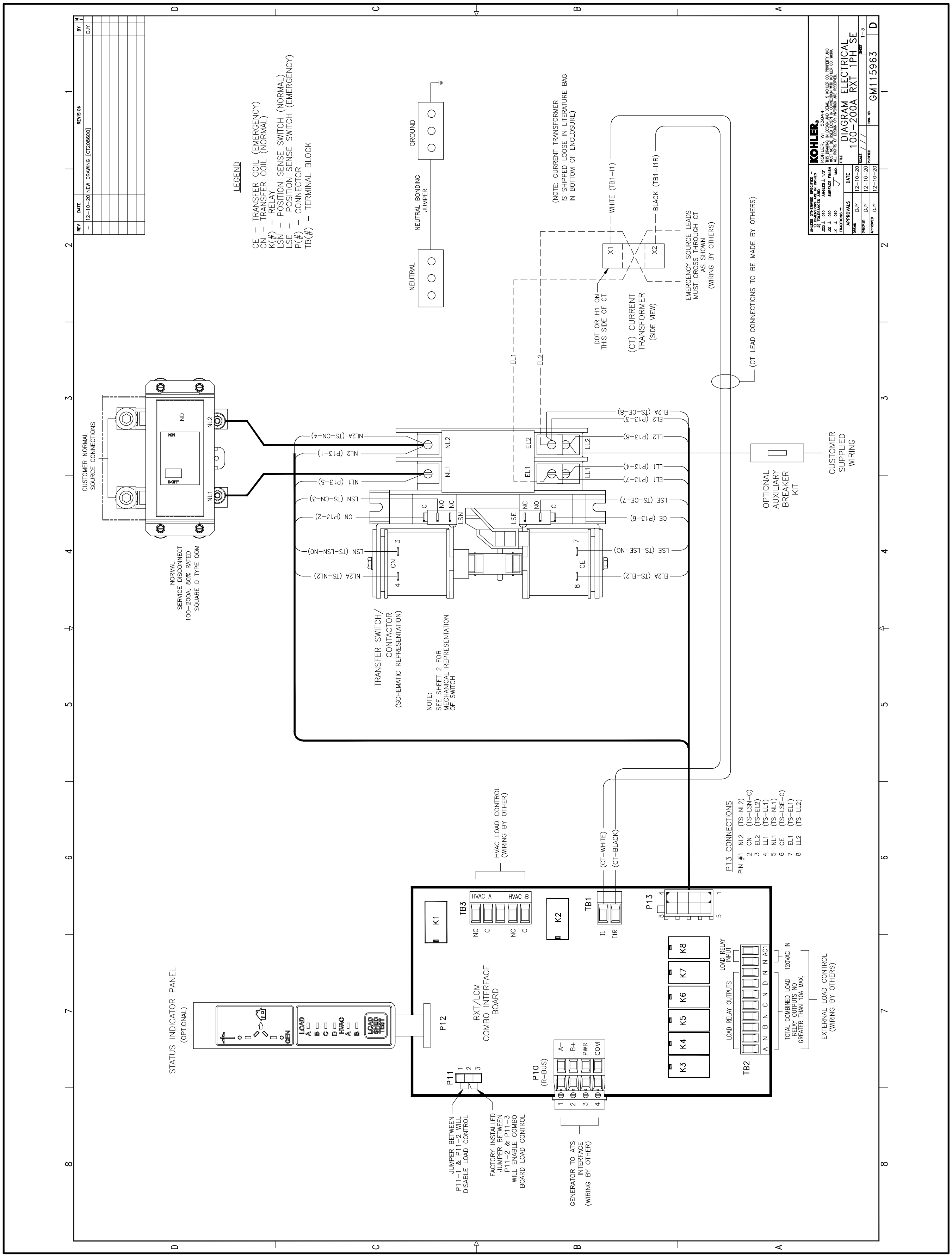


Figure 6-30 Schematic/Wiring Diagram, 100- 200 Amp Service Entrance, GM115963, Sheet 1

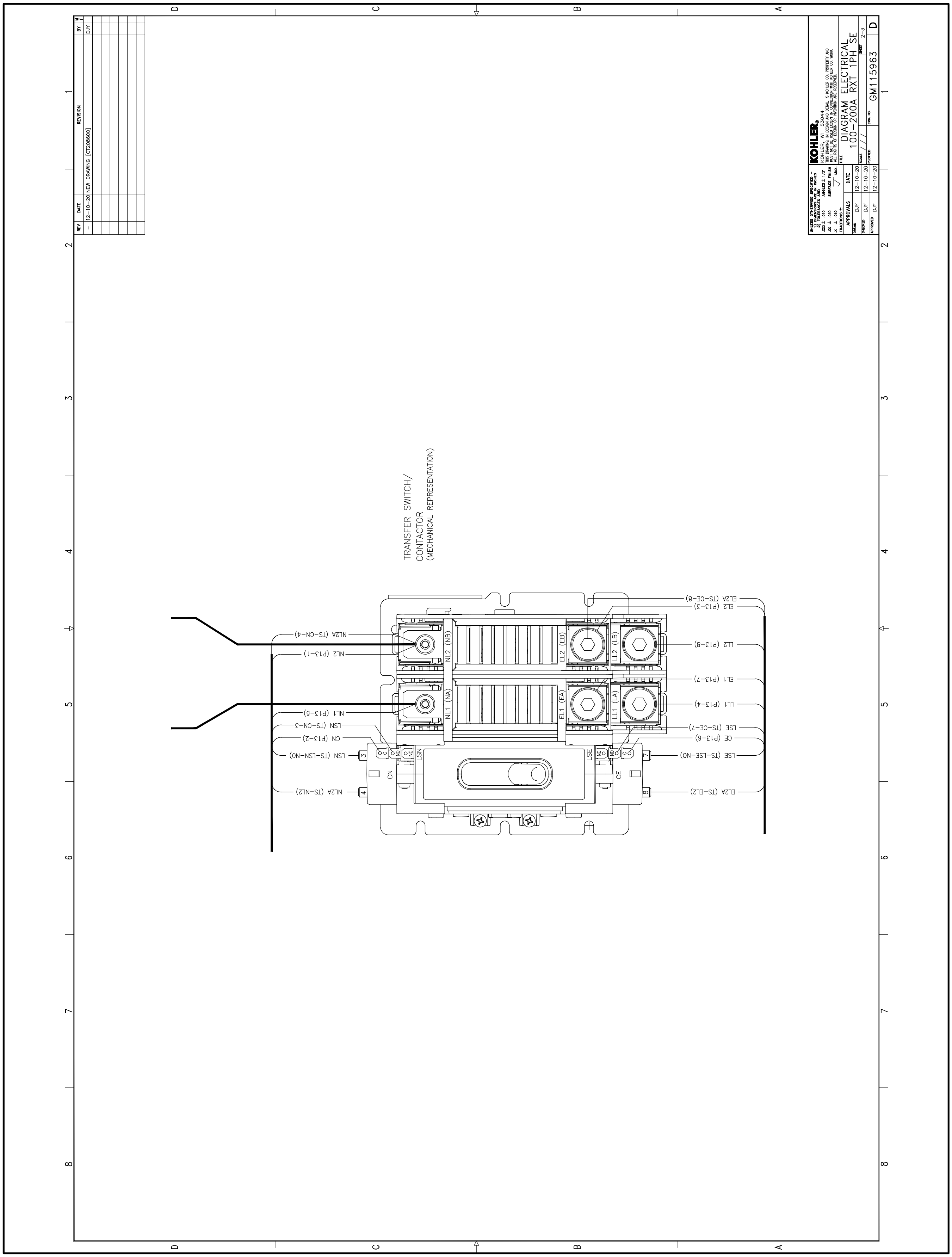


Figure 6-31 Schematic/Wiring Diagram, 100- 200 Amp Service Entrance, GM115963, Sheet 2

