VTAC 9 AC Drive

Installation Instructions

Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. *Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls* (Publication SGI-1.1 available from your local Rockwell Automation sales office or online at **http://www.rockwellautomation.com/literature**) describes some important differences between solid state equipment and hard-wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary we use notes to make you aware of safety considerations.

WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

Important: Identifies information that is critical for successful application and understanding of the product.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

Shock Hazard labels may be located on or inside the equipment (e.g., drive or motor) to alert people that dangerous voltage may be present.

Burn Hazard labels may be located on or inside the equipment (e.g., drive or motor) to alert people that surfaces may be at dangerous temperatures.

Table of Contents

Overview

The purpose of this manual is to provide basic information needed to install, start-up and troubleshoot VTAC 9 Adjustable Frequency AC Drive Packages.

User documentation for the VTAC 9 Drive Packages includes these Installation Instructions and the VTAC 9 *User Manual*, Publication 9VT-UM001. Both manuals are required to properly install and operate the VTAC 9 Adjustable Frequency AC Drive Packages.

Who Should Use this Manual?

This manual is intended for qualified personnel. You must be able to program and operate Adjustable Frequency AC Drive devices. In addition, you must have an understanding of the parameter settings and functions.

What Is Not in this Manual

The VTAC 9 Adjustable Frequency AC Drive Packages *Installation Instructions* is designed to provide only basic installation and operation information. For this reason, the following topics have not been included:

- Specifications
- Troubleshooting
- Start-Up
- Programming and Parameters

Please refer to the VTAC 9 *User Manual* for detailed drive information.

Manual Conventions

- To help differentiate parameter names and LCD display text from other text, the following conventions will be used:
  - Parameter Names will appear in [brackets]. For example: [DC Bus Voltage].
  - Display Text will appear in “quotes.” For example: “Enabled.”
- The following words are used throughout the manual to describe an action:

Word	Meaning
Can	Possible, able to do something
Cannot	Not possible, not able to do something
May	Permitted, allowed
Must	Unavoidable, you must do this
Shall	Required and necessary
Should	Recommended
Should Not	Not recommended

General Precautions

ATTENTION: This drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference publication 8000-4.5.2, “Guarding Against Electrostatic Damage” or any other applicable ESD protection handbook.

ATTENTION: An incorrectly applied or installed drive can result in component damage or a reduction in product life. Wiring or application errors, such as, undersizing the motor, incorrect or inadequate AC supply, or excessive ambient temperatures may result in malfunction of the system.

ATTENTION: Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.

ATTENTION: To avoid an electric shock hazard, verify that the voltage on the bus capacitors has discharged before performing any work on the drive. Measure the voltage at the drive (Refer to the VTAC 9 *User Manual* for test point locations). The voltage must be zero.

Catalog Number Explanations

Main Input Disconnect Package *(Style A)*

The VTAC 9 Adjustable Frequency AC Drive Packages Style A catalog numbering scheme is shown below.

Position

9VT	–	50	4	1	H	0	N	–	A	3	0
a		*b*	*c*	*d*	*e*	*f*	*g*		*h*	*i*	*j*

a

Drive	
Code	Type
9VT	VTAC 9

b1

Horsepower Rating 208V, 60 Hz Input		
Code	Hp	Drive Frame
1	1	B
2	2	B
3	3	B
5	5	C
7	7.5	D
10	10	D
15	15	E
20	20	E
25	25	E
30	30	4
40	40	5

b2

Horsepower Rating 480V, 60 Hz Input		
Code	Hp	Drive Frame
1	1	B
2	2	B
3	3	B
5	5	B
7	7.5	C
10	10	C
15	15	D
20	20	D
25	25	D, 2
30	30	D, 3
40	40	E, 3
50	50	E, 3
60	60	4
75	75	5
100	100	5
125	125	6
150	150	6
200	200	6

c

Voltage Rating		
Code	Voltage	Phase
2	208V ac	3
4	480V ac	3

d

Enclosure	
Code	Enclosure
1	NEMA/UL Type 1
G ✶	NEMA/UL Type 12
E ✶❄✦	NEMA/UL Type 4/3R (Outdoor)

e

OIM	
Code	OIM
B	None
H	Drive mounted LCD OIM
P ‡	Enclosure Mounted LCD OIM
S §	Enclosure Mounted LCD OIM with UV Cover

f

Communications	
Code	Communications
0	None
B	BACnet
L	LonWorks
M	Modbus TCP/IP
R	RS-485 HVAC

g

Control		
Code	Control	Drive Frame
N	Standard	B, C, D, E
A	Standard	2, 3, 4, 5, 6

h

Option Enclosure	
Code	Option
A	Style A

i

Input Power	
Code	Option
1	Main Input Disc.
3	MID and Fuse
4 ?	Motor Protection Circuit Breaker

j

Reactor	
Code	Type
0	None
L ➢	DC Link Reactor
P ⌘	Input AC Line Reactor

✶ NEMA/UL Type 12 and 4/3R enclosures limited to 1…25 Hp @ 208V ac and 1…50 Hp @ 480V ac.

❄ NEMA/UL Type 4/3R (Outdoor) enclosure designed for 45°C ambient with **NO** direct sunlight. If installation will be in direct sunlight, field installed solar shield is required and ambient temperature is limited to 40°C.

‡ Enclosure mounted LCD OIM is only available with NEMA/UL Type 12 or 4/3R enclosures.

§ Enclosure mounted LCD OIM with UV cover is only available with NEMA/UL Type 4/3R enclosures.

? Circuit Breaker option only available with NEMA/UL Type 12 and 4/3R enclosures.

➢ DC Link Reactor option only available on 1…3 Hp @ 208V ac and 1…5 Hp @ 480V ac. When ordered, 208V ac ratings are supplied with 5 Hp drive with built in DC Reactor and 480V ac ratings are supplied with 7.5 Hp drive with built in DC Reactor.

⌘ Input AC Line Reactor option not available with all ratings. Please consult selection table for availability.

✦ NEMA/UL Type 4/3R enclosures include cabinet space heater.

Bypass Package *(Style B)*

The VTAC 9 Adjustable Frequency AC Drive Packages Style B catalog numbering scheme is shown below.

Position

9VT	–	50	4	1	H	0	N	–	B	3	0
a		*b*	*c*	*d*	*e*	*f*	*g*		*h*	*i*	*j*

a

Drive	
Code	Type
9VT	VTAC 9

b1

Horsepower Rating 208V, 60 Hz Input		
Code	Hp	Drive Frame
1	1	B
2	2	B
3	3	B
5	5	C
7	7.5	D
10	10	D
15	15	E
20	20	E
25	25	E
30	30	4
40	40	5

b2

Horsepower Rating 480V, 60 Hz Input		
Code	Hp	Drive Frame
1	1	B
2	2	B
3	3	B
5	5	B
7	7.5	C
10	10	C
15	15	D
20	20	D
25	25	D, 2
30	30	D, 3
40	40	E, 3
50	50	E, 3
60	60	4
75	75	5
100	100	5
125	125	6
150	150	6
200	200	6

c

Voltage Rating		
Code	Voltage	Phase
2	208V ac	3
4	480V ac	3

d

Enclosure	
Code	Enclosure
1	NEMA/UL Type 1
G ✶	NEMA/UL Type 12
E ✶❄✦	NEMA/UL Type 4/3R (Outdoor)

e

OIM	
Code	OIM
B	None
H	Drive Mounted LCD OIM
P ‡	Enclosure Mounted LCD OIM
S §	Enclosure Mounted LCD OIM with UV Cover

f

Communications	
Code	Communications
0	None
B	BACnet
L	LonWorks
M	Modbus TCP/IP
R	RS-485 HVAC

g

Control		
Code	Control	Drive Frame
N	Standard	B, C, D, E
A	Standard	2, 3, 4, 5, 6

h

Option Enclosure	
Code	Option
B	Style B (Bypass)

i

Input Power	
Code	Option
0 ❖	Terminal Block
1	Main Input Disc.
2	Fuse Only
3	MID and Fuse
4 ?	Motor Protection Circuit Breaker

j

Reactor	
Code	Type
0	None
L ➢	DC Link Reactor
P ⌘	Input AC Line Reactor

✶ NEMA/UL Type 12 and 4/3R enclosures limited to 1…25 Hp @ 208V ac and 1…50 Hp @ 480V ac.

❄ NEMA/UL Type 4/3R (Outdoor) enclosure designed for 45°C ambient with **NO** direct sunlight. If installation will be in direct sunlight, field installed solar shield is required and ambient temperature is limited to 40°C.

‡ Enclosure mounted LCD OIM is only available with NEMA/UL Type 12 or 4/3R enclosures.

§ Enclosure mounted LCD OIM with UV cover is only available with NEMA/UL Type 4/3R enclosures.

? Circuit Breaker option only available with NEMA/UL Type 12 and 4/3R enclosures.

➢ DC Link Reactor option only available on 1…3 Hp @ 208V ac and 1…5 Hp @ 480V ac. When ordered, 208V ac ratings are supplied with 5 Hp drive with built in DC Reactor and 480V ac ratings are supplied with 7.5 Hp drive with built in DC Reactor.

⌘ Input AC Line Reactor option not available with all ratings. Please consult selection table for availability.

✦ NEMA/UL Type 4/3R enclosures include cabinet space heater.

❖ Only available with NEMA/UL Type 1 enclosure.

Manual Bypass Package *(Style M)*

The VTAC 9 Adjustable Frequency AC Drive Packages Style M catalog numbering scheme is shown below.

Position

9VT	–	50	4	1	H	0	N	–	M	4	0
a		*b*	*c*	*d*	*e*	*f*	*g*		*h*	*i*	*j*

a

Drive	
Code	Type
9VT	VTAC 9

b1

Horsepower Rating 208V, 60 Hz Input		
Code	Hp	Drive Frame
1	1	B
2	2	B
3	3	B
5	5	C
7	7.5	D
10	10	D
15	15	E
20	20	E
25	25	E

b2

Horsepower Rating 480V, 60 Hz Input		
Code	Hp	Drive Frame
1	1	B
2	2	B
3	3	B
5	5	B
7	7.5	C
10	10	C
15	15	D
20	20	D
25	25	D, 2
30	30	D, 3
40	40	E, 3
50	50	E, 3
60	60	4
75	75	5
100	100	5

c

Voltage Rating		
Code	Voltage	Phase
2	208V ac	3
4	480V ac	3

d

Enclosure	
Code	Enclosure
1	NEMA Type 1

e

OIM	
Code	OIM
B	None
H	LCD OIM

f

Communications	
Code	Communications
0	None
B	BACnet
L	LonWorks
M	Modbus TCP/IP
R	RS-485 HVAC

g

Control		
Code	Control	Drive Frame
N	Standard	B, C, D, E
A	Standard	2, 3, 4, 5

h

Option Enclosure	
Code	Option
M	Manual Bypass

i

Input Power	
Code	Option
3 ✶	MID and Fuse
4 ❄	Motor Protector

✶ Main Input Disconnect and Fuse only available on ratings 60…100 Hp @ 480V ac.

❄ Motor Protector only available on ratings 1…25 @ 208V ac and 1…50 Hp @ 480V ac.

j

Reactor	
Code	Type
0	None
L ‡	DC Link Reactor

‡ DC Link Reactor option only available on 1…3 Hp @ 208V ac and 1…5 Hp @ 480V ac. When ordered, 208V ac ratings are supplied with 5 Hp drive with built in DC Reactor and 480V ac ratings are supplied with 7.5 Hp drive with built in DC Reactor.

Notes:

Main Input Disconnect Package *(Style A)*

Chapter Objectives

This chapter describes the features and operation for the Main Input Disconnect Package (Style A).

Hardware Overview

The Main Input Disconnect Package (Style A) combines an Adjustable Frequency AC Drive with a means for disconnecting input power within a single package. Input power is connected to the VTAC drive through a door interlocked fuse disconnect switch.

Main Disconnect Switch (DS1)

An Allen-Bradley Bulletin 194R Fused Disconnect Switch with lockable rotary mounted operator handle is provided. The disconnect switch is designed to meet disconnect switch requirements for branch circuit protection. The door mounted handle accepts up to three (3) padlocks.

Optional Hardware

Main Fuses (FU1-FU3)

ATTENTION: Most codes require that upstream branch circuit protection be provided to protect input power wiring. Install the fuses recommended in Table 1.A. Do not exceed the fuse ratings. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Input line branch circuit protection fuses must be used to protect the input power lines. If input fuses are not provided with your drive, recommended fuse values are shown in Table 1.A. The input fuse ratings listed in Table 1.A are applicable for one drive per branch circuit. No other load may be applied to that fused circuit.

The recommended fuse type for all VTAC 9 Drive Packages is UL Class J.

Table 1.A Fuse Recommendations

Drive Rating		Fuse Rating
Input Voltage	**HP**	**Amps**
208V AC – 3-Phase	1	10
	2	15
	3	20
	5	20
	7.5	35
	10	40
	15	80
	20	100
	25	125
	30	150
	40	200
460V AC – 3-Phase	1	6
	2	10
	3	10
	5	15
	7.5	20
	10	20
	15	35
	20	35
	25	60
	30	70
	40	80
	50	100
	60	150
	75	175
	100	200
	125	250
	150	350
	200	400

Electrical Installation

Input Power Wiring

Refer to the VTAC 9 *User Manual* for additional detailed information about input power wiring recommendations and selection.

ATTENTION: Protect the contents of the options cabinet from metal chips and other debris while drilling the conduit openings. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

ATTENTION: Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

To connect AC input power to the drive package:

❑ **1.** Select the proper wire size according to NEC and all applicable local codes and standards. Note that you must punch openings in the Option Cabinet of the desired conduit size, following NEC and all applicable local codes and standards. Power terminal block specifications are listed in Table 1.B.

❑ **2.** Connect the three-phase AC input power leads (three-wire VAC) to the appropriate terminals. Connect the AC input power leads to terminals L1, L2, L3 on the fused disconnect switch.

❑ **3.** Tighten the AC input terminal power terminals to the proper torque according to drive type as shown in Table 1.B.

Table 1.B AC Input Power Terminal Block Specifications

Voltage Rating	Drive Frame	HP	Maximum Wire Size(1)	Minimum Wire Size	Recommended Torque
208V AC	B, C	1…5	8 AWG	14 AWG	35 lb.-in.
	D	7.5…10	4 AWG	14 AWG	35 lb.-in.
	D, E	15…20	2 AWG	14 AWG	155 lb.-in.
	E, 4, 5	25…40	250 MCM	6 AWG	275 lb.-in.
460V AC	B, C	1…10	8 AWG	14 AWG	35 lb.-in.
	D, 2	15…25	4 AWG	14 AWG	35 lb.-in.
	D, E, 3	30…50	2 AWG	14 AWG	155 lb.-in.
	4, 5	60…100	250 MCM	6 AWG	275 lb.-in.
	6	125…200	(2) 350 MCM	(2) 6 AWG	275 lb.-in.

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations. If national or local codes require sizes outside the range, lugs may be used.

Output Power Wiring

Refer to the VTAC 9 *User Manual* for additional detailed information about output power wiring recommendations and selection.

ATTENTION: Unused wires in conduit must be grounded at both ends to avoid a possible shock hazard caused by induced voltages. Also, if a drive sharing a conduit is being serviced or installed, all drives using this conduit should be disabled to eliminate the possible shock hazard from cross-coupled motor leads. Failure to observe these precautions could result in bodily injury.

ATTENTION: Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

To connect AC output power wiring from the drive to the motor:

❑ **1.** Wire the three-phase AC output power motor leads by routing them according to the drive option type. Note that you must punch openings in the option cabinet of the desired conduit size, following NEC and all applicable local codes and standards. Power terminal block specifications are listed in Table 1.C.

Do not route more than three sets of motor leads through a single conduit. This will minimize cross-talk that could reduce the effectiveness of noise reduction methods. If more than three drive/motor connections per conduit are required, shielded cable must be used. If possible, each conduit should contain only one set of motor leads.

❑ **2.** Connect the three-phase AC output power motor leads to terminals U, V, W (T1, T2, T3) on the power terminal block located on the drive.

❑ **3.** Tighten the three-phase AC output power terminals to the proper torque according to drive type as shown in Table 1.C.

Table 1.C AC Output Power Terminal Block Specifications

Voltage Rating	Drive Frame	HP	Maximum Wire Size(1)	Minimum Wire Size	Recommended Torque
208V AC	B, C	1…5	12 AWG	22 AWG	5 lb.-in.
	D	7.5…15	8 AWG	18 AWG	12 lb.-in.
	E	20…25	3 AWG	14 AWG	24 lb.-in.
	4	30	1/0 AWG	8 AWG	35 lb.-in.
	5	40	1/0 AWG	14 AWG	Refer to Drive Label

Voltage Rating	Drive Frame	HP	Maximum Wire Size[1]	Minimum Wire Size	Recommended Torque
460V AC	B, C	1…10	12 AWG	22 AWG	5 lb.-in.
	D	7.5…30	8 AWG	18 AWG	12 lb.-in.
	E	40…50	3 AWG	14 AWG	24 lb.-in.
	2	25	6 AWG	18 AWG	12 lb.-in.
	3	30…50	3 AWG	14 AWG	16 lb.-in.
	4	60	1/0 AWG	8 AWG	35 lb.-in.
	5	75	1/0 AWG	14 AWG	Refer to Drive Label
	5	100	2/0 AWG	4 AWG	Refer to Drive Label
	6	125…200	4/0 AWG	14 AWG	52 lb.-in.

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations. If national or local codes require sizes outside the range, lugs may be used.

Control and Signal Wiring

Refer to the VTAC 9 *User Manual* for additional detailed information about control and signal wiring.

The Control I/O Terminal Block located on the drive provides terminals for interfacing customer supplied control inputs and outputs. All analog and discrete control wiring will be made at these terminals. Typical customer control and signal wiring is shown on the Inter-Connect Drawings Figure 1.7 and Figure 1.8.

To connect control and signal wiring to the drive package:

❑ **1.** Wire the control and signal leads by routing them according to the drive option type. Note that you must punch openings in the option cabinet of the desired conduit size, following NEC and all applicable local codes and standards. I/O terminal block specifications are listed in Table 1.D.

Control and signal wires should be separated from power wires by at least 0.3 meters (1 foot).

❑ **2.** Connect the control and signal wiring to the I/O terminals located on the drive.

❑ **3.** Tighten the I/O terminals to the proper torque according to drive type as shown in Table 1.D.

Table 1.D I/O Terminal Block Specifications

Voltage Rating	Drive Frame	HP	Maximum Wire Size[1]	Minimum Wire Size	Recommended Torque
All	B, C, D, E	All	16 AWG	30 AWG	4.4 lb.-in.
	2, 3, 4, 5, 6	All	14 AWG	22 AWG	5.2 lb.-in.

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations. If national or local codes require sizes outside the range, lugs may be used.

Alternate Customer Connection Considerations

A “Freeze/Fire Stat” input is typically connected to terminals T31-T33. Factory default parameter settings cause the drive to fault on an F2 “Function Loss” if the “Freeze/Fire Stat” input opens or if there is a momentary loss of power to the drive. A manual reset to restart is required once the input closes or power is restored.

To restart the drive automatically when the “Freeze/Fire Stat” input closes or power is restored, the F2 “Function Loss” fault can be automatically cleared by one of the following methos.

1. Jumper I/O Terminals 2 (Clear Faults) and 3 (Function Loss) on drives with 26 terminals (Frames B…E) or jumper I/O Terminals 28 (Clear Faults) and 29 (Function Loss) on drives with 32 terminals (Frames 2…6).

2. Set parameter 363 [Digital In3 Sel] to option 1 “Enable” which will start the drive on an enable command if the “Freeze/Fire Stat” input is closed and a Run or Start digital input is present.

If a purge command is intended to follow a “Freeze/Fire Stat” input trip/reset without requiring a manual reset to restart, the above alternate customer connections should be used.

Parameter Defaults Main Input Disconnect Package *(Style A)*

Parameter Name	Number	Default
Output Freq	001	Read Only
Commanded Freq	002	Read Only
Output Current	003	Read Only
Torque Current	004	Read Only
Flux Current	005	Read Only
Output Voltage	006	Read Only
Output Power	007	Read Only
Output Powr Fctr	008	Read Only
Elapsed MWh	009	Read Only
Elapsed Run Time	010	Read Only
MOP Frequency	011	Read Only
DC Bus Voltage	012	Read Only
DC Bus Memory	013	Read Only
Analog In1 Value	016	Read Only
Analog In2 Value	017	Read Only
Rated kW	026	Read Only
Rated Volts	027	Read Only
Rated Amps	028	Read Only
Control SW Ver	029	Read Only
Motor Type	040	0 “Induction”
Motor NP Volts	041	Drive Rating Based
Motor NP FLA	042	Drive Rating Based
Motor NP Hertz	043	60 Hz
Motor NP RPM	044	1740 RPM
Motor NP Power	045	Drive Rating Based
Mtr NP Pwr Units	046	Drive Rating Based
Motor OL Hertz	047	Motor NP Hz/3
Motor OL Factor	048	1.00
Torque Perf Mode	053	3 “Fan/Pmp V/Hz”
Maximum Voltage	054	Drive Rated Volts
Maximum Freq	055	130.0 Hz
Compensation	056	xxxxxxxxxxxx011
Flux Up Mode	057	0 “Manual”
Flux Up Time	058	0.00 Secs
SV Boost Filter	059	500
Autotune	061	3 “Calculate”
IR Voltage Drop	062	[Motor NP Volts] x 0.25
Flux Current Ref	063	Drive Rating Based
Ixo Voltage Drop	064	Drive Rating Based
Start/Acc Boost	069	[Motor NP Volts] x 0.25
Run Boost	070	[Motor NP Volts] x 0.25
Break Voltage	071	[Motor NP Volts] x 0.25
Break Frequency	072	[Motor NP Hertz] x 0.25
Speed Mode	080	0 “Open Loop”
Minimum Speed	081	0.0 Hz
Maximum Speed	082	60.0 Hz
Overspeed Limit	083	10.0 Hz
Skip Frequency 1	084	0.0 Hz
Skip Frequency 2	085	0.0 Hz
Skip Frequency 3	086	0.0 Hz
Skip Freq Band	087	1.0 Hz
Logic Source Sel	089[1]	1 “Local OIM”
Speed Ref A Sel	090[1]	1 “Analog In 1”
Speed Ref A Hi	091	[Maximum Speed]
Speed Ref A Lo	092	0.0 Hz
TB Man Ref Sel	096	1 “Analog In 1”
TB Man Ref Hi	097	[Maximum Speed]
TB Man Ref Lo	098	0.0 Hz
Preset Speed 1	101	5.0 Hz
Preset Speed 2	102	10.0 Hz
Preset Speed 3	103	20.0 Hz
Preset Speed 4	104	30.0 Hz
Preset Speed 5	105	40.0 Hz
Preset Speed 6	106	50.0 Hz
Purge Speed	107	5.0 Hz
Trim In Select	117	2 “Analog In 2”
Trim Out Select	118	xxxxxxxxxxxx000
Trim Hi	119	60.0 Hz
Trim Lo	120	0.0 Hz
Slip RPM @ FLA	121	Based on [Motor NP RPM]
Slip Comp Gain	122	40.0
Slip RPM Meter	123	Read Only
PI Configuration	124	xxxxxxxx00000000
PI Control	125	xxxxxxxxxxxx000
PI Reference Sel	126	0 “PI Setpoint”
PI Setpoint	127	50.00%
PI Feedback Sel	128	2 “Analog In 2”
PI Integral Time	129	2.00 Secs
PI Prop Gain	130	1.00
PI Lower Limit	131	–[Maximum Freq]
PI Upper Limit	132	+[Maximum Freq]
PI Preload	133	0.0 Hz
PI Status	134	xxxxxxxxxxx0000
PI Ref Meter	135	Read Only
PI Fdback Meter	136	Read Only
PI Error Meter	137	Read Only
PI Output Meter	138	Read Only
Accel Time 1	140	20.0 Secs
Accel Time 2	141	20.0 Secs
Decel Time 1	142	20.0 Secs
Decel Time 2	143	20.0 Secs
S Curve %	146	20%
Current Lmt Sel	147	0 “Cur Lim Val”
Current Lmt Val	148	[Rated Amps] x 1.5
Current Lmt Gain	149	200
Drive OL Mode	150	3 “Both–PWM 1st”
CarrierFrequency	151	4 kHz
Stop Mode A	155	0 “Coast”
Stop Mode B	156	1 “Ramp”
DC Brake Lvl Sel	157	0 “DC Brake Lvl”
DC Brake Level	158	[Rated Amps]
DC Brake Time	159	0.0 Secs
Bus Reg Ki	160	450
Bus Reg Mode A	161	1 “Adjust Freq”
Bus Reg Mode B	162	0 “Disabled”
DB Resistor Type	163	0 “Internal Res”
Bus Reg Kp	164	1200
Bus Reg Kd	165	1000
LevelSense Start	168	1 “Enabled”

Parameter Name	Number	Default
Flying Start En	169	1 “Enabled”
Flying StartGain	170	4000
Auto Rstrt Tries	174	0
Auto Rstrt Delay	175	30.0 Secs
Sleep Wake Mode	178	0 “Disabled”
Sleep Wake Ref	179	2 “Analog In 2”
Wake Level	180	6.000 mA, 6.000 Volts
Wake Time	181	1.0 Secs
Sleep Level	182	5.000 mA, 5.000 Volts
Sleep Time	183	1.0 Secs
Power Loss Mode	184	0 “Coast”
Power Loss Time	185	0.5 Secs
Power Loss Level	186	0.0 VDC
Direction Mode	190	2 “Reverse Dis”
Save OIM Ref	192	xxxxxxxxxxxxxx1
Man Ref Preload	193	0 “Disabled”
Save MOP Ref	194	xxxxxxxxxxxxx01
MOP Rate	195	1.0 Hz/s
Param Access Lvl	196	Read Only
Reset To Defalts	197	0 “Ready”
Load Frm Usr Set	198	0 “Ready”
Save To User Set	199	0 “Ready”
Reset Meters	200	0 “Ready”
Language	201	0 “Not Selected”
Voltage Class	202	Based on Drive Cat. No.
Drive Checksum	203	Read Only
Drive Status 1	209	0000111000001100
Drive Status 2	210	xx000000x0000000
Drive Alarm 1	211	xxxxx0000x000000
Drive Alarm 2	212	xx00000000000000
Speed Ref Source	213	Read Only
Start Inhibits	214	Read Only
Last Stop Source	215	Read Only
Dig In Status	216	xxxxxxxxxx000000
Dig Out Status	217	xxxxxxxxxxxxxx00
Drive Temp	218	Read Only
Drive OL Count	219	Read Only
Motor OL Count	220	Read Only
Fault Frequency	224	Read Only
Fault Amps	225	Read Only
Fault Bus Volts	226	Read Only
Status 1 @ Fault	227	Read Only
Status 2 @ Fault	228	Read Only
Alarm 1 @ Fault	229	Read Only
Alarm 2 @ Fault	230	Read Only
Testpoint 1 Sel	234	499
Testpoint 1 Data	235	Read Only
Testpoint 2 Sel	236	499
Testpoint 2 Data	237	Read Only
Fault Config 1	238	xxxxxxxxx1001x10
Fault Clear	240	0 “Ready”
Fault Clear Mode	241	1 “Enabled”
Power Up Marker	242	Read Only
Alarm Config 1	259	xxxxx0111x11x111
Drive Logic Rslt	271	Read Only
Drive Ref Rslt	272	Read Only
Drive Ramp Rslt	273	Read Only
Manual Mask	286	xxxxxxxxxx1x1111

Parameter Name	Number	Default
Stop Owner	288	Read Only
Manual Owner	298	xxxxxxxxxx0x0000
Data In A1	300	0 “Disabled”
Data In A2	301	0 “Disabled”
Data In B1	302	0 “Disabled”
Data In B2	303	0 “Disabled”
Data In C1	304	0 “Disabled”
Data In C2	305	0 “Disabled”
Data In D1	306	0 “Disabled”
Data In D2	307	0 “Disabled”
Data Out A1	310	0 “Disabled”
Data Out A2	311	0 “Disabled”
Data Out B1	312	0 “Disabled”
Data Out B2	313	0 “Disabled”
Data Out C1	314	0 “Disabled”
Data Out C2	315	0 “Disabled”
Data Out D1	316	0 “Disabled”
Data Out D2	317	0 “Disabled”
Anlg In Config	320	xxxxxxxxxxxxx01
Anlg In Sqr Root	321	xxxxxxxxxxxxx00
Analog In 1 Hi	322	20.000 mA
Analog In 1 Lo	323	4.000 mA
Analog In 1 Loss	324	0 “Disabled”
Analog In 2 Hi	325	10.000 Volt
Analog In 2 Lo	326	0.000 Volt
Analog In 2 Loss	327	0 “Disabled”
Anlg Out Config	340	xxxxxxxxxxxxxx0
Anlg Out Absolut	341	xxxxxxxxxxxxxx1
Analog Out1 Sel	342	0 “Output Freq”
Analog Out1 Hi	343	10.000 Volts/20.000 mA
Analog Out1 Lo	344	0.000 Volts/4.000 mA
Digital In1 Sel	361	7 “Run”
Digital In2 Sel	362	2 “Clear Fault”
Digital In3 Sel	363	3 “Function Loss”
Digital In4 Sel	364	1 “Enable”
Digital In5 Sel	365	25 “OIM Control”
Digital In6 Sel	366	31 “Purge”
Dig Out1 Sel	380	1 “Fault”
Dig Out1 Level	381	0.0
Dig Out1 OnTime	382	0.00 Secs
Dig Out1 OffTime	383	0.00 Secs
Dig Out2 Sel	384	4 “Run”
Dig Out2 Level	385	0.00
Dig Out2 OnTime	386	0.00 Secs
Dig Out2 OffTime	387	0.00 Secs

(1) For enclosure mounted NEMA/UL Type 1 OIM’s using bezel kit number VT-REBZL-N1, set P089 [Logic Source Select] to 3 “DPI Port 3” and P090 [Speed Ref A Sel] to 20 “DPI Port 3.”
For enclosure mounted NEMA/UL Type 4/12 OIM’s, kit number VT-RE4ALCDH, set P089 [Logic Source Select] to 2 “DPI Port 2” and P090 [Speed Ref A Sel] to 19 “DPI Port 2.”

Drawing Index

208V AC – Main Input Disconnect Drive Packages (Style A)

208V AC – NEMA/UL Type 1

Input Voltage	HP	Input Line Reactor	Drawing							
			Schematic	*Page*	Inter-Connect	*Page*	Layout	*Page*	Outline	*Page*
208V AC	1		98D01594	1-13	97D01600	1-19	95D01641	1-21	95D01606	1-52
	2		98D01594	1-13	97D01600	1-19	95D01641	1-21	95D01606	1-52
	3		98D01594	1-13	97D01600	1-19	95D01641	1-21	95D01606	1-52
	5		98D01594	1-13	97D01600	1-19	95D01642	1-22	95D01607	1-53
	7.5		98D01594	1-13	97D01600	1-19	95D01643	1-23	95D01608	1-54
	10	No	98D01594	1-13	97D01600	1-19	95D01643	1-23	95D01608	1-54
	15		98D01594	1-13	97D01600	1-19	95D01645	1-25	95D01610	1-57
	20		98D01594	1-13	97D01600	1-19	95D01645	1-25	95D01610	1-57
	25		98D01594	1-13	97D01600	1-19	95D01645	1-25	95D01610	1-57
	30		98D01595	1-14	97D01601	1-20	95D01646	1-26	95D01611	1-58
	40		98D01595	1-14	97D01601	1-20	95D01647	1-27	95D01612	1-59
	1		98D01634	1-15	97D01600	1-19	95D01649	1-29	95D01614	1-61
	2		98D01634	1-15	97D01600	1-19	95D01649	1-29	95D01614	1-61
	3		98D01634	1-15	97D01600	1-19	95D01649	1-29	95D01614	1-61
	5		98D01634	1-15	97D01600	1-19	95D01650	1-30	95D01615	1-62
	7.5		98D01634	1-15	97D01600	1-19	95D01651	1-31	95D01616	1-63
	10	Yes	98D01634	1-15	97D01600	1-19	95D01651	1-31	95D01616	1-63
	15		98D01634	1-15	97D01600	1-19	95D01807	1-33	95D01811	1-65
	20		98D01634	1-15	97D01600	1-19	95D01807	1-33	95D01811	1-65
	25		98D01634	1-15	97D01600	1-19	95D01807	1-33	95D01811	1-65
	30		98D01804	1-16	97D01601	1-20	95D01808	1-34	95D01812	1-66
	40		98D01804	1-16	97D01601	1-20	95D01809	1-35	95D01813	1-67

208V AC – NEMA/UL Type 12

Input Voltage	HP	Input Line Reactor	Drawing					
			Schematic	*Page*	Layout	*Page*	Outline	*Page*
208V AC	1		98D02078	1-17	95D02120	1-36	95D02096	1-68
	2		98D02078	1-17	95D02120	1-36	95D02096	1-68
	3		98D02078	1-17	95D02120	1-36	95D02096	1-68
	5		98D02078	1-17	95D02121	1-37	95D02097	1-69
	7.5	No	98D02078	1-17	95D02122	1-38	95D02098	1-70
	10		98D02078	1-17	95D02122	1-38	95D02098	1-70
	15		98D02078	1-17	95D02123	1-39	95D02099	1-71
	20		98D02078	1-17	95D02123	1-39	95D02099	1-71
	25		98D02078	1-17	95D02123	1-39	95D02099	1-71
	1		98D02078	1-17	95D02144	1-40	95D02096	1-68
	2		98D02078	1-17	95D02144	1-40	95D02096	1-68
	3		98D02078	1-17	95D02144	1-40	95D02096	1-68
	5		98D02078	1-17	95D02145	1-41	95D02097	1-69
	7.5	Yes	98D02078	1-17	95D02146	1-42	95D02098	1-70
	10		98D02078	1-17	95D02146	1-42	95D02098	1-70
	15		98D02078	1-17	95D02147	1-43	95D02099	1-71
	20		98D02078	1-17	95D02147	1-43	95D02099	1-71
	25		98D02078	1-17	95D02147	1-43	95D02099	1-71

208V AC – NEMA/UL Type 4/3R

Input Voltage	HP	Input Line Reactor	Drawing					
			Schematic	*Page*	Layout	*Page*	Outline	*Page*
208V AC	1		98D02077	1-18	95D02104	1-44	95D02069	1-72
	2		98D02077	1-18	95D02104	1-44	95D02069	1-72
	3		98D02077	1-18	95D02104	1-44	95D02069	1-72
	5		98D02077	1-18	95D02105	1-45	95D02070	1-73
	7.5	No	98D02077	1-18	95D02106	1-46	95D02071	1-74
	10		98D02077	1-18	95D02106	1-46	95D02071	1-74
	15		98D02077	1-18	95D02107	1-47	95D02072	1-75
	20		98D02077	1-18	95D02107	1-47	95D02072	1-75
	25		98D02077	1-18	95D02107	1-47	95D02072	1-75
	1		98D02077	1-18	95D02136	1-48	95D02069	1-72
	2		98D02077	1-18	95D02136	1-48	95D02069	1-72
	3		98D02077	1-18	95D02136	1-48	95D02069	1-72
	5		98D02077	1-18	95D02137	1-49	95D02070	1-73
	7.5	Yes	98D02077	1-18	95D02138	1-50	95D02071	1-74
	10		98D02077	1-18	95D02138	1-50	95D02071	1-74
	15		98D02077	1-18	95D02139	1-51	95D02072	1-75
	20		98D02077	1-18	95D02139	1-51	95D02072	1-75
	25		98D02077	1-18	95D02139	1-51	95D02072	1-75

460V AC – Main Input Disconnect Drive Packages (Style A)

460V AC – NEMA/UL Type 1

Input Voltage	HP	Input Line Reactor	Drawing							
			Schematic	*Page*	Inter-Connect	*Page*	Layout	*Page*	Outline	*Page*
460V AC	1		98D01594	1-13	97D01600	1-19	95D01641	1-21	95D01606	1-52
	2		98D01594	1-13	97D01600	1-19	95D01641	1-21	95D01606	1-52
	3		98D01594	1-13	97D01600	1-19	95D01641	1-21	95D01606	1-52
	5		98D01594	1-13	97D01600	1-19	95D01641	1-21	95D01606	1-52
	7.5		98D01594	1-13	97D01600	1-19	95D01642	1-22	95D01607	1-53
	10		98D01594	1-13	97D01600	1-19	95D01642	1-22	95D01607	1-53
	15		98D01594	1-13	97D01600	1-19	95D01643	1-23	95D01608	1-54
	20		98D01594	1-13	97D01600	1-19	95D01643	1-23	95D01608	1-54
	25		98D01594	1-13	97D01600	1-19	95D01643	1-23	95D00298 95D01608	1-55 1-54
	30	No	98D01594	1-13	97D01600	1-19	95D01644	1-24	95D00298 95D01609	1-55 1-56
	40		98D01594	1-13	97D01600	1-19	95D01645	1-25	95D00298 95D01610	1-55 1-57
	50		98D01594	1-13	97D01600	1-19	95D01645	1-25	95D00298 95D01610	1-55 1-57
	60		98D01595	1-14	97D01601	1-20	95D01646	1-26	95D01611	1-58
	75		98D01595	1-14	97D01601	1-20	95D01647	1-27	95D01612	1-59
	100		98D01595	1-14	97D01601	1-20	95D01647	1-27	95D01612	1-59
	125		98D01595	1-14	97D01601	1-20	95D01648	1-28	95D01613	1-60
	150		98D01595	1-14	97D01601	1-20	95D01648	1-28	95D01613	1-60
	200		98D01595	1-14	97D01601	1-20	95D01648	1-28	95D01613	1-60
	1		98D01634	1-15	97D01600	1-19	95D01649	1-29	95D01614	1-61
	2		98D01634	1-15	97D01600	1-19	95D01649	1-29	95D01614	1-61
	3		98D01634	1-15	97D01600	1-19	95D01649	1-29	95D01614	1-61
	5		98D01634	1-15	97D01600	1-19	95D01649	1-29	95D01614	1-61
	7.5		98D01634	1-15	97D01600	1-19	95D01650	1-30	95D01615	1-62
	10		98D01634	1-15	97D01600	1-19	95D01650	1-30	95D01615	1-62
	15		98D01634	1-15	97D01600	1-19	95D01651	1-31	95D01616	1-63
	20	Yes	98D01634	1-15	97D01600	1-19	95D01651	1-31	95D01616	1-63
	25		98D01634	1-15	97D01600	1-19	95D01651	1-31	95D01616	1-63
	30		98D01634	1-15	97D01600	1-19	95D01806	1-32	95D01810	1-64
	40		98D01634	1-15	97D01600	1-19	95D01807	1-33	95D01811	1-65
	50		98D01634	1-15	97D01600	1-19	95D01807	1-33	95D01811	1-65
	60		98D01804	1-16	97D01601	1-20	95D01808	1-34	95D01812	1-66
	75		98D01804	1-16	97D01601	1-20	95D01809	1-35	95D01813	1-67
	100		98D01804	1-16	97D01601	1-20	95D01809	1-35	95D01813	1-67

460V AC – NEMA/UL Type 12

Input Voltage	HP	Input Line Reactor	Drawing					
			Schematic	*Page*	Layout	*Page*	Outline	*Page*
460V AC	1	No	98D02078	1-17	95D02120	1-36	95D02096	1-68
	2		98D02078	1-17	95D02120	1-36	95D02096	1-68
	3		98D02078	1-17	95D02120	1-36	95D02096	1-68
	5		98D02078	1-17	95D02120	1-36	95D02096	1-68
	7.5		98D02078	1-17	95D02121	1-37	95D02097	1-69
	10		98D02078	1-17	95D02121	1-37	95D02097	1-69
	15		98D02078	1-17	95D02122	1-38	95D02098	1-70
	20		98D02078	1-17	95D02122	1-38	95D02098	1-70
	25		98D02078	1-17	95D02122	1-38	95D02098	1-70
	30		98D02078	1-17	95D02122	1-38	95D02098	1-70
	40		98D02078	1-17	95D02123	1-39	95D02099	1-71
	50		98D02078	1-17	95D02123	1-39	95D02099	1-71
	1	Yes	98D02078	1-17	95D02144	1-40	95D02096	1-68
	2		98D02078	1-17	95D02144	1-40	95D02096	1-68
	3		98D02078	1-17	95D02144	1-40	95D02096	1-68
	5		98D02078	1-17	95D02144	1-40	95D02096	1-68
	7.5		98D02078	1-17	95D02145	1-41	95D02097	1-69
	10		98D02078	1-17	95D02145	1-41	95D02097	1-69
	15		98D02078	1-17	95D02146	1-42	95D02098	1-70
	20		98D02078	1-17	95D02146	1-42	95D02098	1-70
	25		98D02078	1-17	95D02146	1-42	95D02098	1-70
	30		98D02078	1-17	95D02146	1-42	95D02098	1-70
	40		98D02078	1-17	95D02147	1-43	95D02099	1-71
	50		98D02078	1-17	95D02147	1-43	95D02099	1-71

460V AC – NEMA/UL Type 4/3R

Input Voltage	HP	Input Line Reactor	Drawing					
			Schematic	*Page*	Layout	*Page*	Outline	*Page*
460V AC	1	No	98D02077	1-18	95D02104	1-44	95D02069	1-72
	2		98D02077	1-18	95D02104	1-44	95D02069	1-72
	3		98D02077	1-18	95D02104	1-44	95D02069	1-72
	5		98D02077	1-18	95D02104	1-44	95D02069	1-72
	7.5		98D02077	1-18	95D02105	1-45	95D02070	1-73
	10		98D02077	1-18	95D02105	1-45	95D02070	1-73
	15		98D02077	1-18	95D02106	1-46	95D02071	1-74
	20		98D02077	1-18	95D02106	1-46	95D02071	1-74
	25		98D02077	1-18	95D02106	1-46	95D02071	1-74
	30		98D02077	1-18	95D02106	1-46	95D02071	1-74
	40		98D02077	1-18	95D02107	1-47	95D02072	1-75
	50		98D02077	1-18	95D02107	1-47	95D02072	1-75
	1	Yes	98D02077	1-18	95D02136	1-48	95D02069	1-72
	2		98D02077	1-18	95D02136	1-48	95D02069	1-72
	3		98D02077	1-18	95D02136	1-48	95D02069	1-72
	5		98D02077	1-18	95D02136	1-48	95D02069	1-72
	7.5		98D02077	1-18	95D02137	1-49	95D02070	1-73
	10		98D02077	1-18	95D02137	1-49	95D02070	1-73
	15		98D02077	1-18	95D02138	1-50	95D02071	1-74
	20		98D02077	1-18	95D02138	1-50	95D02071	1-74
	25		98D02077	1-18	95D02138	1-50	95D02071	1-74
	30		98D02077	1-18	95D02138	1-50	95D02071	1-74
	40		98D02077	1-18	95D02139	1-51	95D02072	1-75
	50		98D02077	1-18	95D02139	1-51	95D02072	1-75

Schematic Drawings

Figure 1.1 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives NEMA/UL Type 1

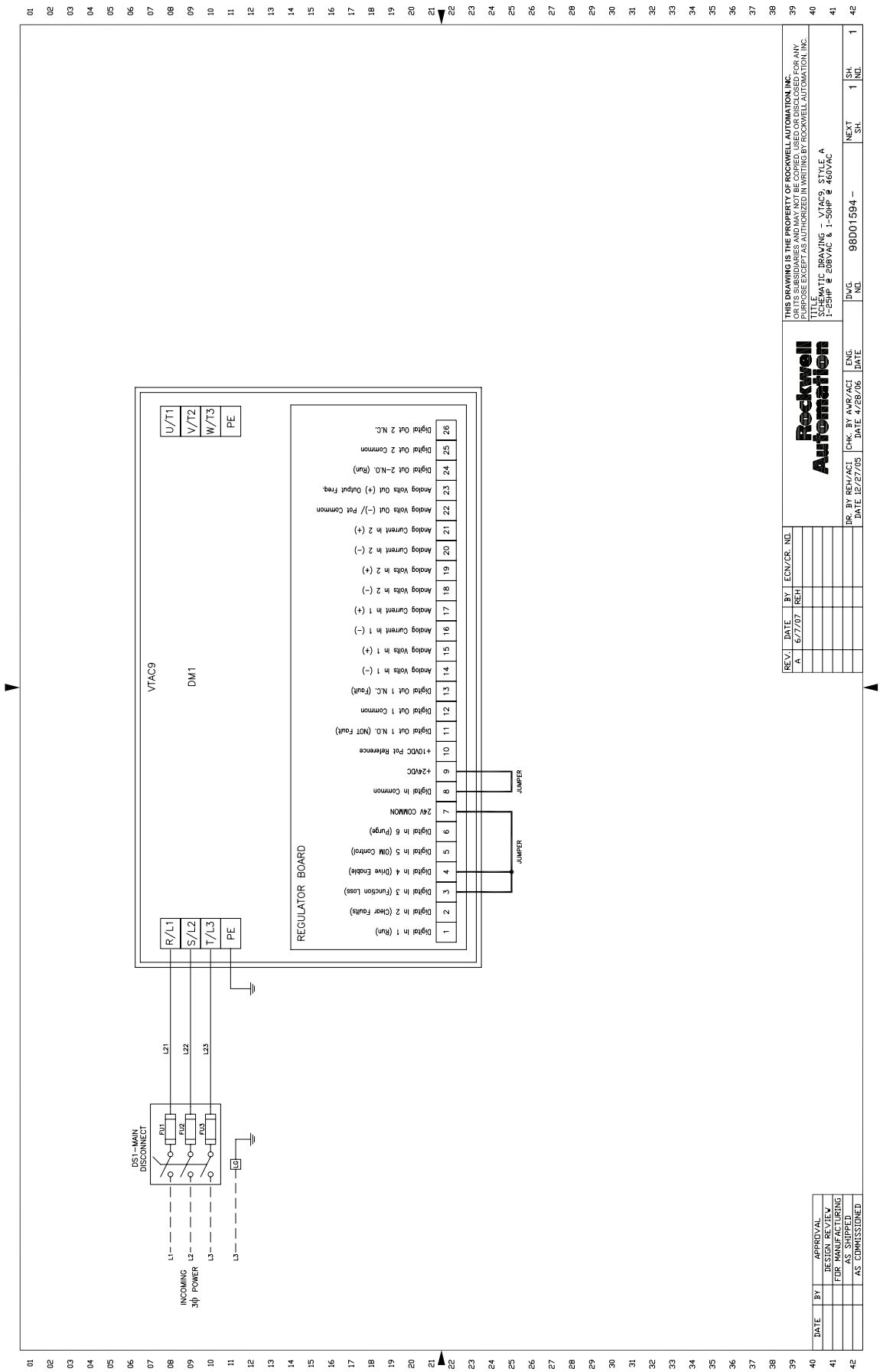


Figure 1.2 30-40 HP, 208V AC and 60-200 HP, 460V AC Drives NEMA/UL Type 1

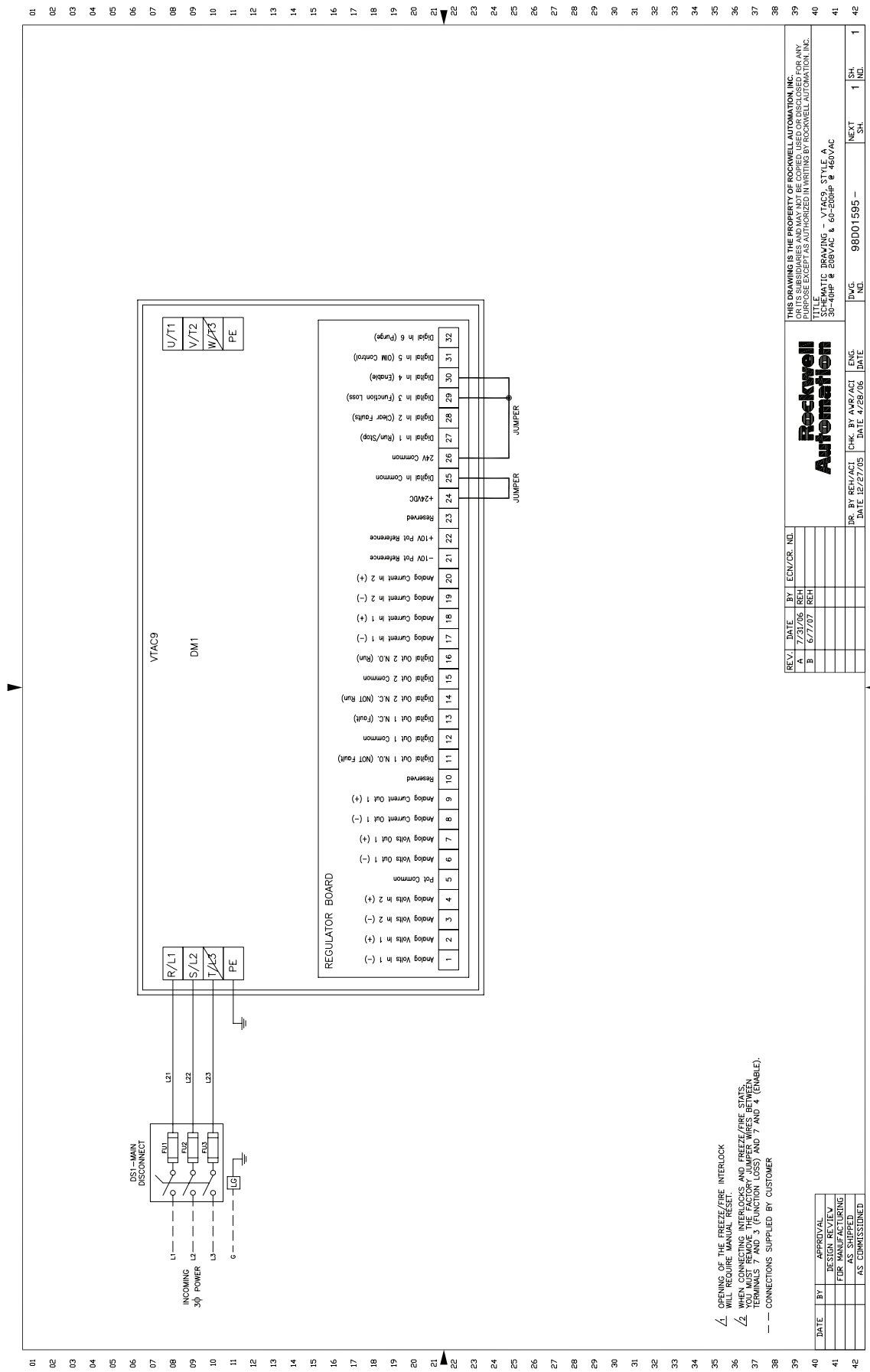


Figure 1.3 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

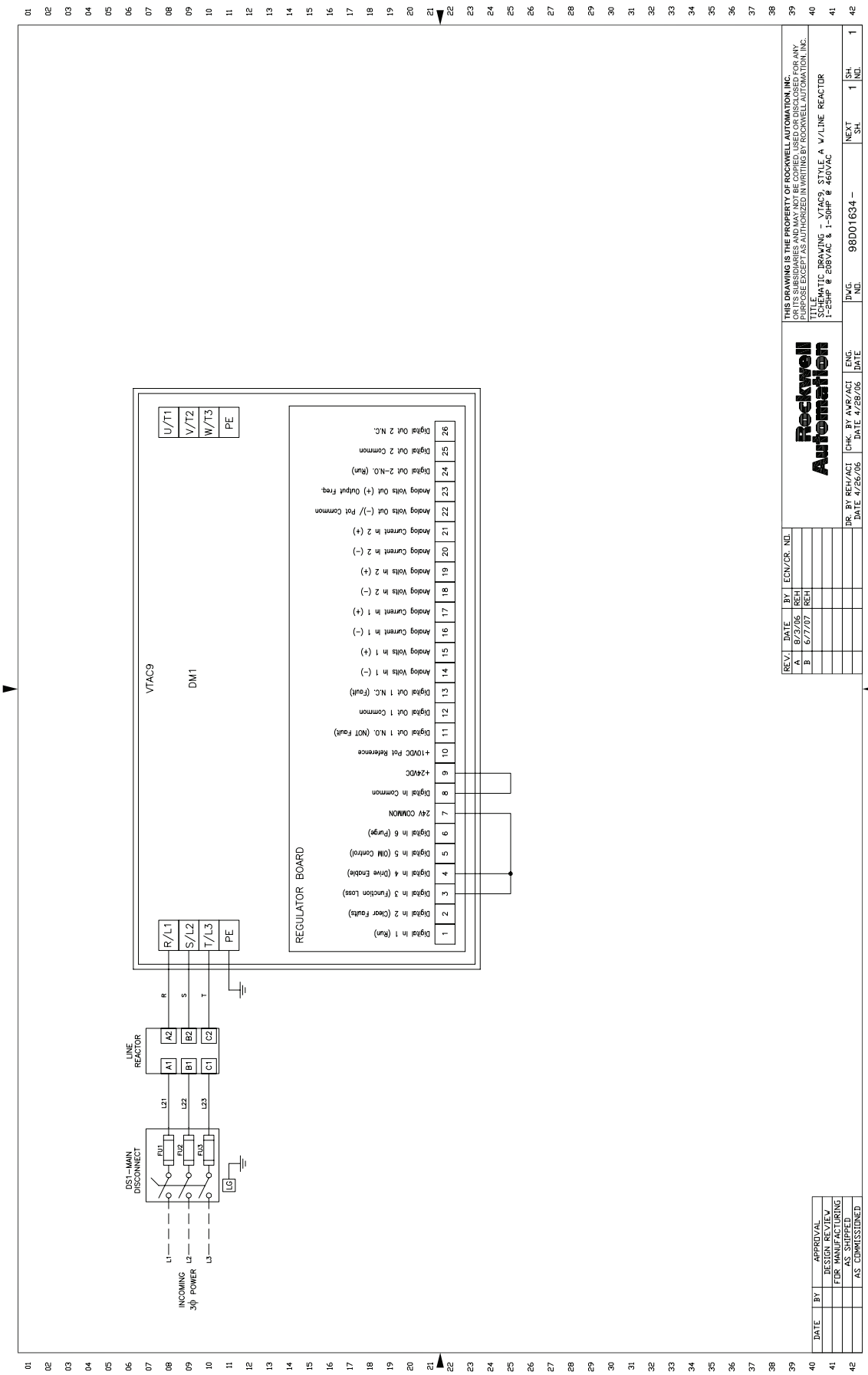


Figure 1.4 30-40 HP, 208V AC and 60-100 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