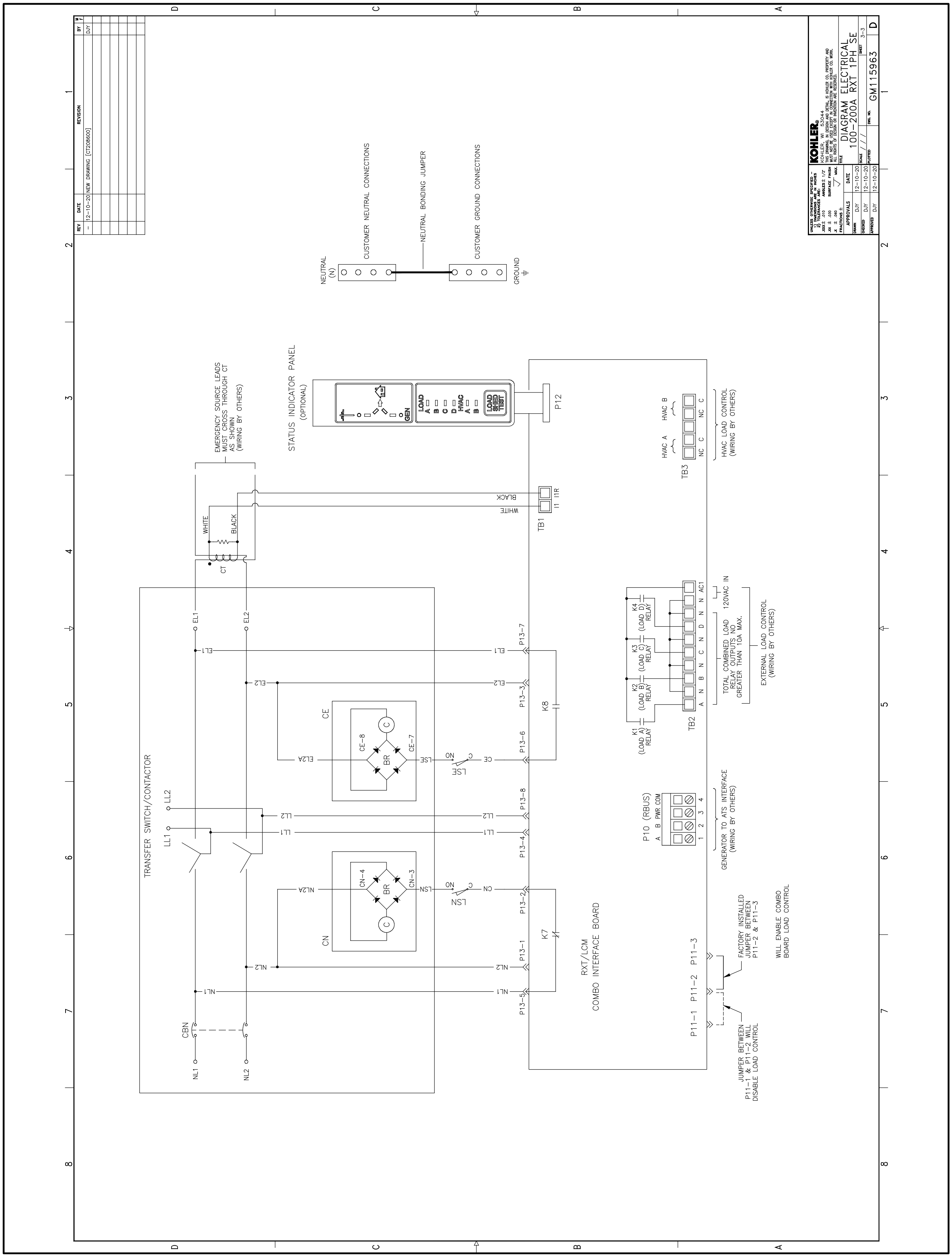


Figure 6-32 Schematic/Wiring Diagram, 100- 200 Amp Service Entrance, GM115963, Sheet 3

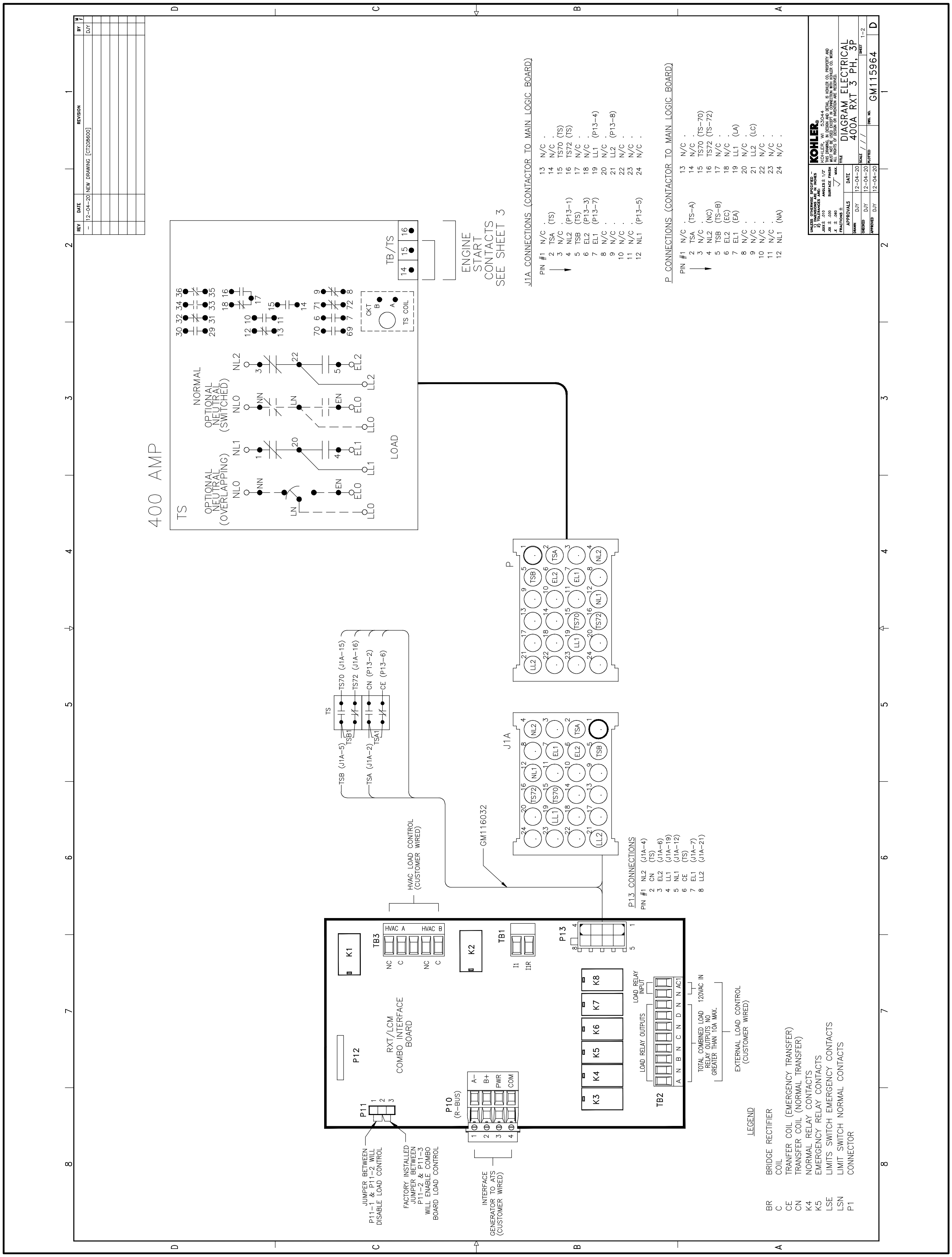


Figure 6-33 Wiring Diagram/Schematic, 400Amps, 3-Phase, 3-Pole, GM115964, Sheet 1

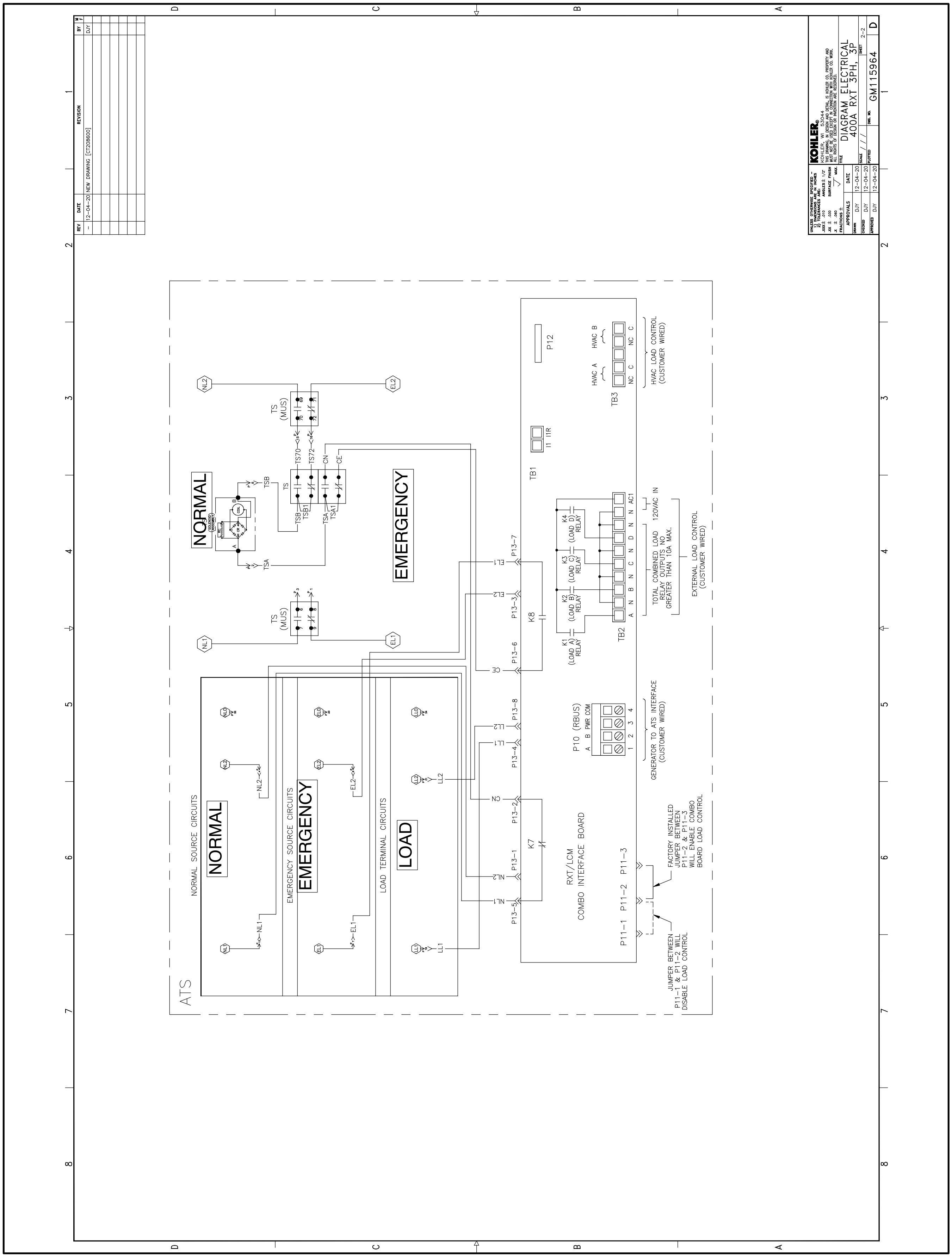


Figure 6-34 Wiring Diagram/Schematic, 400Amps, 3-Phase, 3-Pole, GM115964, Sheet 2