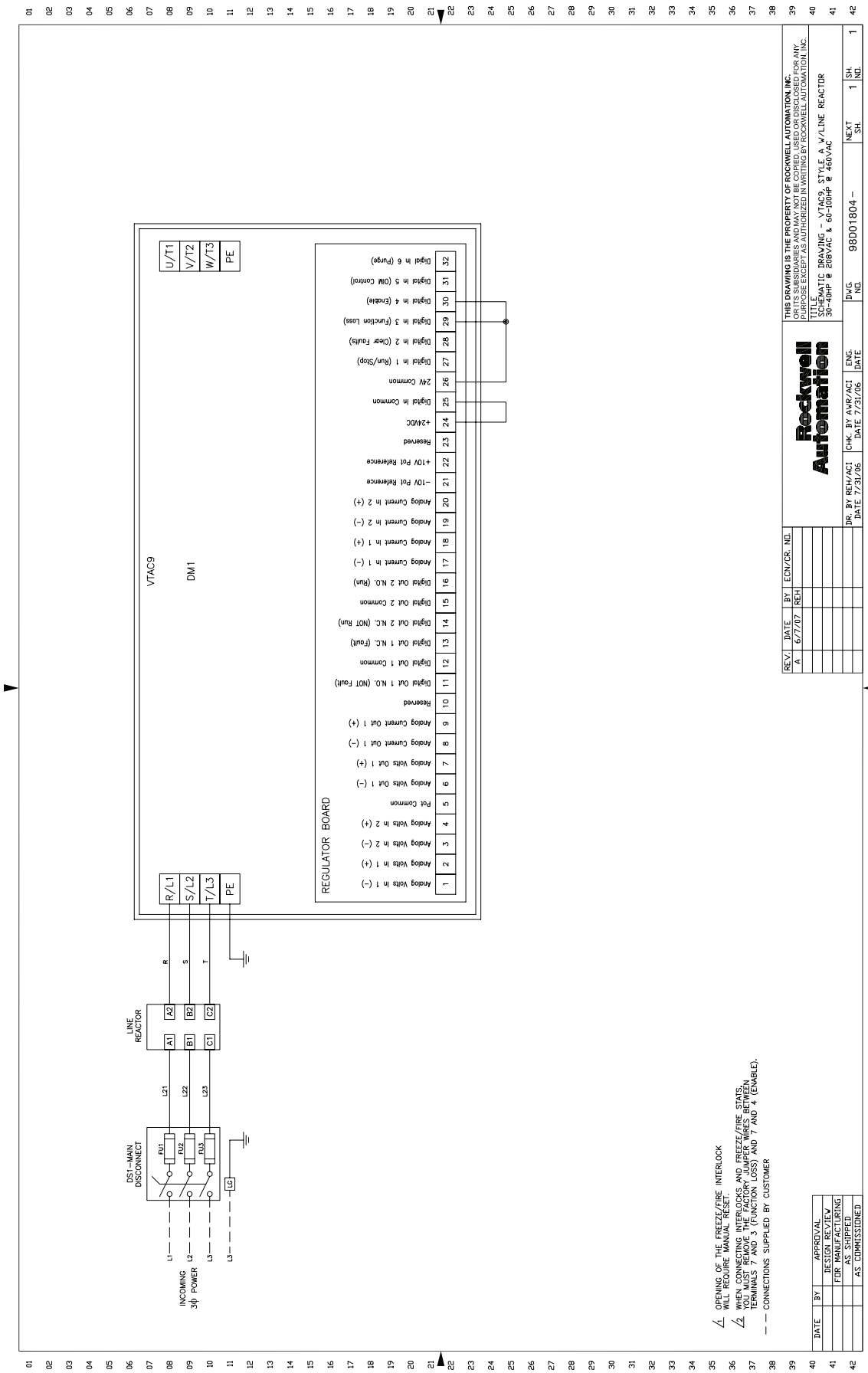


Figure 1.5 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives NEMA/UL Type 12

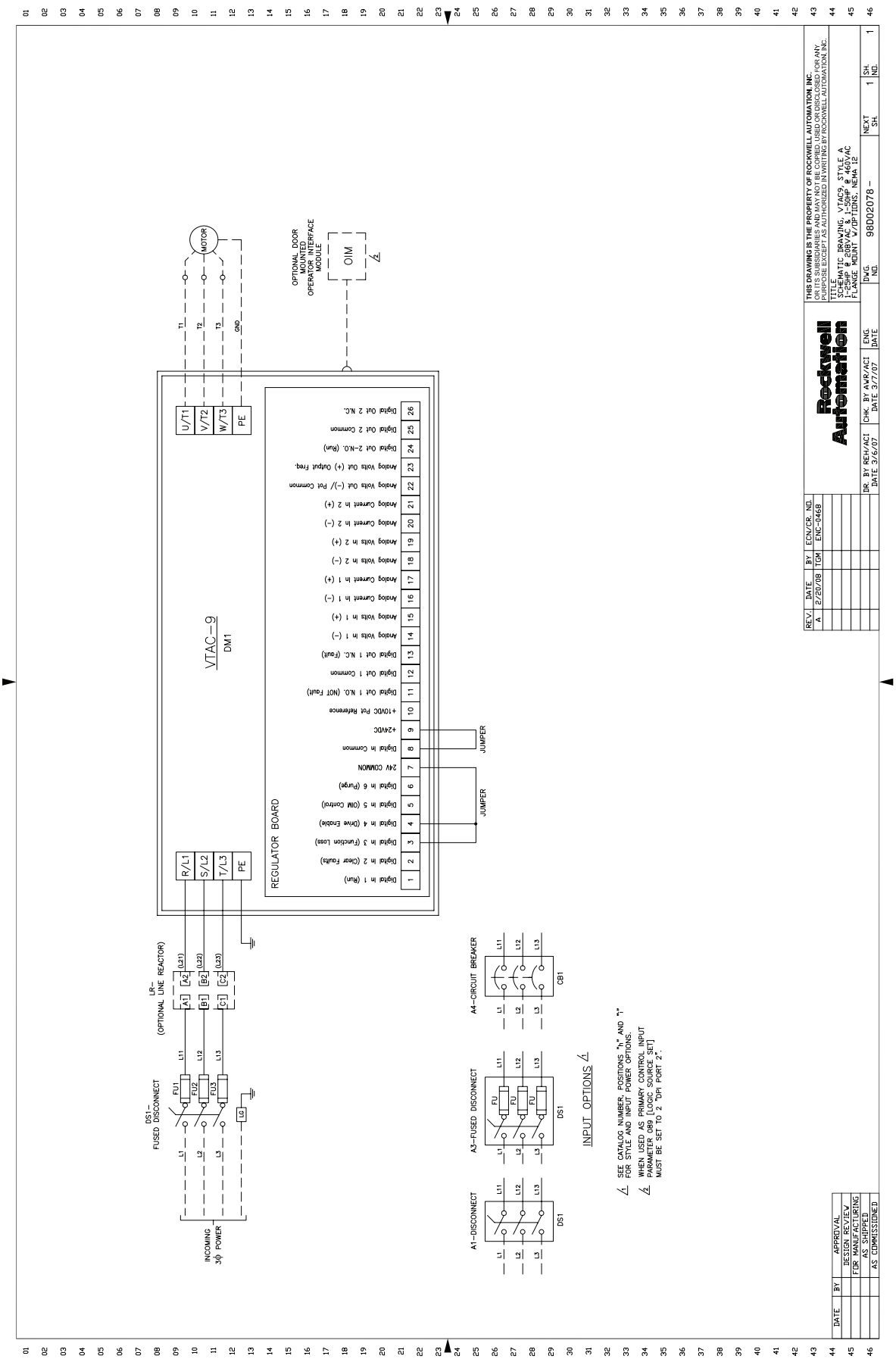
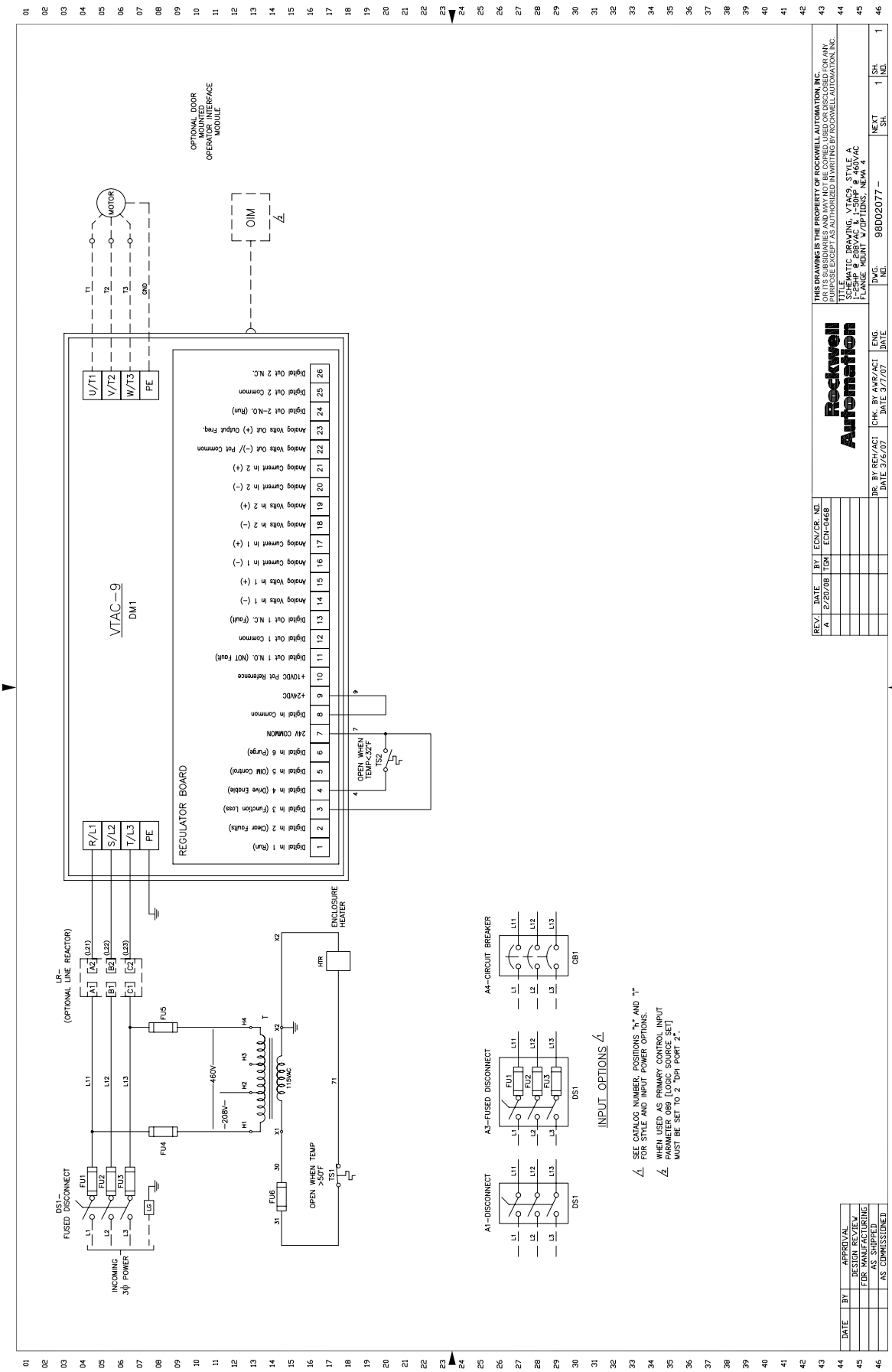


Figure 1.6 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives NEMA/UL Type 4/3R



Inter-Connect Drawings

Figure 1.7 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives NEMA/UL Type 1

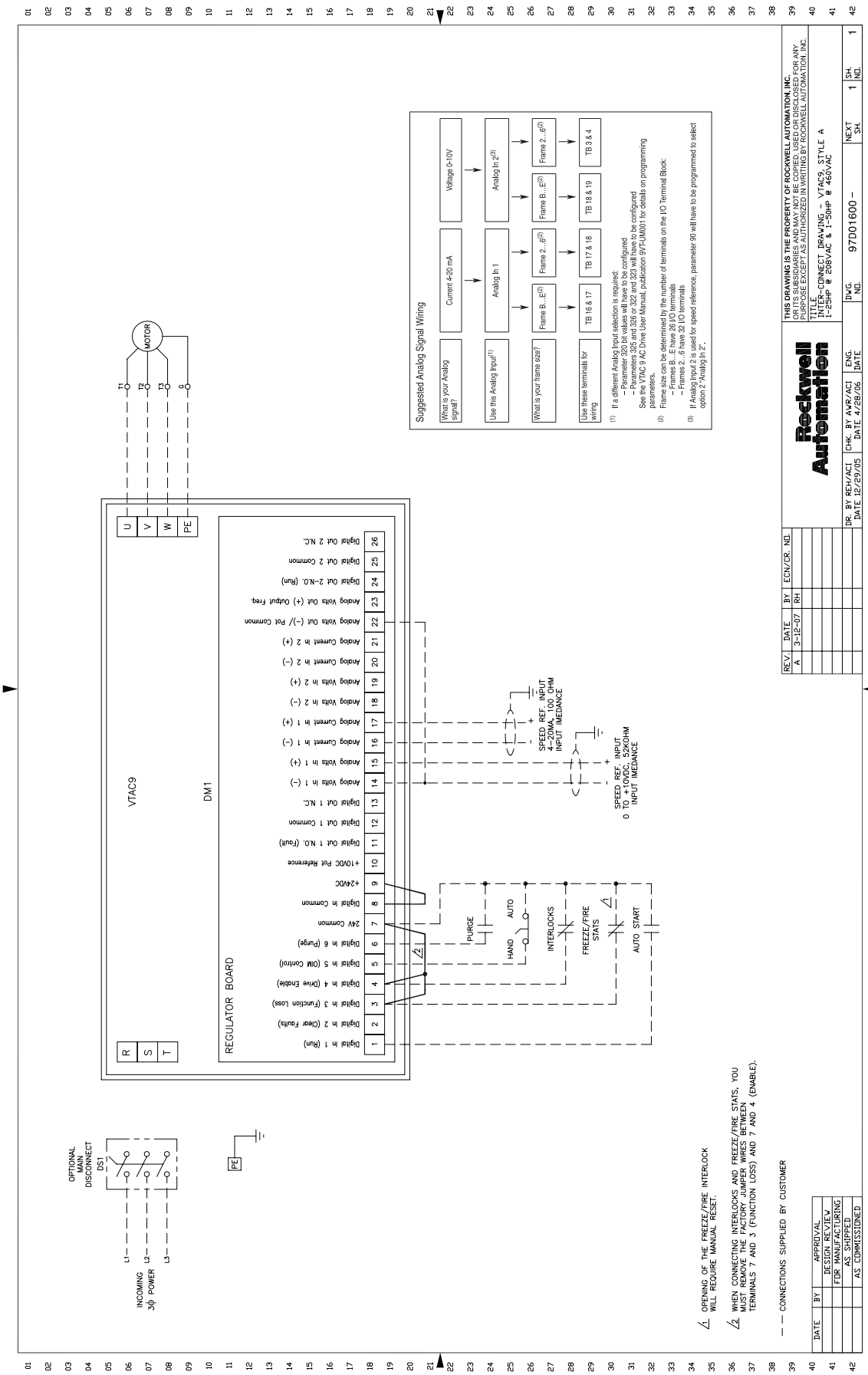
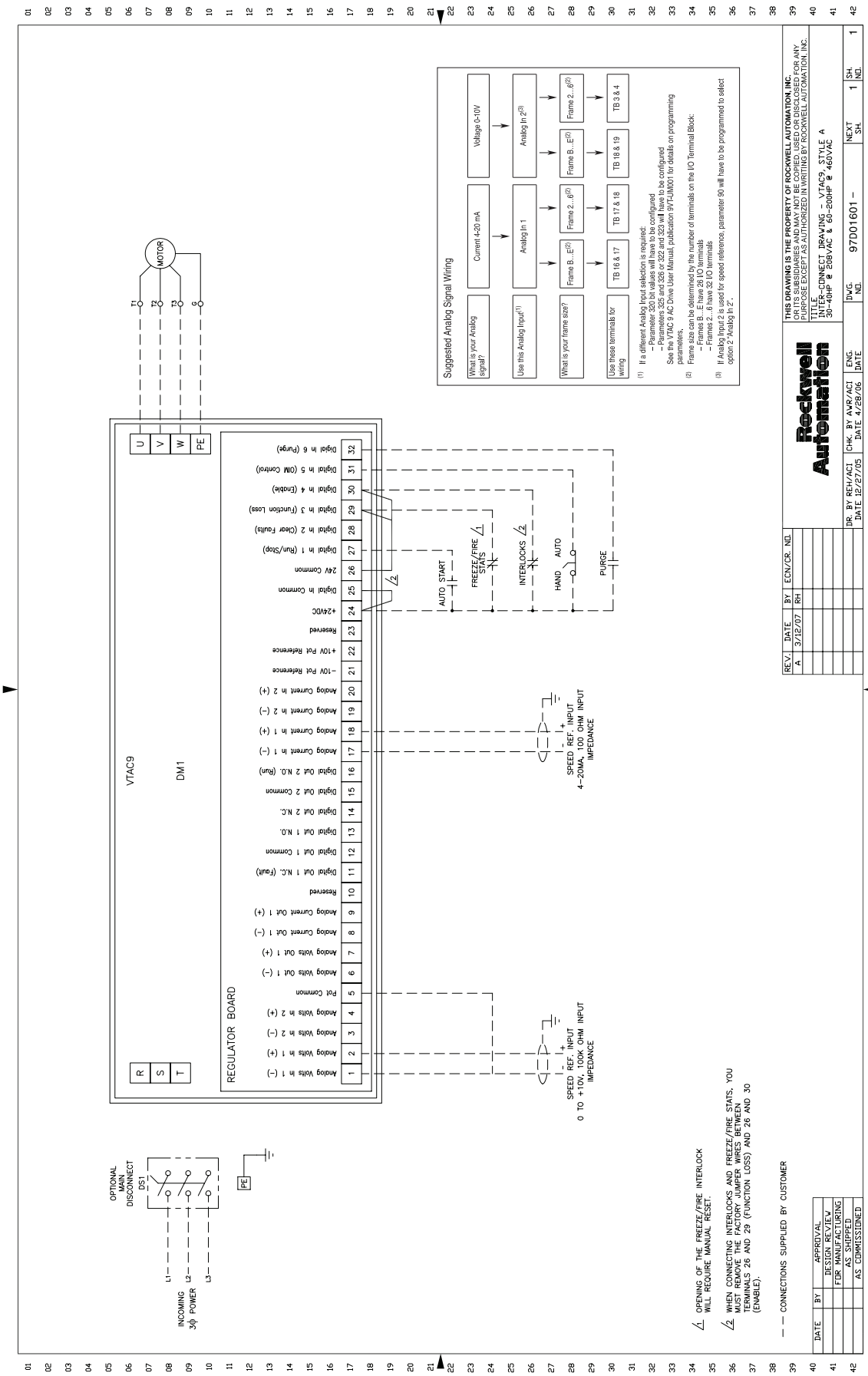


Figure 1.8 30-40 HP, 208V AC and 60-200 HP, 460V AC Drives NEMA/UL Type 1



Layout Drawings

Figure 1.9 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 1

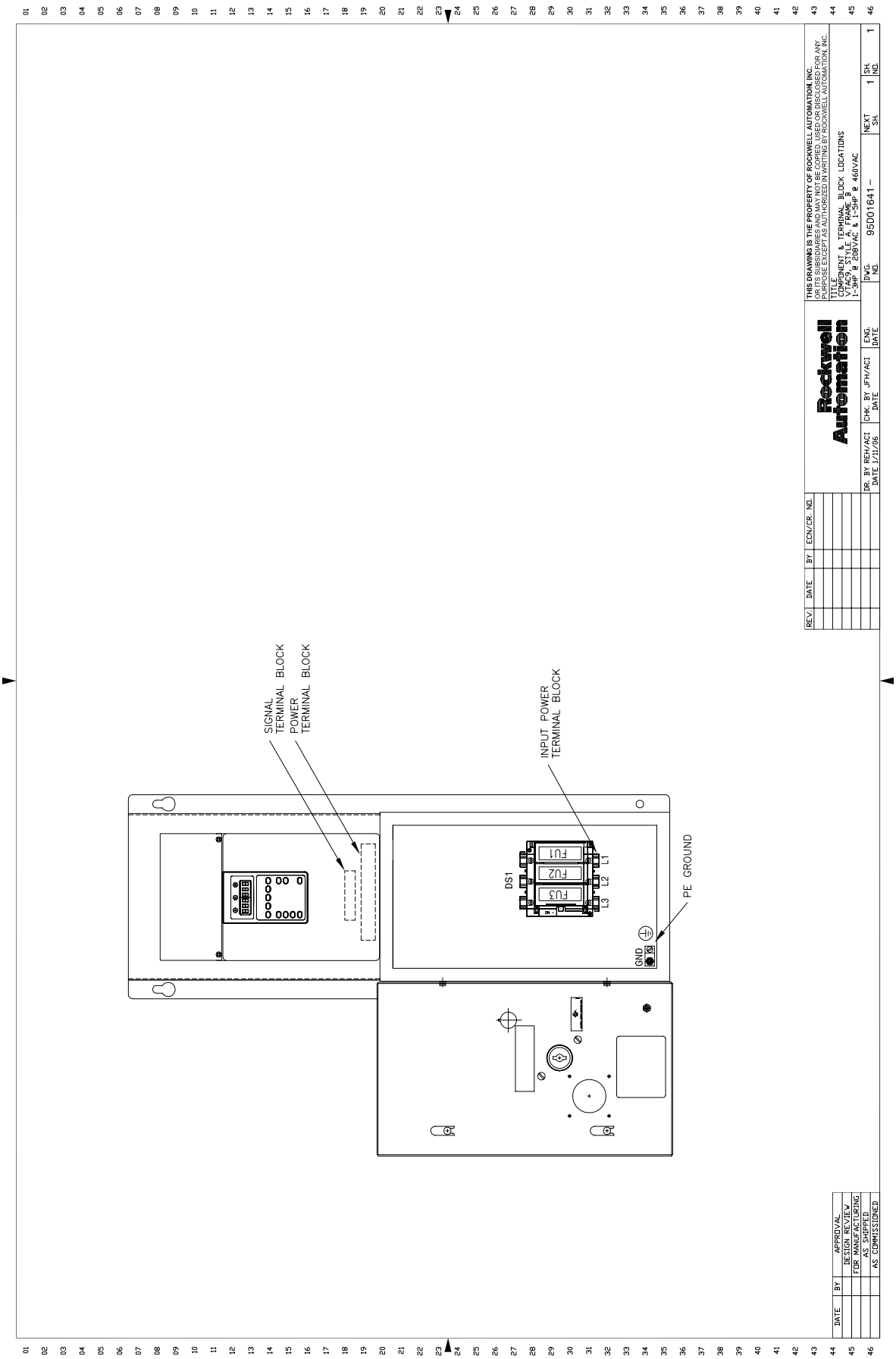


Figure 1.10 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 1

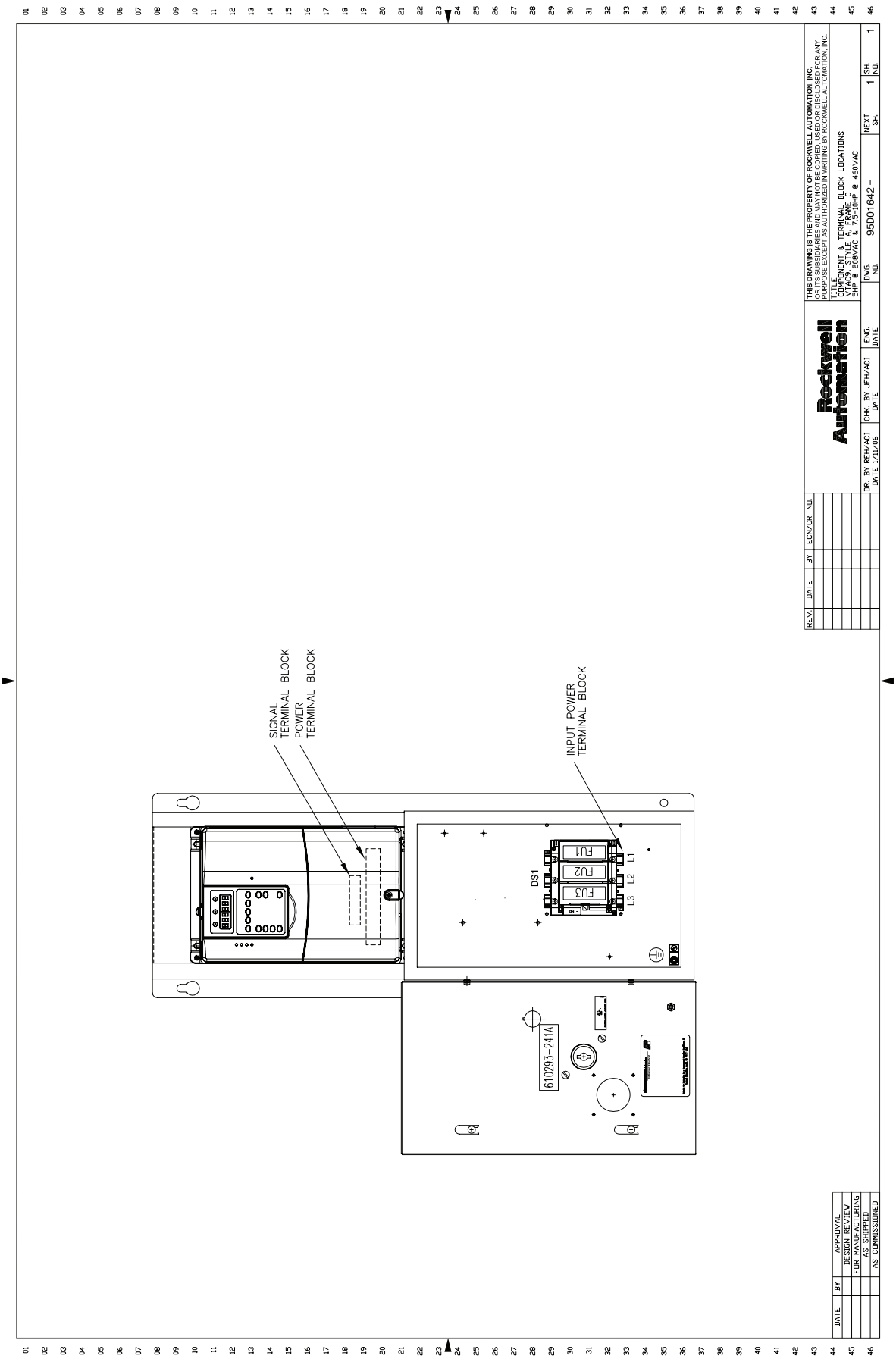


Figure 1.11 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives NEMA/UL Type 1

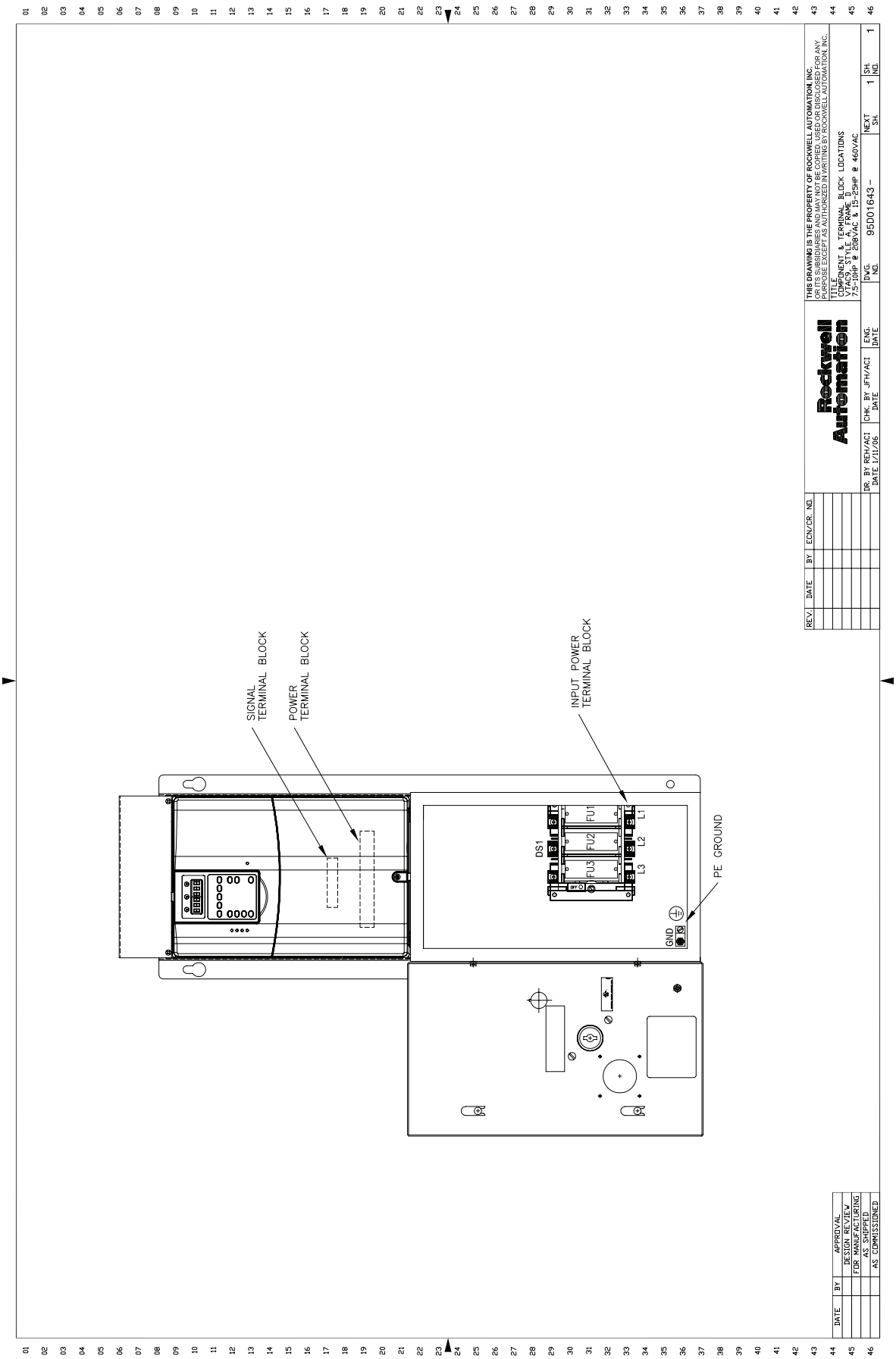


Figure 1.12 30 HP, 460V AC Drives
NEMA/UL Type 1

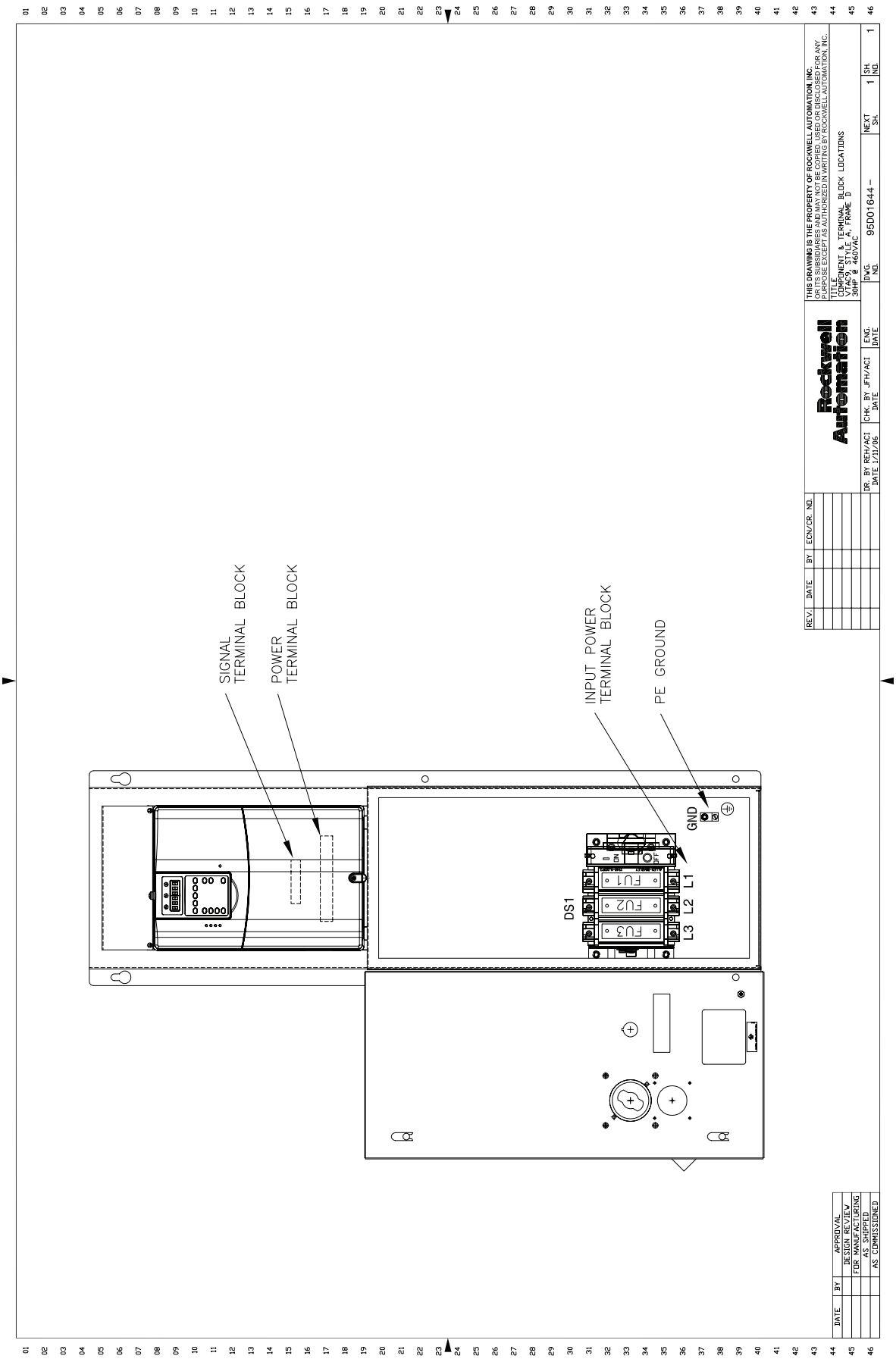


Figure 1.13 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 1

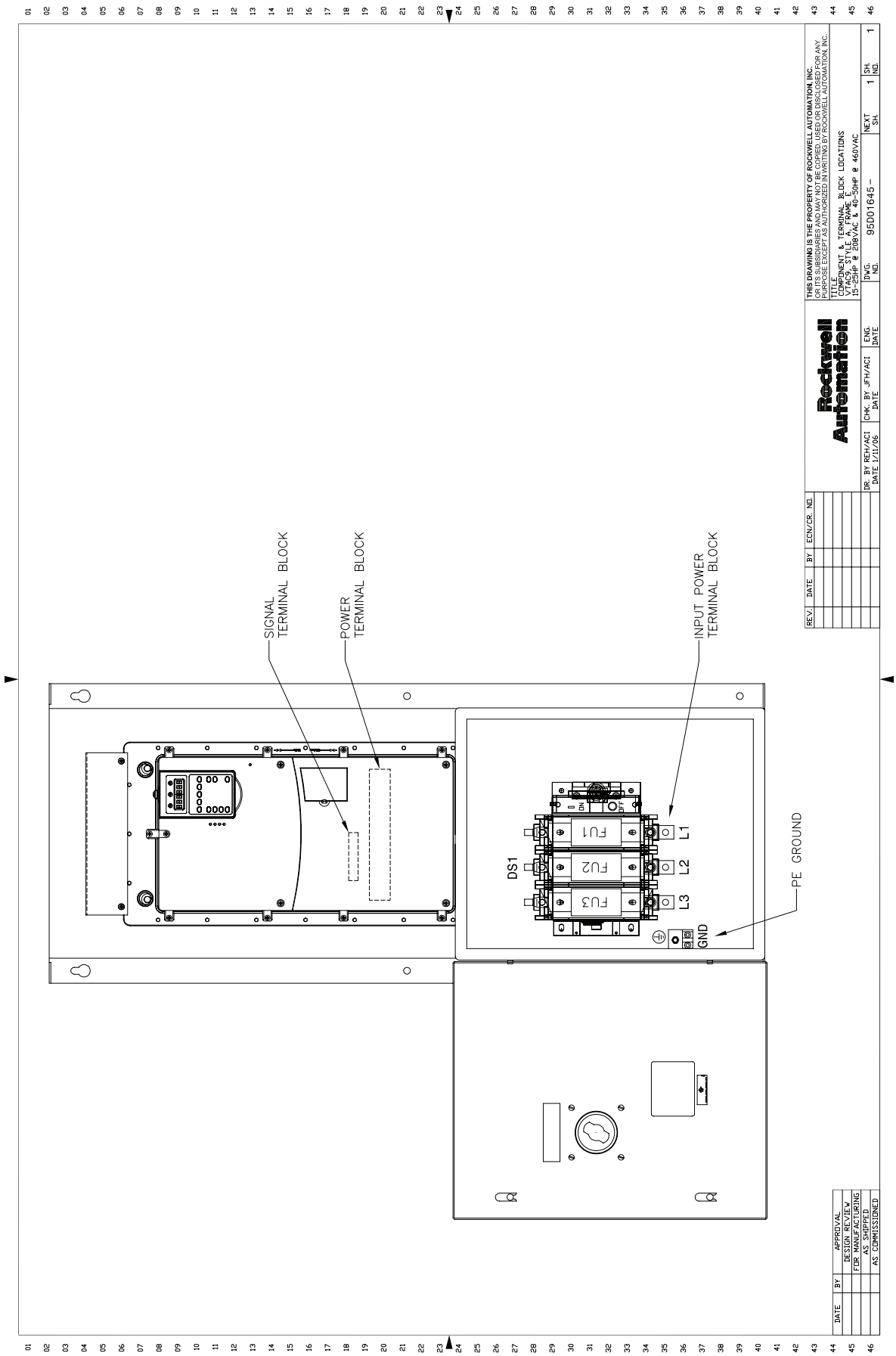


Figure 1.14 30 HP, 208V AC and 60 HP, 460V AC Drives NEMA/UL Type 1

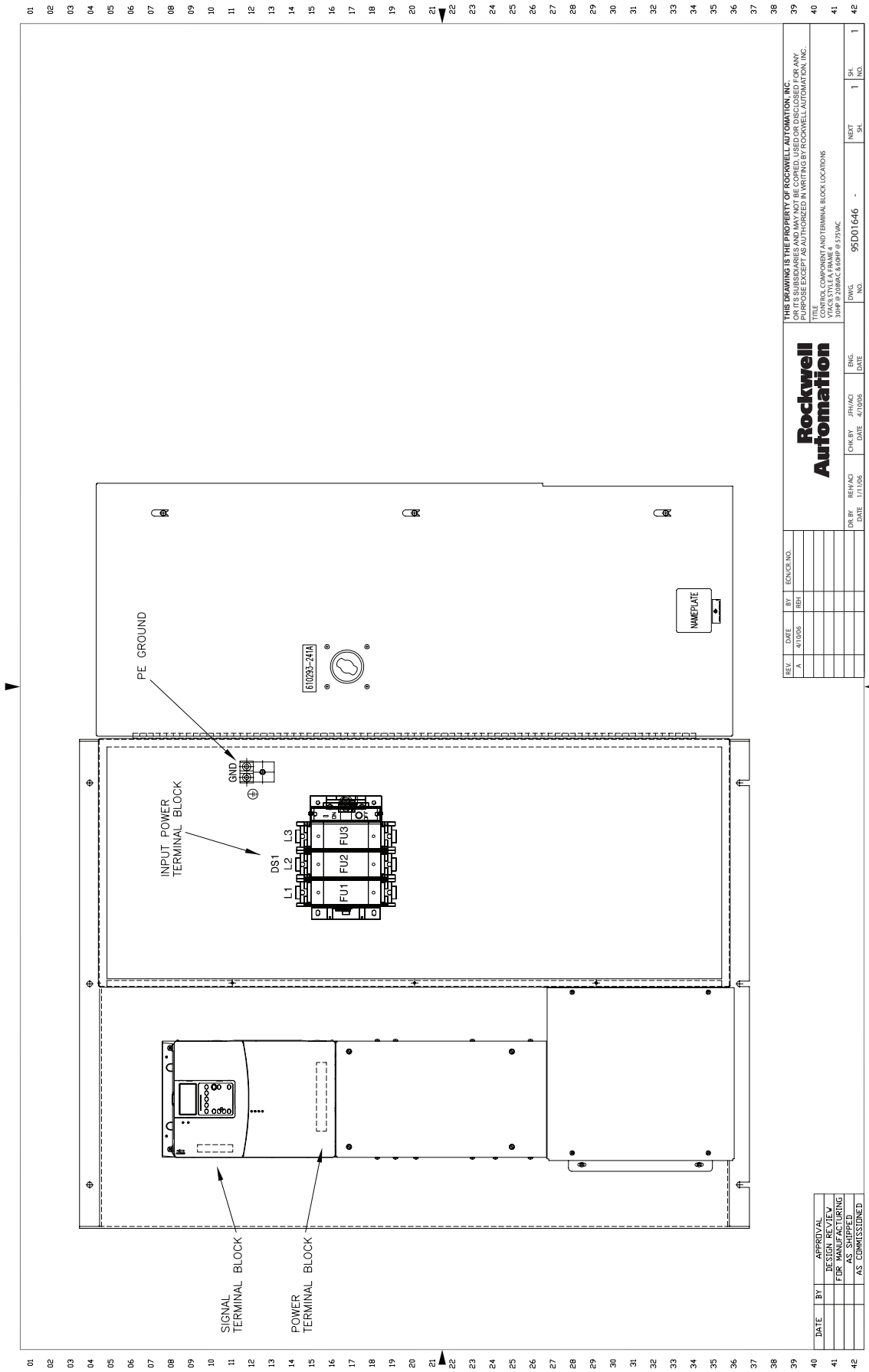


Figure 1.15 40 HP, 208V AC and 75-100 HP, 460V AC Drives NEMA/UL Type 1

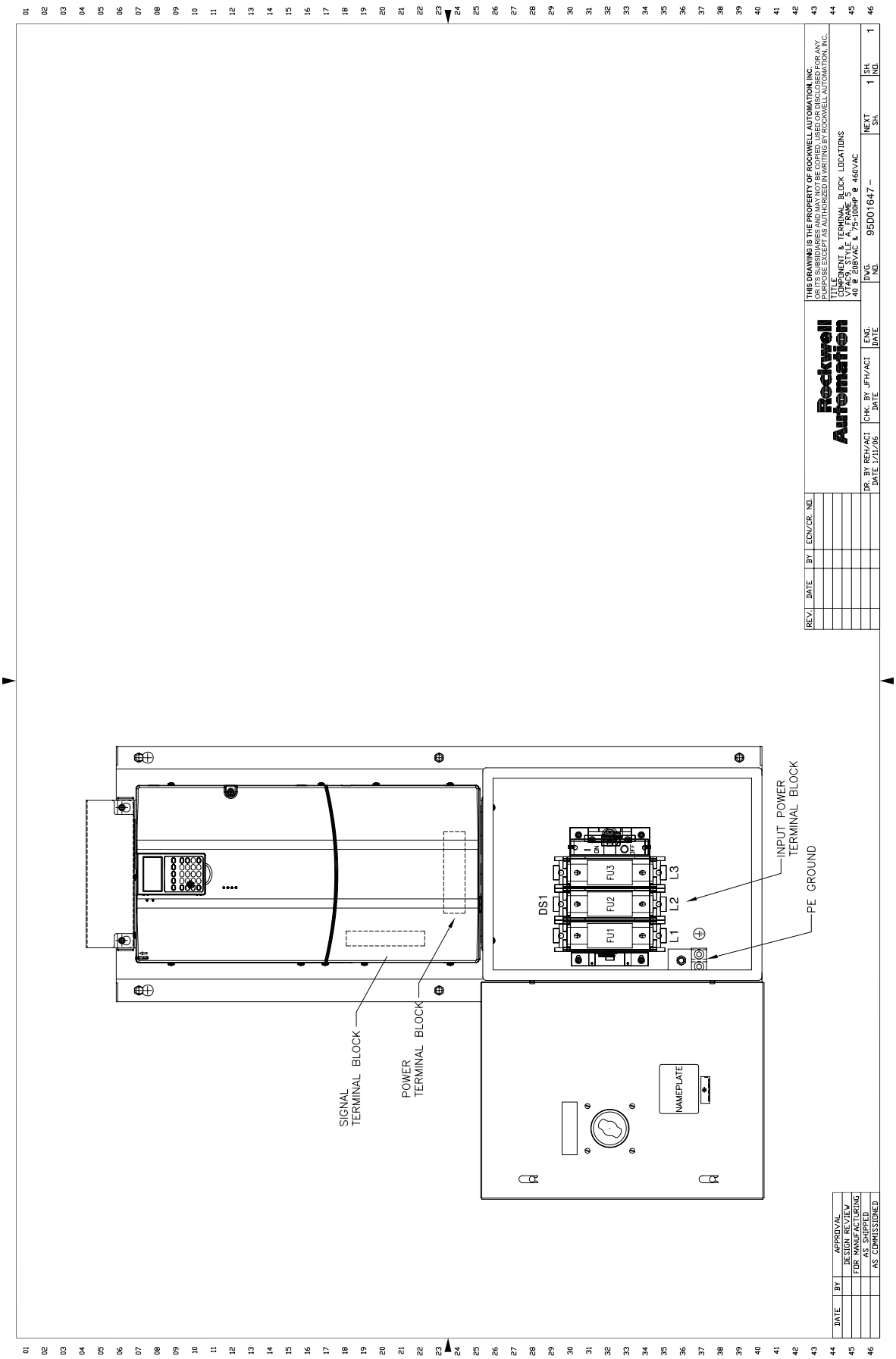


Figure 1.16 125-200 HP, 460V AC Drive
NEMA/UL Type 1

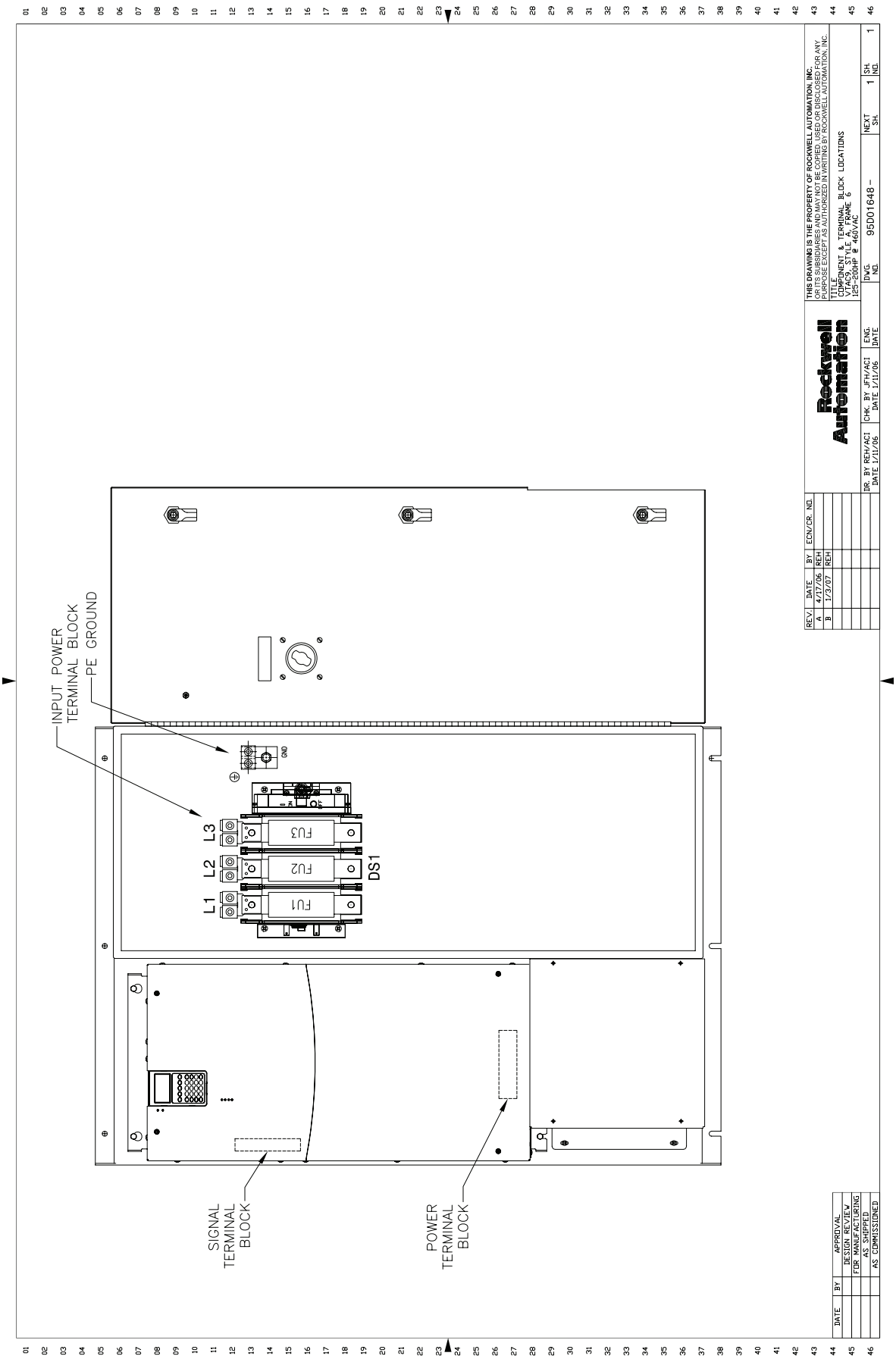


Figure 1.17 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

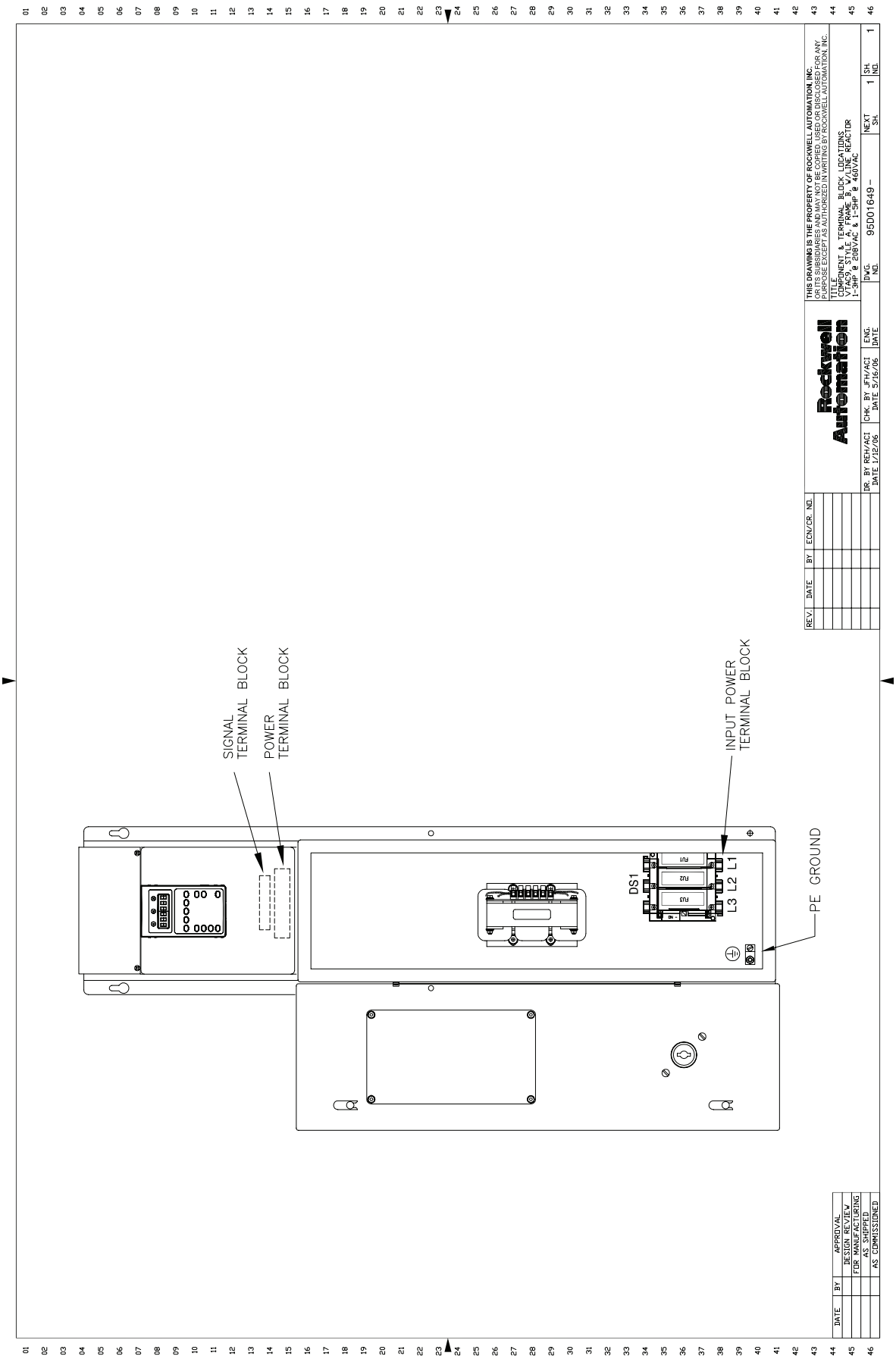


Figure 1.18 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

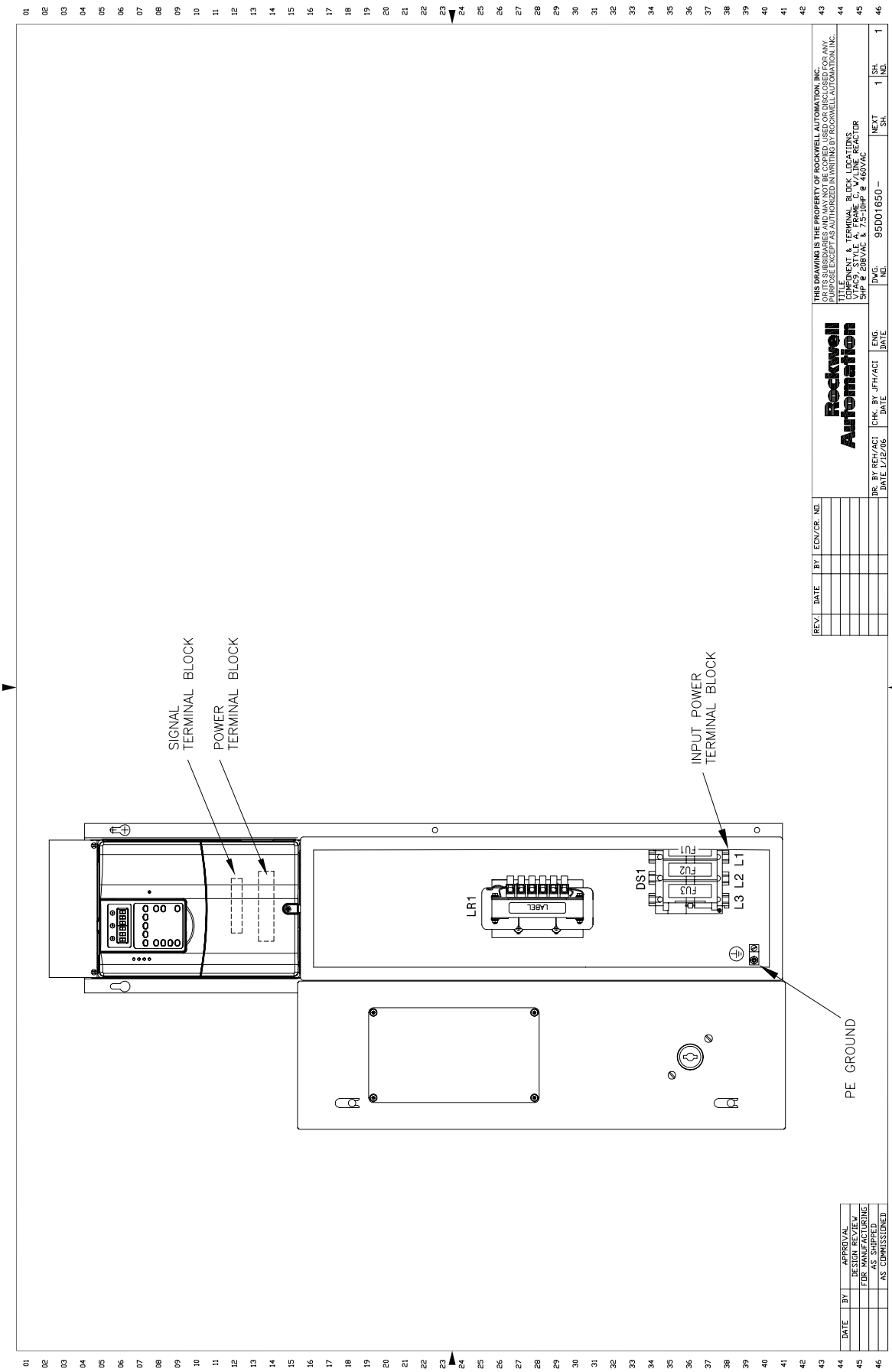


Figure 1.19 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

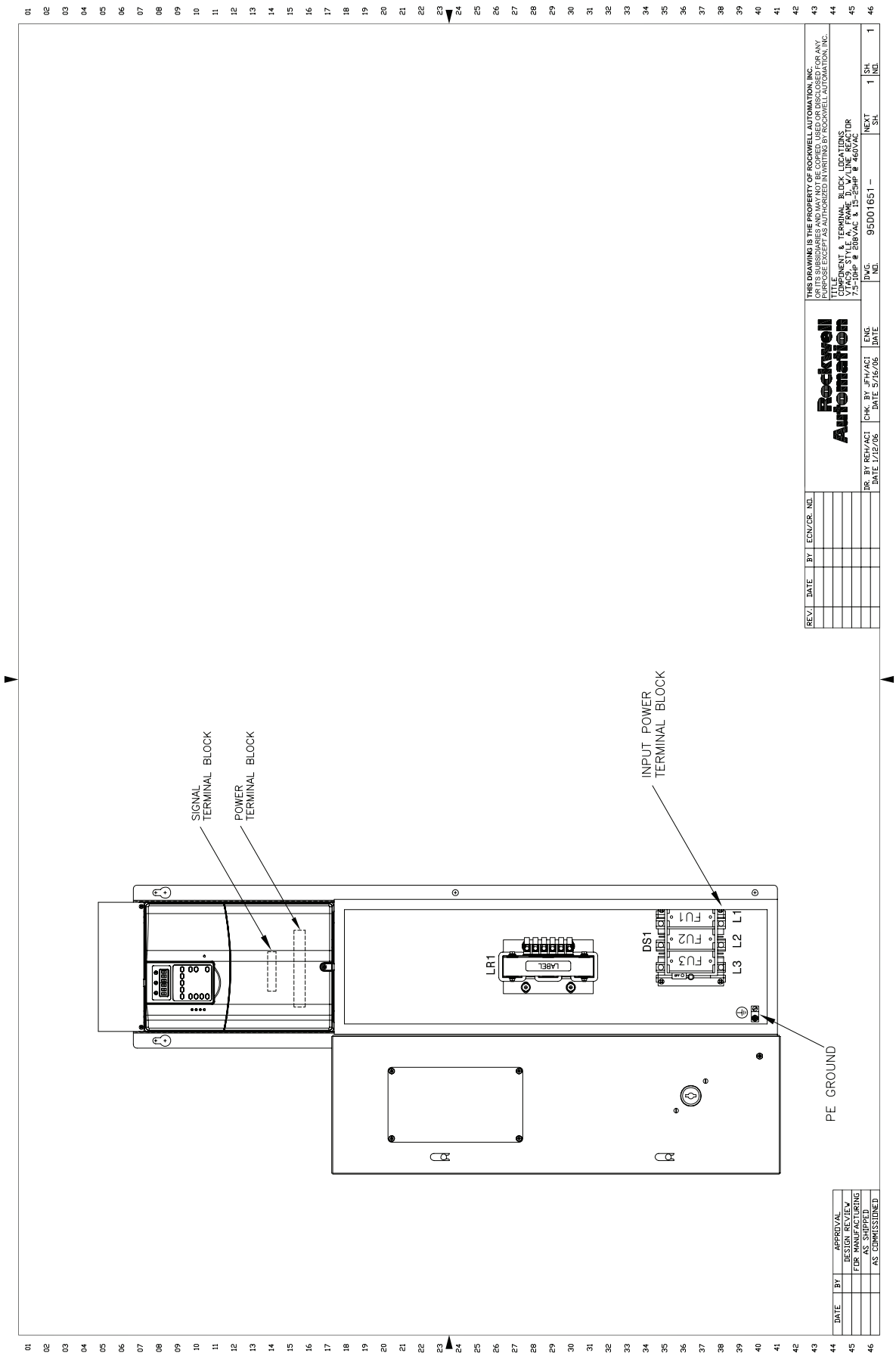


Figure 1.20 30 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

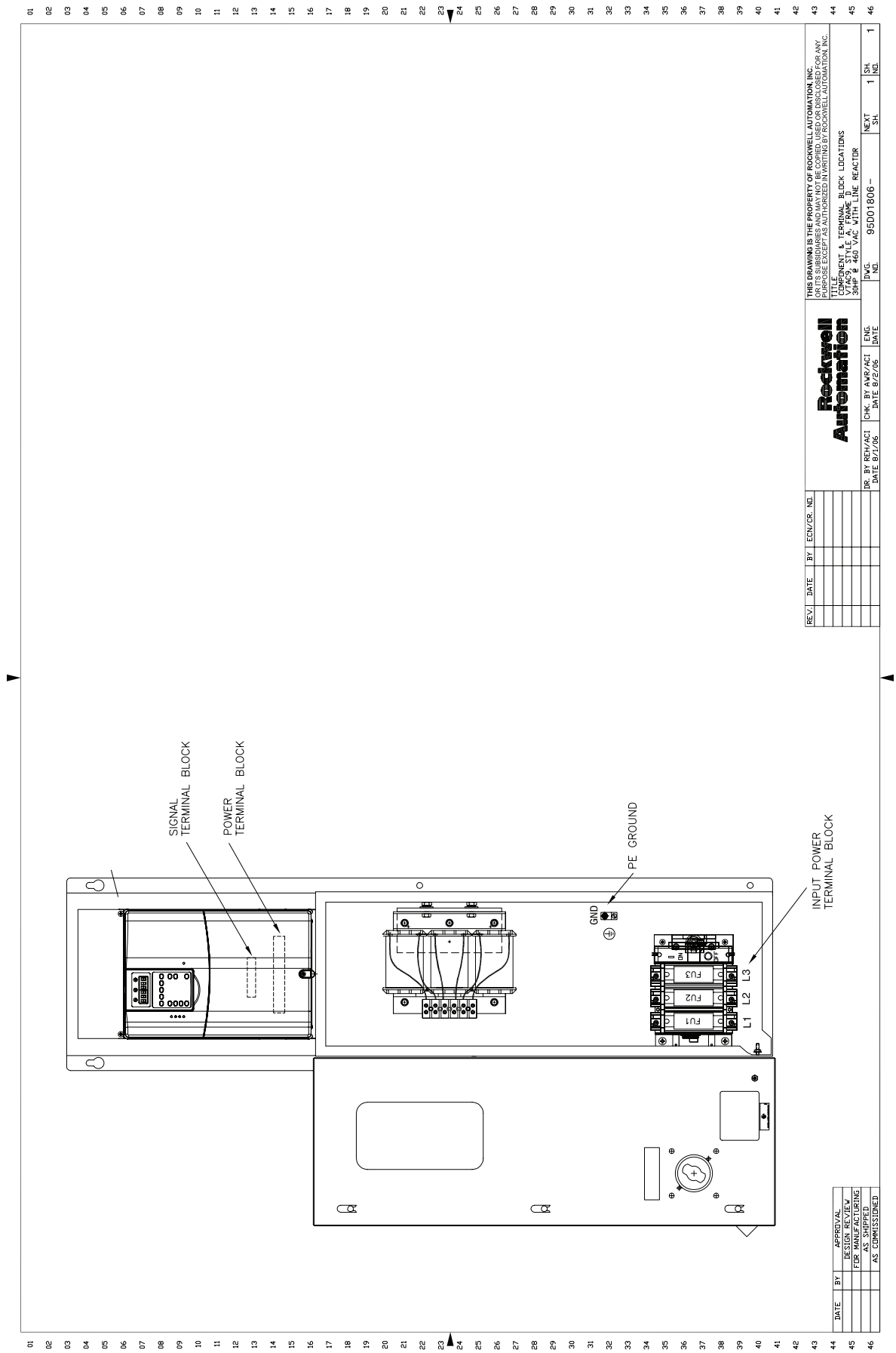


Figure 1.21 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

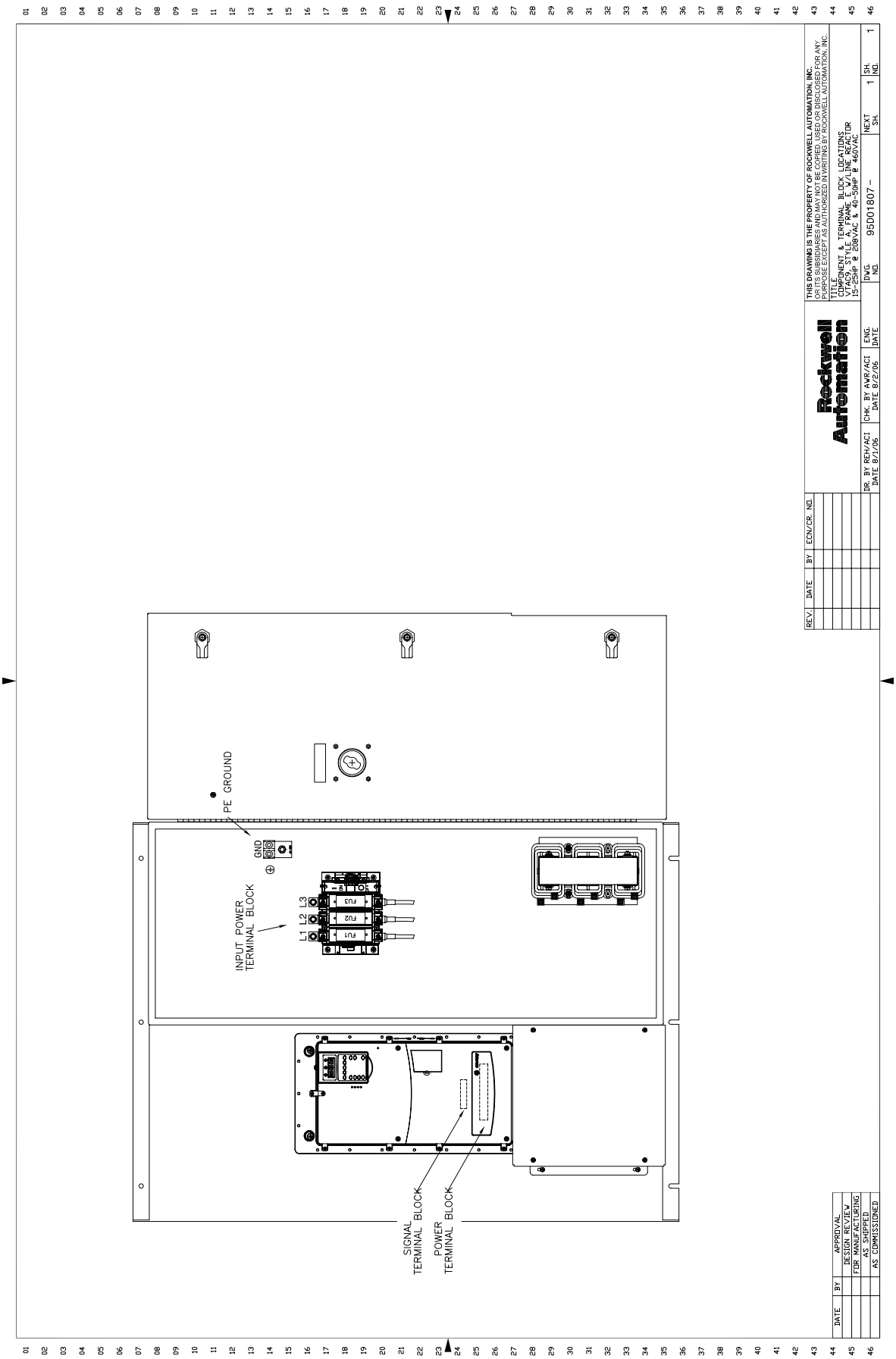


Figure 1.22 30 HP, 208V AC and 60 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

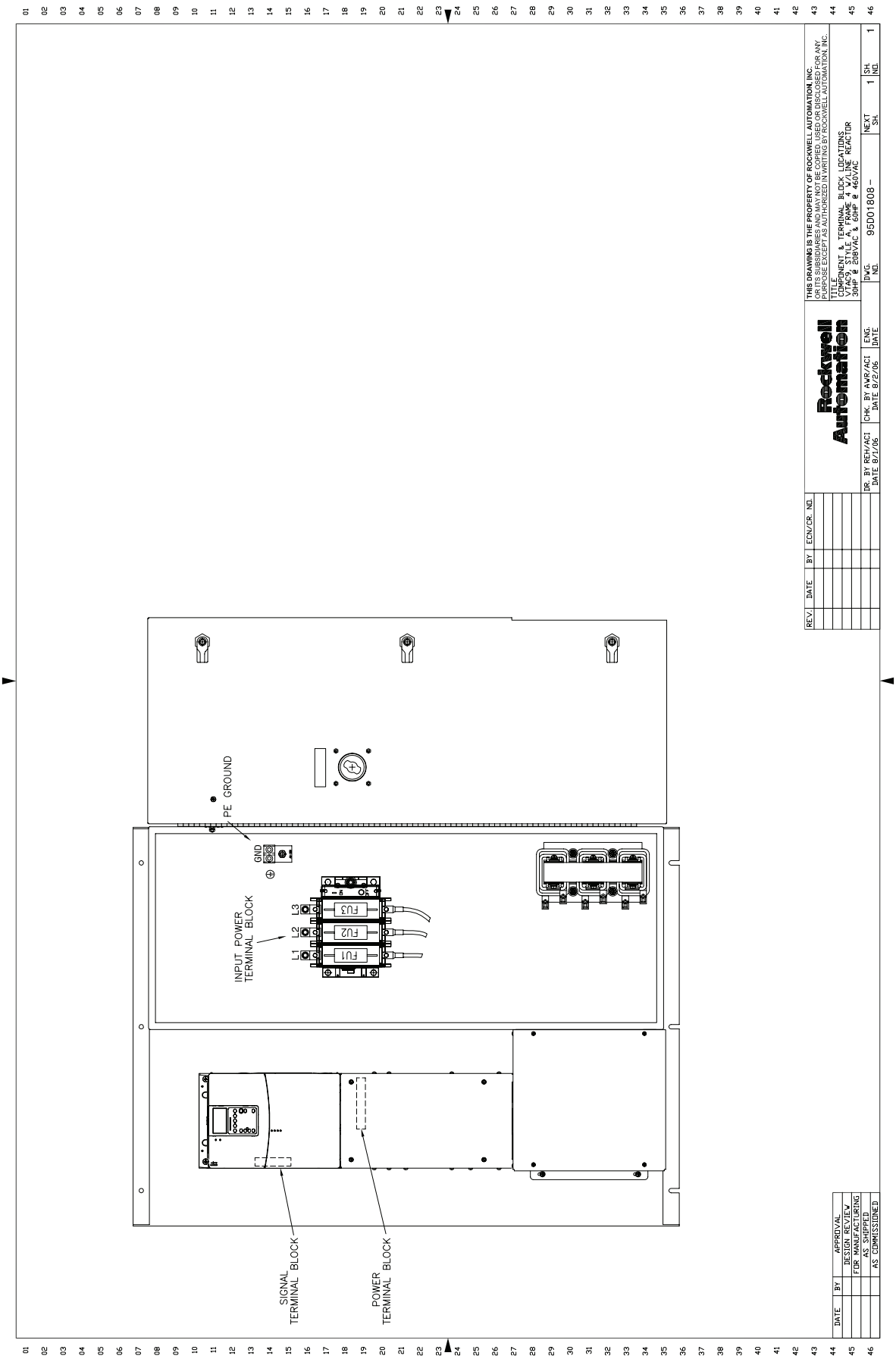


Figure 1.23 40 HP, 208V AC and 75-100 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

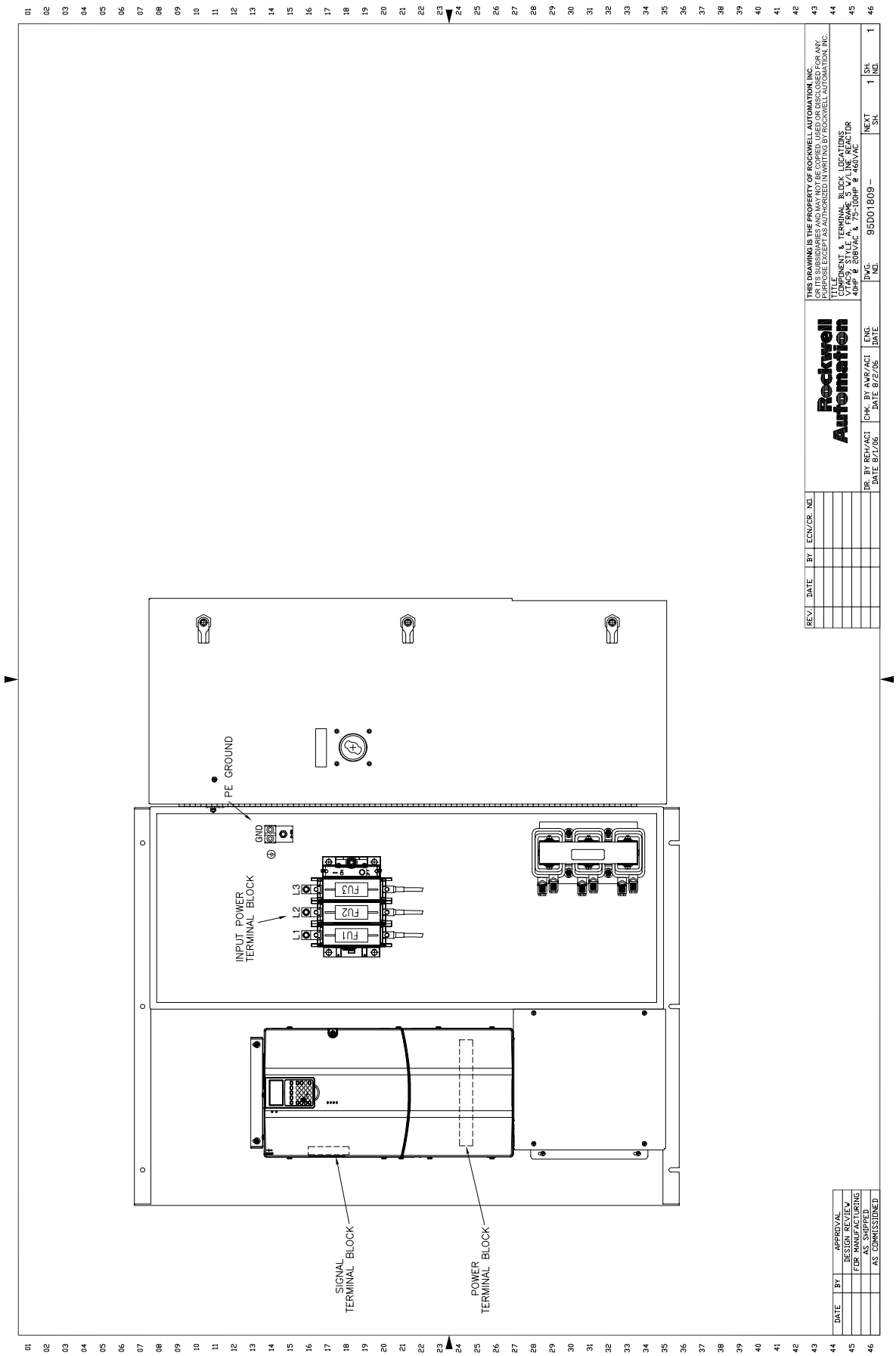


Figure 1.24 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 12

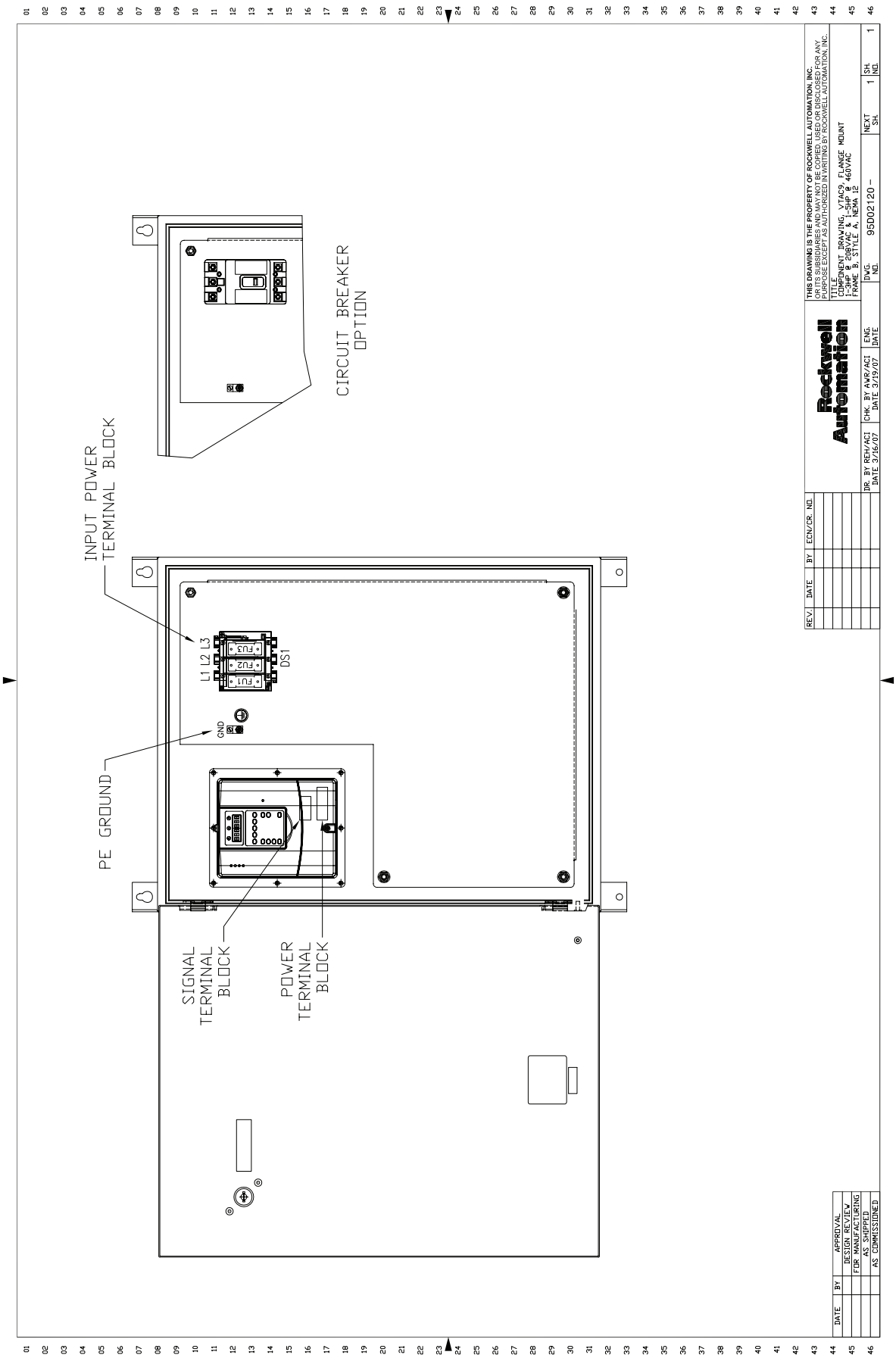


Figure 1.25 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 12

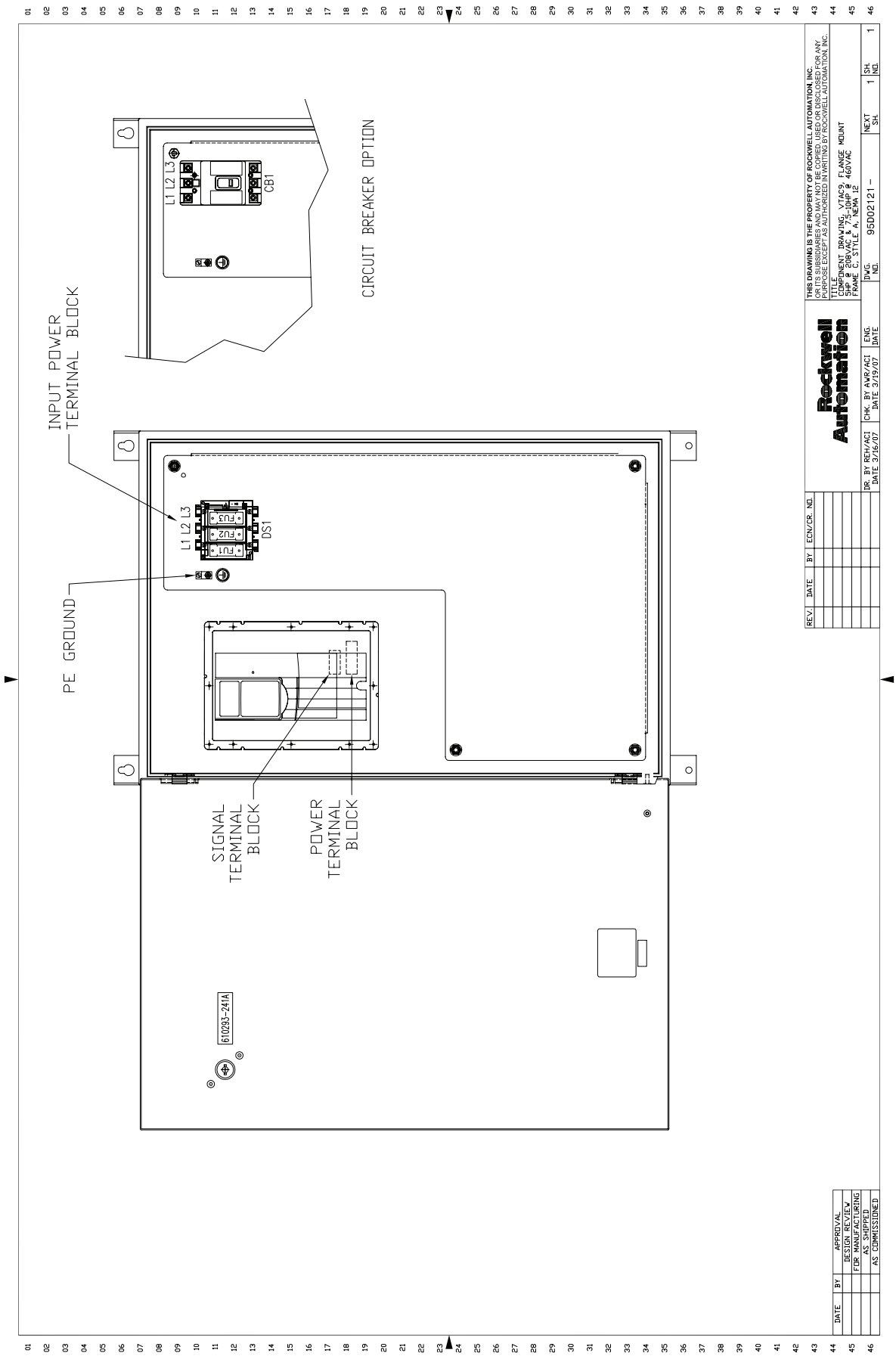


Figure 1.26 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives NEMA/UL Type 12

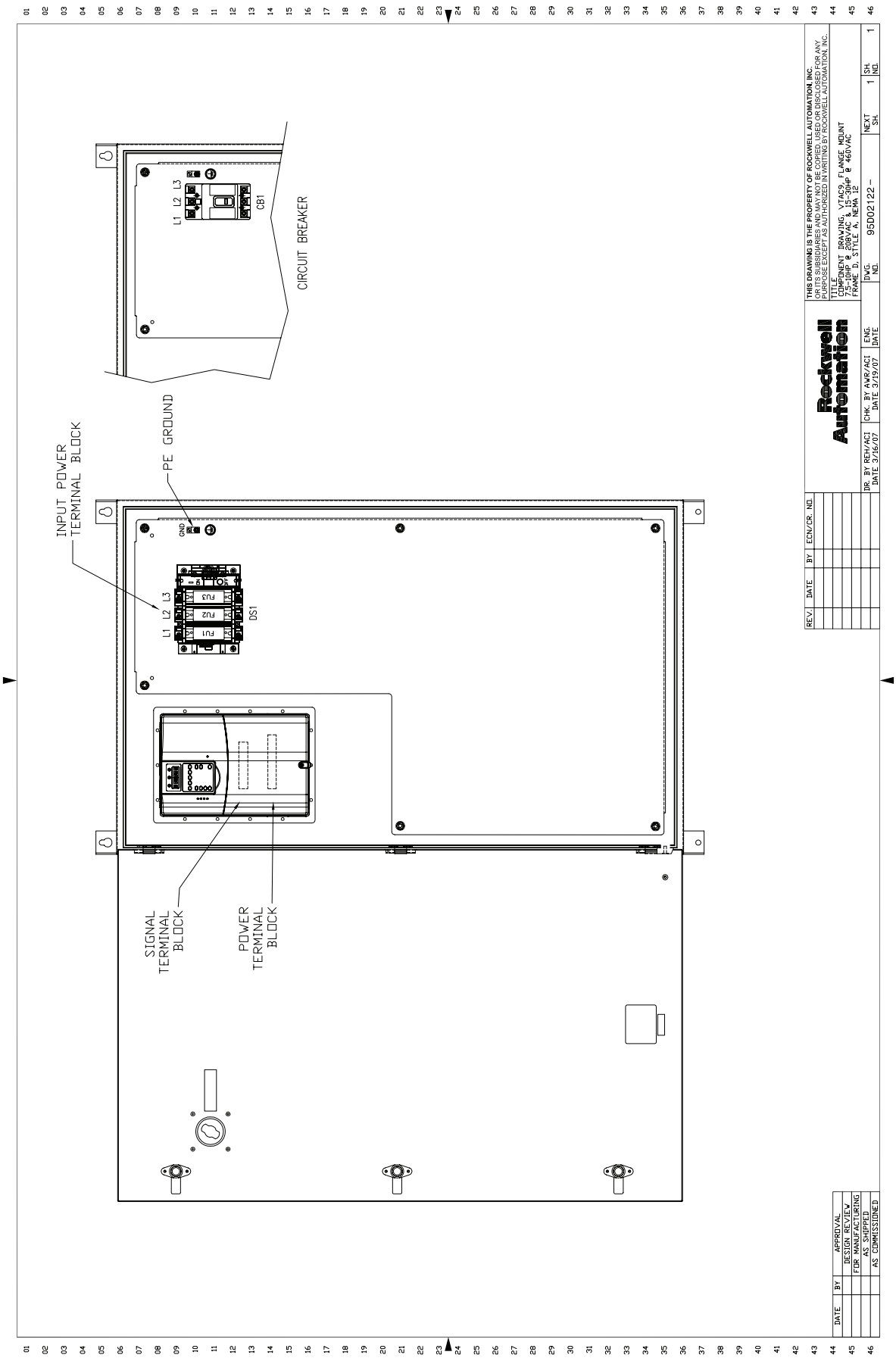


Figure 1.27 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 12

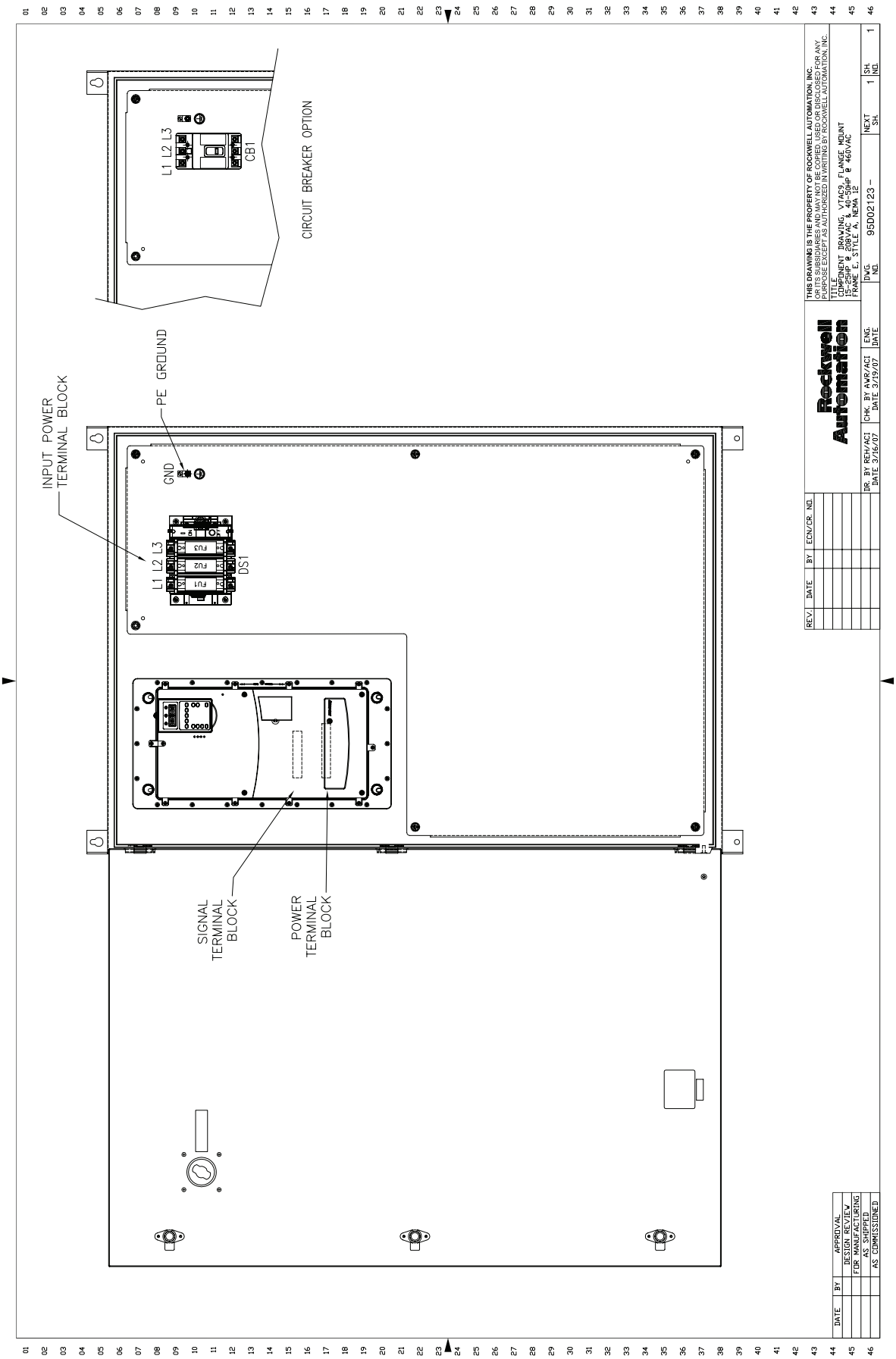


Figure 1.28 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives with Line Reactor NEMA/UL Type 12

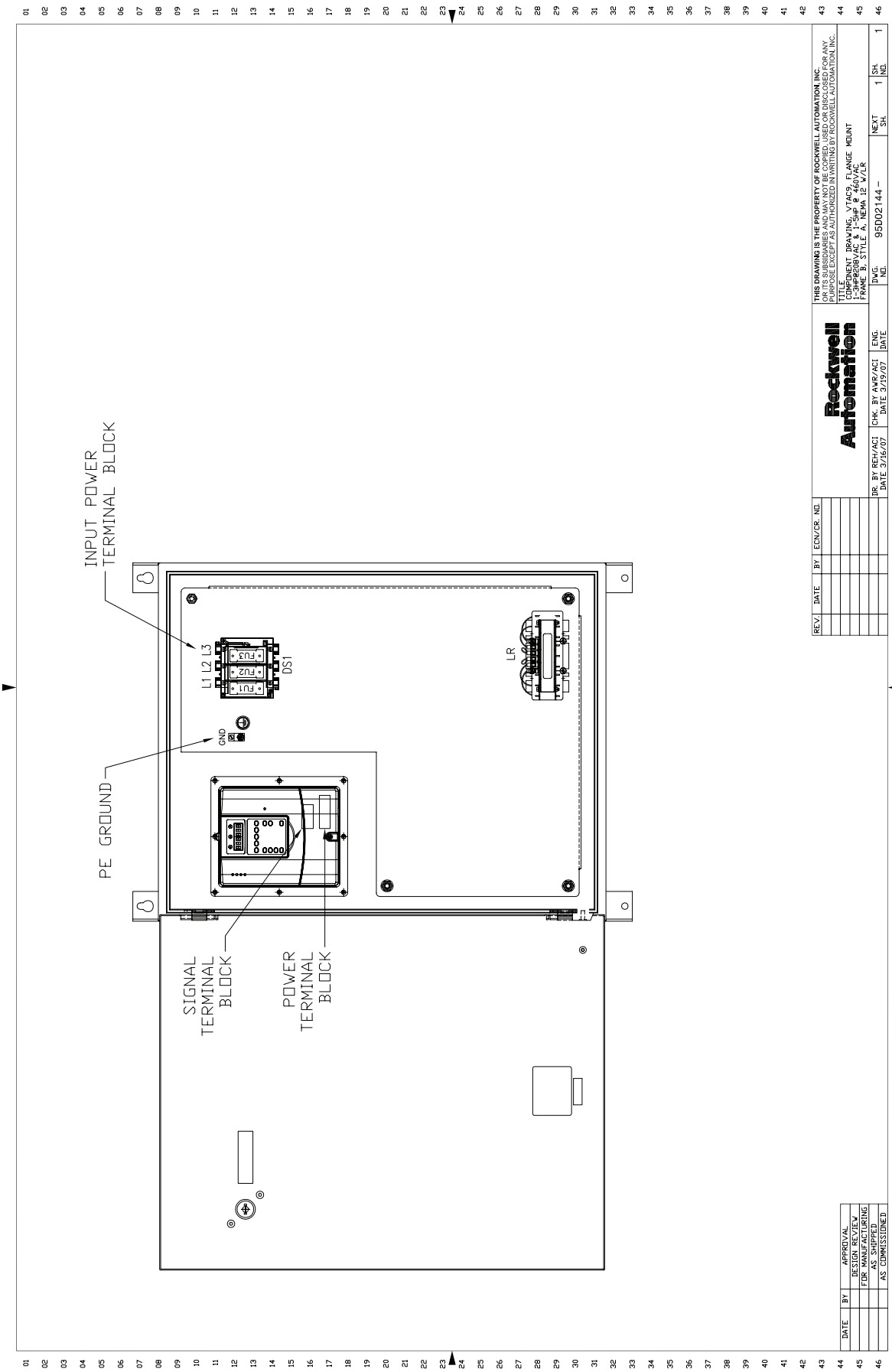


Figure 1.29 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives with Line Reactor NEMA/UL Type 12