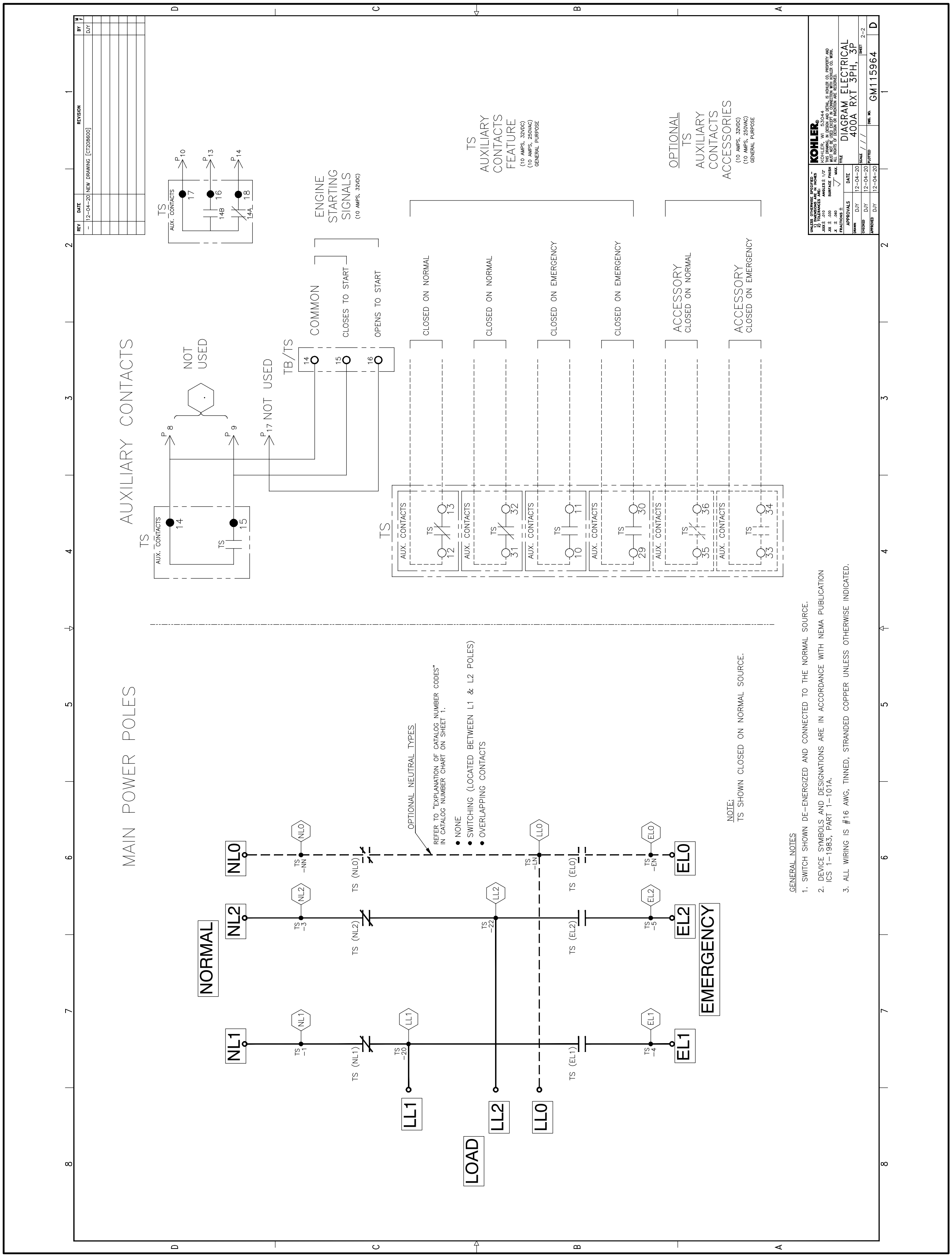


Figure 6-35 Wiring Diagram/Schematic, 400Amps, 3-Phase, 3-Pole GM115964, Sheet 3

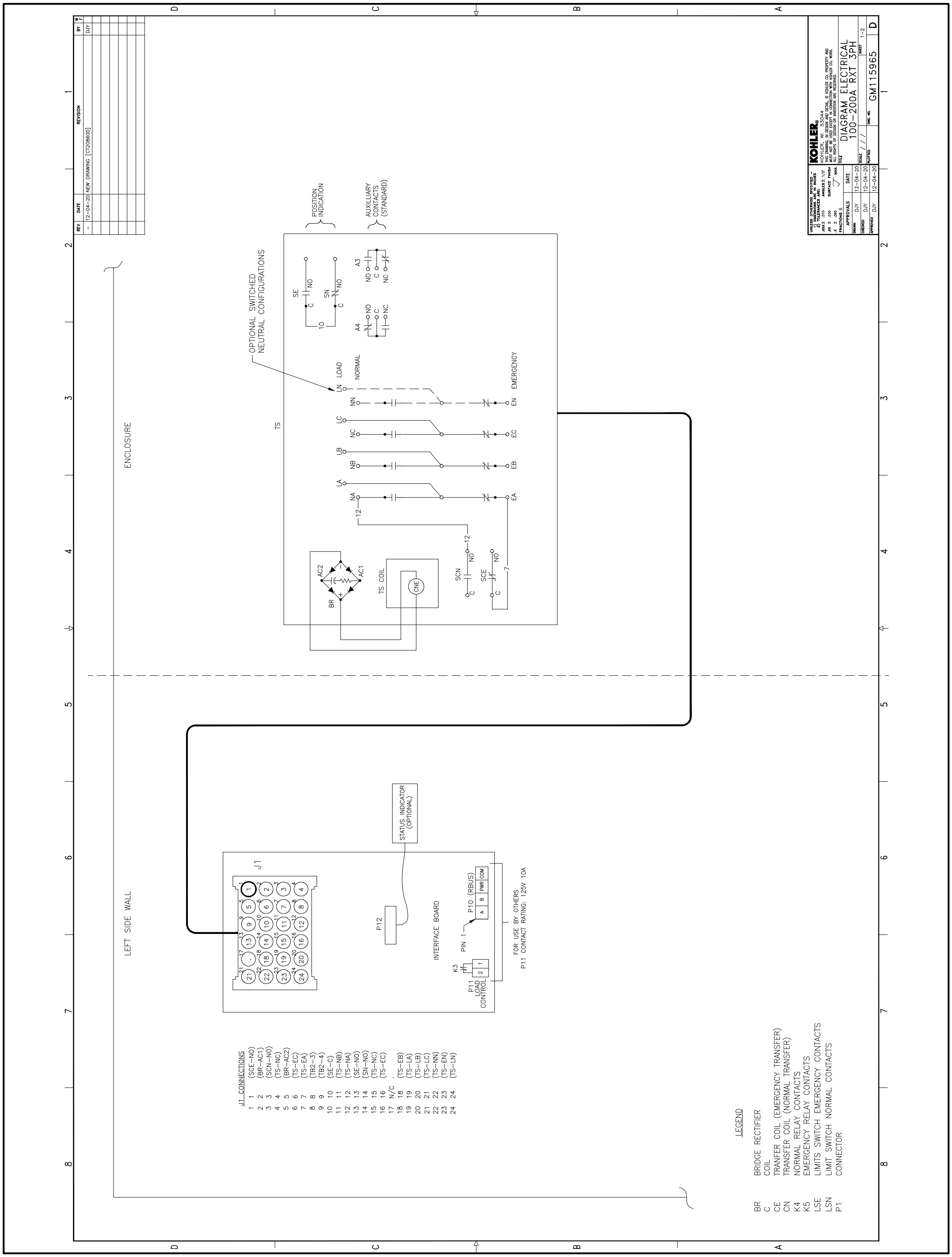


Figure 6-36 Wiring Diagram/Schematic, 100- 200 Amps, 3-Phase, GM115965, Sheet 1