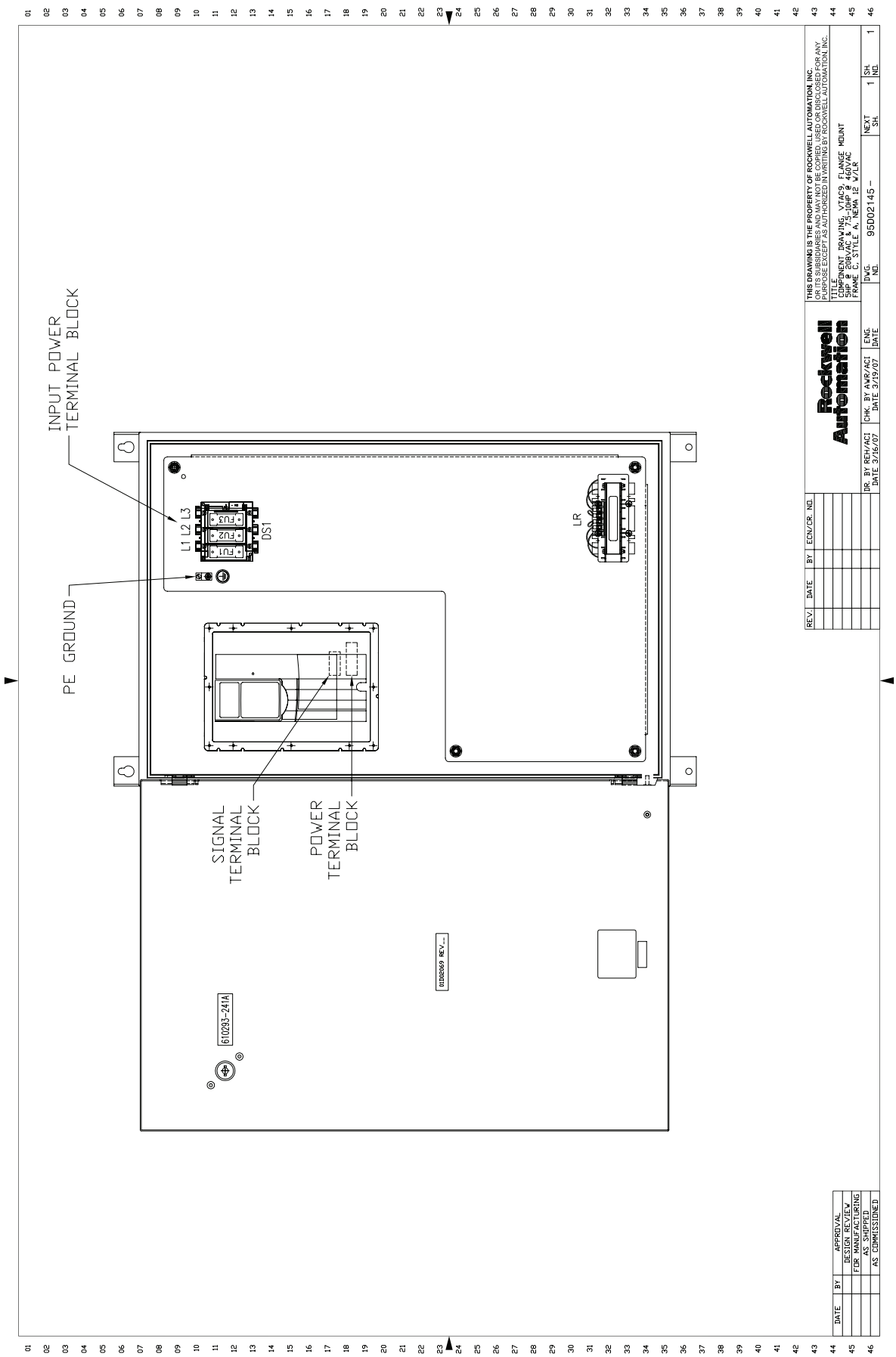


Figure 1.30 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives with Line Reactor NEMA/UL Type 12

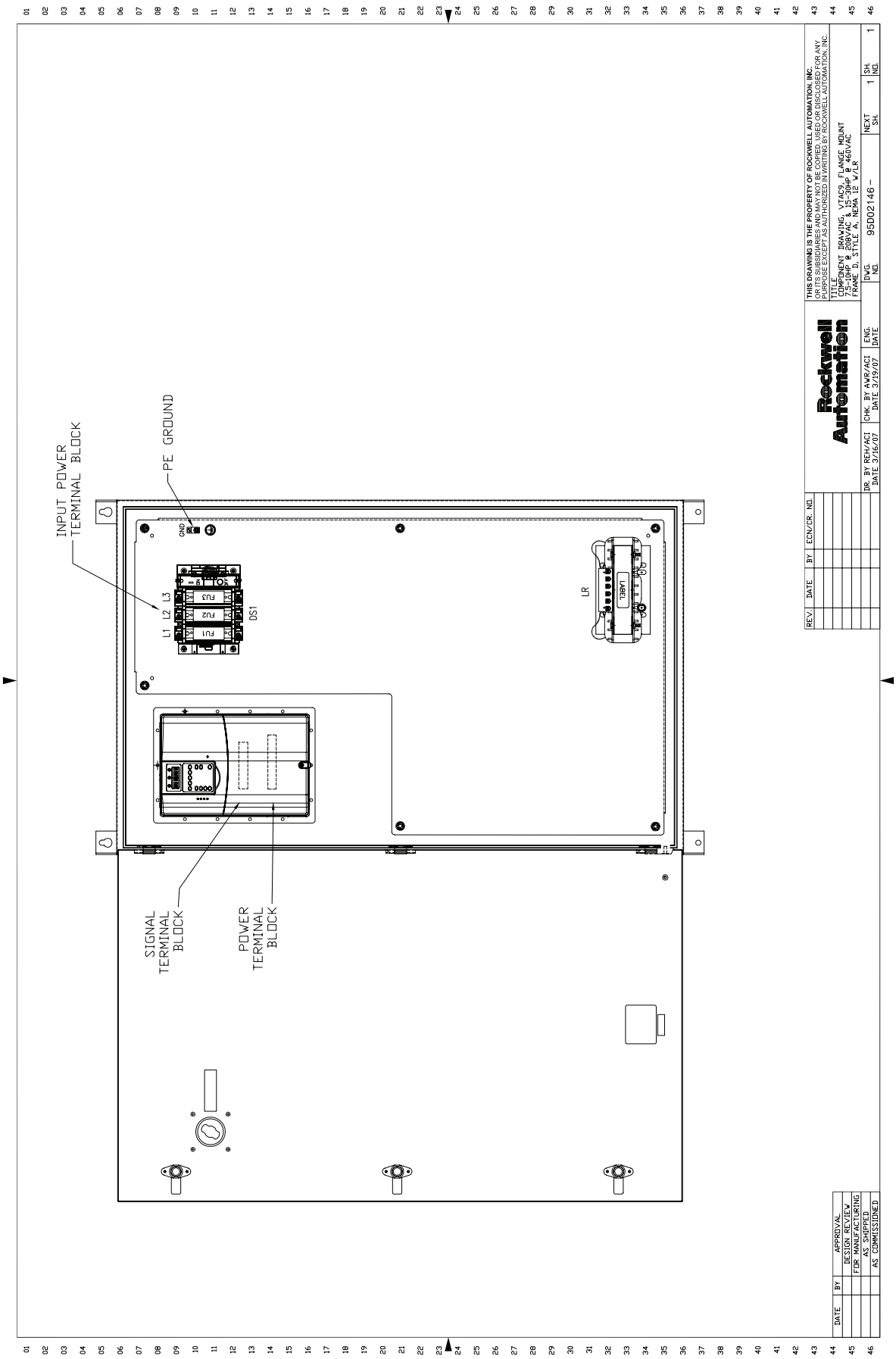


Figure 1.31 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives with Line Reactor NEMA/UL Type 12

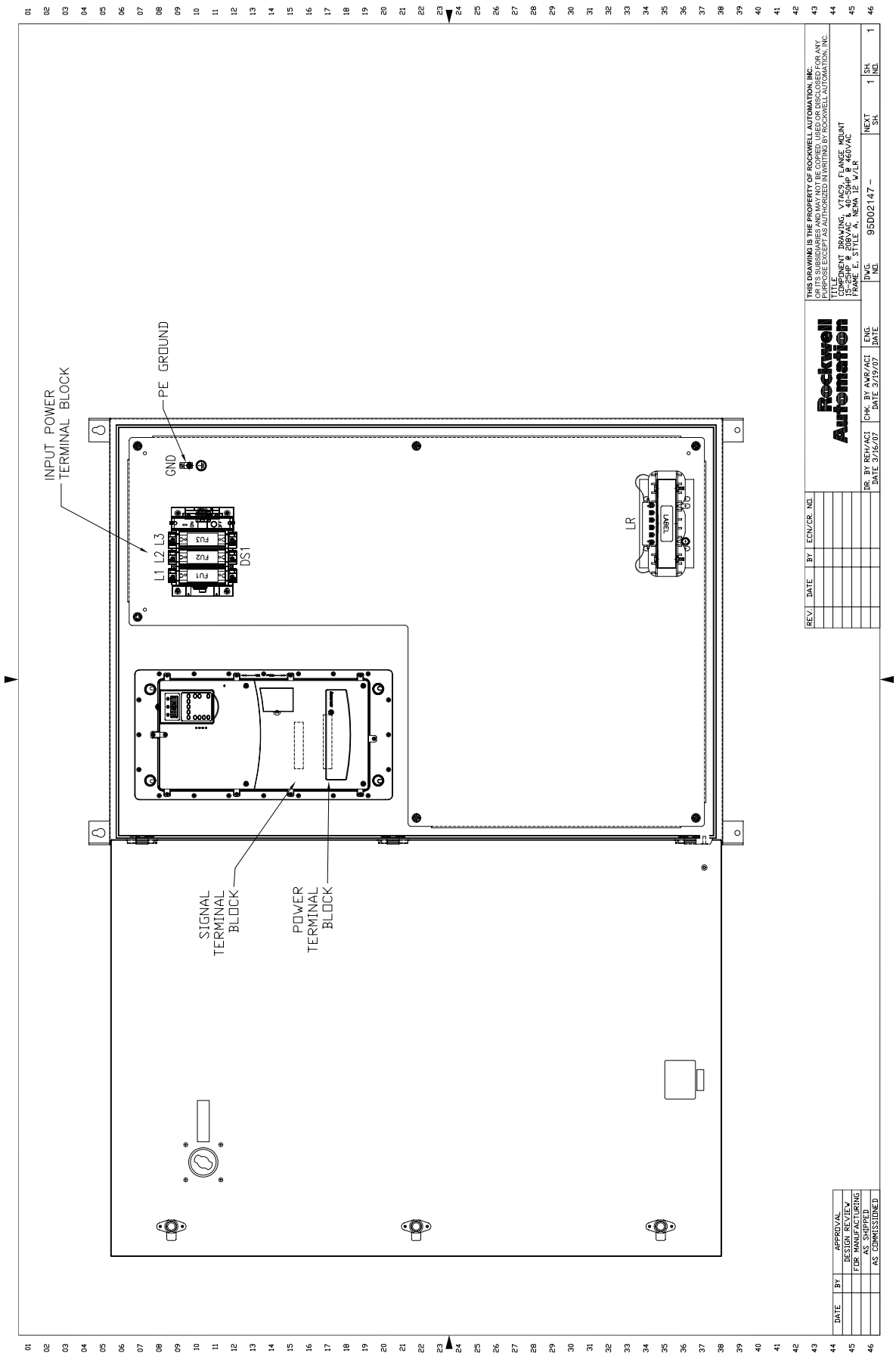


Figure 1.32 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 4/3R

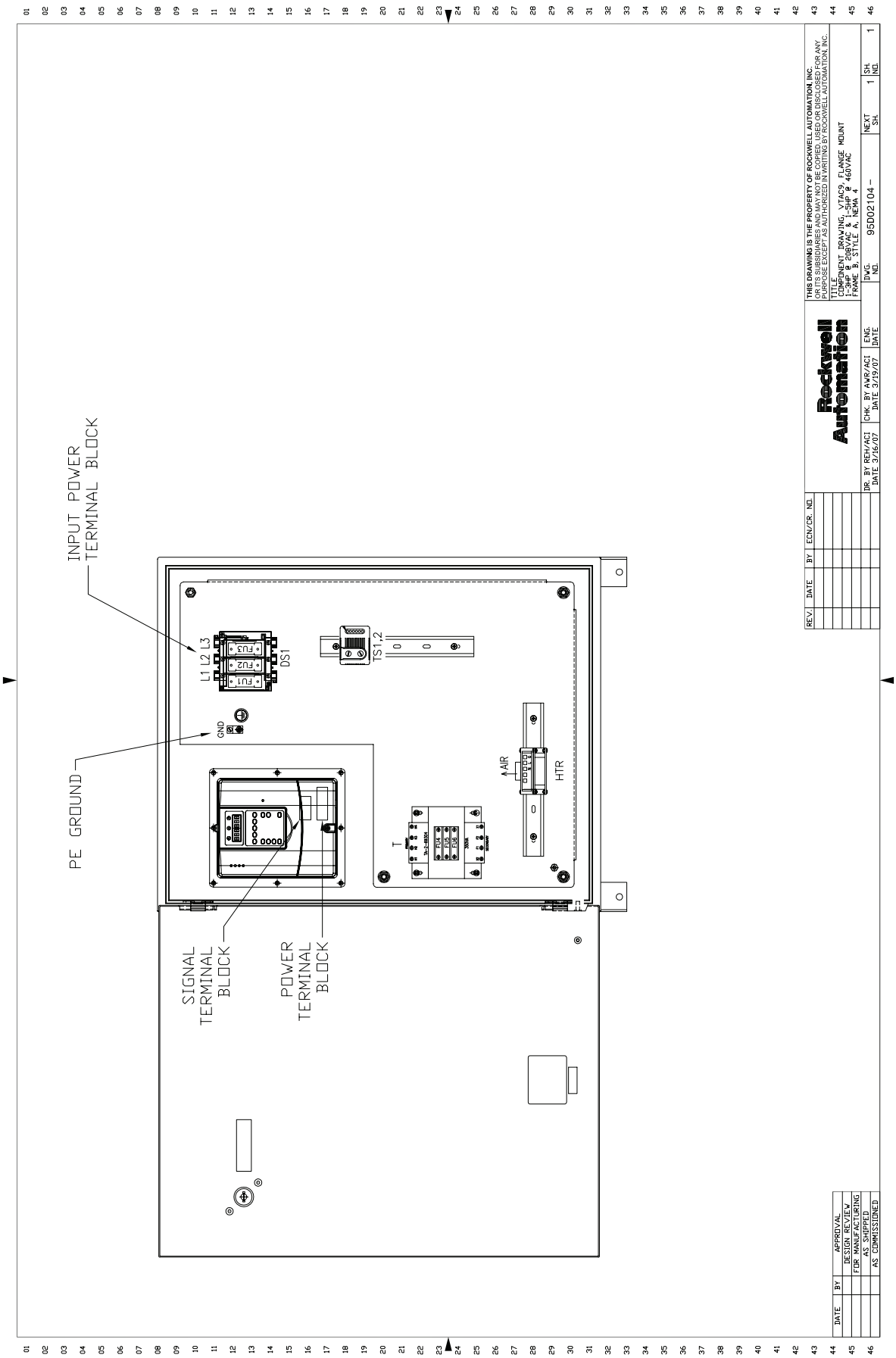


Figure 1.33 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 4/3R

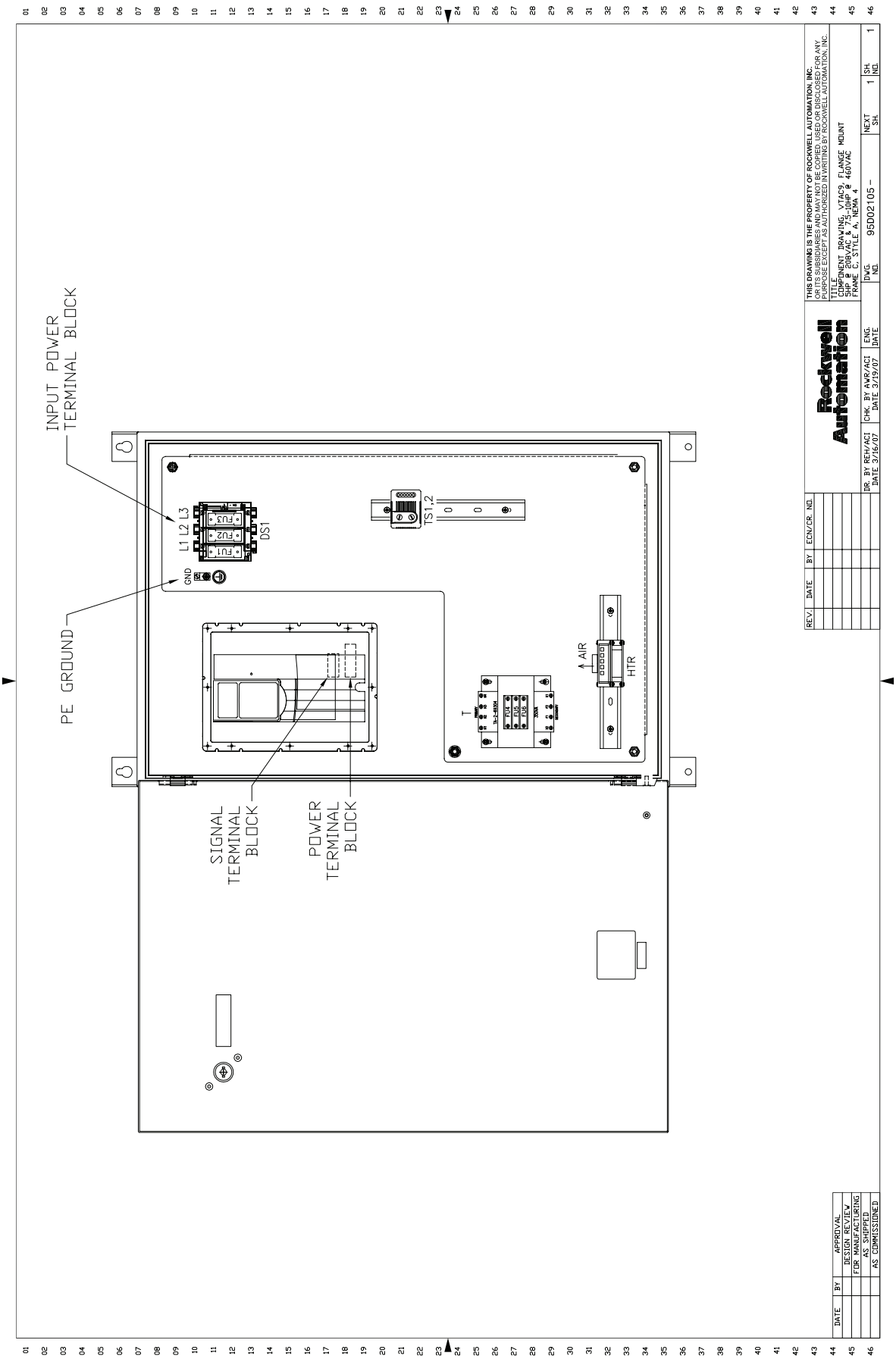


Figure 1.34 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives NEMA/UL Type 4/3R

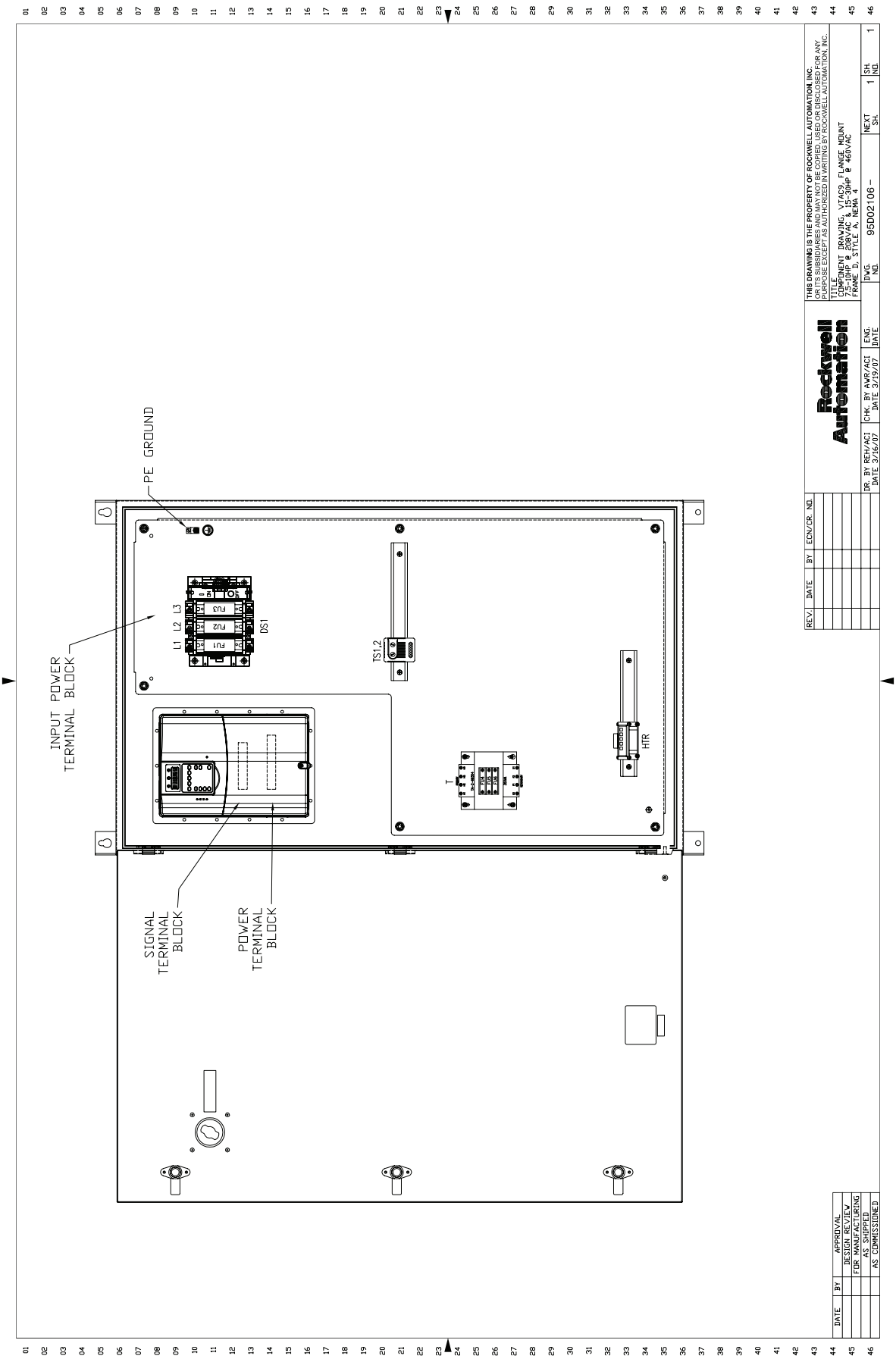


Figure 1.35 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 4/3R

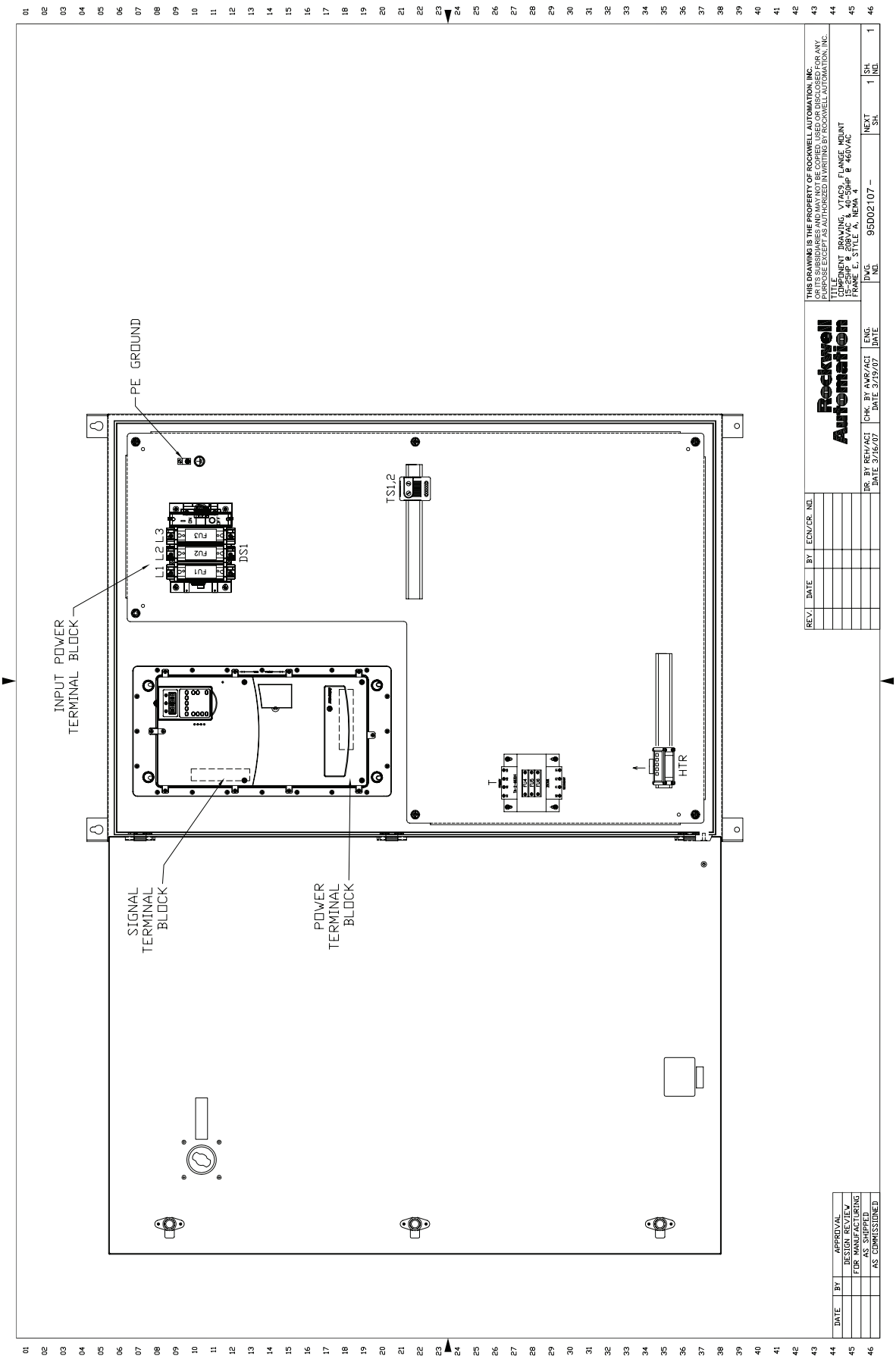


Figure 1.36 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives with Line Reactor NEMA/UL Type 4/3R

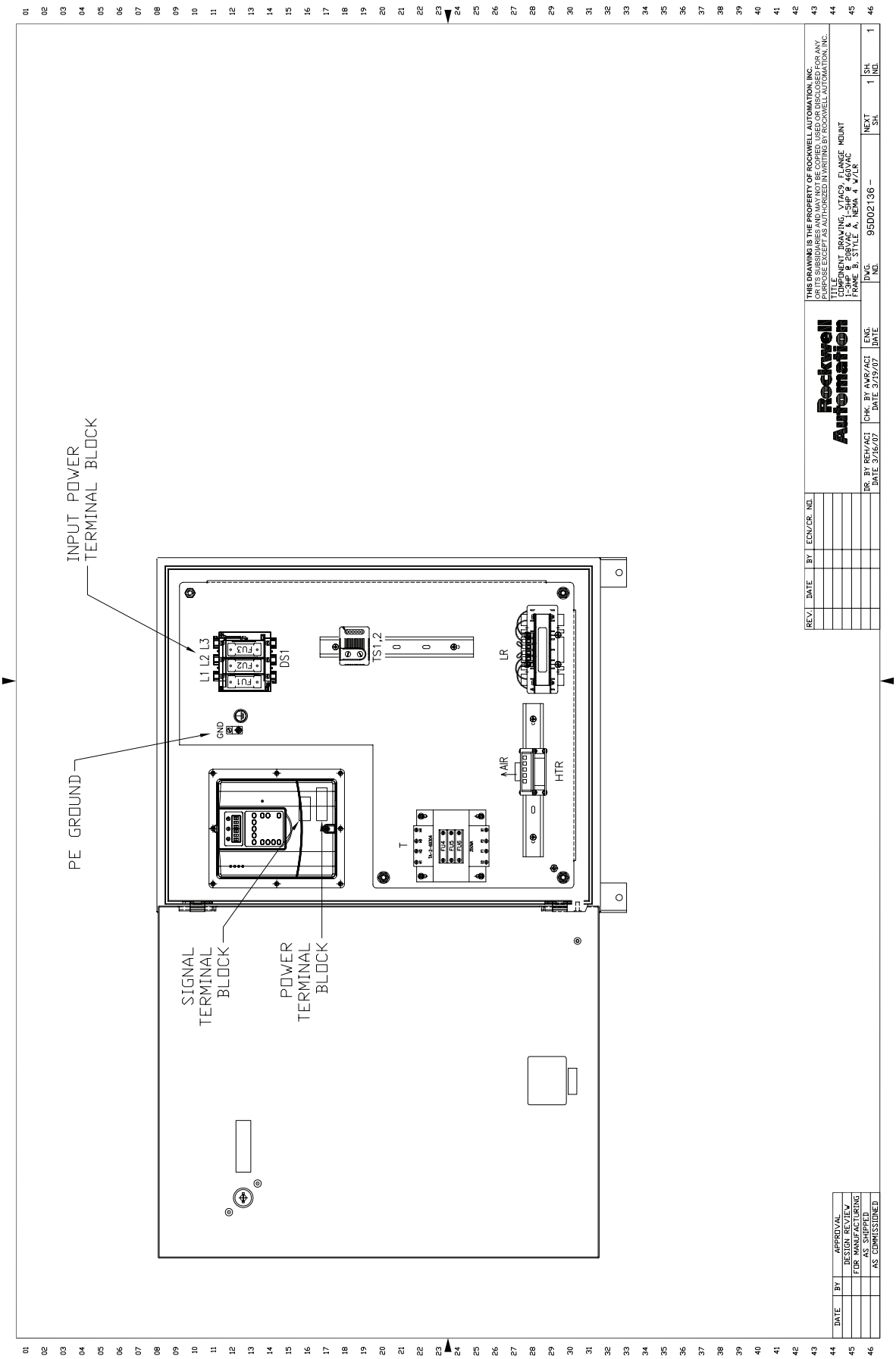


Figure 1.37 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives with Line Reactor NEMA/UL Type 4/3R

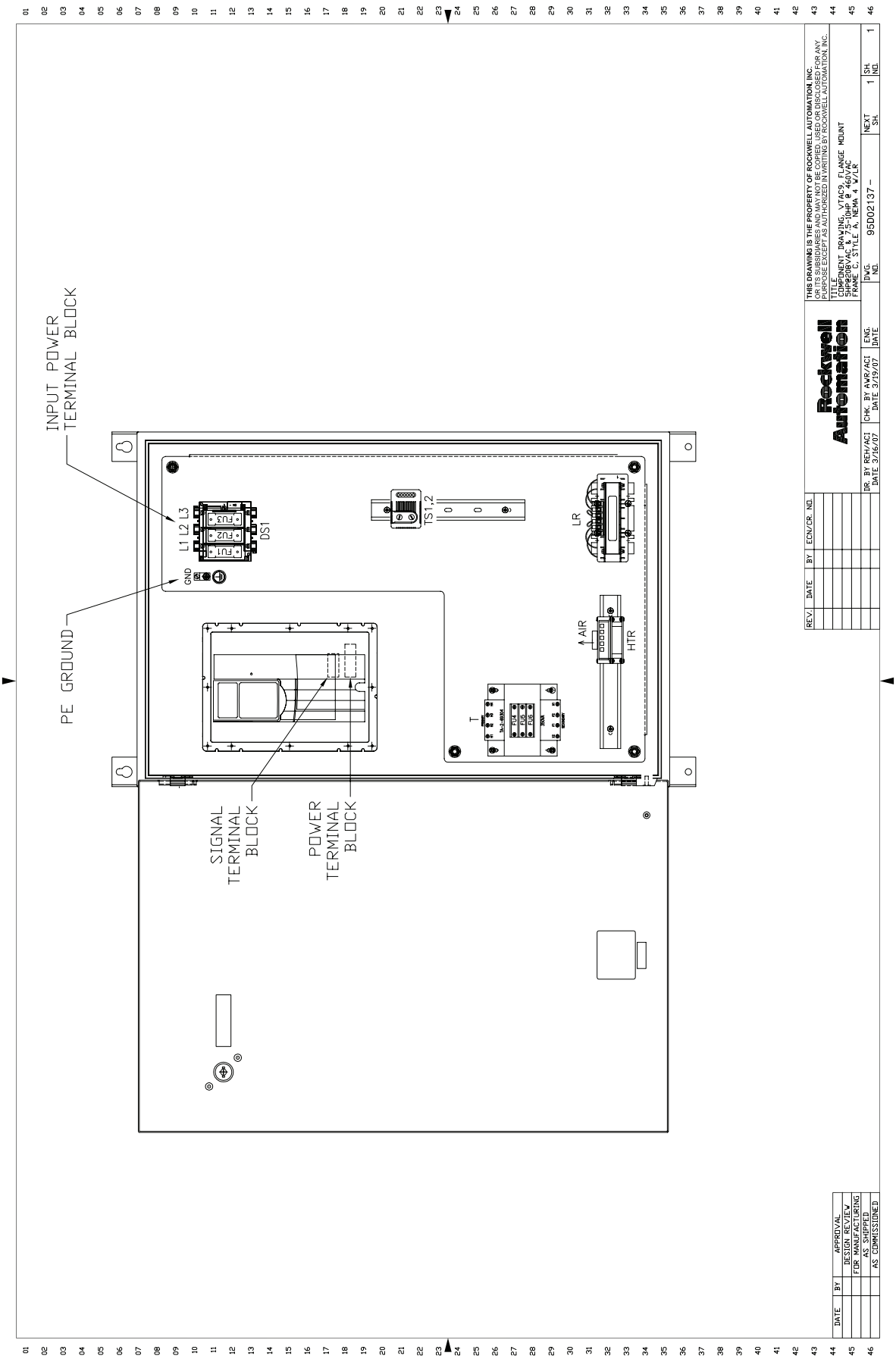


Figure 1.38 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives with Line Reactor NEMA/UL Type 4/3R

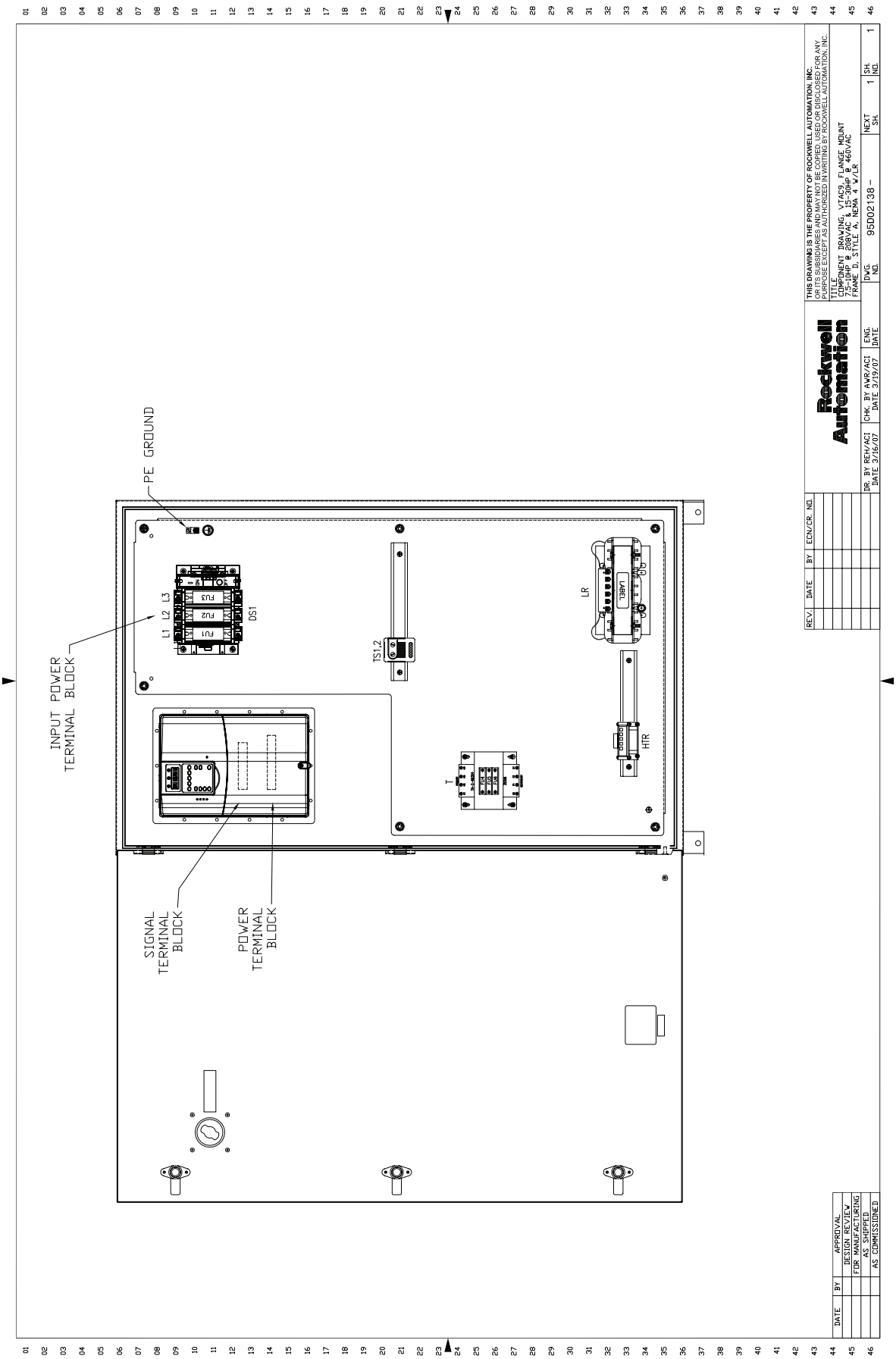
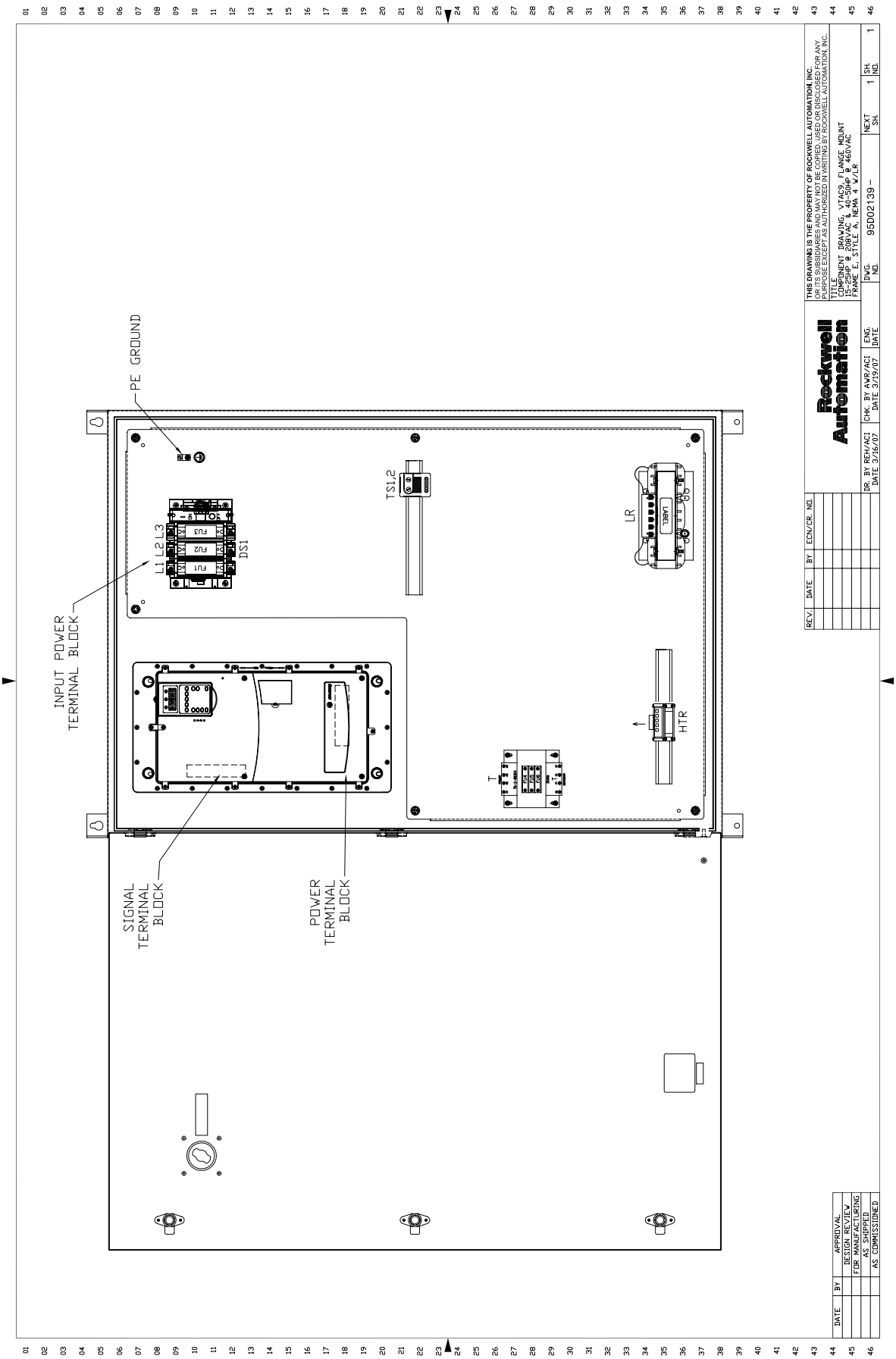


Figure 1.39 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives with Line Reactor NEMA/UL Type 4/3R



Outline Drawings

Figure 1.40 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 1

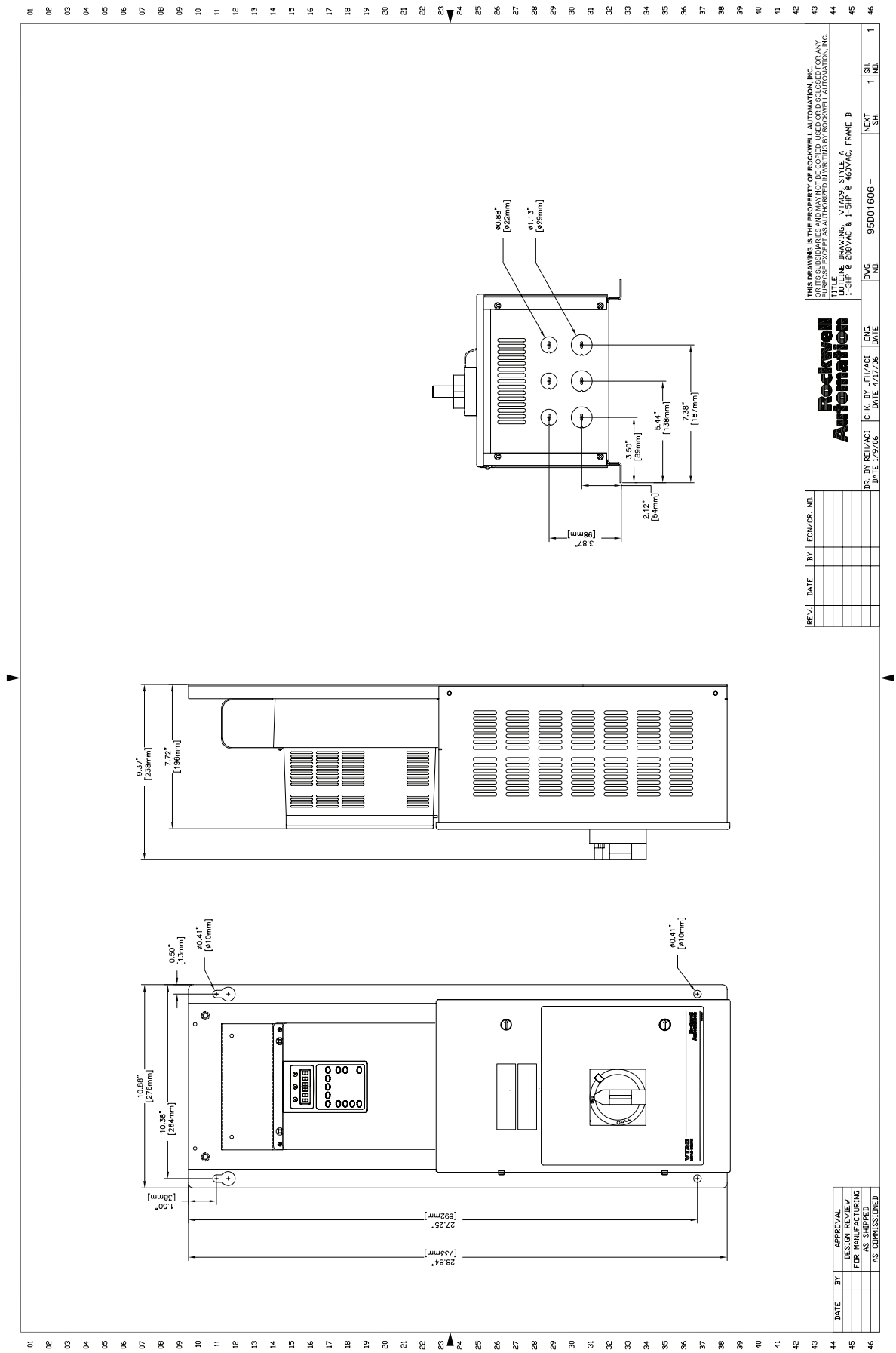


Figure 1.41 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 1

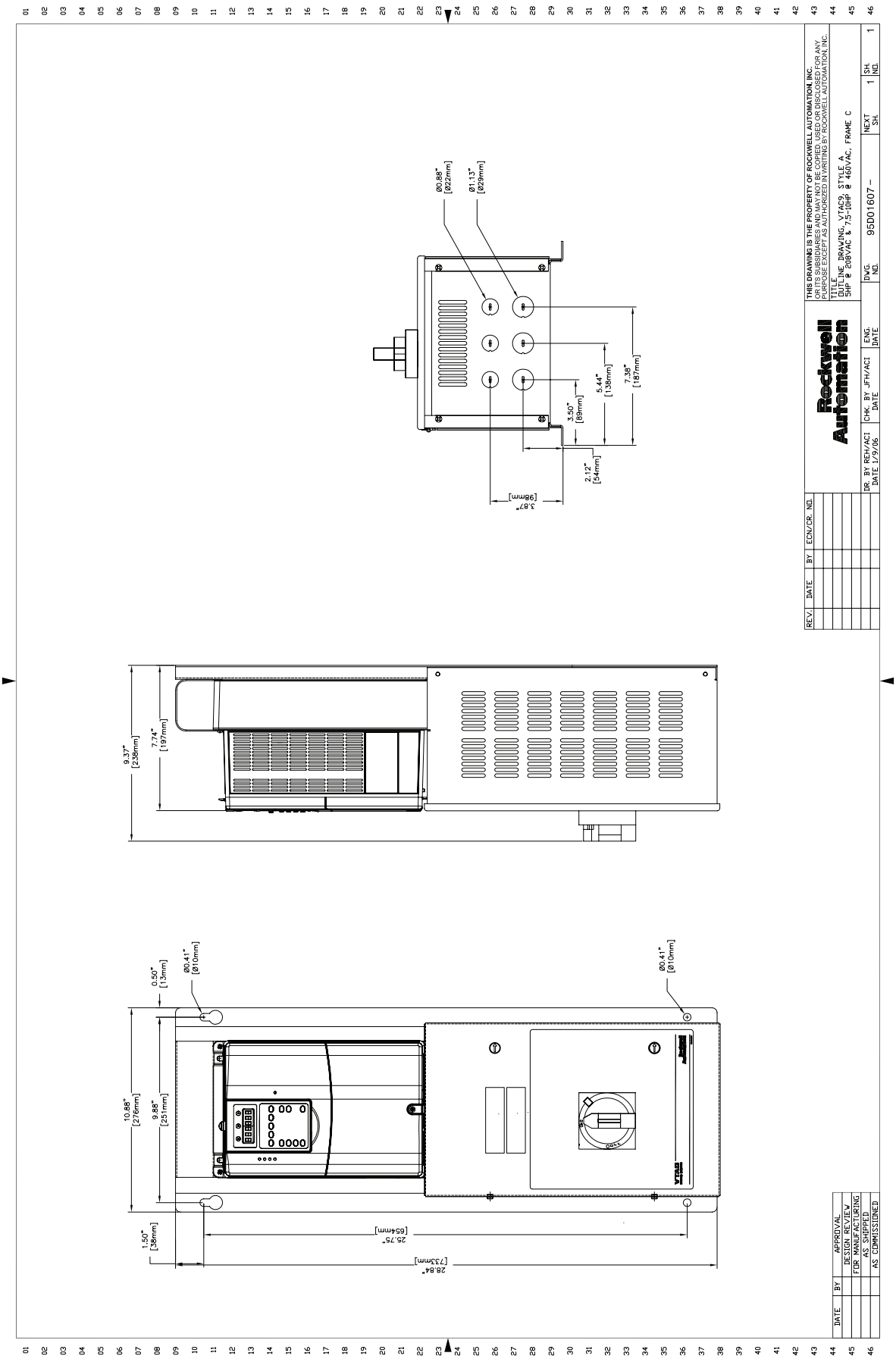


Figure 1.42 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives NEMA/UL Type 1

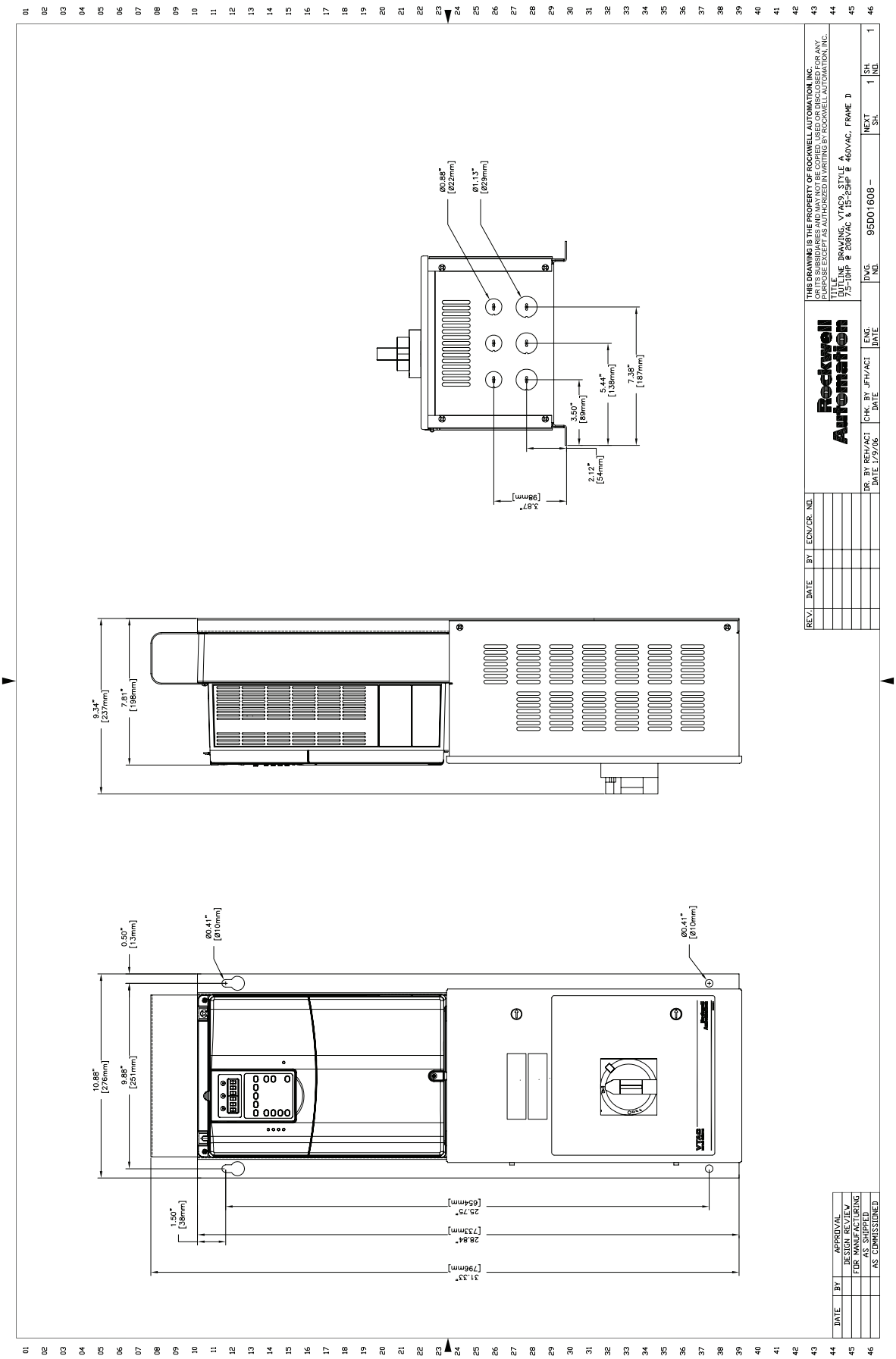


Figure 1.43 25-50 HP, 460V AC Drives NEMA/UL Type 1

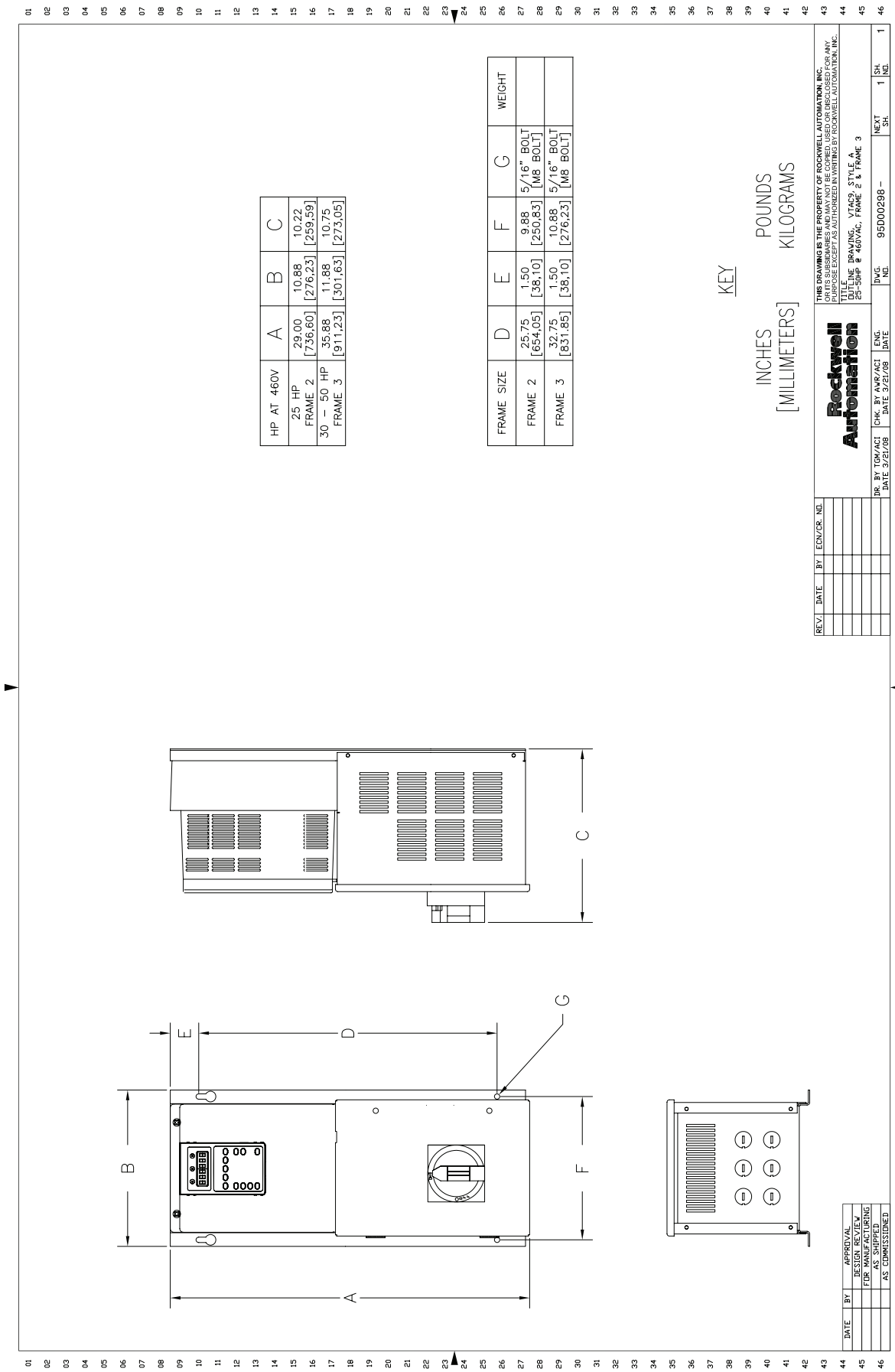


Figure 1.44 30 HP, 460V AC Drives NEMA/UL Type 1

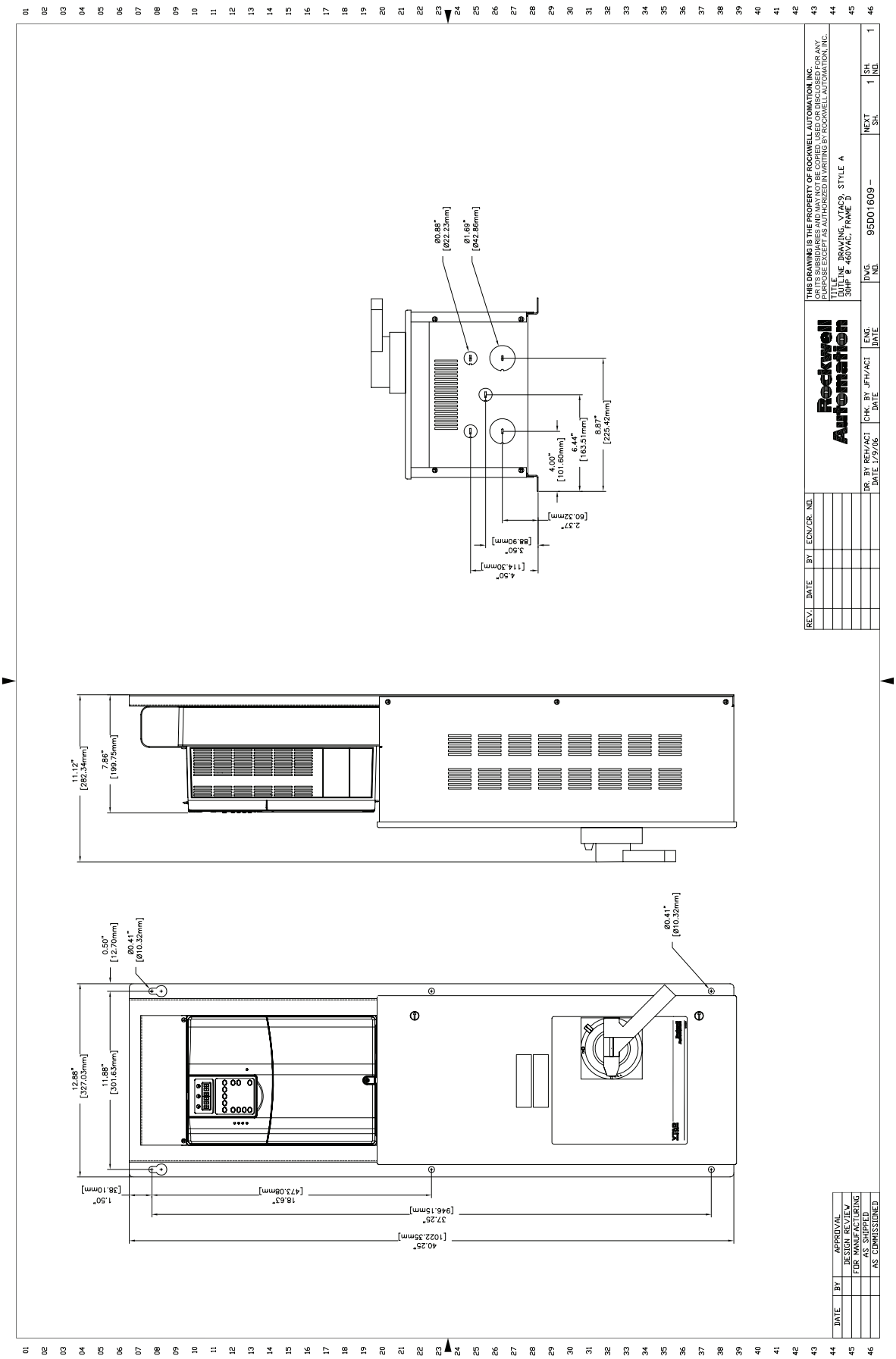


Figure 1.45 15-25 HP, 208V AC, 40-50 HP, 460V AC Drives NEMA/UL Type 1

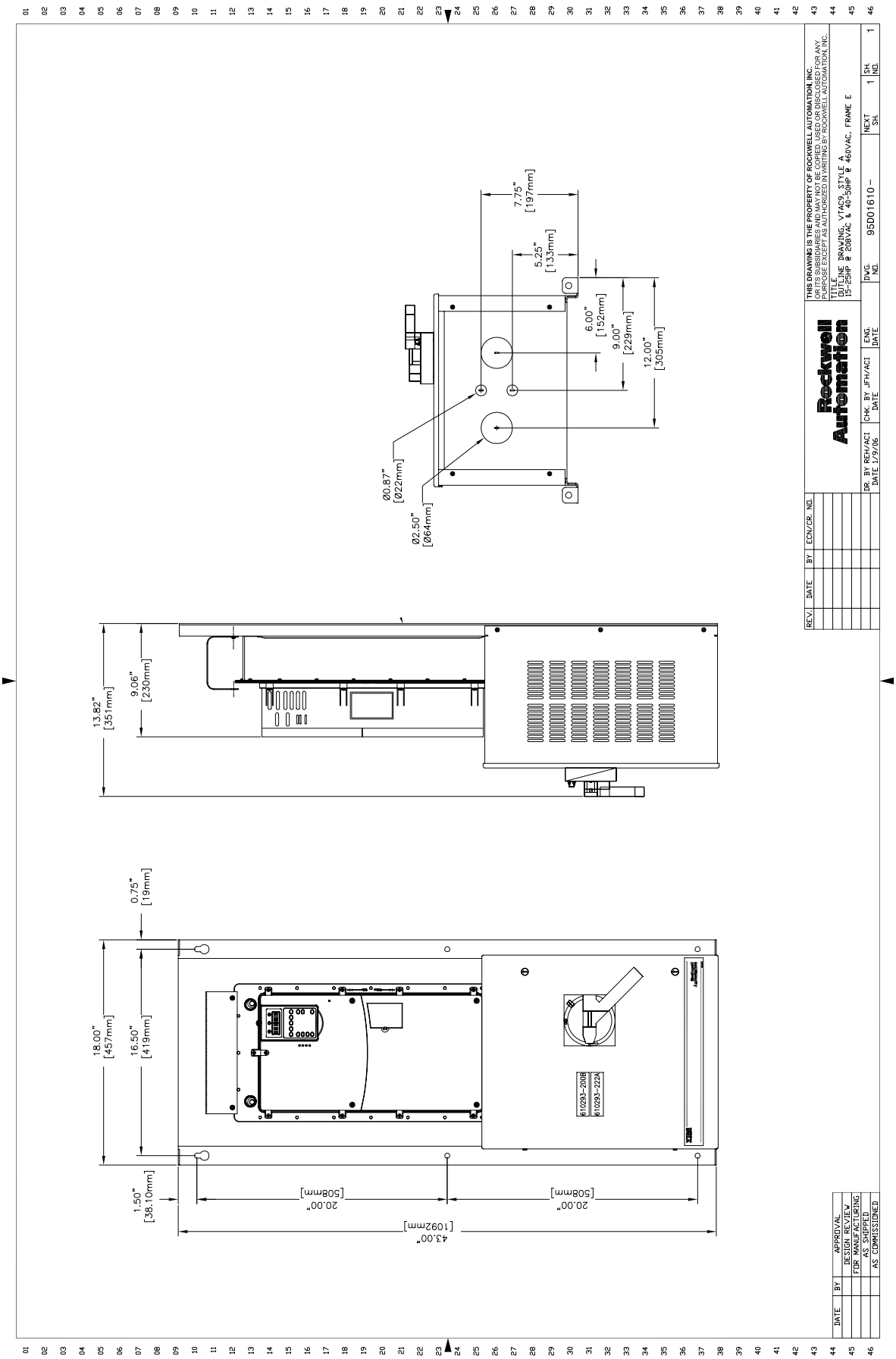


Figure 1.46 30 HP, 208V AC, 60 HP, 460V AC Drives NEMA/UL Type 1

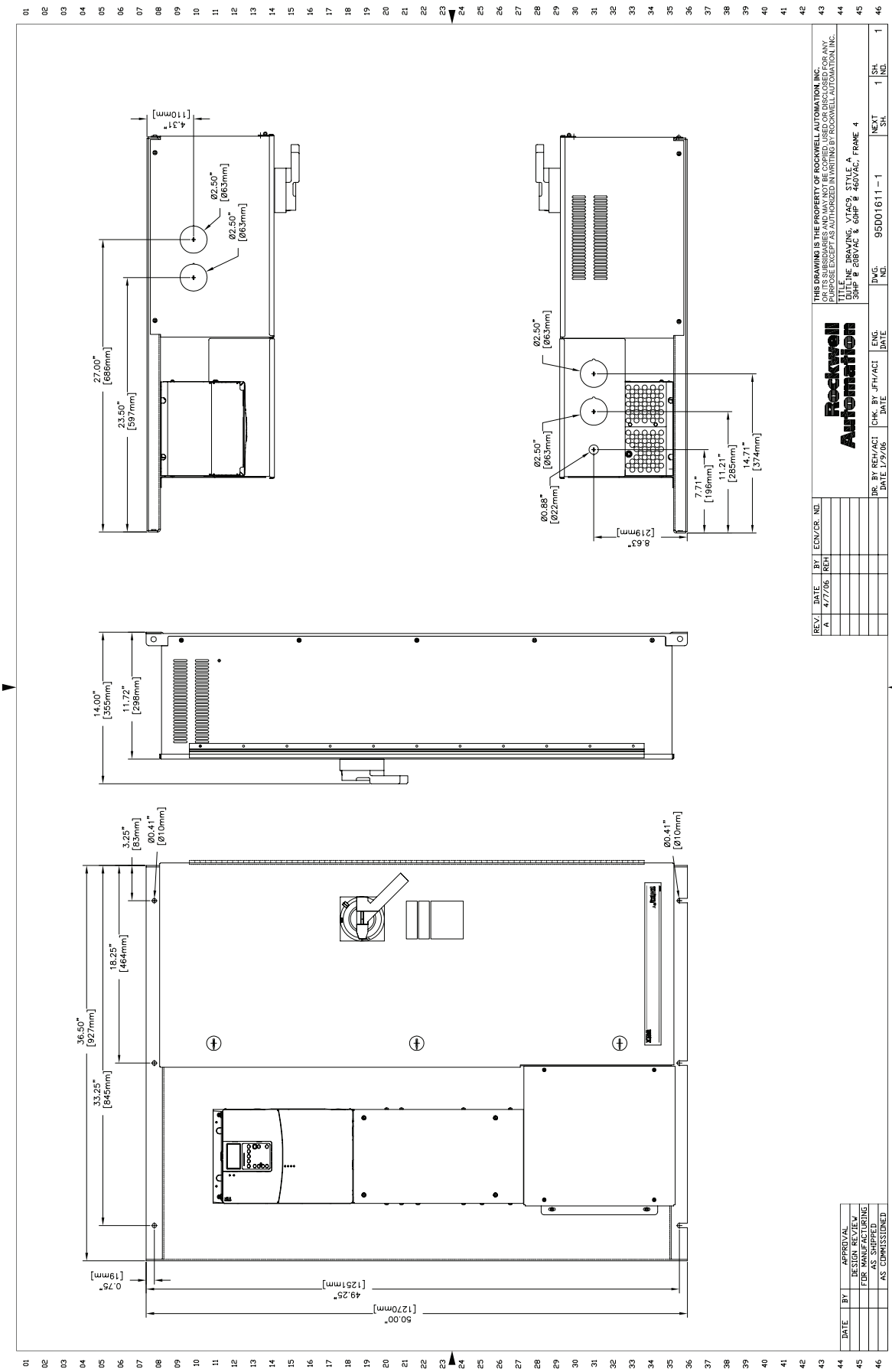


Figure 1.47 40 HP, 208V AC, 75-100 HP, 460V AC Drives NEMA/UL Type 1

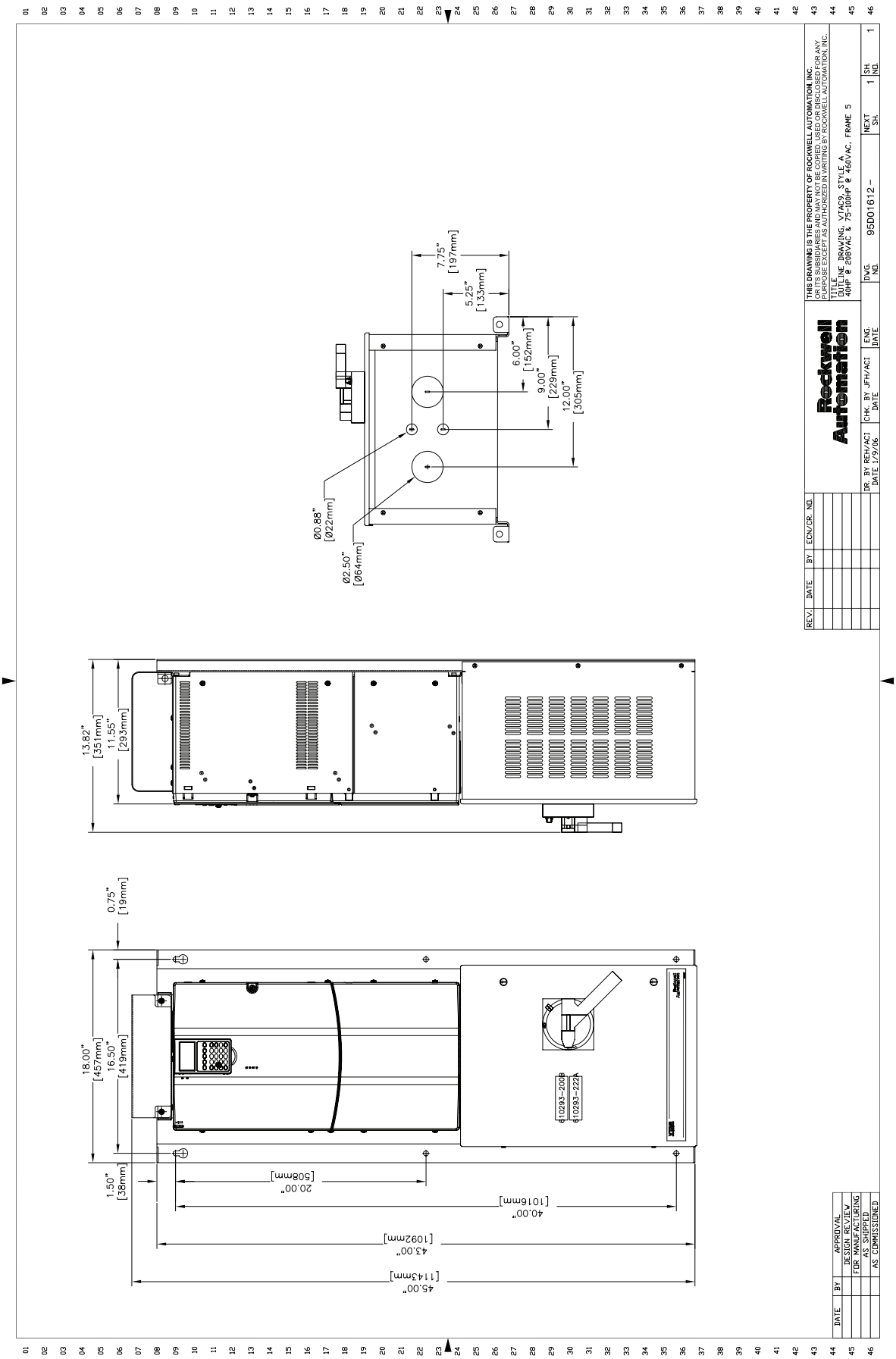


Figure 1.48 125-200 HP, 460V AC Drives
NEMA/UL Type 1

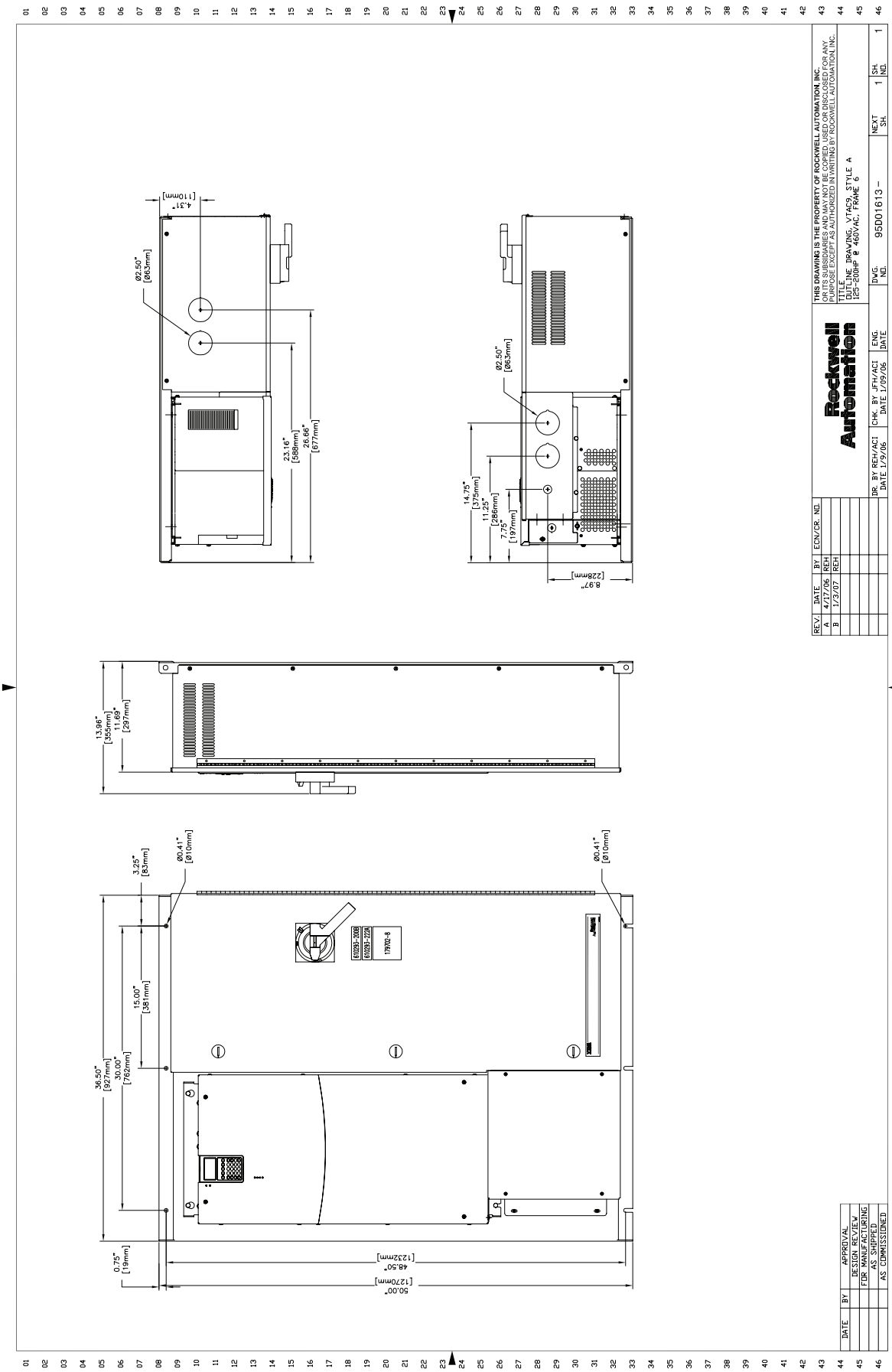


Figure 1.49 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

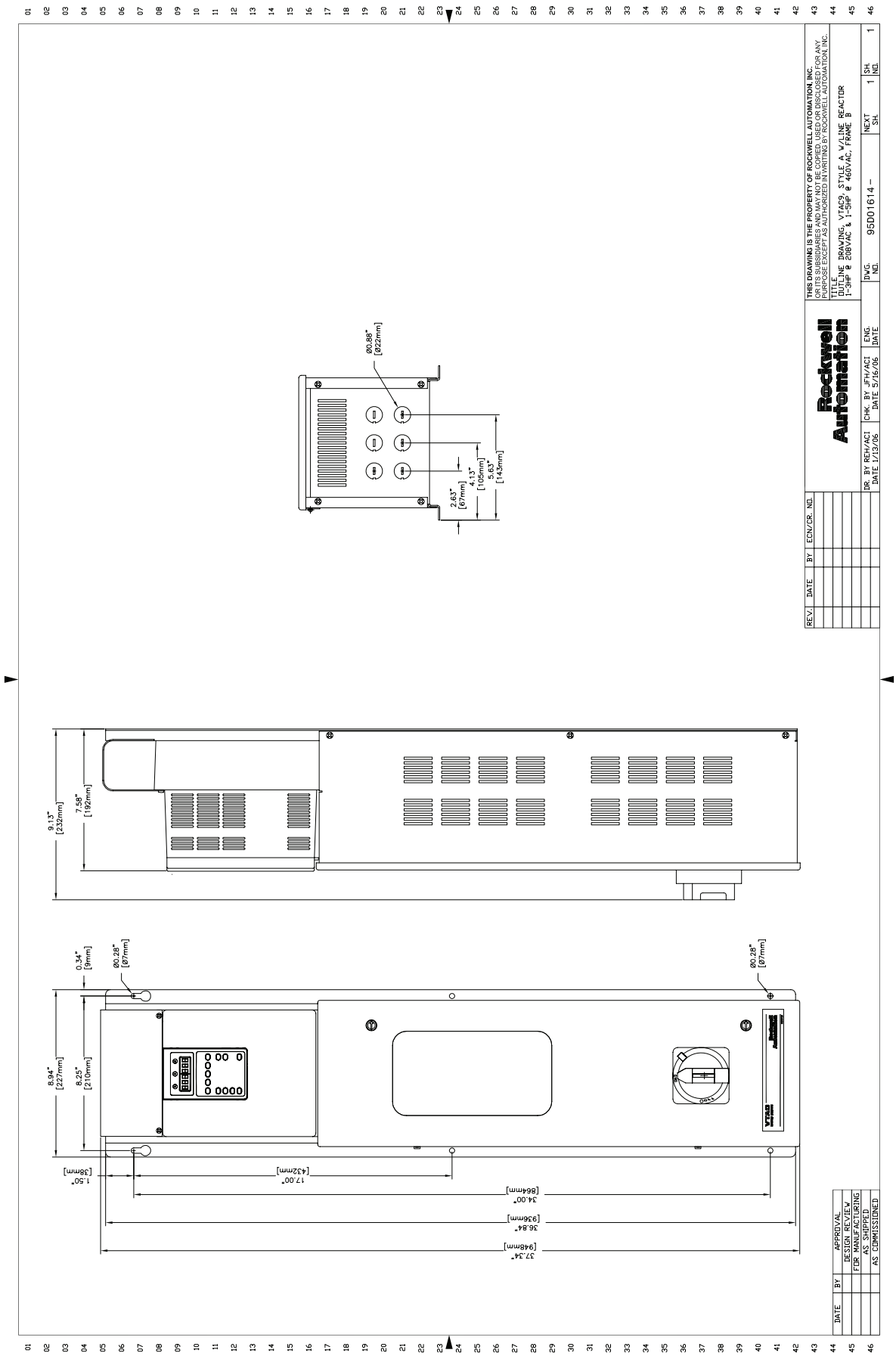


Figure 1.50 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

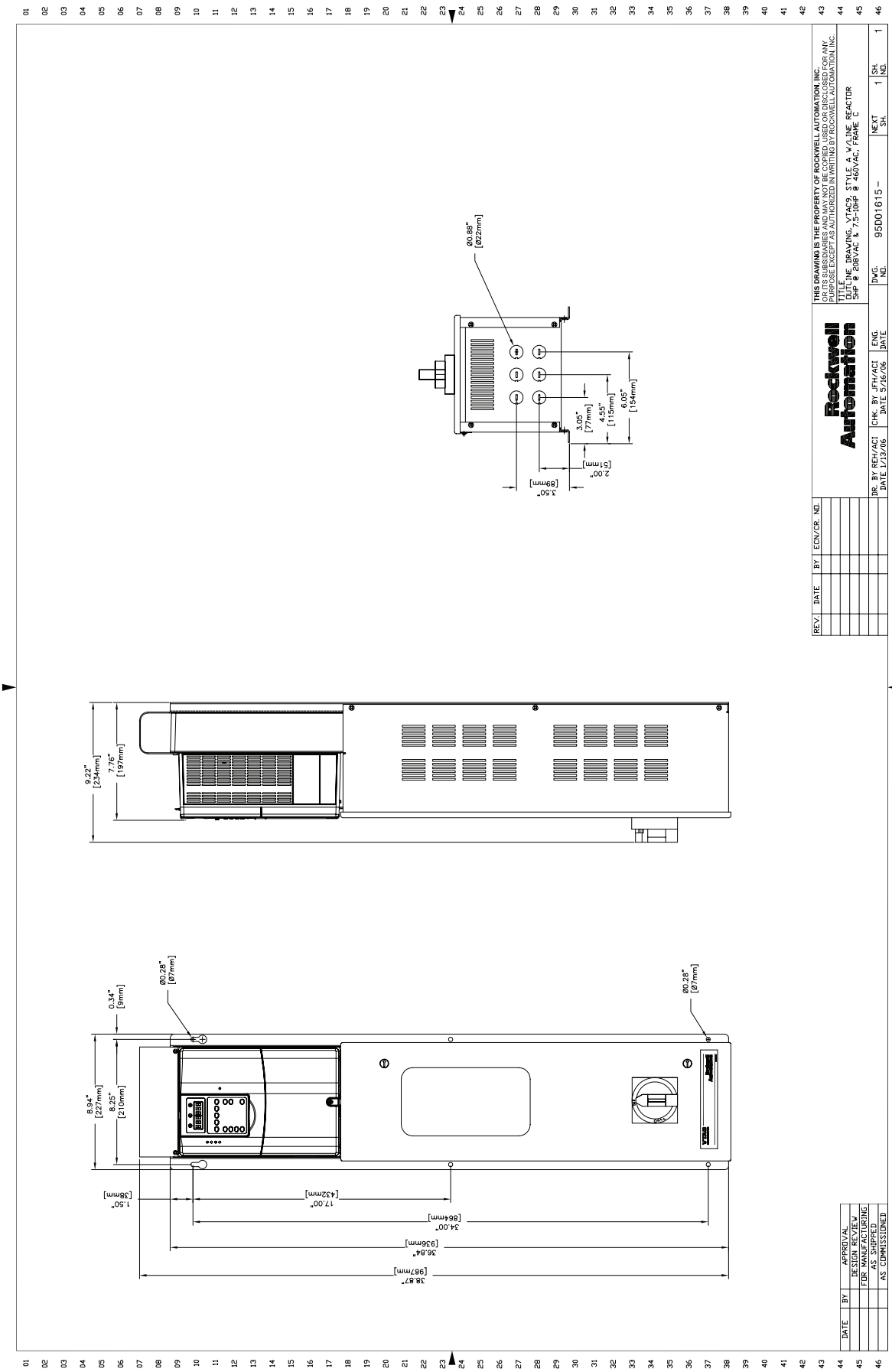


Figure 1.51 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

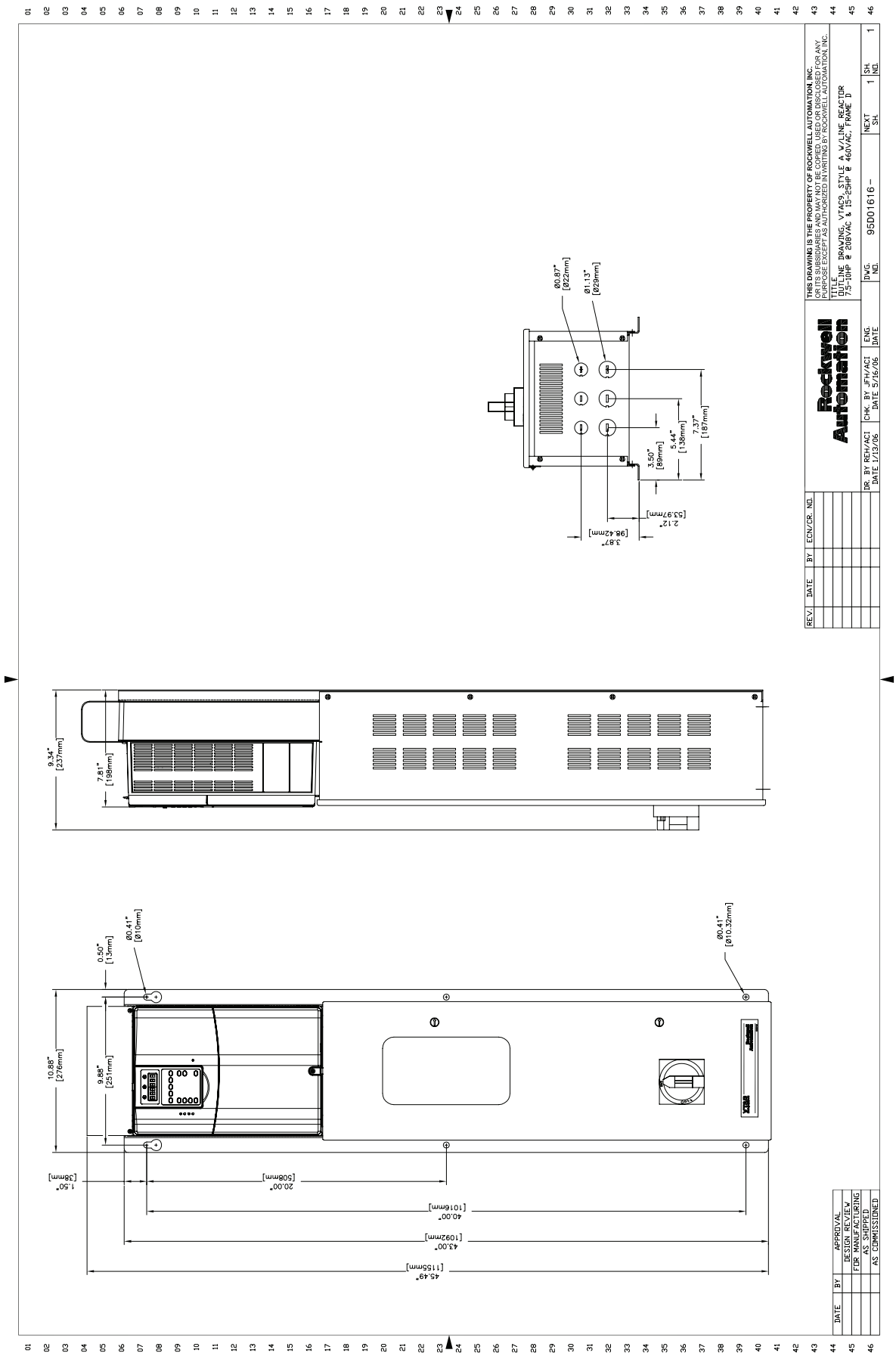


Figure 1.52 30 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

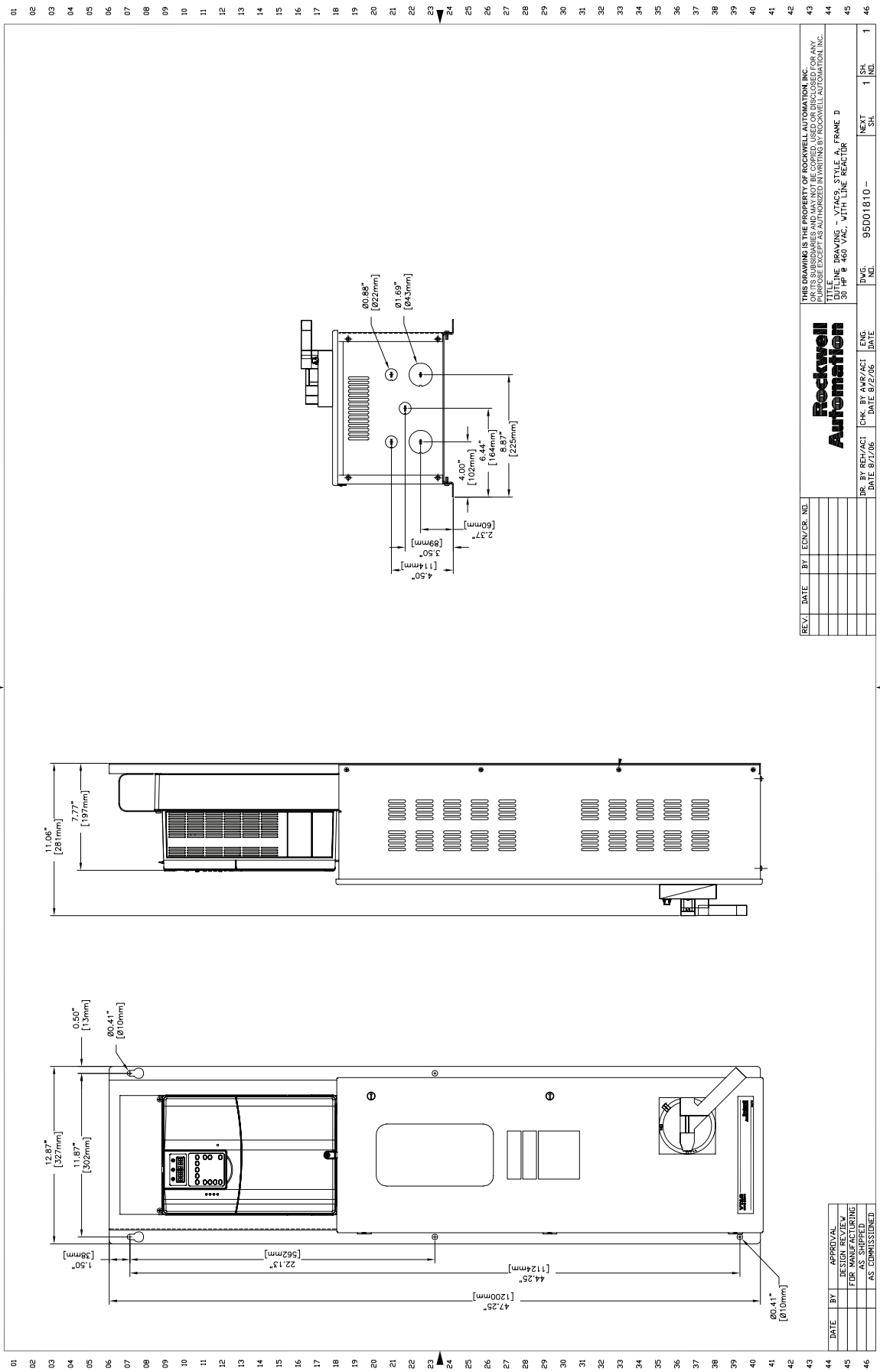


Figure 1.53 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

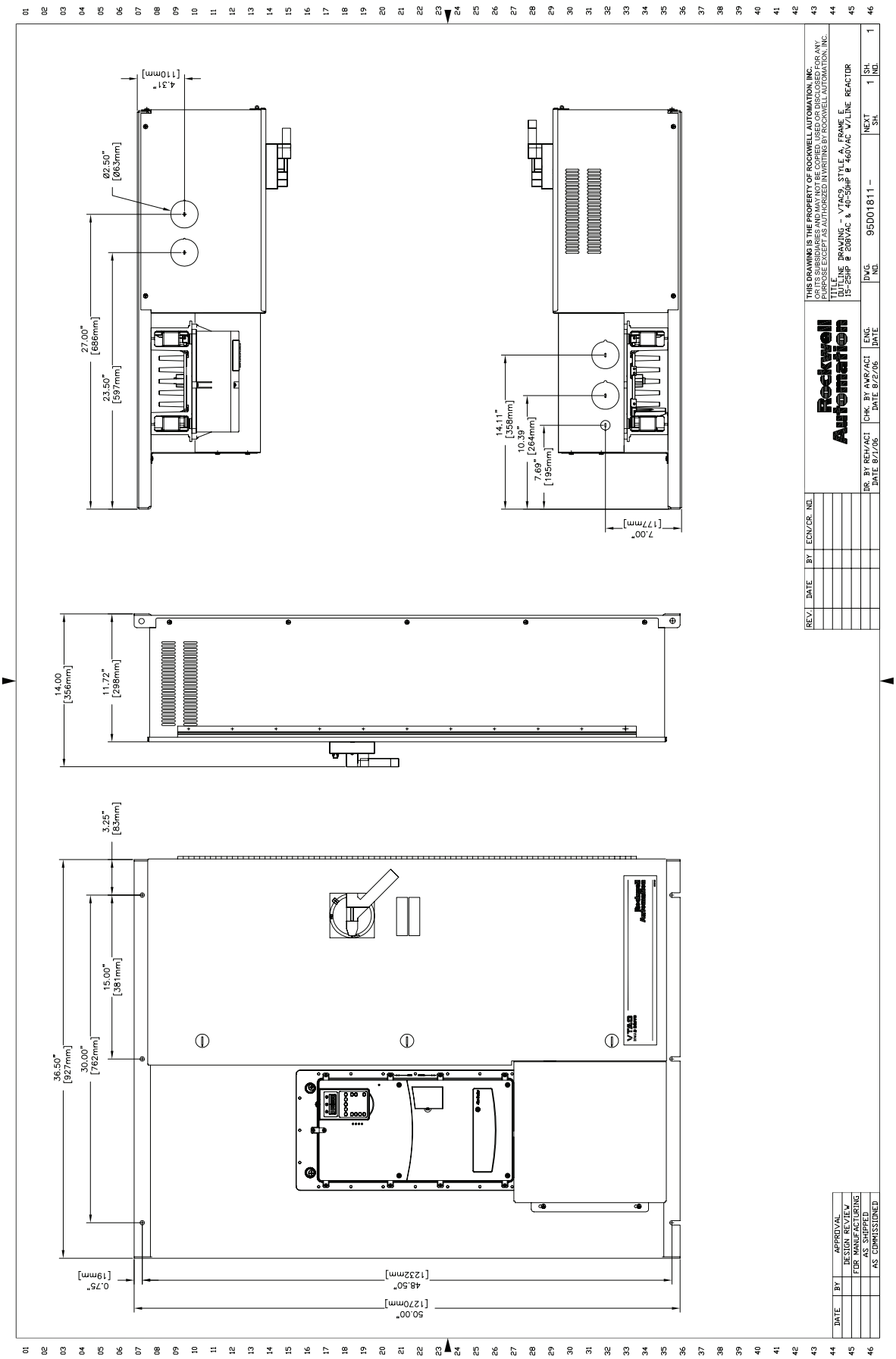


Figure 1.54 30 HP, 208V AC and 60 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