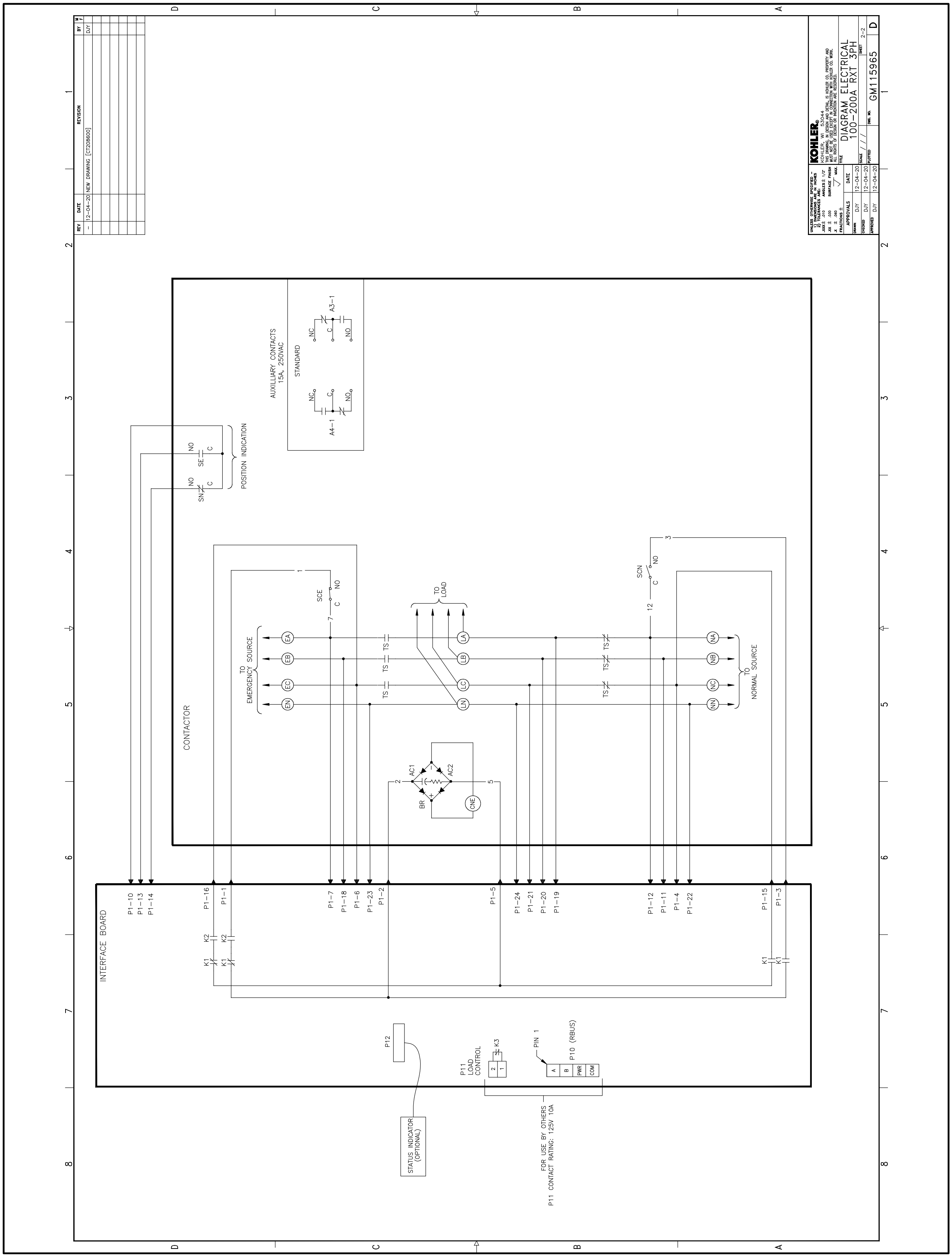


Figure 6-37 Wiring Diagram/Schematic, 100- 200 Amps, 3-Phase, GM115965, Sheet 2

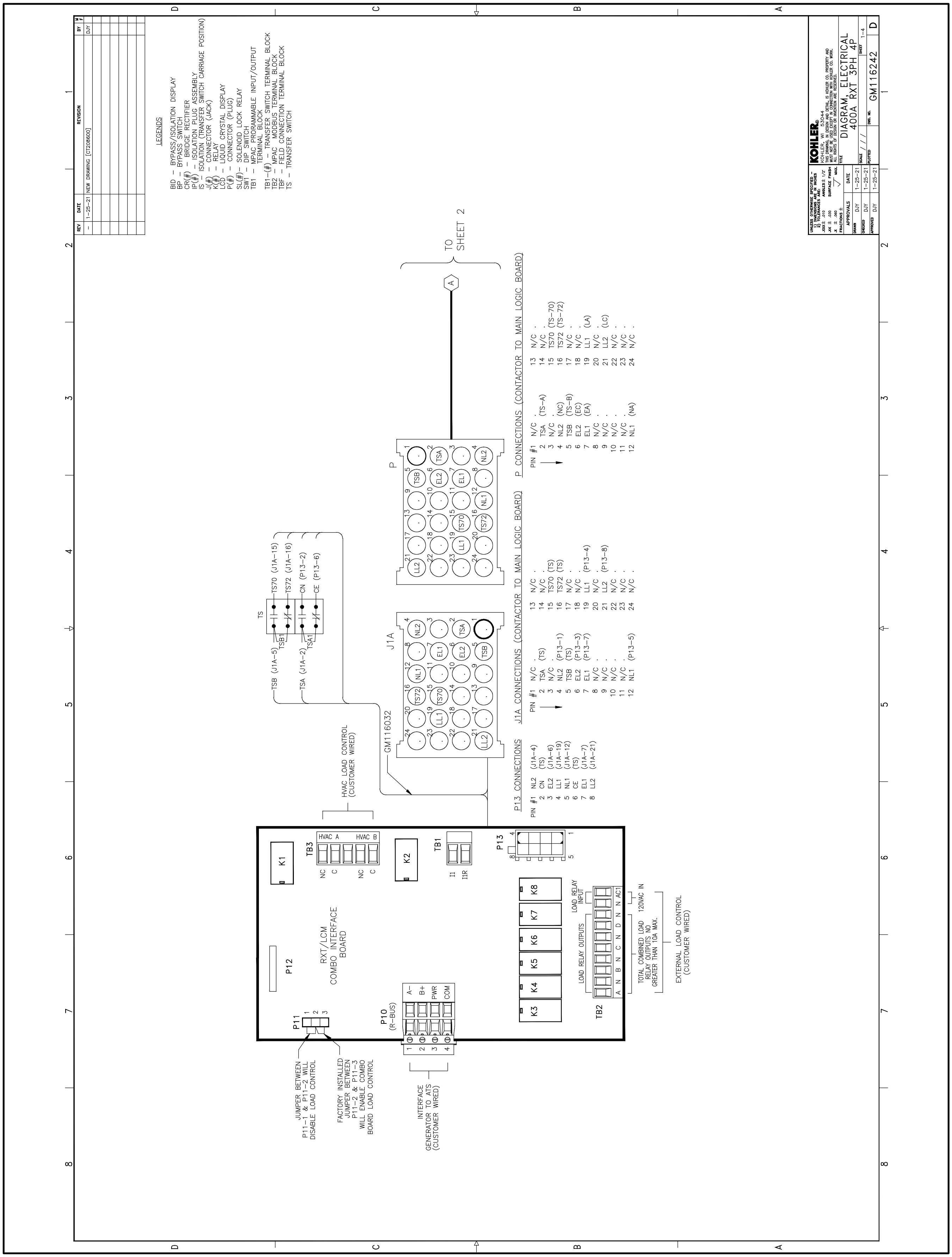


Figure 6-38 Wiring Diagram/Schematic, 400 Amps, 3-Phase, 4-Pole, GM116242, Sheet 1