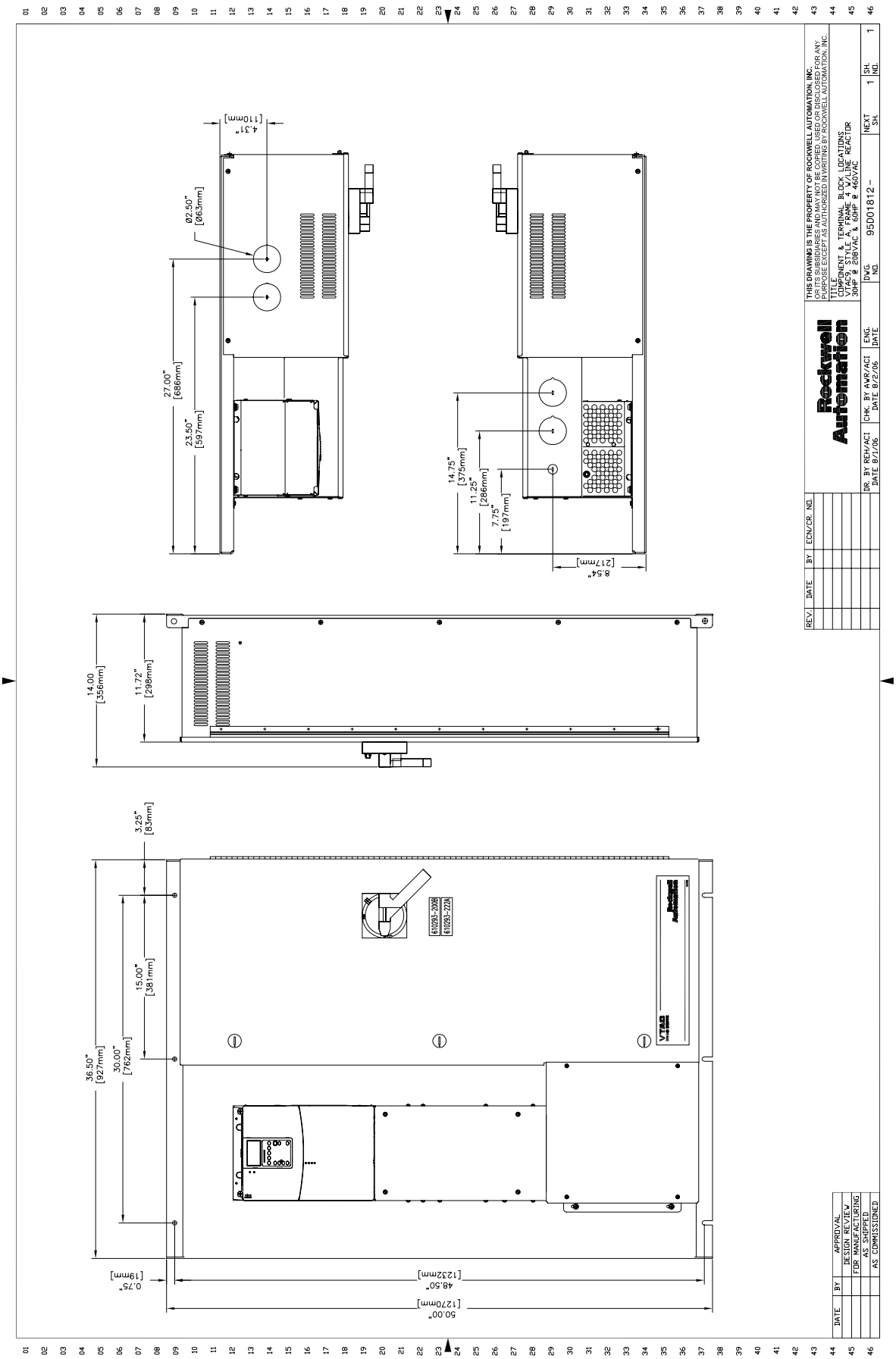


Figure 1.55 40 HP, 208V AC and 75-100 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

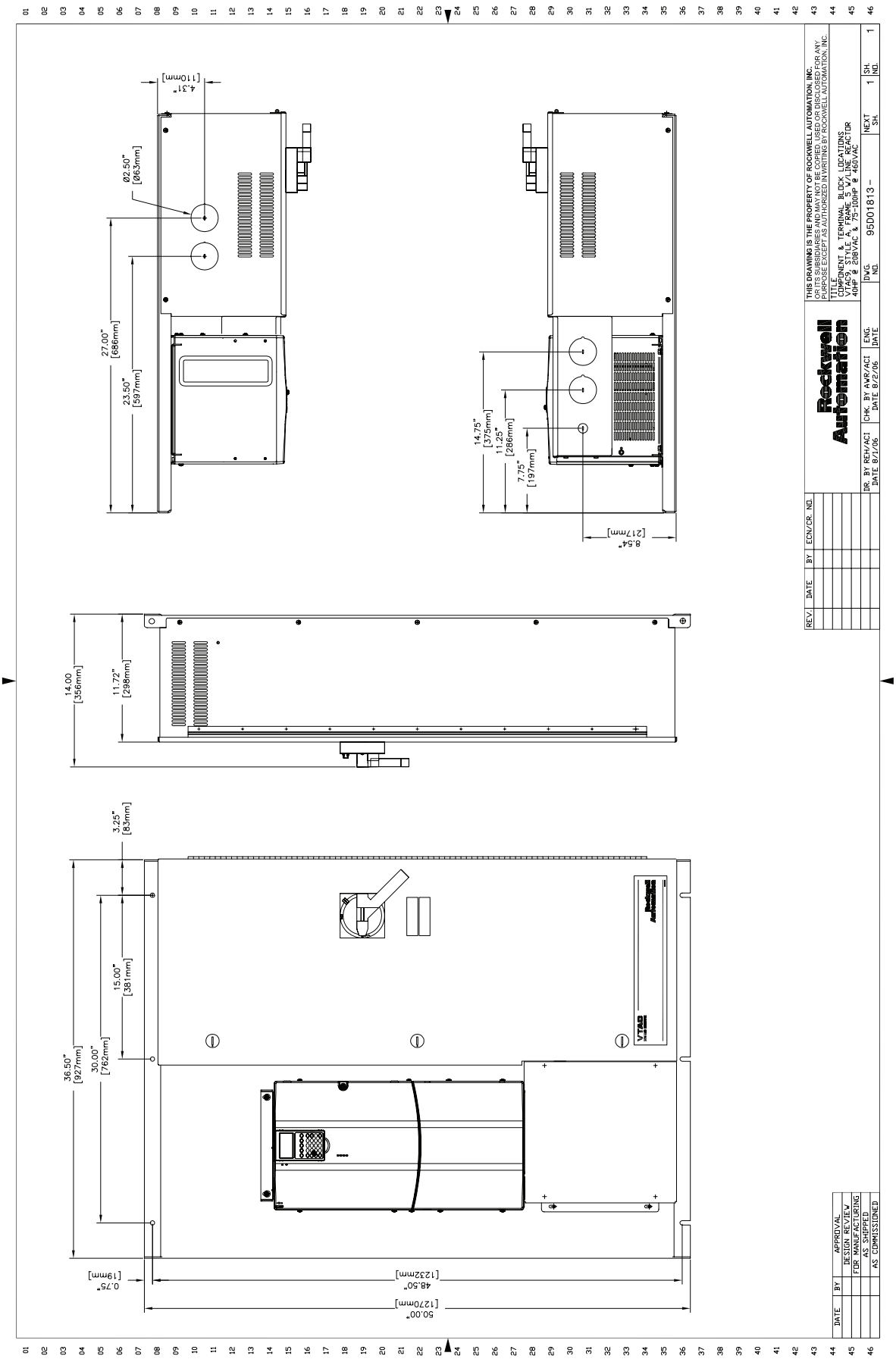


Figure 1.56 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 12

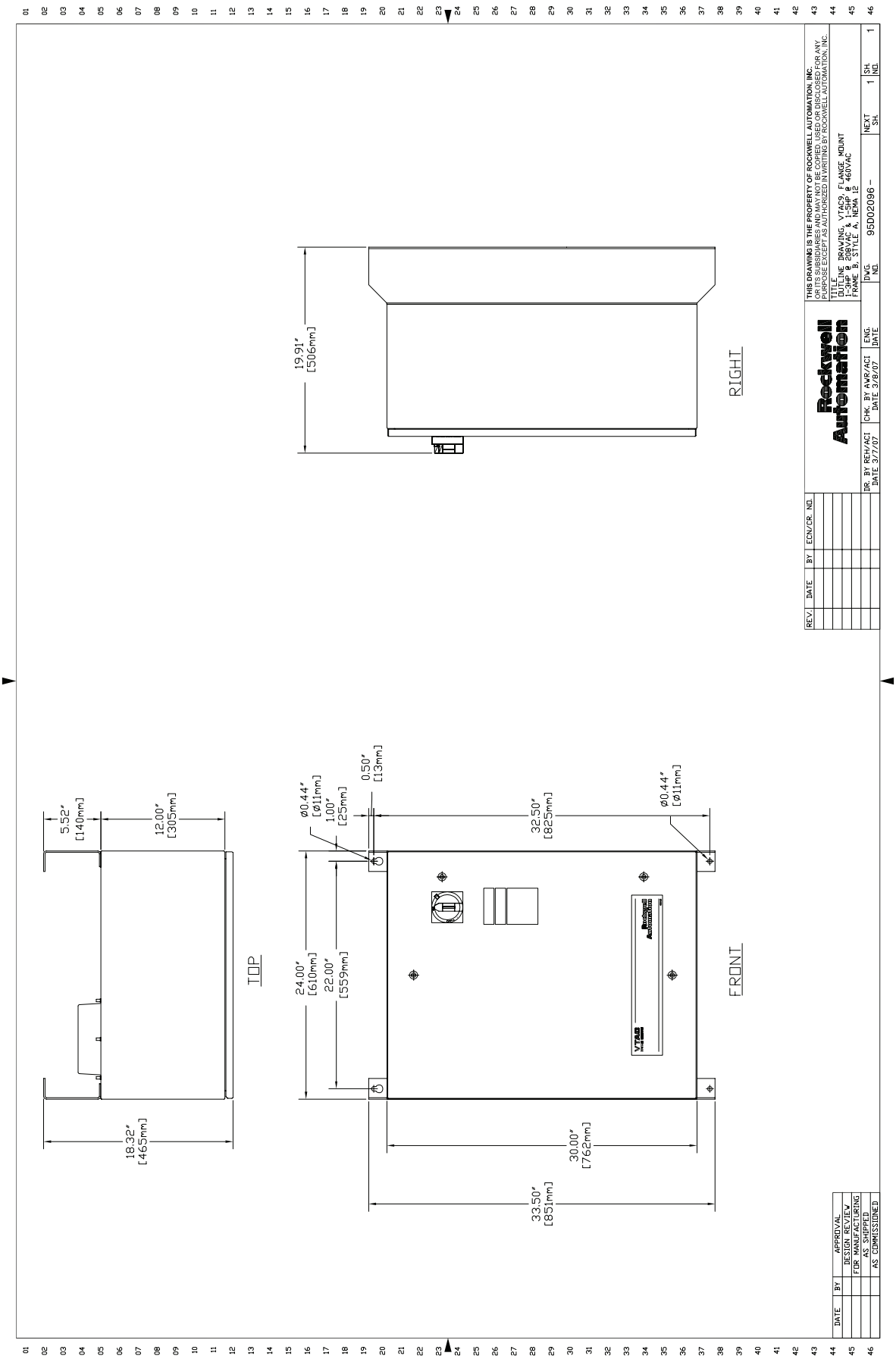


Figure 1.57 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 12

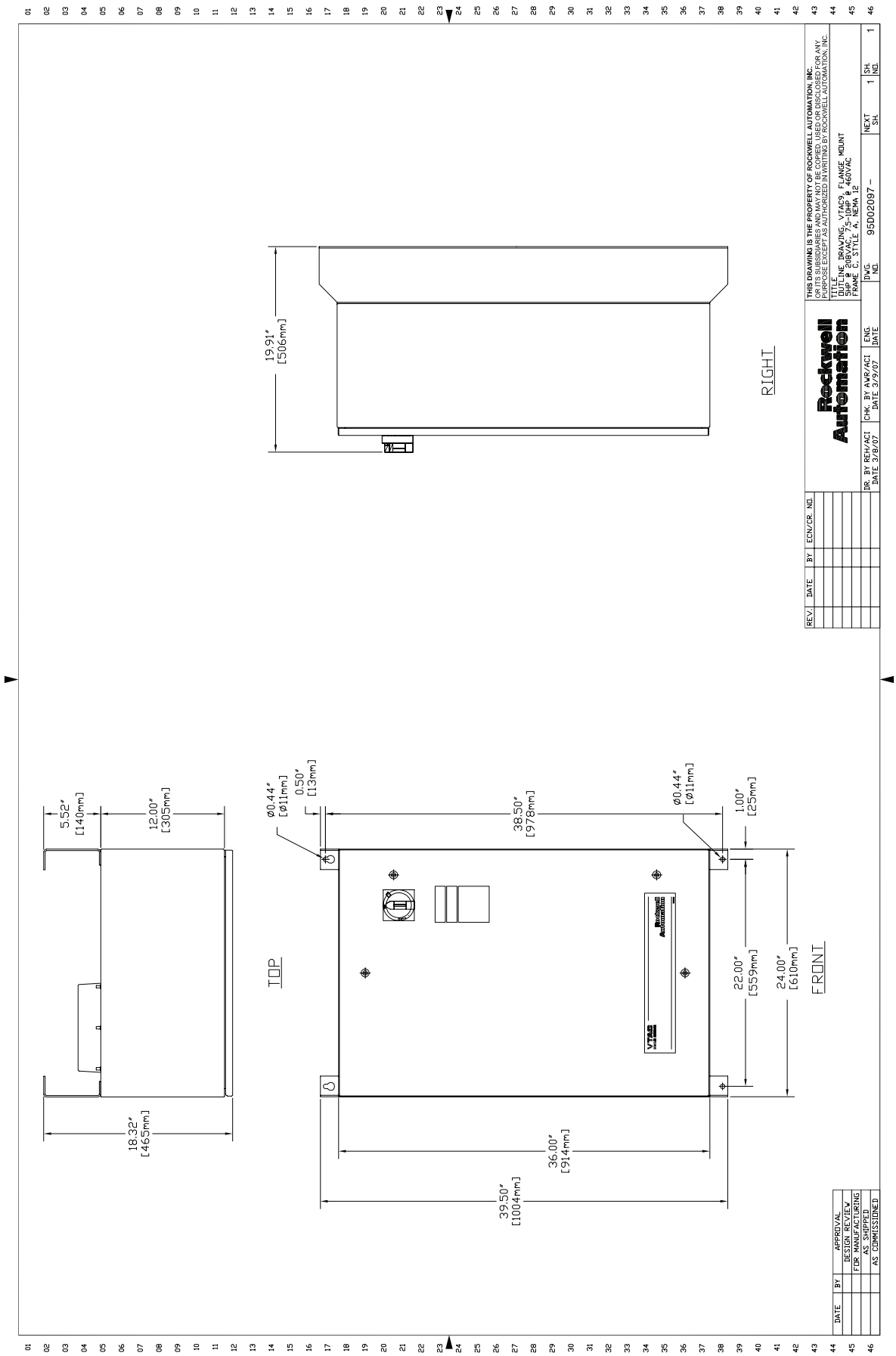


Figure 1.58 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives NEMA/UL Type 12

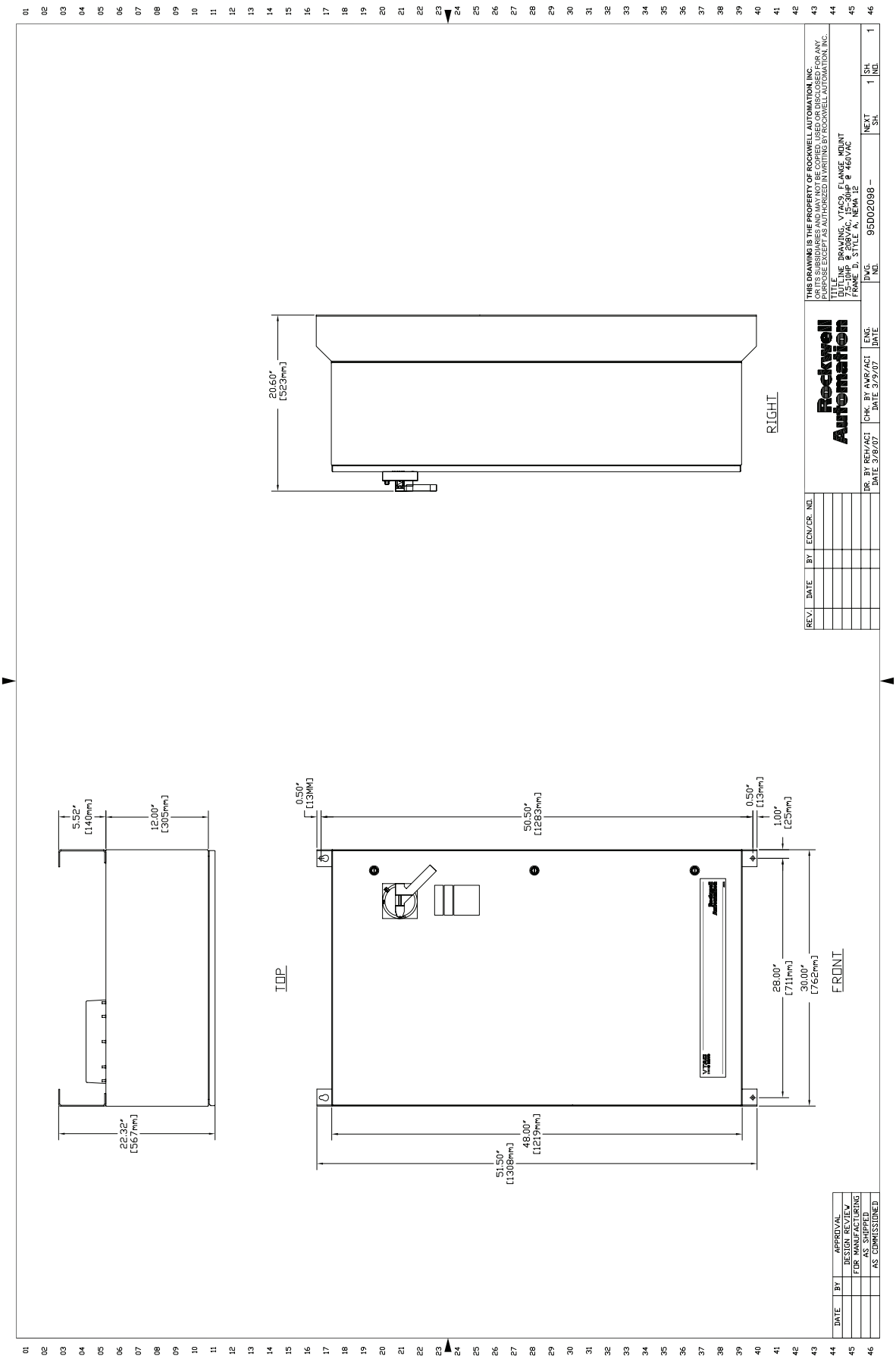


Figure 1.59 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 12

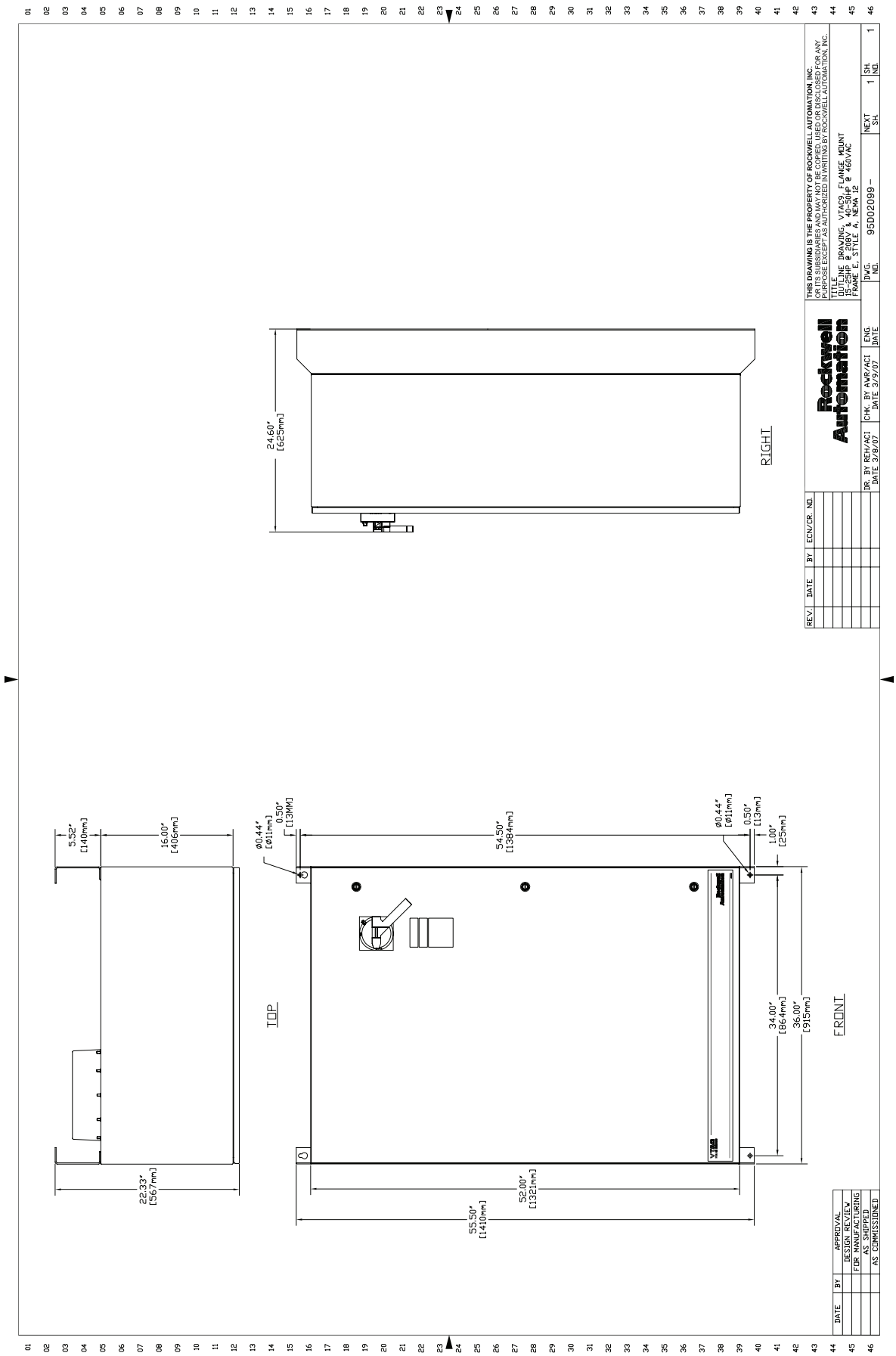


Figure 1.60 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 4/3R

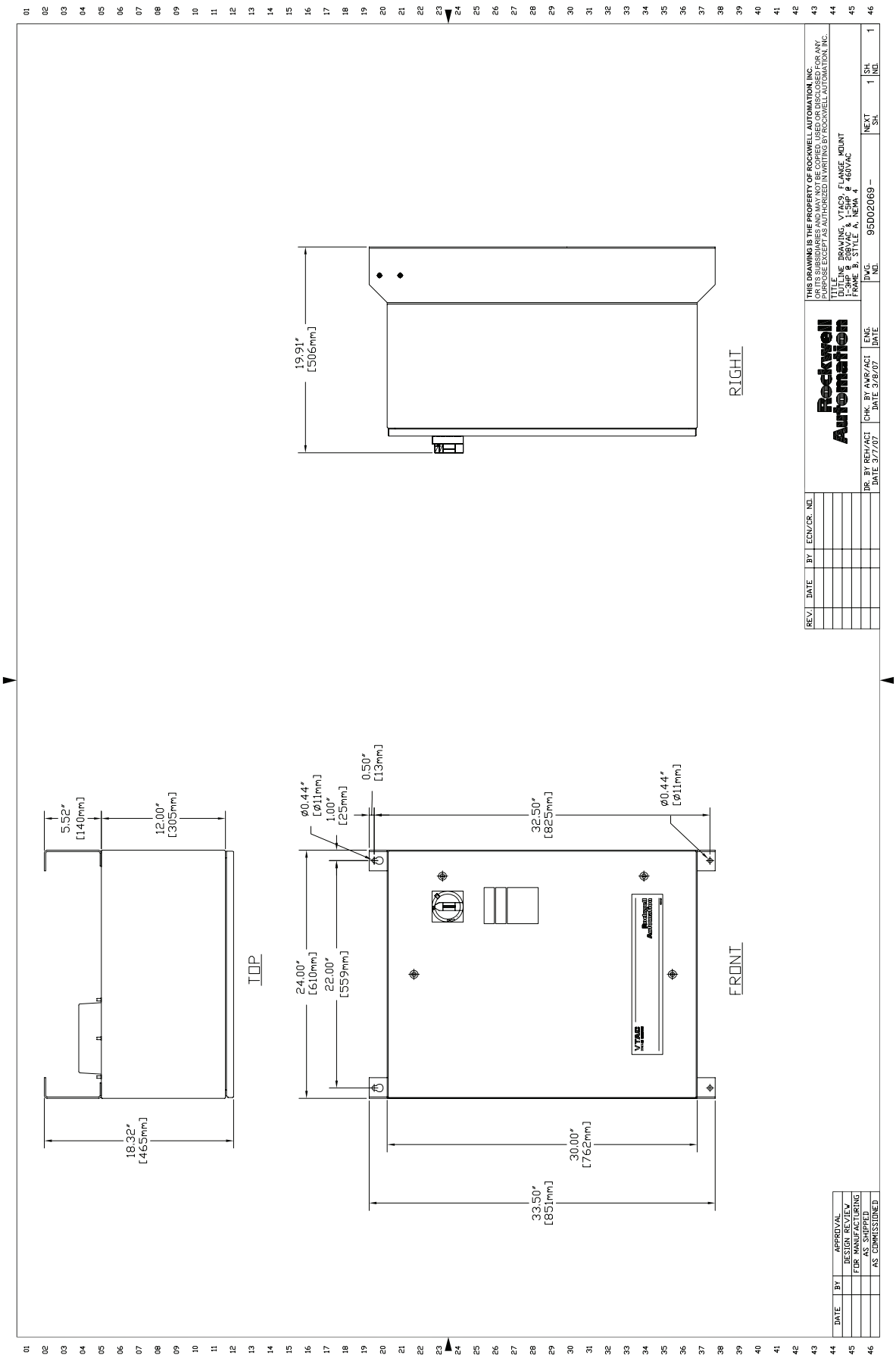


Figure 1.61 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 4/3R

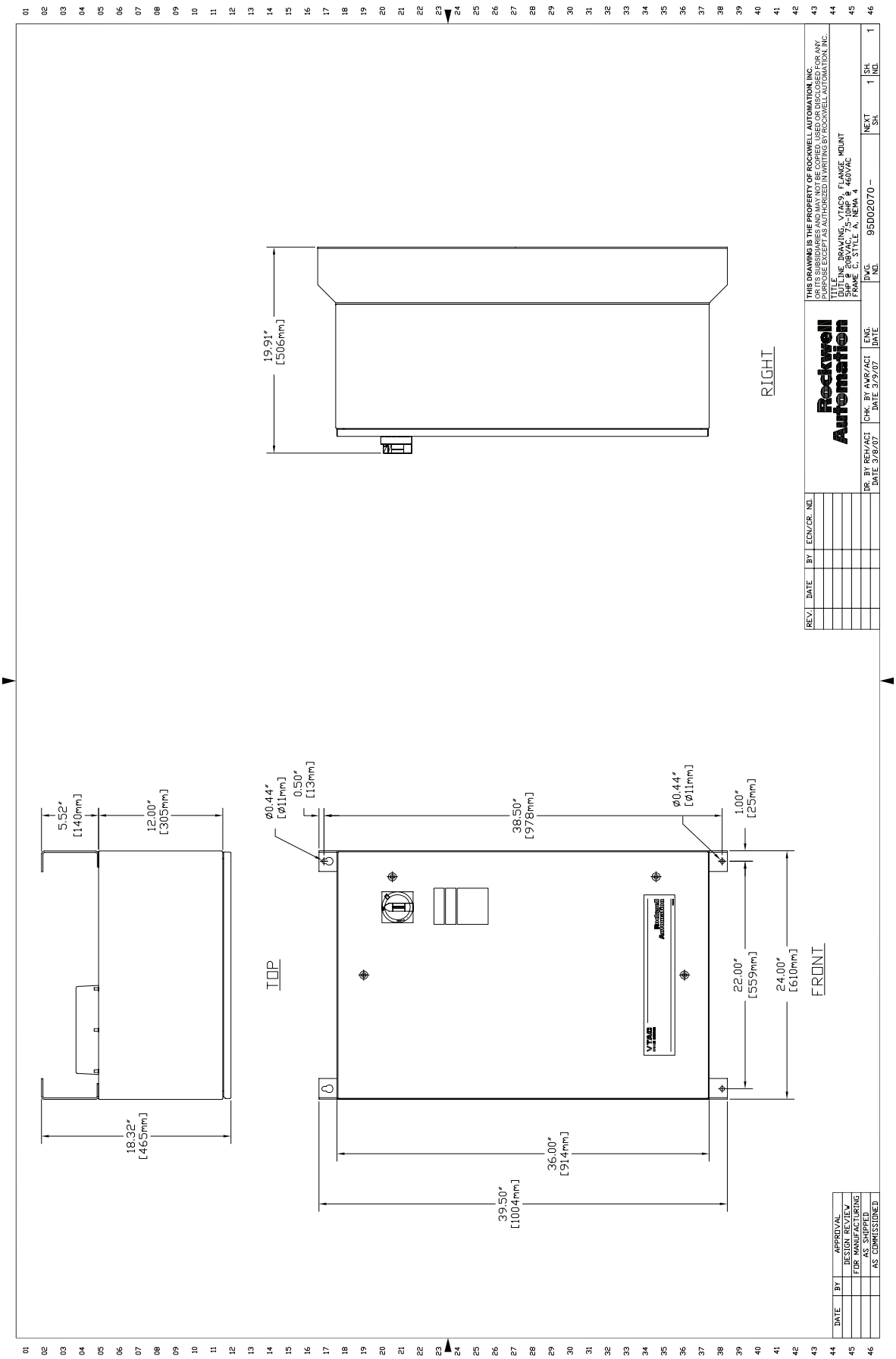


Figure 1.62 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives NEMA/UL Type 4/3R

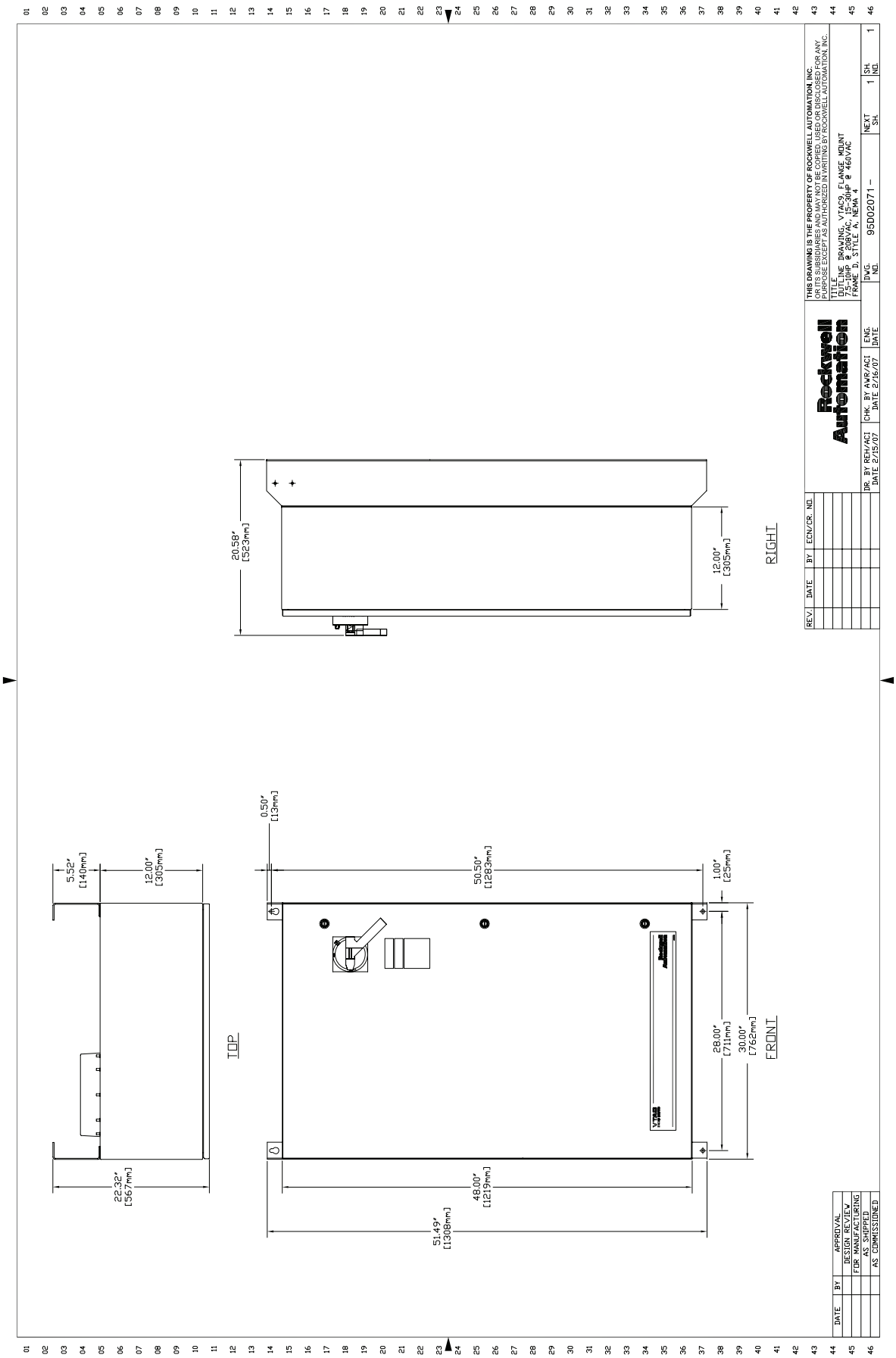
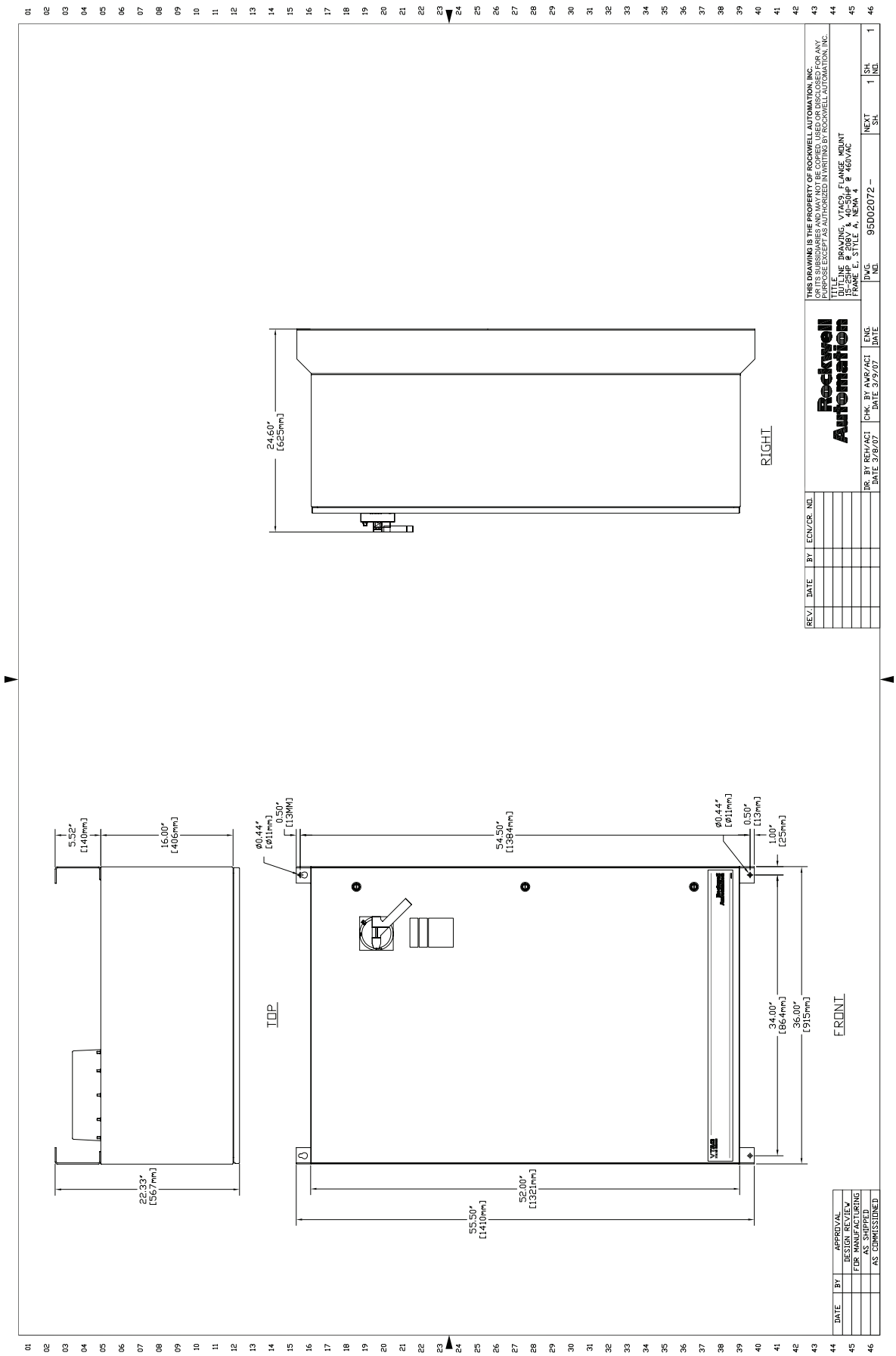


Figure 1.63 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 4/3R



Notes:

Bypass Package *(Style B)*

Chapter Objectives

This chapter describes the features and operation for the Bypass Package (Style B).

Hardware Overview

The Bypass Package (Style B) allows the motor to be manually transferred from drive output to the AC line, or from the AC line to the drive, while the motor is at zero (0) speed. The contactor bypass is electrically interlocked. A means for disconnecting input power via a door interlocked fuse disconnect switch is standard. In addition, this package is supplied with a bypass control interface which provides status indication and allows for remote activation of the bypass circuit.

Optional Hardware

Main Disconnect Switch (DS1)

An Allen-Bradley Bulletin 194R fused disconnect switch with lockable rotary mounted operator handle is provided. The disconnect switch is designed to meet disconnect switch requirements for branch circuit protection. The door-mounted handle accepts up to three (3) padlocks.

Main Fuses (FU1-FU3)

ATTENTION: Most codes require that upstream branch circuit protection be provided to protect input power wiring. Install the fuses recommended in Table 2.A. Do not exceed the fuse ratings. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

Input line branch circuit protection fuses must be used to protect the input power lines. If input fuses are not provided with your drive, recommended fuse values are shown in Table 2.A. The input fuse ratings listed in Table 2.A are applicable for one drive per branch circuit. No other load may be applied to that fused circuit.

The recommended fuse type for all VTAC 9 Drive Packages is UL Class J, 600V.

Table 2.A Fuse Recommendations

Drive Rating		Fuse Rating
Input Voltage	HP	Amps
208V AC – 3-Phase	1	10
	2	15
	3	20
	5	20
	7.5	35
	10	40
	15	80
	20	100
	25	125
	30	150
	40	200
460V AC – 3-Phase	1	6
	2	10
	3	10
	5	15
	7.5	20
	10	20
	15	35
	20	35
	25	60
	30	70
	40	80
	50	100
	60	150
	75	175
	100	200
	125	250
	150	350
	200	400

Contactors (DIC, DOC, BC)

Allen-Bradley Bulletin 100 Contactors are provided for all ratings. The contactors function as follows:

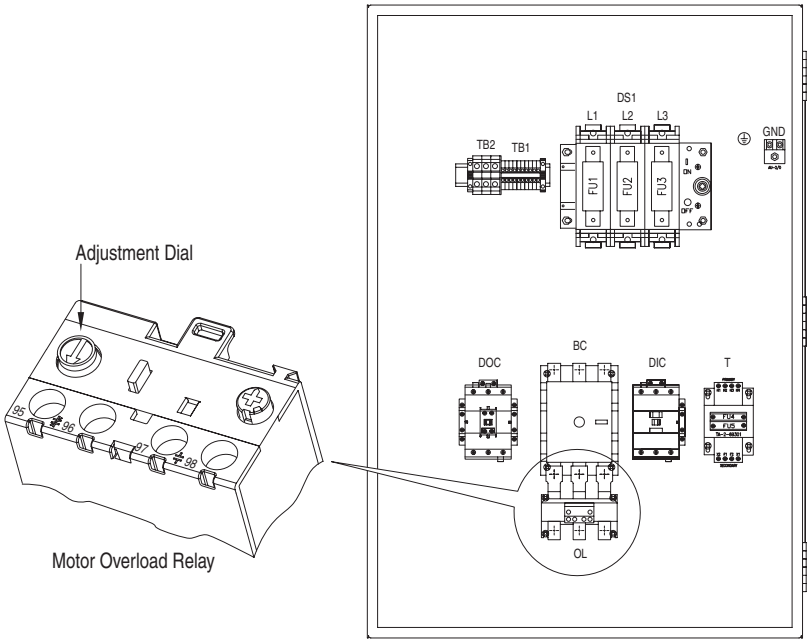
1. Drive-input contactor (DIC) opens and closes input to the drive.
2. Drive-output contactor (DOC) opens and closes the connection between the drive and the motor.
3. Bypass contactor (BC) opens and closes the connection to line-start the motor.

Motor Overload Relay (OL)

The motor overload relay is set at the factory to 100% of the drive output current. In many cases, this setting matches the motor full load amps (FLA). However, before starting the drive, you should check the setting on the motor overload relay to assure that it is set properly for your motor.

- For motors with a service factor less than 1.15, set the motor overload relays to 0.9x motor FLA.
- For motors with a service factor equal to, or greater than 1.15, set the motor overload relay to the motor FLA.

Figure 2.1 Setting Motor Overload



Control Transformer (T1)

115V AC control power is obtained via a supplied control power transformer. The control transformer is fused on the primary.

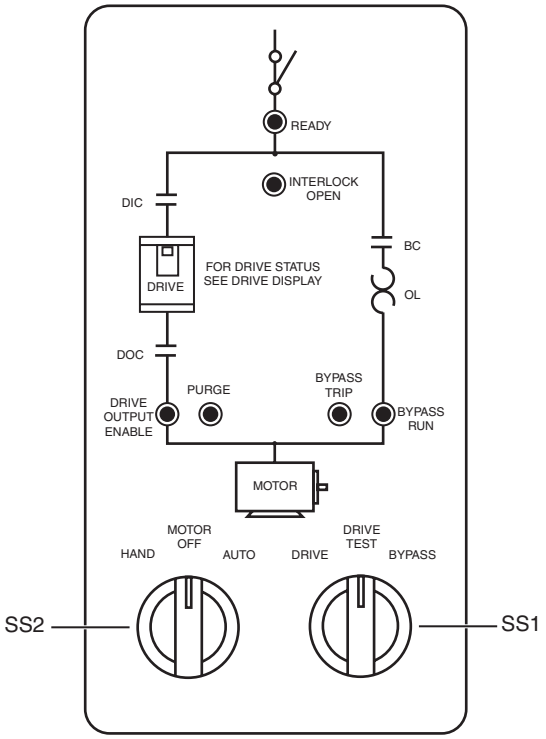
Bypass Control Interface (CP1)

The operator interface on the bypass option box shows the following LEDs:

- Ready (green) - On when power is applied to the drive-bypass unit.
- Interlock Open (amber) - On when the customer interlock wired between terminals T31-T32 is de-energized.
- Bypass Run (green) - On when the bypass contactor (BC) is energized.
- Bypass Trip (red) - On when a bypass fault condition exists (for example, bypass motor overload has tripped).
- Purge (amber) - On when the purge condition is active.
- Drive Output Enable (Green) - On when the drive output contactor (DOC) is energized.

In addition, the Bypass Control Interface contains two selector switches. Selector Switch 1 (SS1) determines the state of the DIC, DOC and BC contactors. Selector Switch 2 (SS2) determines the source of control logic.

Figure 2.2 Bypass Control Interface



Electrical Installation

Input Power Wiring

Refer to the VTAC 9 *User Manual* for additional detailed information about input power wiring recommendations and selection.

ATTENTION: Protect the contents of the options cabinet from metal chips and other debris while drilling the conduit openings. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

ATTENTION: Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

To connect AC input power to the drive package:

❑ **1.** Select the proper wire size according to NEC and all applicable local codes and standards. Note that you must punch openings in the Option Cabinet of the desired conduit size, following NEC and all applicable local codes and standards. Power terminal block specifications are listed in Table 2.B.

❑ **2.** Connect the three-phase AC input power leads (three-wire VAC) to the appropriate terminals. Connect the AC input power leads to terminals L1, L2, L3 on the fused disconnect switch.

❑ **3.** Tighten the AC input terminal power terminals to the proper torque according to drive type as shown in Table 2.B.

Table 2.B AC Input Power Terminal Block Specification

Voltage Rating	Drive Frame	HP	Maximum Wire Size(1)	Minimum Wire Size	Recommended Torque
208V AC	B, C	1…5	8 AWG	14 AWG	35 lb.-in.
	D	7.5…10	4 AWG	14 AWG	35 lb.-in.
	D, E	15…20	2 AWG	14 AWG	155 lb.-in.
	E, 4, 5	25…40	250 MCM	6 AWG	275 lb.-in.
460V AC	B, C	1…10	8 AWG	14 AWG	35 lb.-in.
	D, 2	15…25	4 AWG	14 AWG	35 lb.-in.
	D, E, 3	30…50	2 AWG	14 AWG	155 lb.-in.
	4, 5	60…100	250 MCM	6 AWG	275 lb.-in.
	6	125…200	(2) 350 MCM	(2) 6 AWG	275 lb.-in.

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations. If national or local codes require sizes outside the range, lugs may be used.

Output Power Wiring

Refer to the VTAC 9 *User Manual* for additional detailed information about output power wiring recommendations and selection.

ATTENTION: Unused wires in conduit must be grounded at both ends to avoid a possible shock hazard caused by induced voltages. Also, if a drive sharing a conduit is being serviced or installed, all drives using this conduit should be disabled to eliminate the possible shock hazard from cross-coupled motor leads. Failure to observe these precautions could result in bodily injury.

ATTENTION: Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

To connect AC output power wiring from the drive to the motor:

❑ **1.** Wire the three-phase AC output power motor leads by routing them according to the drive option type. Note that you must punch openings in the option cabinet of the desired conduit size, following NEC and all applicable local codes and standards. Output power terminal block specifications are listed in Table 2.C.

Do not route more than three sets of motor leads through a single conduit. This will minimize cross-talk that could reduce the effectiveness of noise reduction methods. If more than three drive/motor connections per conduit are required, shielded cable must be used. If possible, each conduit should contain only one set of motor leads.

❑ **2.** Connect the three-phase AC output power motor leads to terminals T1, T2, T3 on the output power terminal block (TB2) located inside the option cabinet.

❑ **3.** Tighten the three-phase AC output power terminals to the proper torque according to drive type as shown in Table 2.C.

Table 2.C Output Power Terminal Block Specification

Voltage Rating	Drive Frame	HP	Maximum Wire Size(1)	Minimum Wire Size	Recommended Torque
208V AC	B, C, D	1…7.5	8 AWG	22 AWG	13 lb.-in.
	D, E	10…20	4 AWG	14 AWG	20 lb.-in.
	E, 4	25…30	1/0 AWG	14 AWG	22 lb.-in.
	5	40	350 MCM	6 AWG	275 lb.-in.
460V AC	B, C	1…7.5	8 AWG	22 AWG	13 lb.-in.
	C, D, 2, 3	10…30	4 AWG	14 AWG	20 lb.-in.
	E, 3, 4, 5	40…75	1/0 AWG	14 AWG	22 lb.-in.
	5	100	350 MCM	6 AWG	275 lb.-in.
	6	125…150	350 MCM	6 AWG	275 lb.-in.
	6	200	500 MCM	4 AWG	500 lb.-in.

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations. If national or local codes require sizes outside the range, lugs may be used.

Control and Signal Wiring

Refer to the VTAC 9 *User Manual* for additional detailed information about control and signal wiring.

The Signal Terminal Block (I/O Terminals 1-26 for Frames B, C, D, E and I/O Terminals 1-32 for Frames 2, 3, 4, 5, 6) located on the drive Main Control Board and Control Terminal Block (TB1 Terminals 31-40) located inside the Option Cabinet provide terminals for interfacing customer supplied control inputs and outputs. All analog and discrete control wiring will be made at these terminals. Typical customer control and signal wiring is shown on the Inter-Connect drawings, Figure 2.16 and Figure 2.17.

To connect control and signal wiring to the drive package:

❑ **1.** Wire the control and signal leads by routing them according to the drive option type. Note that you must punch openings in the option cabinet of the desired conduit size, following NEC and all applicable local codes and standards. Control and signal terminal block specifications are listed in Table 2.D.

Control and signal wires should be separated from power wires by at least 0.3 meters (1 foot).

❑ **2.** Connect the analog and relay output signal wiring to the I/O Terminal Block located on the drive Main Control Board.

❑ **3.** Connect the control wiring listed below to terminals 31-40 located inside the Option Cabinet.

- Interlock
- Freeze/Fire Stats
- Autostart
- Bypass
- Purge
- Bypass Running

❑ **4.** Tighten the control and signal terminals to the proper torque according to drive type as shown in Table 2.D.

Table 2.D Control and Signal Terminal Block Specifications

Voltage Rating	Terminals	Drive Frame	HP	Maximum Wire Size[1]	Minimum Wire Size	Recommended Torque
All	1…26	B, C, D, E	All	16 AWG	30 AWG	4.4 lb.-in.
	1…32	2, 3, 4, 5, 6	All	14 AWG	22 AWG	5.2 lb.-in.
	T31…T40	All	All	10 AWG	22 AWG	5…5.6 lb.-in.

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations. If national or local codes require sizes outside the range, lugs may be used.

Customer Connections

The Bypass Package is set up to accommodate the following customer supplied contacts. Contacts should be rated for 120V AC.

Interlock

The “Interlock” input functions as an Enable input when operating in either Drive or Bypass mode. Opening of the “Interlock” input (T31-T32) will prevent the drive/motor from running. T31-T32 are shipped jumpered together (with a jumper wire) from the factory. If it is desirable to use the “Interlock” input, this jumper wire can be removed and appropriate customer contacts wired in. If a valid “Autostart” or “Bypass” contact is present, the drive/motor will immediately run upon the closing of the “Interlock” input.

Freeze/Fire Stat

The “Freeze/Fire Stat” input functions as a system fault input when operating in either Drive or Bypass mode. Opening of the “Freeze/Fire Stat” input (T31-T33) will prevent the drive/motor from running. T31-T33 are shipped jumpered together (with a jumper wire) from the factory. If it is desirable to use the “Freeze/Fire Stat” input, the jumper wire can be removed and appropriate customer contacts wired in. If the “Freeze/Fire Stat” input opens while operating in Drive mode, the drive will fault and require a manual reset to restart once the input closes. If the “Freeze/Fire Stat” input opens while operating in Bypass mode, the motor will coast to a stop and immediately run upon the re-closing of the input.

Autostart

The “Autostart” input is used to remotely start the drive when SS1 is in the DRIVE position and SS2 is in the AUTO position. A closed input to terminals 34-35 will start the drive.

Bypass

The “Bypass” input is used to remotely start the motor across the 3-phase AC line when SS1 is in the BYPASS position and SS2 is in the AUTO position. A closed input to terminals 34-36 will start the motor.

Purge

A “Purge” input can be wired to terminals 37-38. When this input is closed, the motor will run at the Purge Frequency, which is defined by Parameter 107 [Purge Speed], assuming the following conditions exist.

- SS1 is either in the DRIVE or BYPASS position.
- SS2 is either in the HAND or AUTO position if Jumper P1 on the Bypass Control Panel (CP1) is in position A.
- SS2 is in the HAND, MOTOR OFF or AUTO position if Jumper P1 on the Bypass Control Panel (CP1) is in Position B.
- Interlock wired to terminals 31-32 is closed.
- Freeze/Fire Stat wired to terminals 31-33 is closed.

ATTENTION: A Purge mm Port/Network. Insure that another stop method is available if stopping is necessary during a purge.

Alternate Customer Connection Considerations

A “Freeze/Fire Stat” input is typically connected to terminals T31-T33. Factory default parameter settings cause the drive to fault on an F2 “Function Loss” if the “Freeze/Fire Stat” input opens or if there is a momentary loss of power to the drive. A manual reset to restart is required once the input closes or power is restored.

To restart the drive automatically when the “Freeze/Fire Stat” input closes or power is restored, the F2 “Function Loss” fault can be automatically cleared by one of the following methos.

1. Jumper I/O Terminals 2 (Clear Faults) and 3 (Function Loss) on drives with 26 terminals (Frames B…E) or jumper I/O Terminals 28 (Clear Faults) and 29 (Function Loss) on drives with 32 terminals (Frames 2…6).

2. Set parameter 363 [Digital In3 Sel] to option 1 “Enable” which will start the drive on an enable command if the “Freeze/Fire Stat” input is closed and a Run or Start digital input is present.

If a purge command is intended to follow a “Freeze/Fire Stat” input trip/reset without requiring a manual reset to restart, the above alternate customer connections should be used.

Bypass Running

The “Bypass Running” contact is normally open. When the Bypass Contactor (BC) is closed the Bypass Running” contact will also be closed.

Operating Modes

Selector Switch 1 (SS1) and Selector Switch 2 (SS2), located on the Bypass Control Panel (CP1), are used to determine the operating state of the 3 Contactor Full Feature Bypass with Disconnect Package. SS1 is used to select motor control:

- DRIVE = Drive keypad/terminal block controls the motor
- DRIVE TEST = Drive is powered but is not controlling the motor
- BYPASS = Motor runs across 3-Phase line

Jumper P2 on the Bypass Control Panel (CP1) allows the drive to be powered while running in bypass. This is accomplished by moving Jumper P2 to position B-C and turning SS1 from BYPASS to DRIVE TEST. If Jumper P2 is in position A-B, the drive cannot be powered while running in bypass. SS2 selects the source of the Start, Stop, and Drive Speed Reference as defined in Table 2.E.

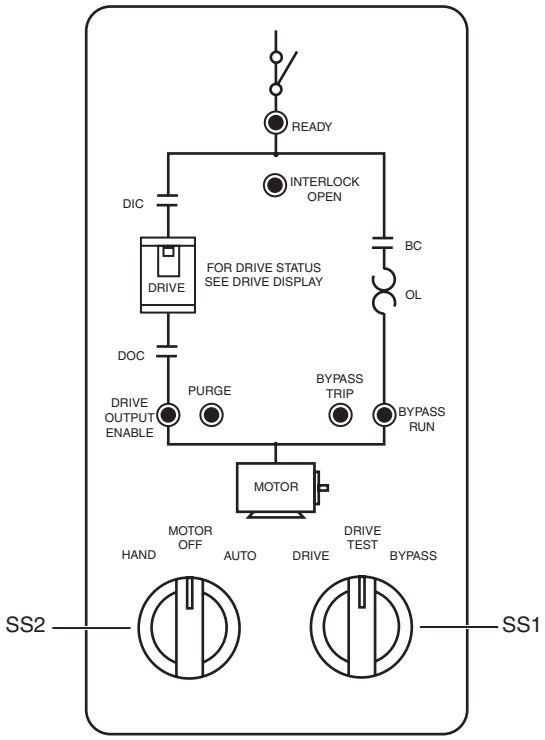
Table 2.E Command and Reference Selection

SS1 Selection	SS2 Selection	Start Command(1)			Stop Command			Drive Speed Reference(2)		
		TB	Keypad	None	TB	Keypad	None	TB	Keypad	None
DRIVE	HAND		•			•			•	
	MOTOR OFF			•			•			•
	AUTO		•			•			•	
DRIVE TEST	HAND		•			•			•	
	MOTOR OFF			•			•			•
	AUTO		•			•			•	
BYPASS	HAND	Automatically Starts			Automatically Starts			Motor Runs at Base Speed		
	MOTOR OFF			•			•			•
	AUTO	•			•			Motor Runs at Base Speed		

(1) When "Auto" is selected, the Start Command is defined by parameter 089 [Logic Source Sel]. Factory default is configured for keypad control. For drive control from the terminal block, parameter 089 [Logic Source Sel] must be set to 0 "Terminal Blk".

(2) When "Auto" is selected, the Speed Reference is defined by parameter 090 [Speed Ref A Sel]. Analog In1 has control by factory default. Refer to the VTAC 9 *User Manual* for other control schemes.

Figure 2.3 Bypass Control Interface



Parameter Defaults
Bypass Package *(Style B)*

Parameter Name	Number	Default
Output Freq	001	Read Only
Commanded Freq	002	Read Only
Output Current	003	Read Only
Torque Current	004	Read Only
Flux Current	005	Read Only
Output Voltage	006	Read Only
Output Power	007	Read Only
Output Powr Fctr	008	Read Only
Elapsed MWh	009	Read Only
Elapsed Run Time	010	Read Only
MOP Frequency	011	Read Only
DC Bus Voltage	012	Read Only
DC Bus Memory	013	Read Only
Analog In1 Value	016	Read Only
Analog In2 Value	017	Read Only
Rated kW	026	Read Only
Rated Volts	027	Read Only
Rated Amps	028	Read Only
Control SW Ver	029	Read Only
Motor Type	040	0 “Induction”
Motor NP Volts	041	Drive Rating Based
Motor NP FLA	042	Drive Rating Based
Motor NP Hertz	043	60 Hz
Motor NP RPM	044	1740 RPM
Motor NP Power	045	Drive Rating Based
Mtr NP Pwr Units	046	Drive Rating Based
Motor OL Hertz	047	Motor NP Hz/3
Motor OL Factor	048	1.00
Torque Perf Mode	053	3 “Fan/Pmp V/Hz”
Maximum Voltage	054	Drive Rated Volts
Maximum Freq	055	130.0 Hz
Compensation	056	xxxxxxxxxxxx011
Flux Up Mode	057	0 “Manual”
Flux Up Time	058	0.00 Secs
SV Boost Filter	059	500
Autotune	061	3 “Calculate”
IR Voltage Drop	062	[Motor NP Volts] x 0.25
Flux Current Ref	063	Drive Rating Based
Ixo Voltage Drop	064	Drive Rating Based
Start/Acc Boost	069	[Motor NP Volts] x 0.25
Run Boost	070	[Motor NP Volts] x 0.25
Break Voltage	071	[Motor NP Volts] x 0.25
Break Frequency	072	[Motor NP Hertz] x 0.25
Speed Mode	080	0 “Open Loop”
Minimum Speed	081	0.0 Hz
Maximum Speed	082	60.0 Hz
Overspeed Limit	083	10.0 Hz
Skip Frequency 1	084	0.0 Hz
Skip Frequency 2	085	0.0 Hz
Skip Frequency 3	086	0.0 Hz
Skip Freq Band	087	1.0 Hz
Logic Source Sel	089[1]	1 “Local OIM”
Speed Ref A Sel	090[1]	1 “Analog In 1”
Speed Ref A Hi	091	[Maximum Speed]
Speed Ref A Lo	092	0.0 Hz
TB Man Ref Sel	096	1 “Analog In 1”
TB Man Ref Hi	097	[Maximum Speed]
TB Man Ref Lo	098	0.0 Hz
Preset Speed 1	101	5.0 Hz
Preset Speed 2	102	10.0 Hz
Preset Speed 3	103	20.0 Hz
Preset Speed 4	104	30.0 Hz
Preset Speed 5	105	40.0 Hz
Preset Speed 6	106	50.0 Hz
Purge Speed	107	5.0 Hz
Trim In Select	117	2 “Analog In 2”
Trim Out Select	118	xxxxxxxxxxxx000
Trim Hi	119	60.0 Hz
Trim Lo	120	0.0 Hz
Slip RPM @ FLA	121	Based on [Motor NP RPM]
Slip Comp Gain	122	40.0
Slip RPM Meter	123	Read Only
PI Configuration	124	xxxxxxxx00000000
PI Control	125	xxxxxxxxxxxx000
PI Reference Sel	126	0 “PI Setpoint”
PI Setpoint	127	50.00%
PI Feedback Sel	128	2 “Analog In 2”
PI Integral Time	129	2.00 Secs
PI Prop Gain	130	1.00
PI Lower Limit	131	–[Maximum Freq]
PI Upper Limit	132	+[Maximum Freq]
PI Preload	133	0.0 Hz
PI Status	134	xxxxxxxxxxxx0000
PI Ref Meter	135	Read Only
PI Fdback Meter	136	Read Only
PI Error Meter	137	Read Only
PI Output Meter	138	Read Only
Accel Time 1	140	20.0 Secs
Accel Time 2	141	20.0 Secs
Decel Time 1	142	20.0 Secs
Decel Time 2	143	20.0 Secs
S Curve %	146	20%
Current Lmt Sel	147	0 “Cur Lim Val”
Current Lmt Val	148	[Rated Amps] x 1.5
Current Lmt Gain	149	200
Drive OL Mode	150	3 “Both–PWM 1st”
CarrierFrequency	151	4 kHz
Stop Mode A	155	0 “Coast”
Stop Mode B	156	1 “Ramp”
DC Brake Lvl Sel	157	0 “DC Brake Lvl”
DC Brake Level	158	[Rated Amps]
DC Brake Time	159	0.0 Secs
Bus Reg Ki	160	450
Bus Reg Mode A	161	1 “Adjust Freq”
Bus Reg Mode B	162	0 “Disabled”
DB Resistor Type	163	0 “Internal Res”
Bus Reg Kp	164	1200
Bus Reg Kd	165	1000
LevelSense Start	168	1 “Enabled”
Flying Start En	169	1 “Enabled”
Flying StartGain	170	4000
Auto Rstrt Tries	174	0
Auto Rstrt Delay	175	30.0 Secs

Parameter Name	Number	Default
Sleep Wake Mode	178	0 “Disabled”
Sleep Wake Ref	179	2 “Analog In 2”
Wake Level	180	6.000 mA, 6.000 Volts
Wake Time	181	1.0 Secs
Sleep Level	182	5.000 mA, 5.000 Volts
Sleep Time	183	1.0 Secs
Power Loss Mode	184	0 “Coast”
Power Loss Time	185	0.5 Secs
Power Loss Level	186	0.0 VDC
Direction Mode	190	2 “Reverse Dis”
Save OIM Ref	192	xxxxxxxxxxxxxxx1
Man Ref Preload	193	0 “Disabled”
Save MOP Ref	194	xxxxxxxxxxxxxx01
MOP Rate	195	1.0 Hz/s
Param Access Lvl	196	Read Only
Reset To Defalts	197	0 “Ready”
Load Frm Usr Set	198	0 “Ready”
Save To User Set	199	0 “Ready”
Reset Meters	200	0 “Ready”
Language	201	0 “Not Selected”
Voltage Class	202	Based on Drive Cat. No.
Drive Checksum	203	Read Only
Drive Status 1	209	0000111000001100
Drive Status 2	210	xx000000x0000000
Drive Alarm 1	211	xxxxx0000x000000
Drive Alarm 2	212	xx00000000000000
Speed Ref Source	213	Read Only
Start Inhibits	214	Read Only
Last Stop Source	215	Read Only
Dig In Status	216	xxxxxxxxxx000000
Dig Out Status	217	xxxxxxxxxxxxxx00
Drive Temp	218	Read Only
Drive OL Count	219	Read Only
Motor OL Count	220	Read Only
Fault Frequency	224	Read Only
Fault Amps	225	Read Only
Fault Bus Volts	226	Read Only
Status 1 @ Fault	227	Read Only
Status 2 @ Fault	228	Read Only
Alarm 1 @ Fault	229	Read Only
Alarm 2 @ Fault	230	Read Only
Testpoint 1 Sel	234	499
Testpoint 1 Data	235	Read Only
Testpoint 2 Sel	236	499
Testpoint 2 Data	237	Read Only
Fault Config 1	238	xxxxxxxxx1001x10
Fault Clear	240	0 “Ready”
Fault Clear Mode	241	1 “Enabled”
Power Up Marker	242	Read Only
Alarm Config 1	259	xxxxx0111x11x111
Drive Logic Rslt	271	Read Only
Drive Ref Rslt	272	Read Only
Drive Ramp Rslt	273	Read Only
Manual Mask	286	xxxxxxxxx1x1111
Stop Owner	288	Read Only
Manual Owner	298	xxxxxxxxxx0x0000
Data In A1	300	0 “Disabled”
Data In A2	301	0 “Disabled”

Parameter Name	Number	Default
Data In B1	302	0 “Disabled”
Data In B2	303	0 “Disabled”
Data In C1	304	0 “Disabled”
Data In C2	305	0 “Disabled”
Data In D1	306	0 “Disabled”
Data In D2	307	0 “Disabled”
Data Out A1	310	0 “Disabled”
Data Out A2	311	0 “Disabled”
Data Out B1	312	0 “Disabled”
Data Out B2	313	0 “Disabled”
Data Out C1	314	0 “Disabled”
Data Out C2	315	0 “Disabled”
Data Out D1	316	0 “Disabled”
Data Out D2	317	0 “Disabled”
Anlg In Config	320	xxxxxxxxxxxxxx01
Anlg In Sqr Root	321	xxxxxxxxxxxxxx00
Analog In 1 Hi	322	20.000 mA
Analog In 1 Lo	323	4.000 mA
Analog In 1 Loss	324	0 “Disabled”
Analog In 2 Hi	325	10.000 Volt
Analog In 2 Lo	326	0.000 Volt
Analog In 2 Loss	327	0 “Disabled”
Anlg Out Config	340	xxxxxxxxxxxxxx0
Anlg Out Absolut	341	xxxxxxxxxxxxxx1
Analog Out1 Sel	342	0 “Output Freq”
Analog Out1 Hi	343	10.000 Volts/20.000 mA
Analog Out1 Lo	344	0.000 Volts/4.000 mA
Digital In1 Sel	361	7 “Run”
Digital In2 Sel	362	2 “Clear Fault”
Digital In3 Sel	363	3 “Function Loss”
Digital In4 Sel	364	1 “Enable”
Digital In5 Sel	365	25 “OIM Control”
Digital In6 Sel	366	31 “Purge”
Dig Out1 Sel	380	1 “Fault”
Dig Out1 Level	381	0.0
Dig Out1 OnTime	382	0.00 Secs
Dig Out1 OffTime	383	0.00 Secs
Dig Out2 Sel	384	4 “Run”
Dig Out2 Level	385	0.00
Dig Out2 OnTime	386	0.00 Secs
Dig Out2 OffTime	387	0.00 Secs

(1) For enclosure mounted NEMA/UL Type 1 OIM’s using bezel kit number VT-REBZL-N1, set P089 [Logic Source Select] to 3 “DPI Port 3” and P090 [Speed Ref A Sel] to 20 “DPI Port 3.”
For enclosure mounted NEMA/UL Type 4/12 OIM’s, kit number VT-RE4ALCDH, set P089 [Logic Source Select] to 2 “DPI Port 2” and P090 [Speed Ref A Sel] to 19 “DPI Port 2.”

Drawing Index

208V AC – 3 Contactor Full Feature Bypass with Disconnect Package (Style B)

208V AC – NEMA/UL Type 1

Input Voltage	HP	Input Line Reactor	Drawing							
			Schematic	*Page*	Inter-Connect	*Page*	Layout	*Page*	Outline	*Page*
208V AC	1		98D01596	2-17	97D01602	2-29	95D01652	2-31	95D01617	2-62
	2		98D01596	2-17	97D01602	2-29	95D01652	2-31	95D01617	2-62
	3		98D01596	2-17	97D01602	2-29	95D01652	2-31	95D01617	2-62
	5		98D01596	2-17	97D01602	2-29	95D01653	2-32	95D01618	2-63
	7.5		98D01596	2-17	97D01602	2-29	95D01654	2-33	95D01619	2-64
	10	No	98D01596	2-17	97D01602	2-29	95D01654	2-33	95D01619	2-64
	15		98D01596	2-17	97D01602	2-29	95D01656	2-35	95D01621	2-67
	20		98D01596	2-17	97D01602	2-29	95D01656	2-35	95D01621	2-67
	25		98D01596	2-17	97D01602	2-29	95D01656	2-35	95D01621	2-67
	30		98D01597	2-19	97D01603	2-30	95D01657	2-36	95D01622	2-69
	40		98D01597	2-19	97D01603	2-30	95D01658	2-37	95D01623	2-70
	1		98D01635	2-21	97D01602	2-29	95D01660	2-39	95D01625	2-72
	2		98D01635	2-21	97D01602	2-29	95D01660	2-39	95D01625	2-72
	3		98D01635	2-21	97D01602	2-29	95D01660	2-39	95D01625	2-72
	5		98D01635	2-21	97D01602	2-29	95D01661	2-40	95D01626	2-73
	7.5		98D01635	2-21	97D01602	2-29	95D01662	2-41	95D01627	2-74
	10	Yes	98D01635	2-21	97D01602	2-29	95D01662	2-41	95D01627	2-74
	15		98D01635	2-21	97D01602	2-29	95D01815	2-43	95D01819	2-76
	20		98D01635	2-21	97D01602	2-29	95D01815	2-43	95D01819	2-76
	25		98D01635	2-21	97D01602	2-29	95D01815	2-43	95D01819	2-76
	30		98D01832	2-23	97D01603	2-30	95D01816	2-44	95D01820	2-77
	40		98D01832	2-23	97D01603	2-30	95D01817	2-45	95D01821	2-78

208V AC – NEMA/UL Type 12

Input Voltage	HP	Input Lisne Reactor	Drawing Schematic	Page	Layout	Page	Outline	Page
208V AC	1	No	98D02080	2-25	95D02124	2-46	95D02100	2-79
	2		98D02080	2-25	95D02124	2-46	95D02100	2-79
	3		98D02080	2-25	95D02124	2-46	95D02100	2-79
	5		98D02080	2-25	95D02125	2-47	95D02101	2-80
	7.5		98D02080	2-25	95D02125	2-47	95D02102	2-81
	10		98D02080	2-25	95D02125	2-47	95D02102	2-81
	15		98D02080	2-25	95D02127	2-49	95D02103	2-82
	20		98D02080	2-25	95D02127	2-49	95D02103	2-82
	25		98D02080	2-25	95D02127	2-49	95D02103	2-82
	1	Yes	98D02080	2-25	95D02148	2-50	95D02100	2-79
	2		98D02080	2-25	95D02148	2-50	95D02100	2-79
	3		98D02080	2-25	95D02148	2-50	95D02100	2-79
	5		98D02080	2-25	95D02149	2-51	95D02101	2-80
	7.5		98D02080	2-25	95D02150	2-52	95D02102	2-81
	10		98D02080	2-25	95D02150	2-52	95D02102	2-81
	15		98D02080	2-25	95D02151	2-53	95D02103	2-82
	20		98D02080	2-25	95D02151	2-53	95D02103	2-82
	25		98D02080	2-25	95D02151	2-53	95D02103	2-82

208V AC – NEMA/UL Type 4/3R

Input Voltage	HP	Input Line Reactor	Drawing Schematic	Page	Layout	Page	Outline	Page
208V AC	1	No	98D02079	2-27	95D02108	2-54	95D02073	2-83
	2		98D02079	2-27	95D02108	2-54	95D02073	2-83
	3		98D02079	2-27	95D02108	2-54	95D02073	2-83
	5		98D02079	2-27	95D02109	2-55	95D02074	2-84
	7.5		98D02079	2-27	95D02110	2-56	95D02075	2-85
	10		98D02079	2-27	95D02110	2-56	95D02075	2-85
	15		98D02079	2-27	95D02111	2-57	95D02076	2-86
	20		98D02079	2-27	95D02111	2-57	95D02076	2-86
	25		98D02079	2-27	95D02111	2-57	95D02076	2-86
	1	Yes	98D02079	2-27	95D02140	2-58	95D02073	2-83
	2		98D02079	2-27	95D02140	2-58	95D02073	2-83
	3		98D02079	2-27	95D02140	2-58	95D02073	2-83
	5		98D02079	2-27	95D02141	2-59	95D02074	2-84
	7.5		98D02079	2-27	95D02142	2-60	95D02075	2-85
	10		98D02079	2-27	95D02142	2-60	95D02075	2-85
	15		98D02079	2-27	95D02143	2-61	95D02076	2-86
	20		98D02079	2-27	95D02143	2-61	95D02076	2-86
	25		98D02079	2-27	95D02143	2-61	95D02076	2-86

460V AC – 3 Contactor Full Feature Bypass with Disconnect Package (Style B)

460V AC – NEMA/UL Type 1

Input Voltage	HP	Input Line Reactor	Drawing Schematic	*Page*	Inter-Connect	*Page*	Layout	*Page*	Outline	*Page*
460V AC	1		98D01596	2-17	97D01602	2-29	95D01652	2-31	95D01617	2-62
	2		98D01596	2-17	97D01602	2-29	95D01652	2-31	95D01617	2-62
	3		98D01596	2-17	97D01602	2-29	95D01652	2-31	95D01617	2-62
	5		98D01596	2-17	97D01602	2-29	95D01652	2-31	95D01617	2-62
	7.5		98D01596	2-17	97D01602	2-29	95D01653	2-32	95D01618	2-63
	10		98D01596	2-17	97D01602	2-29	95D01653	2-32	95D01618	2-63
	15		98D01596	2-17	97D01602	2-29	95D01654	2-33	95D01619	2-64
	20		98D01596	2-17	97D01602	2-29	95D01654	2-33	95D01619	2-64
	25		98D01596	2-17	97D01602	2-29	95D01654	2-33	95D01619 95D00299	2-64 2-65
	30	No	98D01596	2-17	97D01602	2-29	95D01655	2-34	95D01620 95D00301	2-66 2-68
	40		98D01596	2-17	97D01602	2-29	95D01656	2-35	95D01621 95D00301	2-67 2-68
	50		98D01596	2-17	97D01602	2-29	95D01656	2-35	95D01621 95D00301	2-67 2-68
	60		98D01597	2-19	97D01603	2-30	95D01657	2-36	95D01622	2-69
	75		98D01597	2-19	97D01603	2-30	95D01658	2-37	95D01623	2-70
	100		98D01597	2-19	97D01603	2-30	95D01658	2-37	95D01623	2-70
	125		98D01597	2-19	97D01603	2-30	95D01659	2-38	95D01624	2-71
	150		98D01597	2-19	97D01603	2-30	95D01659	2-38	95D01624	2-71
	200		98D01597	2-19	97D01603	2-30	95D01659	2-38	95D01624	2-71
	1		98D01635	2-21	97D01602	2-29	95D01660	2-39	95D01625	2-72
	2		98D01635	2-21	97D01602	2-29	95D01660	2-39	95D01625	2-72
	3		98D01635	2-21	97D01602	2-29	95D01660	2-39	95D01625	2-72
	5		98D01635	2-21	97D01602	2-29	95D01660	2-39	95D01625	2-72
	7.5		98D01635	2-21	97D01602	2-29	95D01661	2-40	95D01626	2-73
	10		98D01635	2-21	97D01602	2-29	95D01661	2-40	95D01626	2-73
	15		98D01635	2-21	97D01602	2-29	95D01662	2-41	95D01627	2-74
	20	Yes	98D01635	2-21	97D01602	2-29	95D01662	2-41	95D01627	2-74
	25		98D01635	2-21	97D01602	2-29	95D01662	2-41	95D01627	2-74
	30		98D01635	2-21	97D01602	2-29	95D01814	2-42	95D01818	2-75
	40		98D01635	2-21	97D01602	2-29	95D01815	2-43	95D01819	2-76
	50		98D01635	2-21	97D01602	2-29	95D01815	2-43	95D01819	2-76
	60		98D01832	2-23	97D01603	2-30	95D01816	2-44	95D01820	2-77
	75		98D01832	2-23	97D01603	2-30	95D01817	2-45	95D01821	2-78
	100		98D01832	2-23	97D01603	2-30	95D01817	2-45	95D01821	2-78

460V AC – NEMA/UL Type 12

Input Voltage	HP	Input Line Reactor	Drawing					
			Schematic	*Page*	Layout	*Page*	Outline	*Page*
460V AC	1	No	98D02080	2-25	95D02124	2-46	95D02100	2-79
	2		98D02080	2-25	95D02124	2-46	95D02100	2-79
	3		98D02080	2-25	95D02124	2-46	95D02100	2-79
	5		98D02080	2-25	95D02124	2-46	95D02100	2-79
	7.5		98D02080	2-25	95D02125	2-47	95D02101	2-80
	10		98D02080	2-25	95D02125	2-47	95D02101	2-80
	15		98D02080	2-25	95D02126	2-48	95D02102	2-81
	20		98D02080	2-25	95D02126	2-48	95D02102	2-81
	25		98D02080	2-25	95D02126	2-48	95D02102	2-81
	30		98D02080	2-25	95D02126	2-48	95D02102	2-81
	40		98D02080	2-25	95D02127	2-49	95D02103	2-82
	50		98D02080	2-25	95D02127	2-49	95D02103	2-82
	1	Yes	98D02080	2-25	95D02148	2-50	95D02100	2-79
	2		98D02080	2-25	95D02148	2-50	95D02100	2-79
	3		98D02080	2-25	95D02148	2-50	95D02100	2-79
	5		98D02080	2-25	95D02148	2-50	95D02100	2-79
	7.5		98D02080	2-25	95D02149	2-51	95D02101	2-80
	10		98D02080	2-25	95D02149	2-51	95D02101	2-80
	15		98D02080	2-25	95D02150	2-52	95D02102	2-81
	20		98D02080	2-25	95D02150	2-52	95D02102	2-81
	25		98D02080	2-25	95D02150	2-52	95D02102	2-81
	30		98D02080	2-25	95D02150	2-52	95D02102	2-81
	40		98D02080	2-25	95D02151	2-53	95D02103	2-82
	50		98D02080	2-25	95D02151	2-53	95D02103	2-82

460V AC – NEMA/UL Type 4/3R

Input Voltage	HP	Input Line Reactor	Drawing					
			Schematic	*Page*	Layout	*Page*	Outline	*Page*
460V AC	1	No	98D02079	2-27	95D02108	2-54	95D02073	2-83
	2		98D02079	2-27	95D02108	2-54	95D02073	2-83
	3		98D02079	2-27	95D02108	2-54	95D02073	2-83
	5		98D02079	2-27	95D02108	2-54	95D02073	2-83
	7.5		98D02079	2-27	95D02109	2-55	95D02074	2-84
	10		98D02079	2-27	95D02109	2-55	95D02074	2-84
	15		98D02079	2-27	95D02110	2-56	95D02075	2-85
	20		98D02079	2-27	95D02110	2-56	95D02075	2-85
	25		98D02079	2-27	95D02110	2-56	95D02075	2-85
	30		98D02079	2-27	95D02110	2-56	95D02075	2-85
	40		98D02079	2-27	95D02111	2-57	95D02076	2-86
	50		98D02079	2-27	95D02111	2-57	95D02076	2-86
	1	Yes	98D02079	2-27	95D02140	2-58	95D02073	2-83
	2		98D02079	2-27	95D02140	2-58	95D02073	2-83
	3		98D02079	2-27	95D02140	2-58	95D02073	2-83
	5		98D02079	2-27	95D02140	2-58	95D02073	2-83
	7.5		98D02079	2-27	95D02141	2-59	95D02074	2-84
	10		98D02079	2-27	95D02141	2-59	95D02074	2-84
	15		98D02079	2-27	95D02142	2-60	95D02075	2-85
	20		98D02079	2-27	95D02142	2-60	95D02075	2-85
	25		98D02079	2-27	95D02142	2-60	95D02075	2-85
	30		98D02079	2-27	95D02142	2-60	95D02075	2-85
	40		98D02079	2-27	95D02143	2-61	95D02076	2-86
	50		98D02079	2-27	95D02143	2-61	95D02076	2-86

Schematic Drawings

Figure 2.4 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives (Sheet 1 of 2) NEMA/UL Type 1

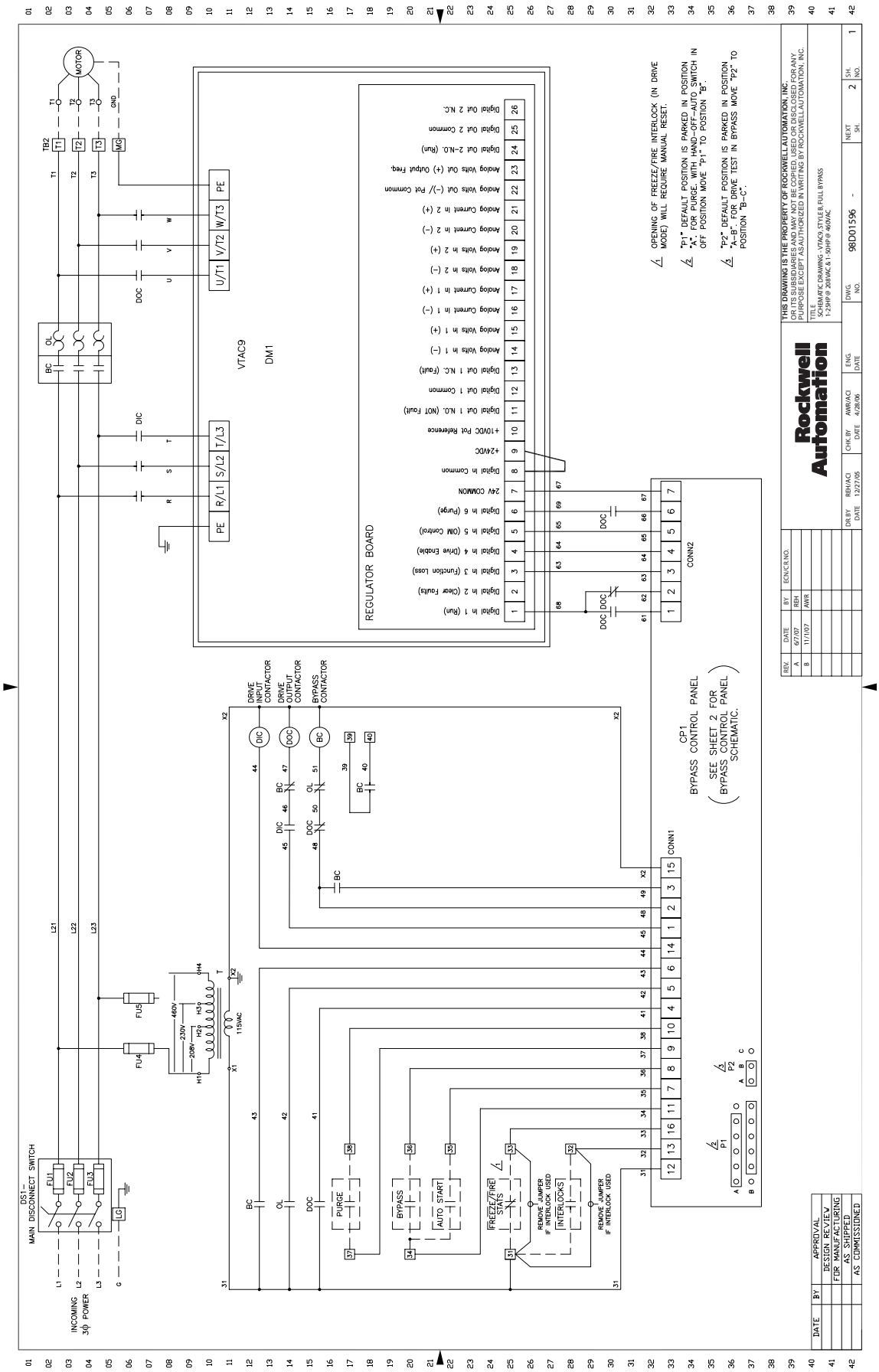


Figure 2.5 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives (Sheet 2 of 2)
NEMA/UL Type 1

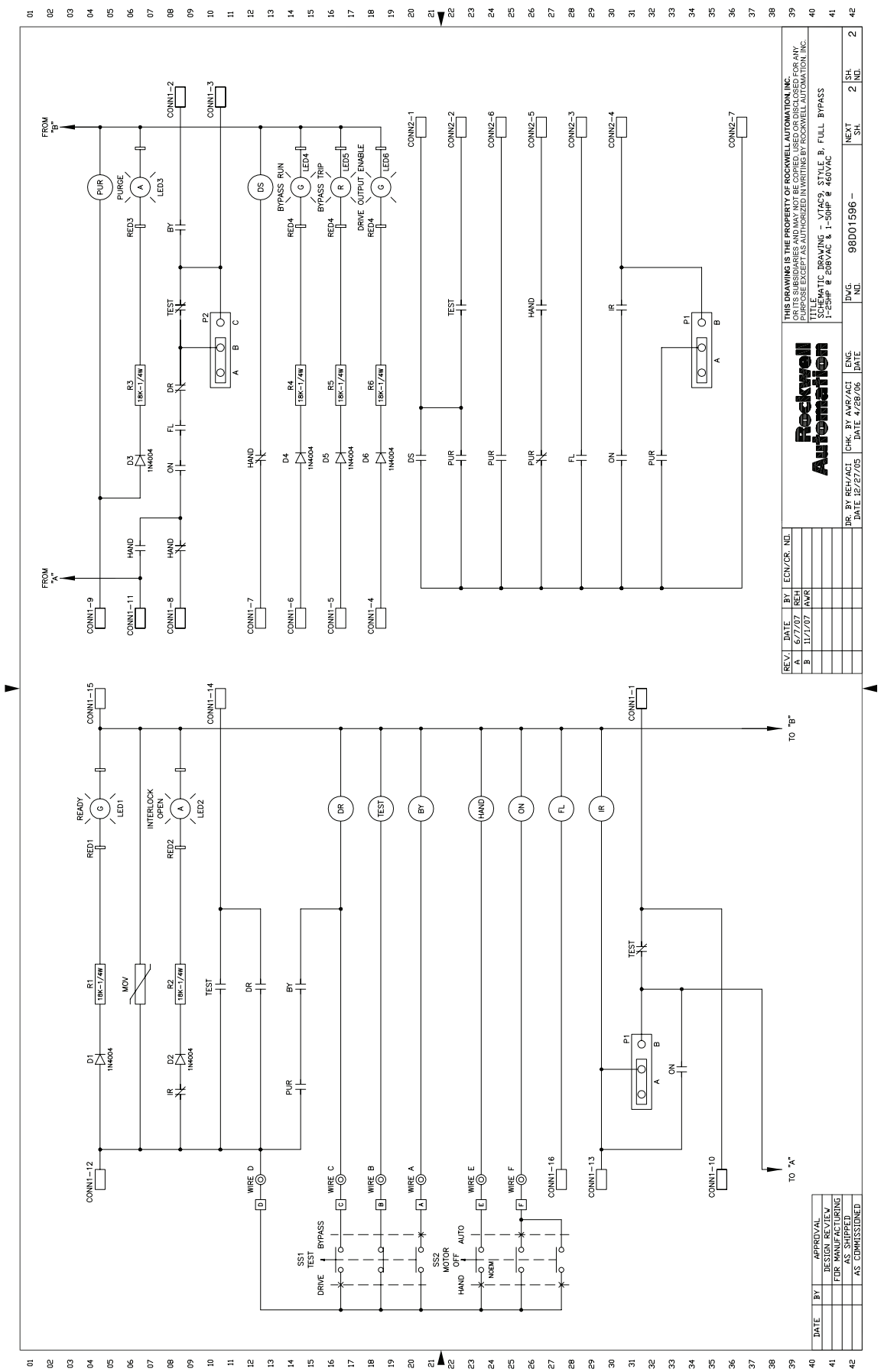


Figure 2.6 30-40 HP, 208V AC and 60-200 HP, 460V AC Drives (Sheet 1 of 2) NEMA/UL Type 1

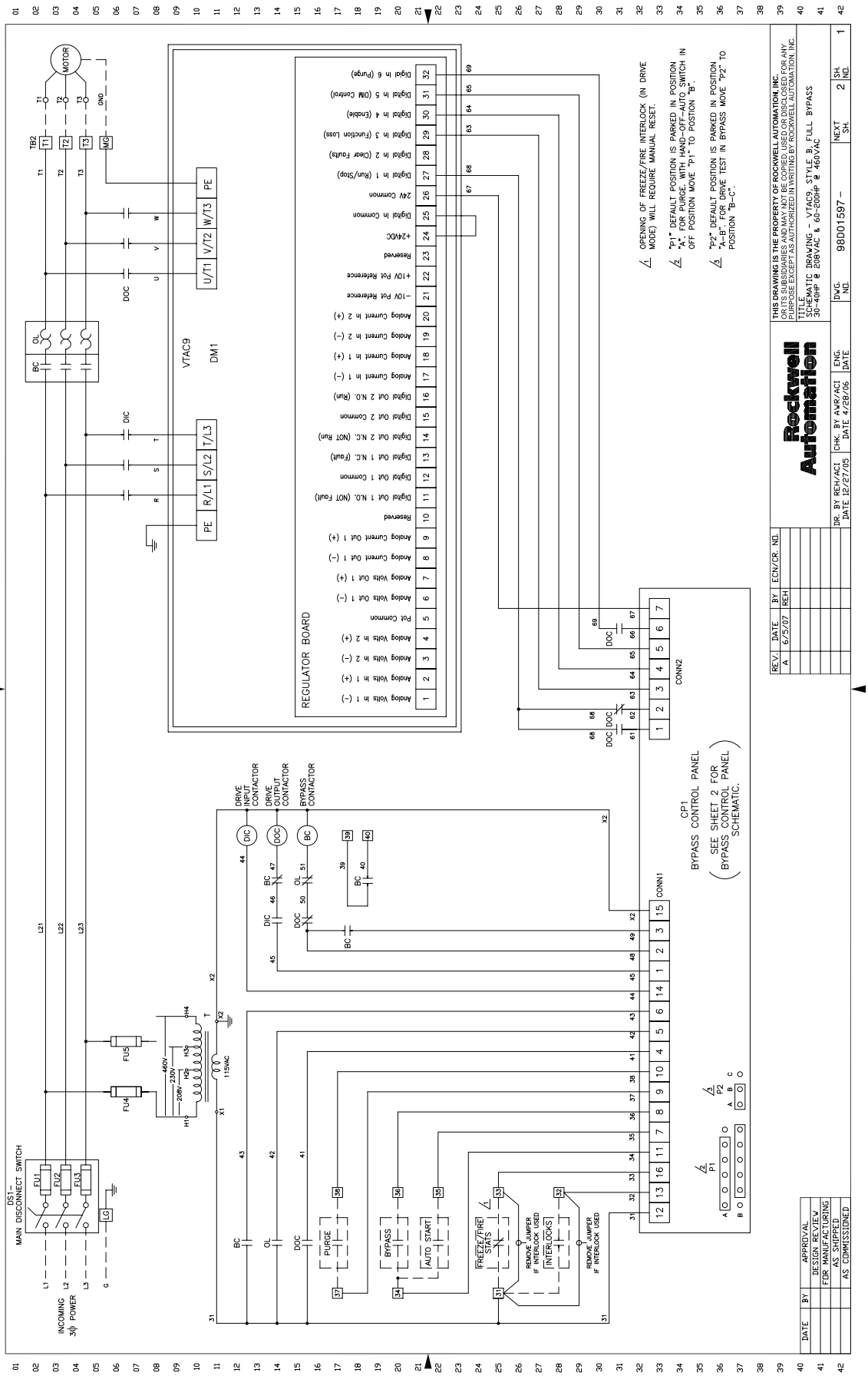


Figure 2.7 30-40 HP, 208V AC and 60-200 HP, 460V AC Drives (Sheet 2 of 2)
NEMA/UL Type 1

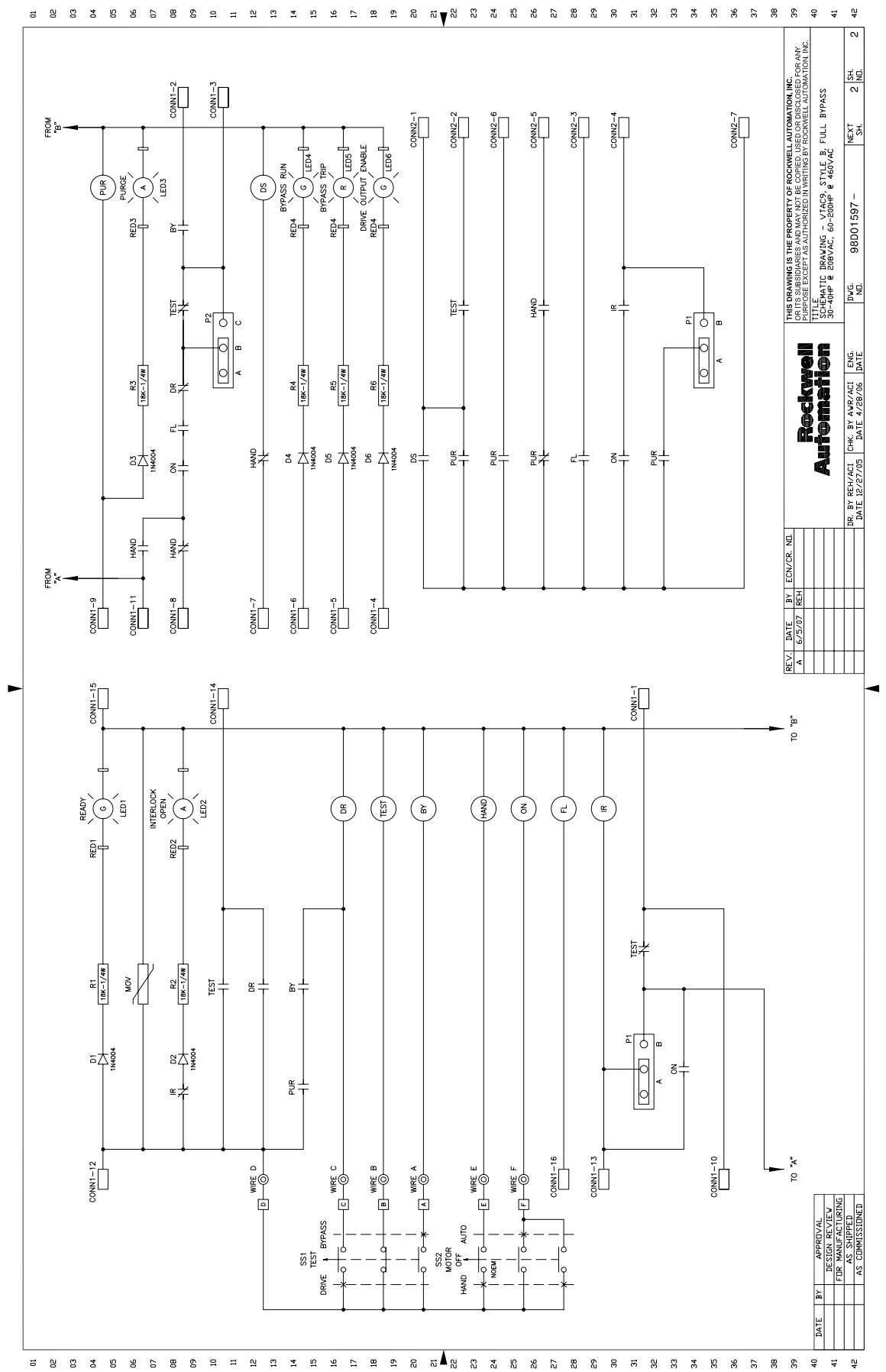


Figure 2.8 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives with Line Reactor (Sheet 1 of 2) NEMA/UL Type 1

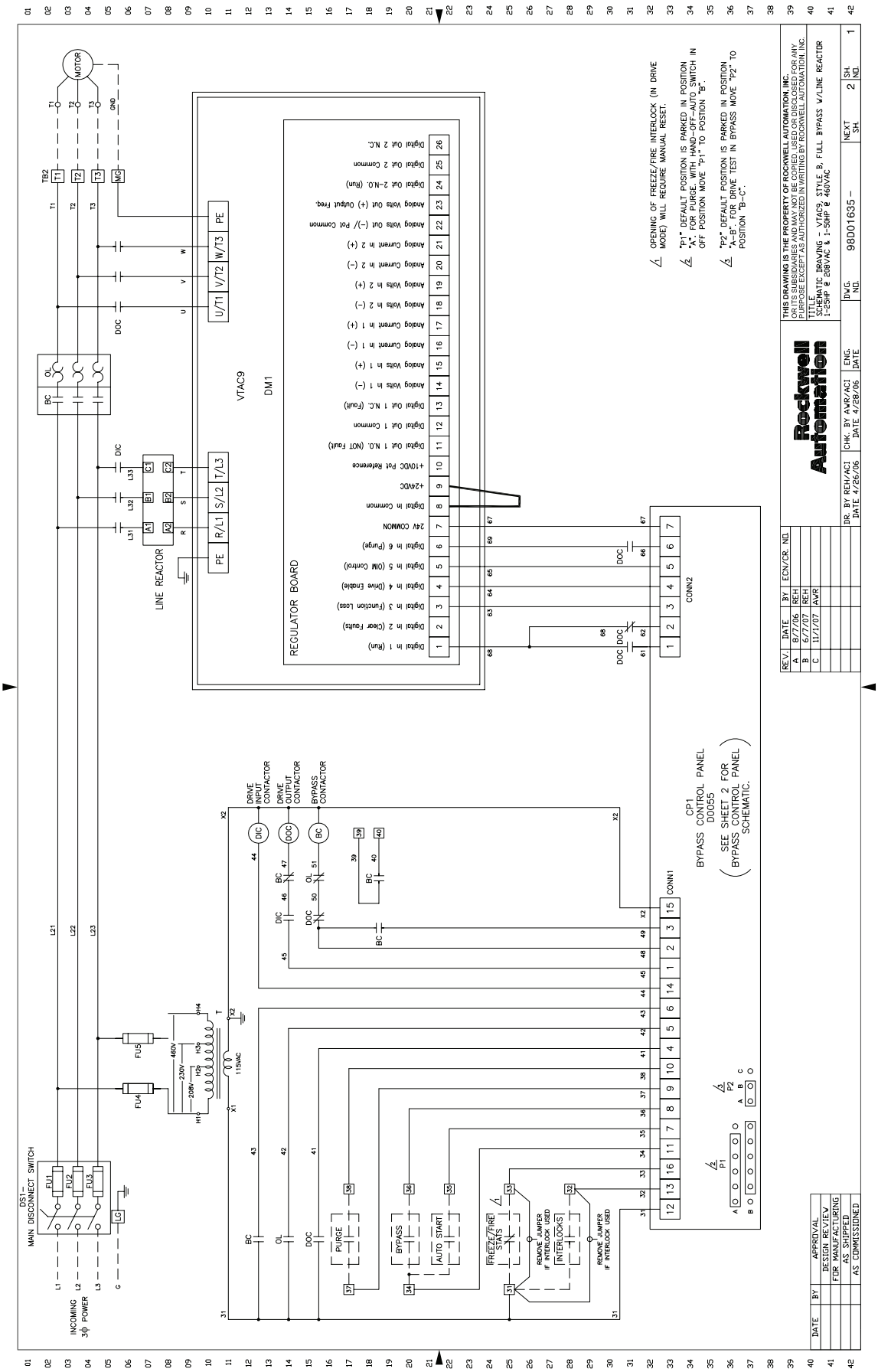


Figure 2.9 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives with Line Reactor (Sheet 2 of 2) NEMA/UL Type 1