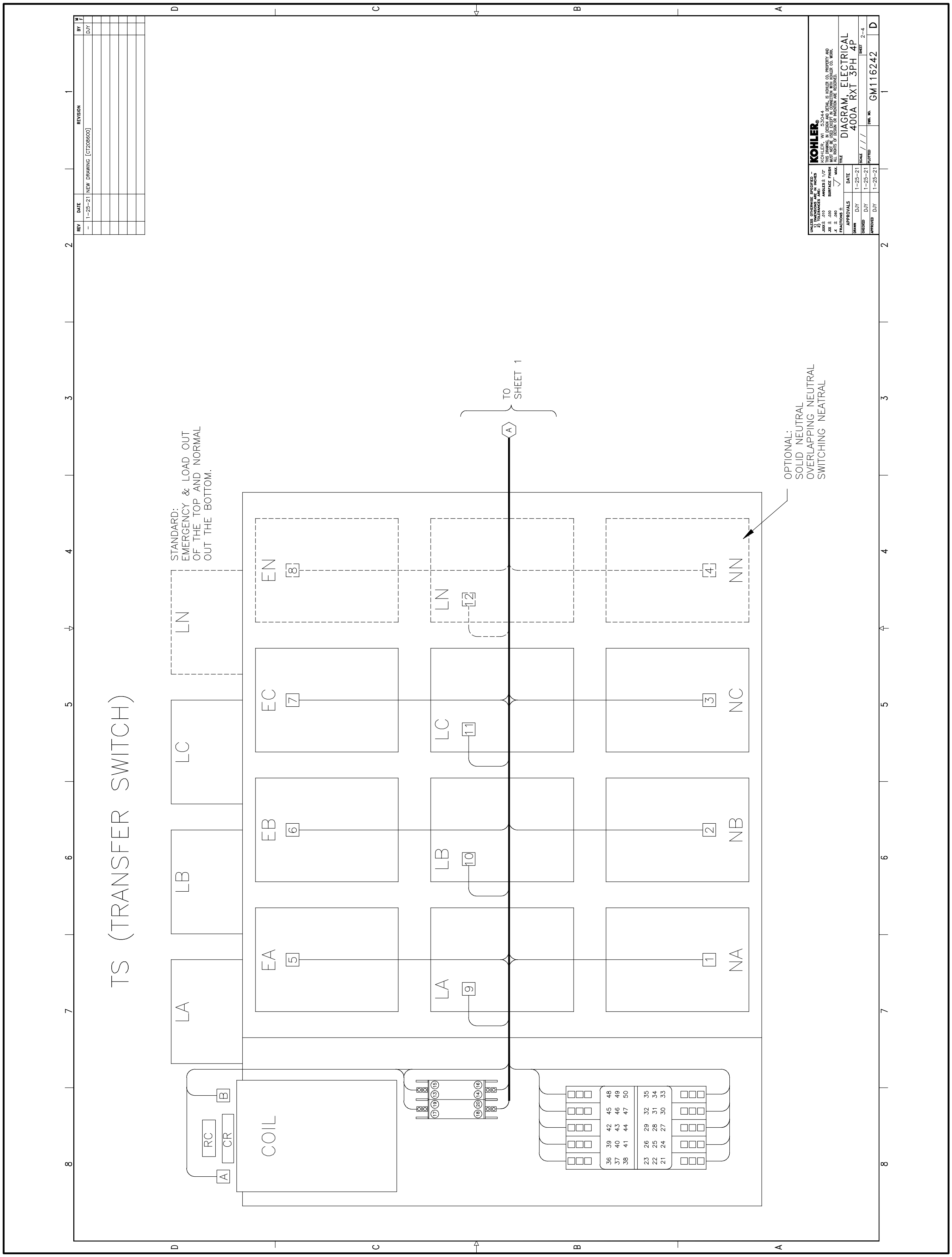


Figure 6-39 Wiring Diagram/Schematic, 400 Amps, 3-Phase, 4-Pole, GM116242, Sheet 2

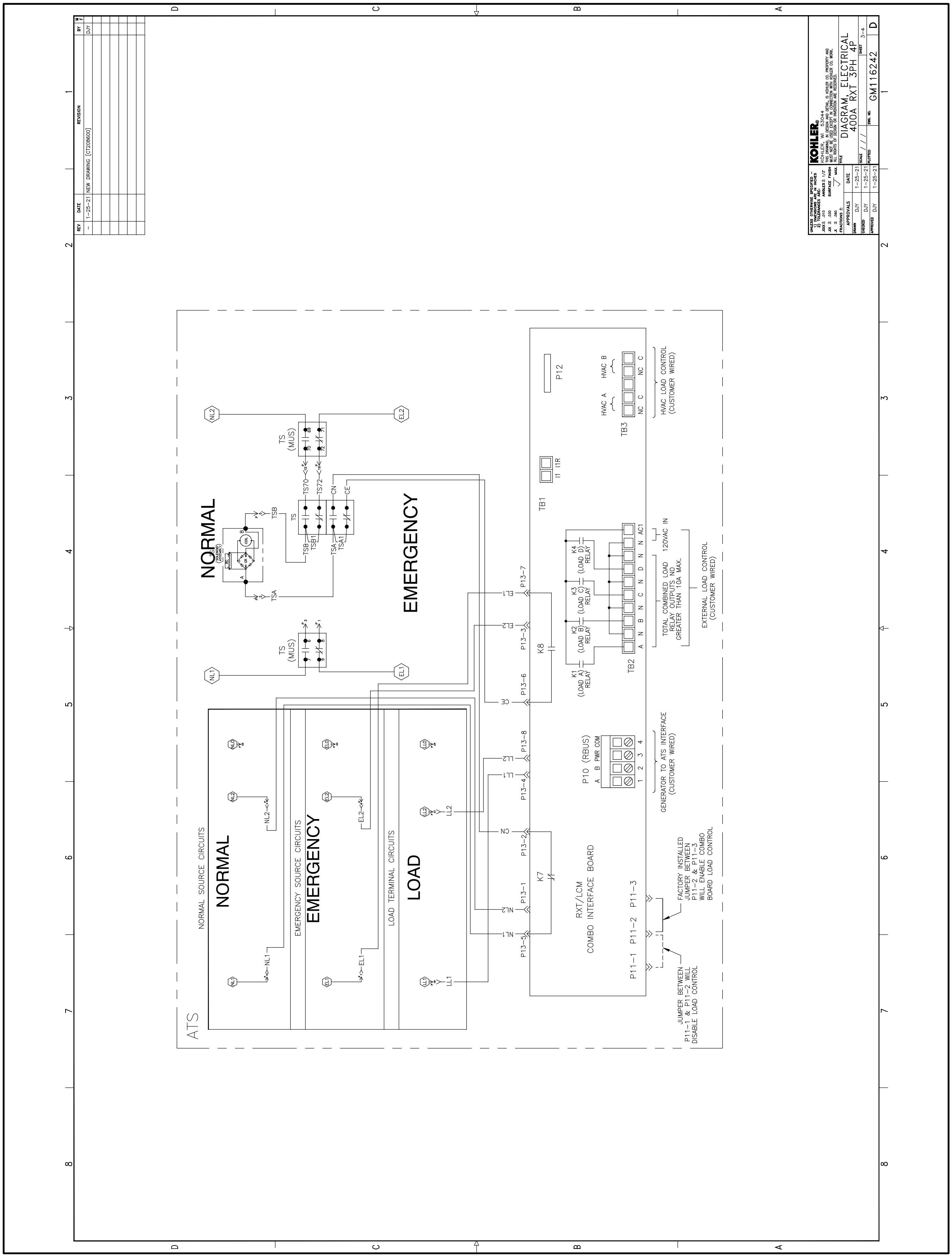


Figure 6-40 Wiring Diagram/Schematic, 400 Amps, 3-Phase, 4-Pole, GM116242, Sheet 3

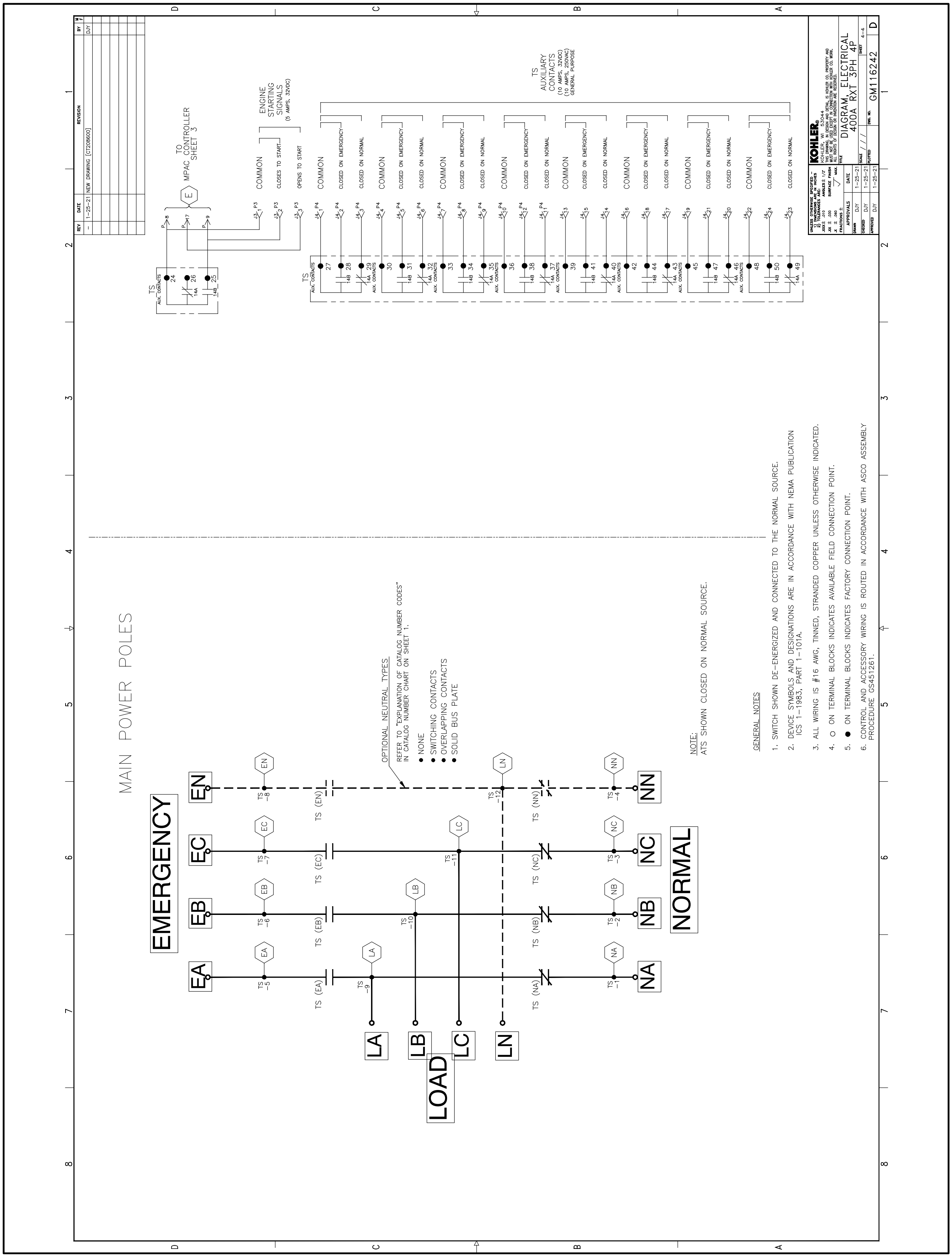


Figure 6-41 Wiring Diagram/Schematic, 400 Amps, 3-Phase, 4-Pole, GM116242, Sheet 4

Appendix A Abbreviations

The following list contains abbreviations that may appear in this publication.

A, amp	ampere
ABDC	after bottom dead center
AC	alternating current
A/D	analog to digital
ADC	advanced digital control; analog to digital converter
adj.	adjust, adjustment
ADV	advertising dimensional drawing
Ah	amp-hour
AHWT	anticipatory high water temperature
AISI	American Iron and Steel Institute
ALOP	anticipatory low oil pressure
alt.	alternator
Al	aluminum
ANSI	American National Standards Institute (formerly American Standards Association, ASA)
AO	anticipatory only
APDC	Air Pollution Control District
API	American Petroleum Institute
approx.	approximate, approximately
APU	Auxiliary Power Unit
AQMD	Air Quality Management District
AR	as required, as requested
AS	as supplied, as stated, as suggested
ASE	American Society of Engineers
ASME	American Society of Mechanical Engineers
assy.	assembly
ASTM	American Society for Testing Materials
ATDC	after top dead center
ATS	automatic transfer switch
auto.	automatic
aux.	auxiliary
avg.	average
AVR	automatic voltage regulator
AWG	American Wire Gauge
AWM	appliance wiring material
bat.	battery
BBDC	before bottom dead center
BC	battery charger, battery charging
BCA	battery charging alternator
BCI	Battery Council International
BDC	before dead center
BHP	brake horsepower
blk.	black (paint color), block (engine)
blk. htr.	block heater
BMEP	brake mean effective pressure
bps	bits per second
br.	brass
BTDC	before top dead center
Btu	British thermal unit
Btu/min.	British thermal units per minute
C	Celsius, centigrade
cal.	calorie
CAN	controller area network
CARB	California Air Resources Board
CAT5	Category 5 (network cable)
CB	circuit breaker
CC	crank cycle
cc	cubic centimeter
CCA	cold cranking amps
ccw.	counterclockwise
CEC	Canadian Electrical Code
cert.	certificate, certification, certified
cfh	cubic feet per hour
cfm	cubic feet per minute
CG	center of gravity
CID	cubic inch displacement
CL	centerline
cm	centimeter
CMOS	complementary metal oxide substrate (semiconductor)
com	communications (port)
coml	commercial
Coml/Rec	Commercial/Recreational
conn.	connection
cont.	continued
CPVC	chlorinated polyvinyl chloride
crit.	critical
CSA	Canadian Standards Association
CT	current transformer
Cu	copper
cUL	Canadian Underwriter's Laboratories
CUL	Canadian Underwriter's Laboratories
cu. in.	cubic inch
cw.	clockwise
CWC	city water-cooled
cyl.	cylinder
D/A	digital to analog
DAC	digital to analog converter
dB	decibel
dB(A)	decibel (A weighted)
DC	direct current
DCR	direct current resistance
deg., °	degree
dept.	department
dia.	diameter
DI/EO	dual inlet/end outlet
DIN	Deutsches Institut fur Normung e. V. (also Deutsche Industrie Normenausschuss)
DIP	dual inline package
DPDT	double-pole, double-throw
DPST	double-pole, single-throw
DS	disconnect switch
DVR	digital voltage regulator
E^2PROM, EEPROM	electrically-erasable programmable read-only memory
E, emer.	emergency (power source)
ECM	electronic control module, engine control module
EDI	electronic data interchange
EFR	emergency frequency relay
e.g.	for example (*exempli gratia)*
EG	electronic governor
EGSA	Electrical Generating Systems Association
EIA	Electronic Industries Association
EI/EO	end inlet/end outlet
EMI	electromagnetic interference
emiss.	emission
eng.	engine
EPA	Environmental Protection Agency
EPS	emergency power system
ER	emergency relay
ES	engineering special, engineered special
ESD	electrostatic discharge
est.	estimated
E-Stop	emergency stop
etc.	et cetera (and so forth)
exh.	exhaust
ext.	external
F	Fahrenheit, female
FHM	flat head machine (screw)
fl. oz.	fluid ounce
flex.	flexible
freq.	frequency
FS	full scale
ft.	foot, feet
ft. lb.	foot pounds (torque)
ft./min.	feet per minute
ftp	file transfer protocol
g	gram
ga.	gauge (meters, wire size)
gal.	gallon
gen.	generator
genset	generator set
GFI	ground fault interrupter
GND, ⏚	ground
gov.	governor
gph	gallons per hour
gpm	gallons per minute
gr.	grade, gross
GRD	equipment ground
gr. wt.	gross weight
H x W x D	height by width by depth
HC	hex cap
HCHT	high cylinder head temperature
HD	heavy duty
HET	high exhaust temp., high engine temp.
hex	hexagon
Hg	mercury (element)
HH	hex head
HHC	hex head cap
HP	horsepower
hr.	hour
HS	heat shrink
hsg.	housing
HVAC	heating, ventilation, and air conditioning
HWT	high water temperature
Hz	hertz (cycles per second)
IBC	International Building Code
IC	integrated circuit
ID	inside diameter, identification
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IMS	improved motor starting
in.	inch
in. H_2O	inches of water
in. Hg	inches of mercury
in. lb.	inch pounds
Inc.	incorporated
ind.	industrial
int.	internal
int./ext.	internal/external
I/O	input/output
IP	internet protocol
ISO	International Organization for Standardization
J	joule
JIS	Japanese Industry Standard
k	kilo (1000)
K	kelvin
kA	kiloampere
KB	kilobyte (2^{10} bytes)
KBus	Kohler communication protocol
kg	kilogram

kg/cm^2	kilograms per square centimeter
kgm	kilogram-meter
kg/m^3	kilograms per cubic meter
kHz	kilohertz
kJ	kilojoule
km	kilometer
kOhm, kΩ	kilo-ohm
kPa	kilopascal
kph	kilometers per hour
kV	kilovolt
kVA	kilovolt ampere
kVAR	kilovolt ampere reactive
kW	kilowatt
kWh	kilowatt-hour
kWm	kilowatt mechanical
kWth	kilowatt-thermal
L	liter
LAN	local area network
L x W x H	length by width by height
lb.	pound, pounds
lbm/ft^3	pounds mass per cubic feet
LCB	line circuit breaker
LCD	liquid crystal display
LED	light emitting diode
Lph	liters per hour
Lpm	liters per minute
LOP	low oil pressure
LP	liquefied petroleum
LPG	liquefied petroleum gas
LS	left side
L_{wa}	sound power level, A weighted
LWL	low water level
LWT	low water temperature
m	meter, milli (1/1000)
M	mega (10^6 when used with SI units), male
m^3	cubic meter
m^3/hr.	cubic meters per hour
m^3/min.	cubic meters per minute
mA	milliampere
man.	manual
max.	maximum
MB	megabyte (2^{20} bytes)
MCCB	molded-case circuit breaker
MCM	one thousand circular mils
meggar	megohmmeter
MHz	megahertz
mi.	mile
mil	one one-thousandth of an inch
min.	minimum, minute
misc.	miscellaneous
MJ	megajoule
mJ	millijoule
mm	millimeter
mOhm, mΩ	milliohm
MOhm, MΩ	megohm
MOV	metal oxide varistor
MPa	megapascal
mpg	miles per gallon
mph	miles per hour
MS	military standard
ms	millisecond
m/sec.	meters per second
mtg.	mounting
MTU	Motoren-und Turbinen-Union
MW	megawatt
mW	milliwatt
μF	microfarad
N, norm.	normal (power source)
NA	not available, not applicable
nat. gas	natural gas
NBS	National Bureau of Standards
NC	normally closed
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
Nm	newton meter
NO	normally open
no., nos.	number, numbers
NPS	National Pipe, Straight
NPSC	National Pipe, Straight-coupling
NPT	National Standard taper pipe thread per general use
NPTF	National Pipe, Taper-Fine
NR	not required, normal relay
ns	nanosecond
OC	overcrank
OD	outside diameter
OEM	original equipment manufacturer
OF	overfrequency
opt.	option, optional
OS	oversize, overspeed
OSHA	Occupational Safety and Health Administration
OV	overvoltage
oz.	ounce
p., pp.	page, pages
PC	personal computer
PCB	printed circuit board
pF	picofarad
PF	power factor
ph., ∅	phase
PHC	Phillips® head Crimptite® (screw)
PHH	Phillips® hex head (screw)
PHM	pan head machine (screw)
PLC	programmable logic control
PMG	permanent magnet generator
pot	potentiometer, potential
ppm	parts per million
PROM	programmable read-only memory
psi	pounds per square inch
psig	pounds per square inch gauge
pt.	pint
PTC	positive temperature coefficient
PTO	power takeoff
PVC	polyvinyl chloride
qt.	quart, quarts
qty.	quantity
R	replacement (emergency) power source
rad.	radiator, radius
RAM	random access memory
RBUS	RS-485 proprietary communications
RDO	relay driver output
ref.	reference
rem.	remote
Res/Coml	Residential/Commercial
RFI	radio frequency interference
RH	round head
RHM	round head machine (screw)
rly.	relay
rms	root mean square
rnd.	round
RO	read only
ROM	read only memory
rot.	rotate, rotating
rpm	revolutions per minute
RS	right side
RTDs	Resistance Temperature Detectors
RTU	remote terminal unit
RTV	room temperature vulcanization
RW	read/write
SAE	Society of Automotive Engineers
scfm	standard cubic feet per minute
SCR	silicon controlled rectifier
s, sec.	second
SI	*Systeme international d'unites,* International System of Units
SI/EO	side in/end out
sil.	silencer
SMTP	simple mail transfer protocol
SN	serial number
SNMP	simple network management protocol
SPDT	single-pole, double-throw
SPST	single-pole, single-throw
spec	specification
specs	specification(s)
sq.	square
sq. cm	square centimeter
sq. in.	square inch
SMS	short message service
SS	stainless steel
std.	standard
stl.	steel
tach.	tachometer
TB	terminal block
TCP	transmission control protocol
TD	time delay
TDC	top dead center
TDEC	time delay engine cooldown
TDEN	time delay emergency to normal
TDES	time delay engine start
TDNE	time delay normal to emergency
TDOE	time delay off to emergency
TDON	time delay off to normal
temp.	temperature
term.	terminal
THD	total harmonic distortion
TIF	telephone influence factor
tol.	tolerance
turbo.	turbocharger
typ.	typical (same in multiple locations)
UF	underfrequency
UHF	ultrahigh frequency
UIF	user interface
UL	Underwriter's Laboratories, Inc.
UNC	unified coarse thread (was NC)
UNF	unified fine thread (was NF)
univ.	universal
URL	uniform resource locator (web address)
US	undersize, underspeed
UV	ultraviolet, undervoltage
V	volt
VAC	volts alternating current
VAR	voltampere reactive
VDC	volts direct current
VFD	vacuum fluorescent display
VGA	video graphics adapter
VHF	very high frequency
W	watt
WCR	withstand and closing rating
w/	with
WO	write only
w/o	without
wt.	weight
xfmr	transformer

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Original Instructions (English)

KOHLER CO., Kohler, Wisconsin 53044
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales/service outlet in the
US and Canada, phone 1-800-544-2444
KOHLERPower.com