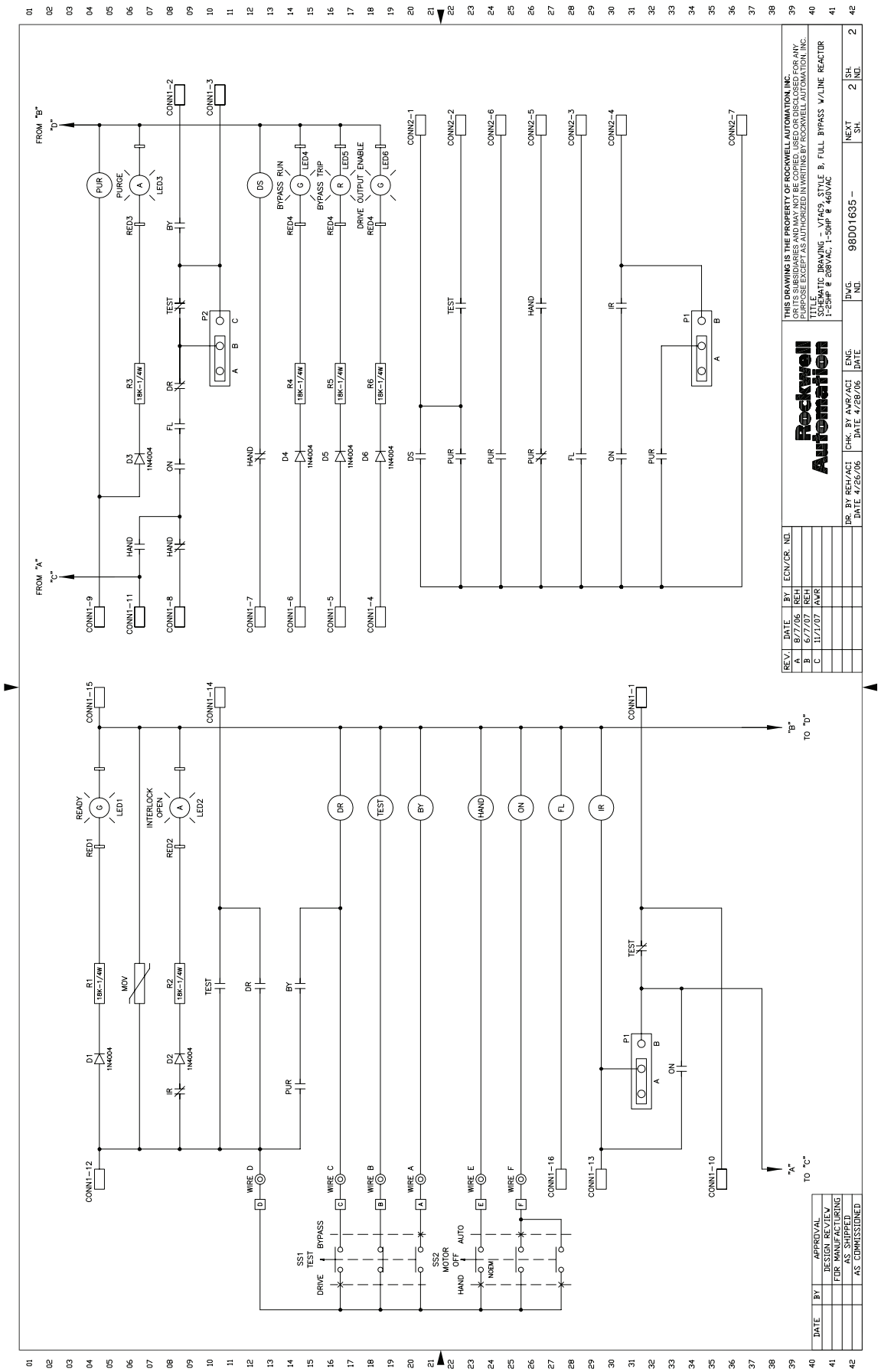


Figure 2.10 30-40 HP, 208V AC and 60-100 HP, 460V AC Drives with Line Reactor (Sheet 1 of 2) NEMA/UL Type 1

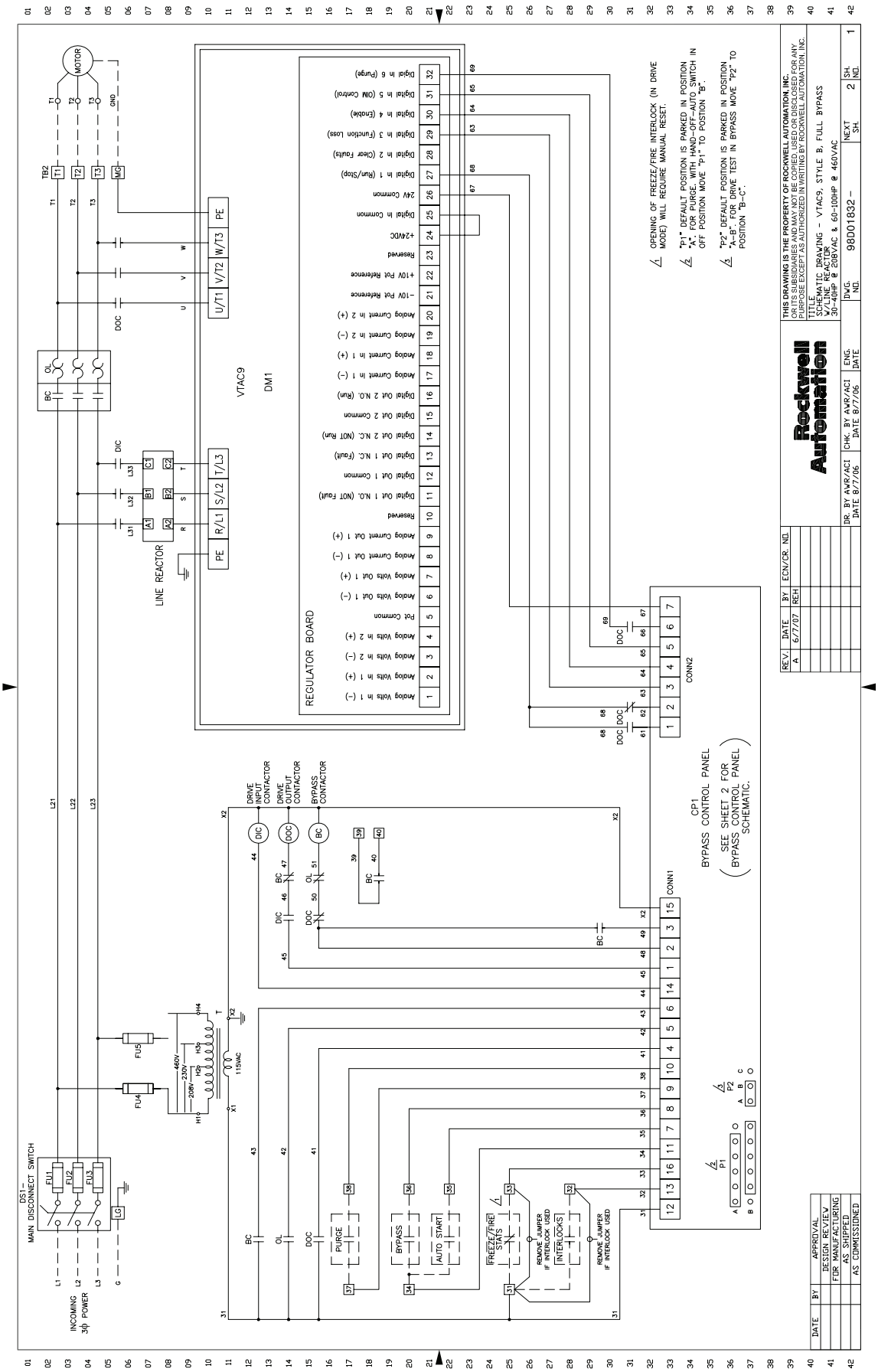


Figure 2.11 30-40 HP, 208V AC and 60-100 HP, 460V AC Drives with Line Reactor (Sheet 2 of 2) NEMA/UL Type 1

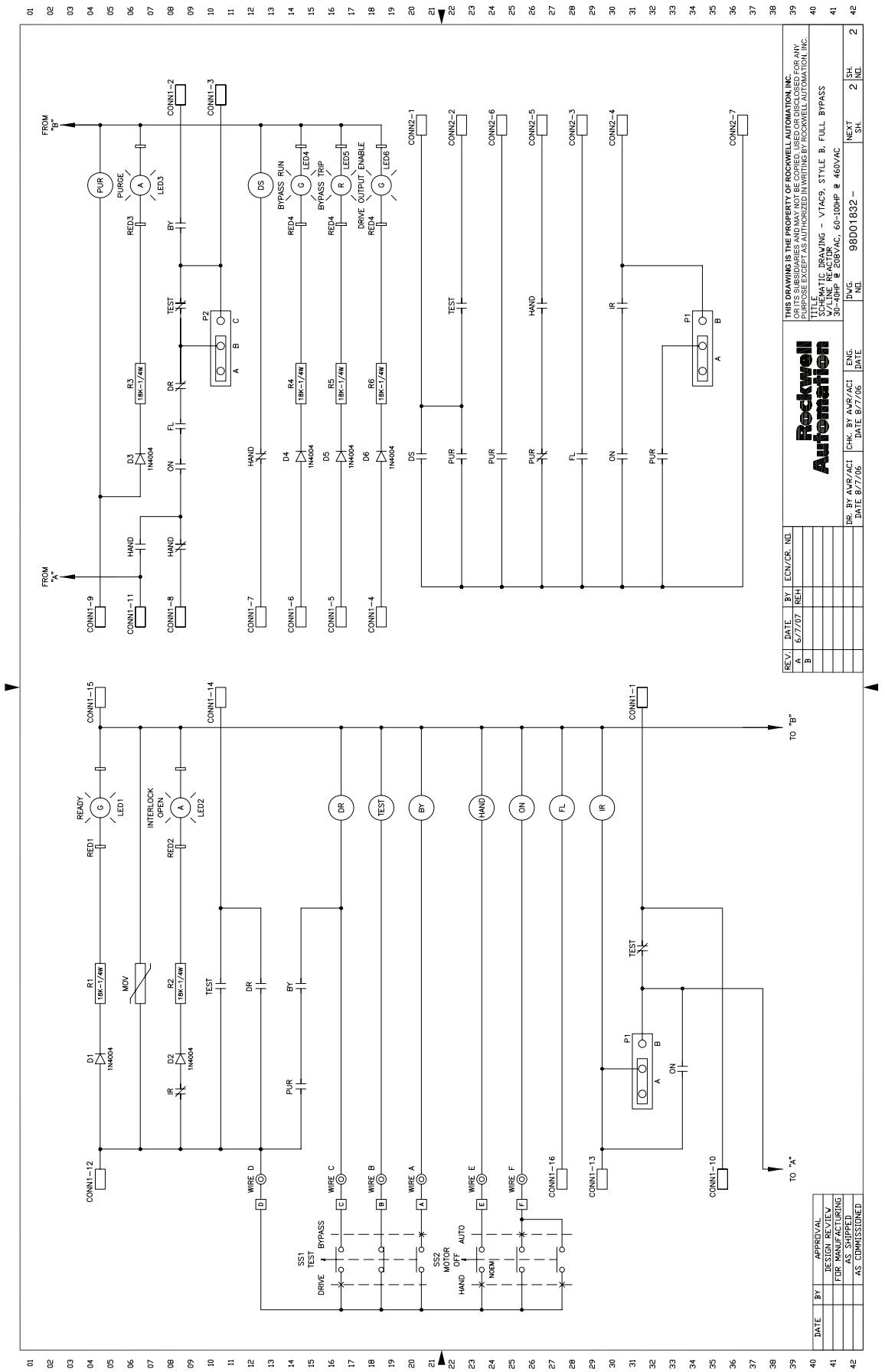


Figure 2.12 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives (Sheet 1 of 2)
NEMA/UL Type 12

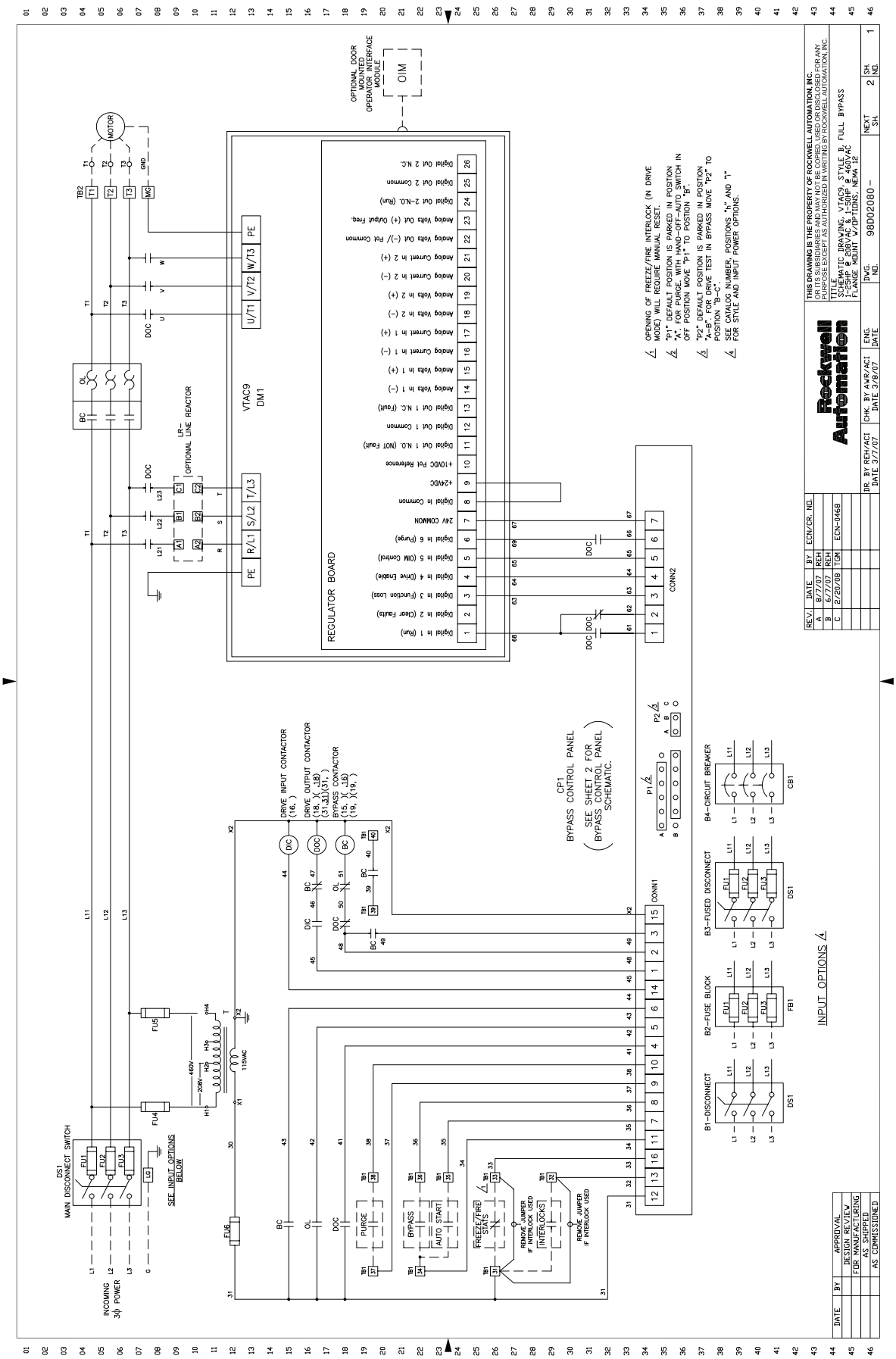


Figure 2.13 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives (Sheet 2 of 2)
NEMA/UL Type 12

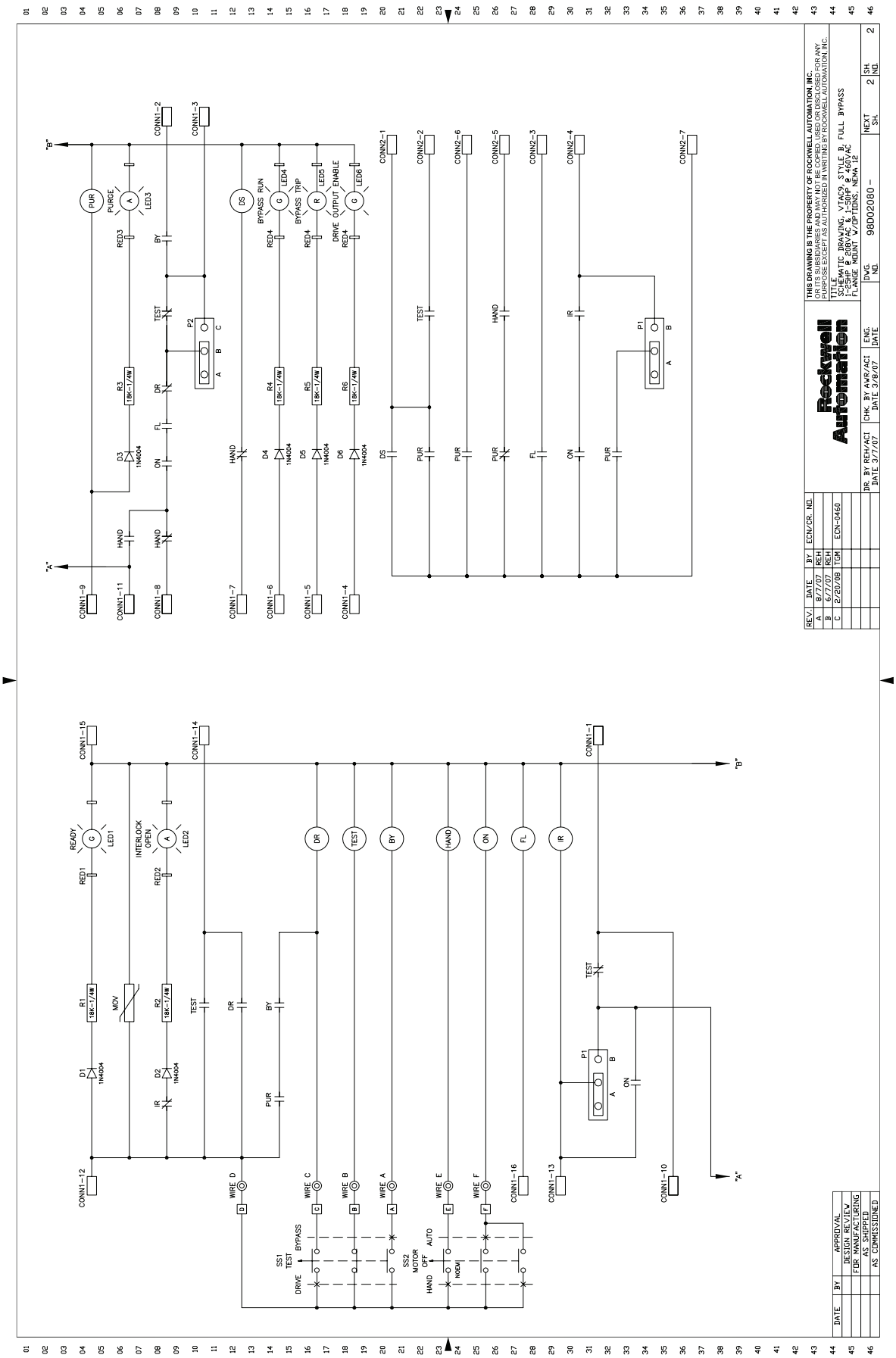


Figure 2.14 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives (Sheet 1 of 2)
NEMA/UL Type 4/3R

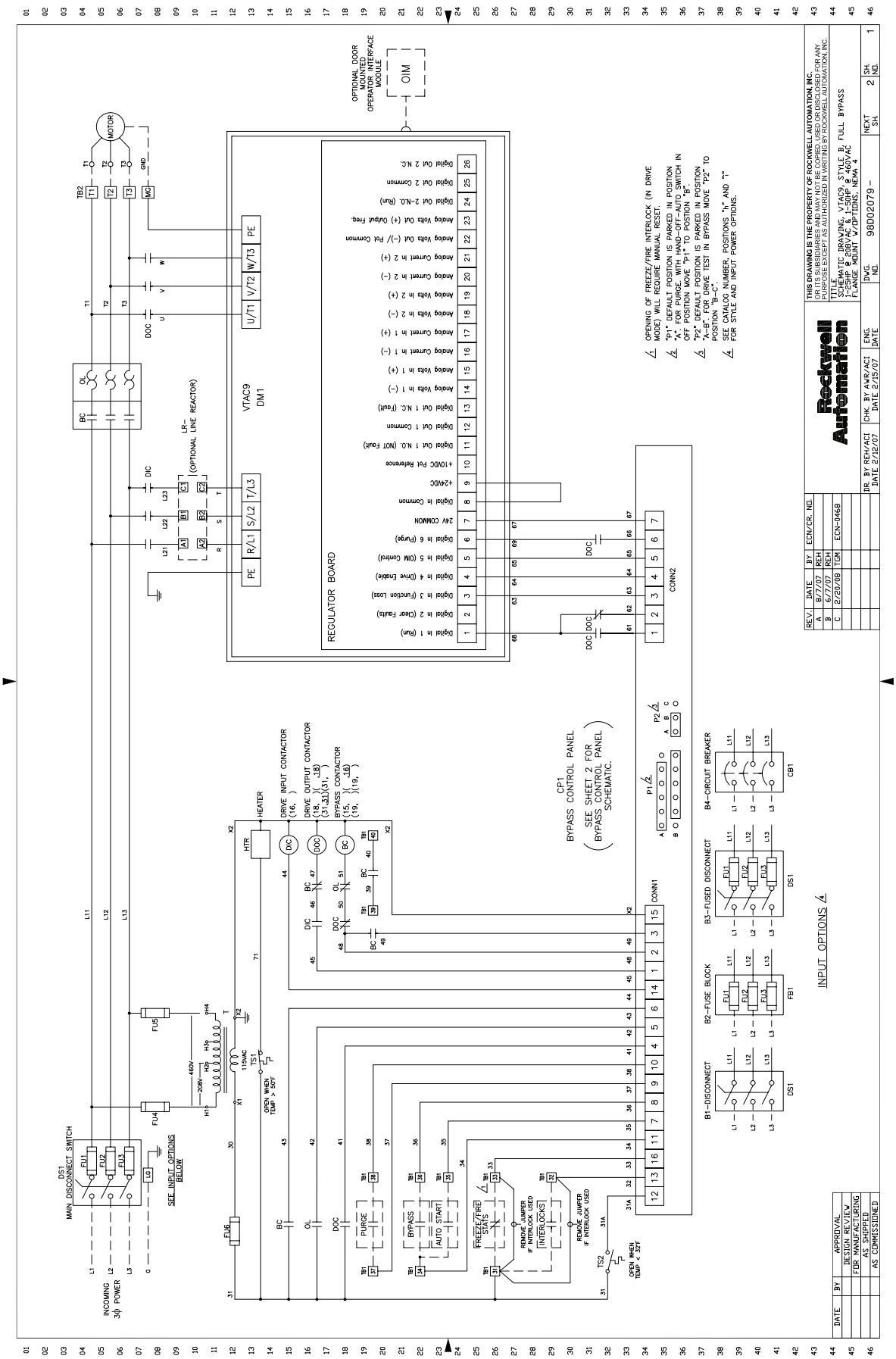
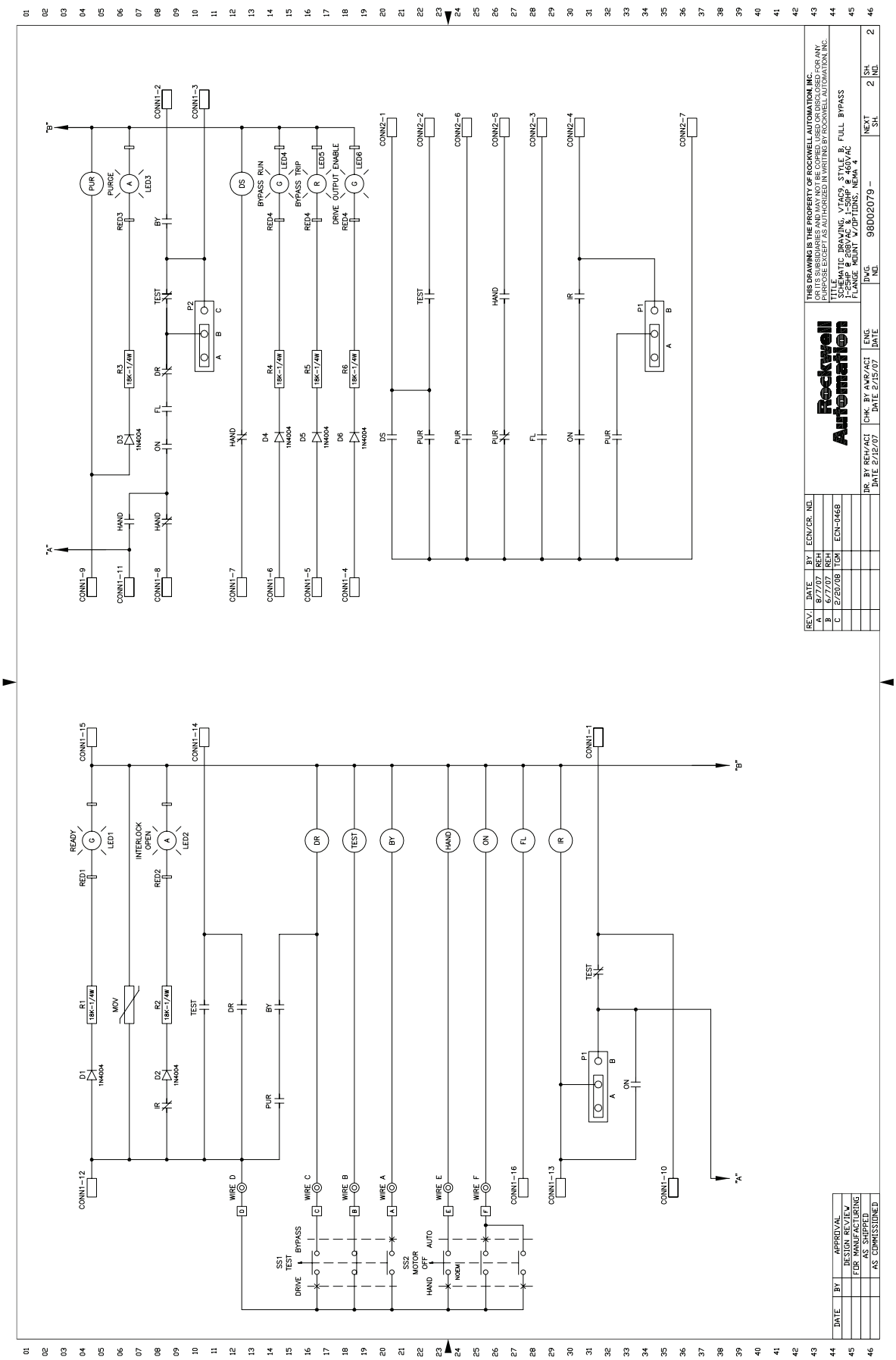


Figure 2.15 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives (Sheet 2 of 2)
NEMA/UL Type 4/3R



Inter-Connect Drawings

Figure 2.16 1-25 HP, 208V AC and 1-50 HP, 460V AC Drives NEMA/UL Type 1

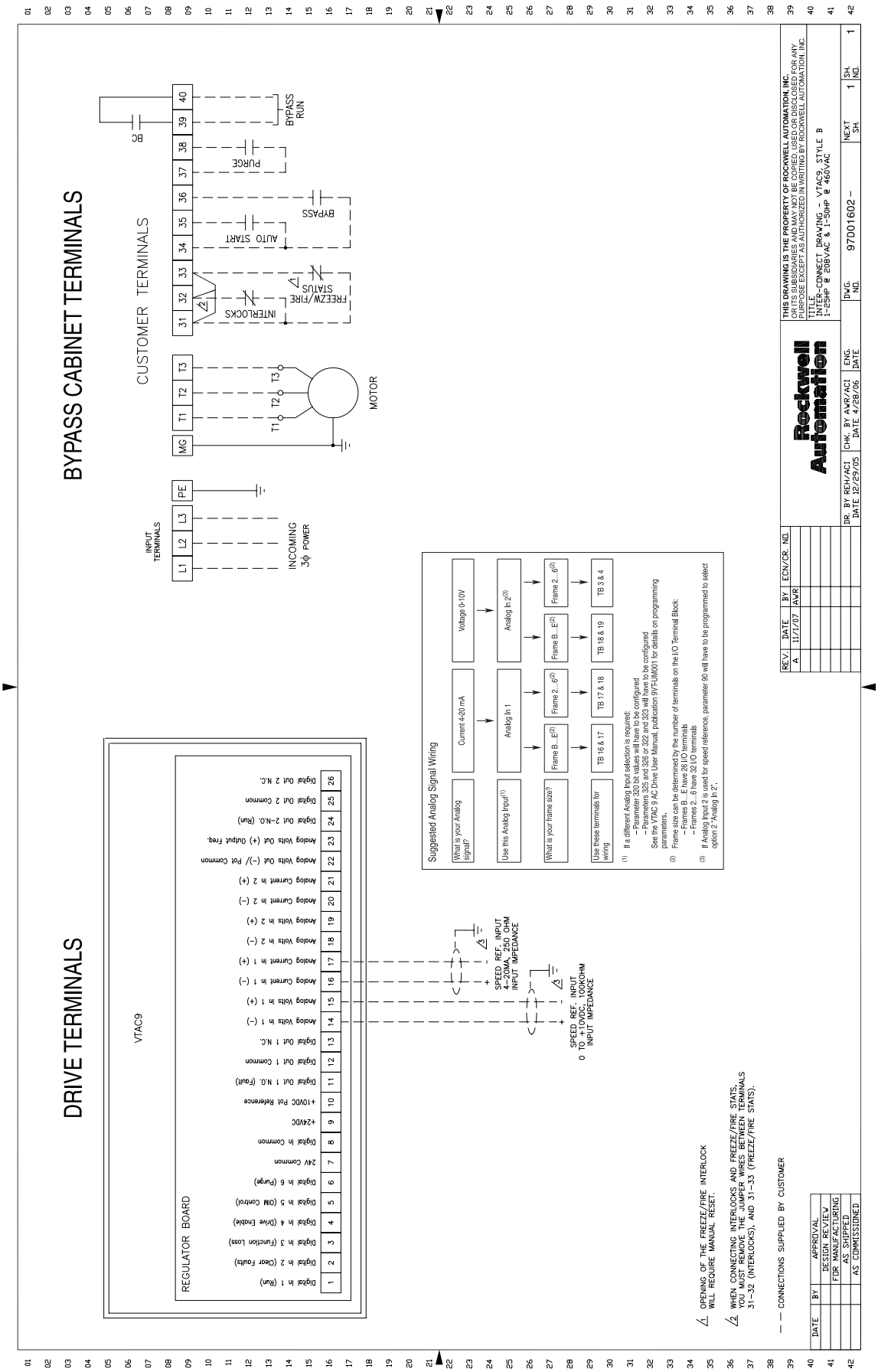
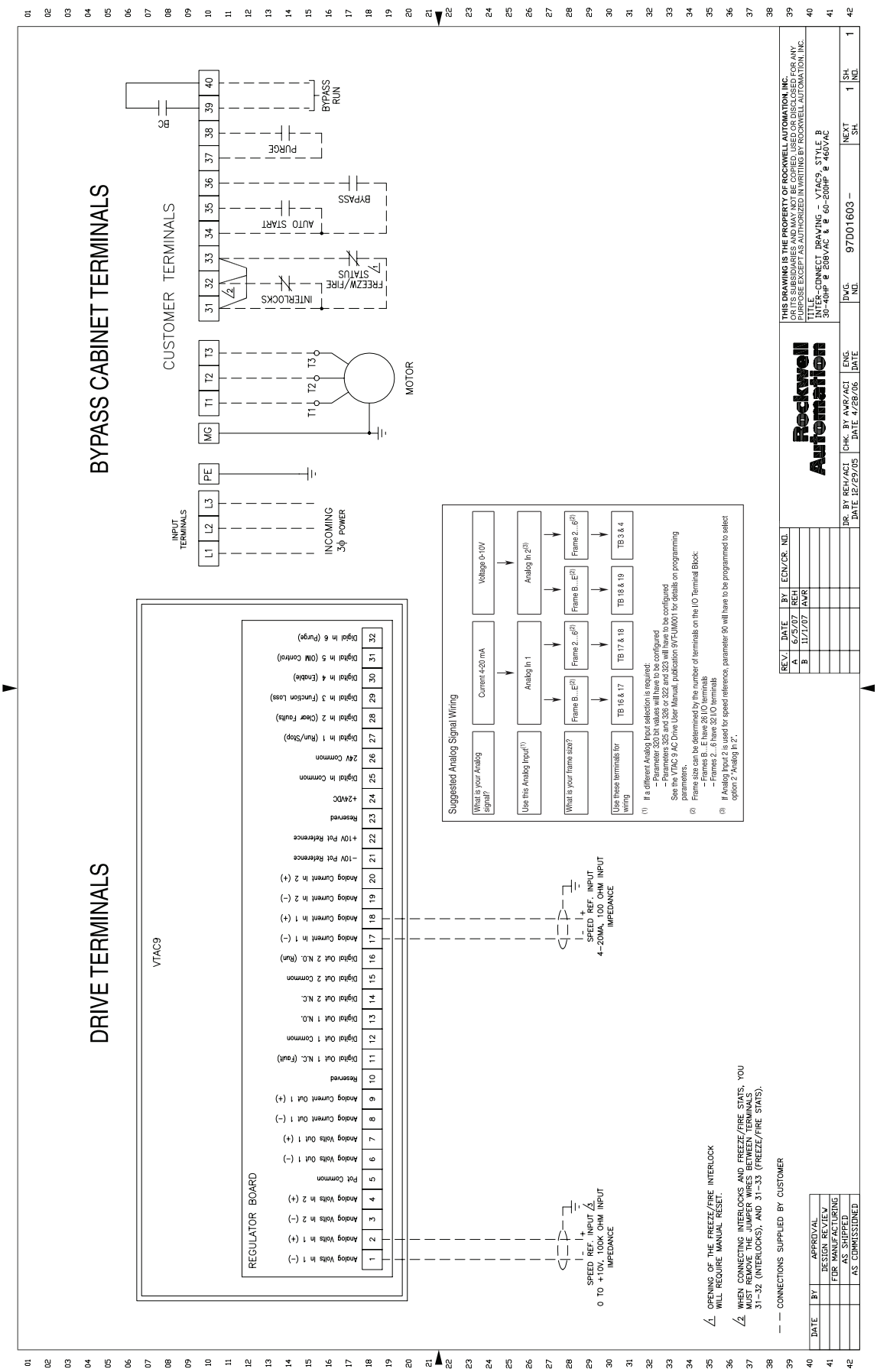


Figure 2.17 30-40 HP, 208V AC and 60-200 HP, 460V AC Drives NEMA/UL Type 1



Layout Drawings

Figure 2.18 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 1

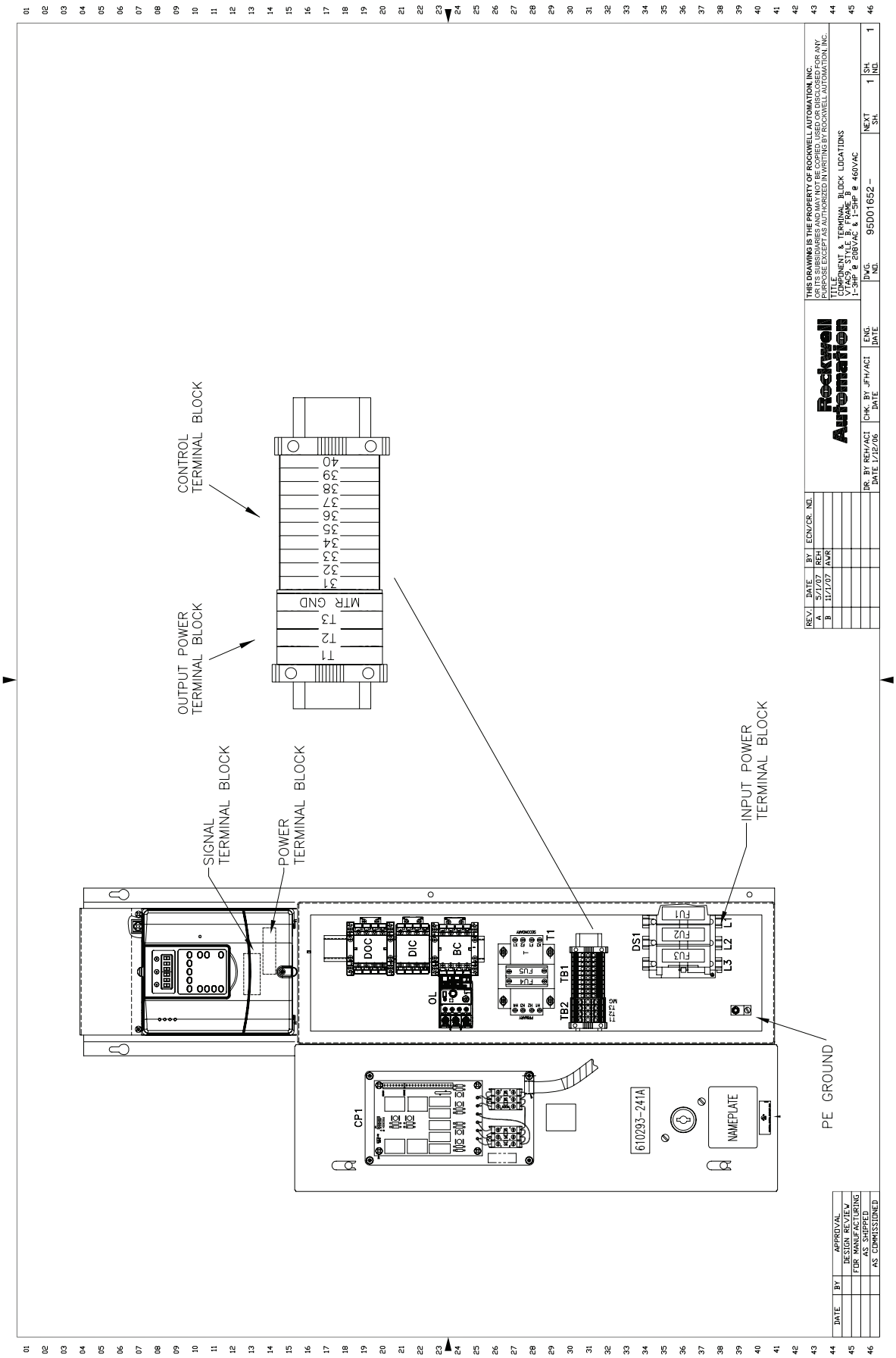


Figure 2.19 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 1

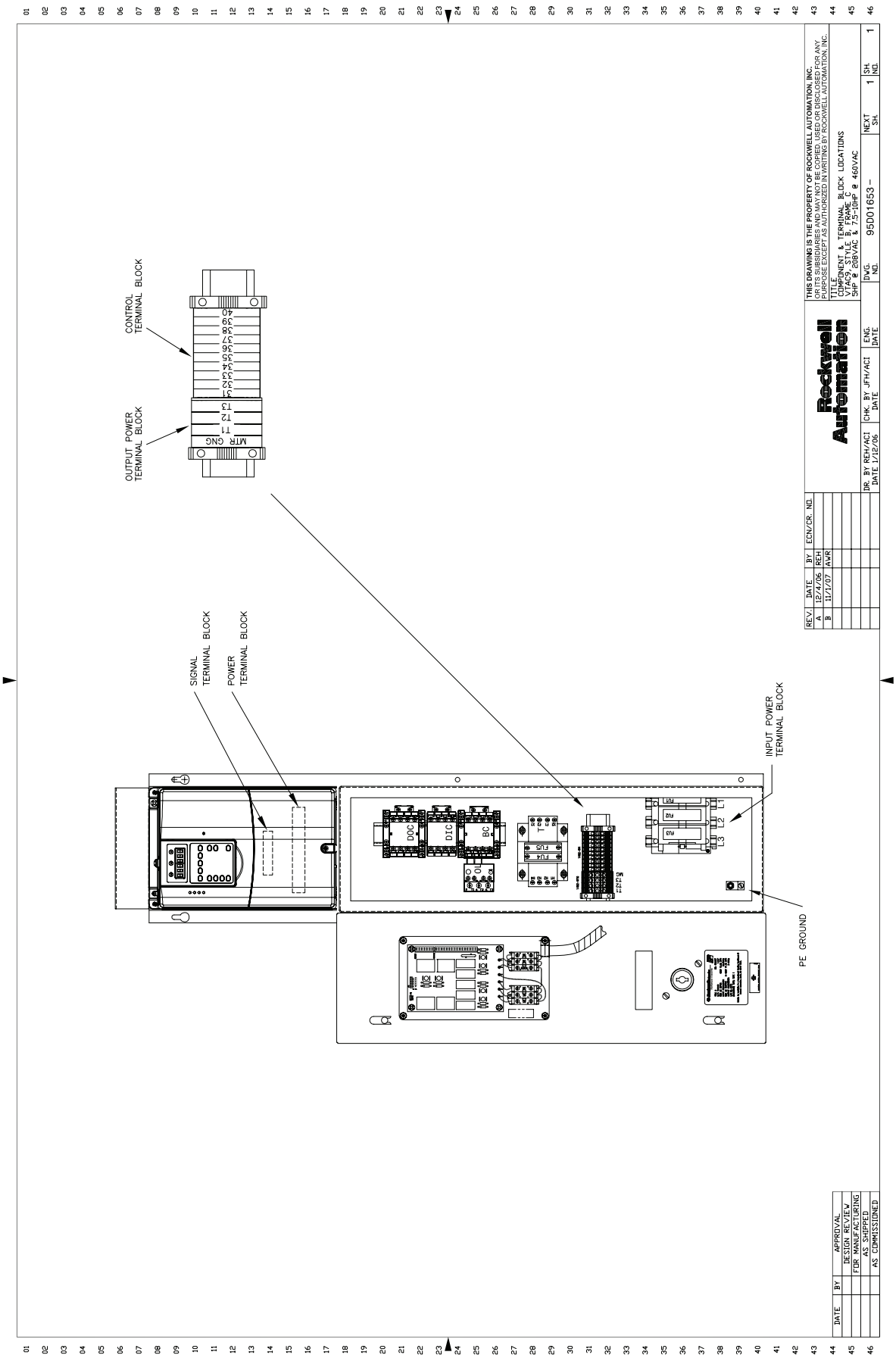


Figure 2.20 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives NEMA/UL Type 1

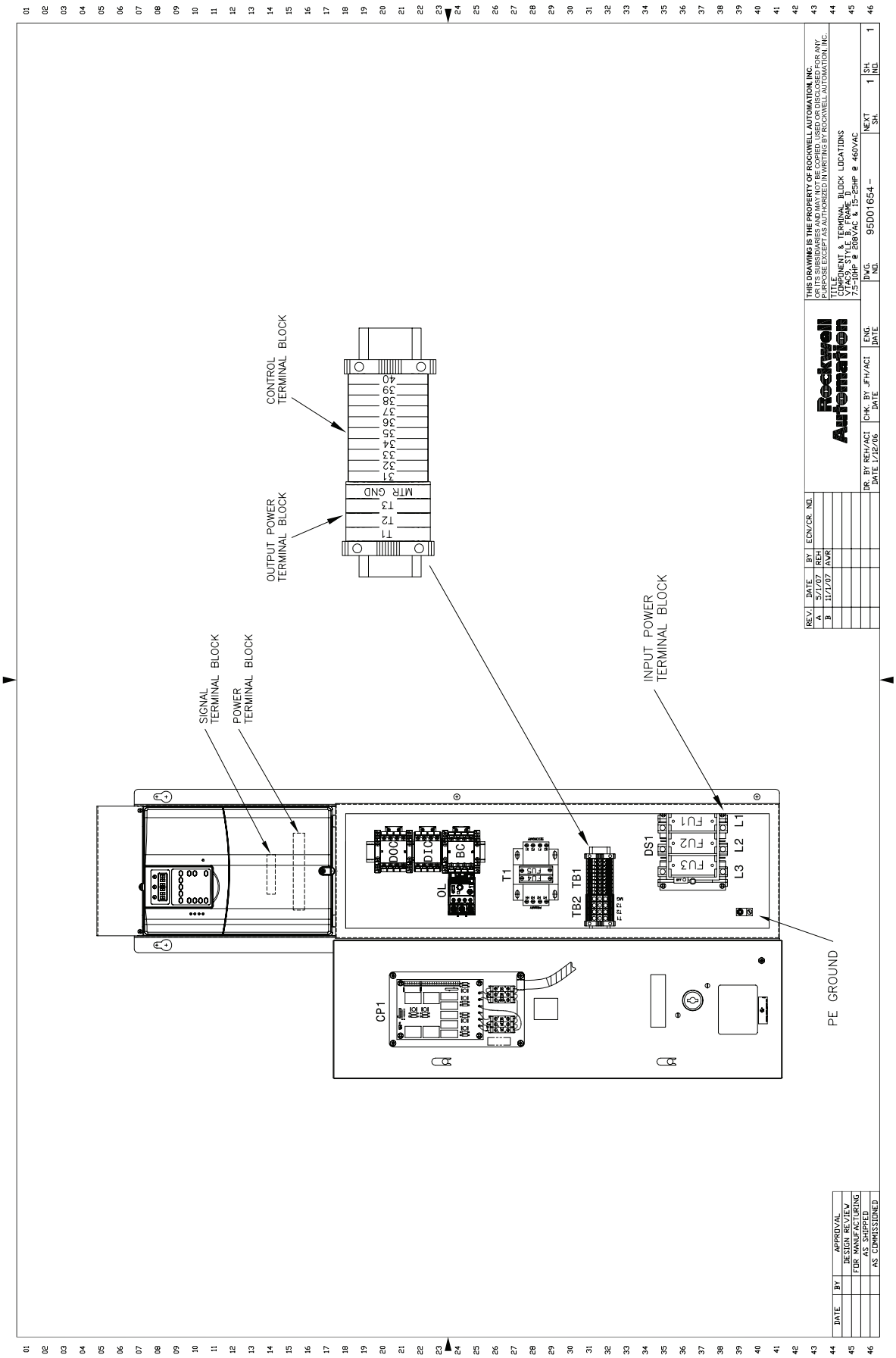


Figure 2.21 30 HP, 480V AC Drives
NEMA/UL Type 1

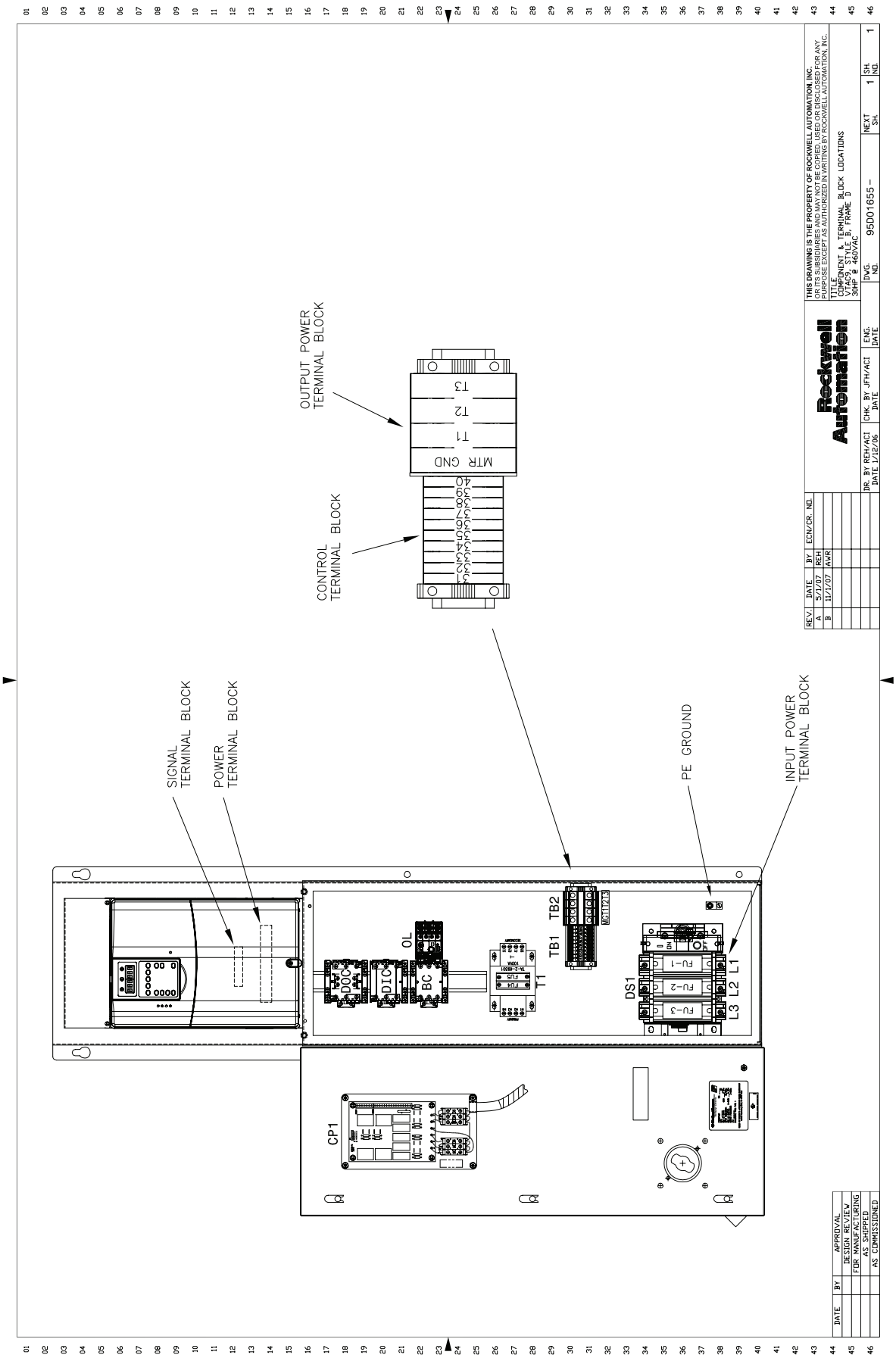


Figure 2.22 15-25 HP, 208 and 40-50 HP, 460V AC Drives NEMA/UL Type 1

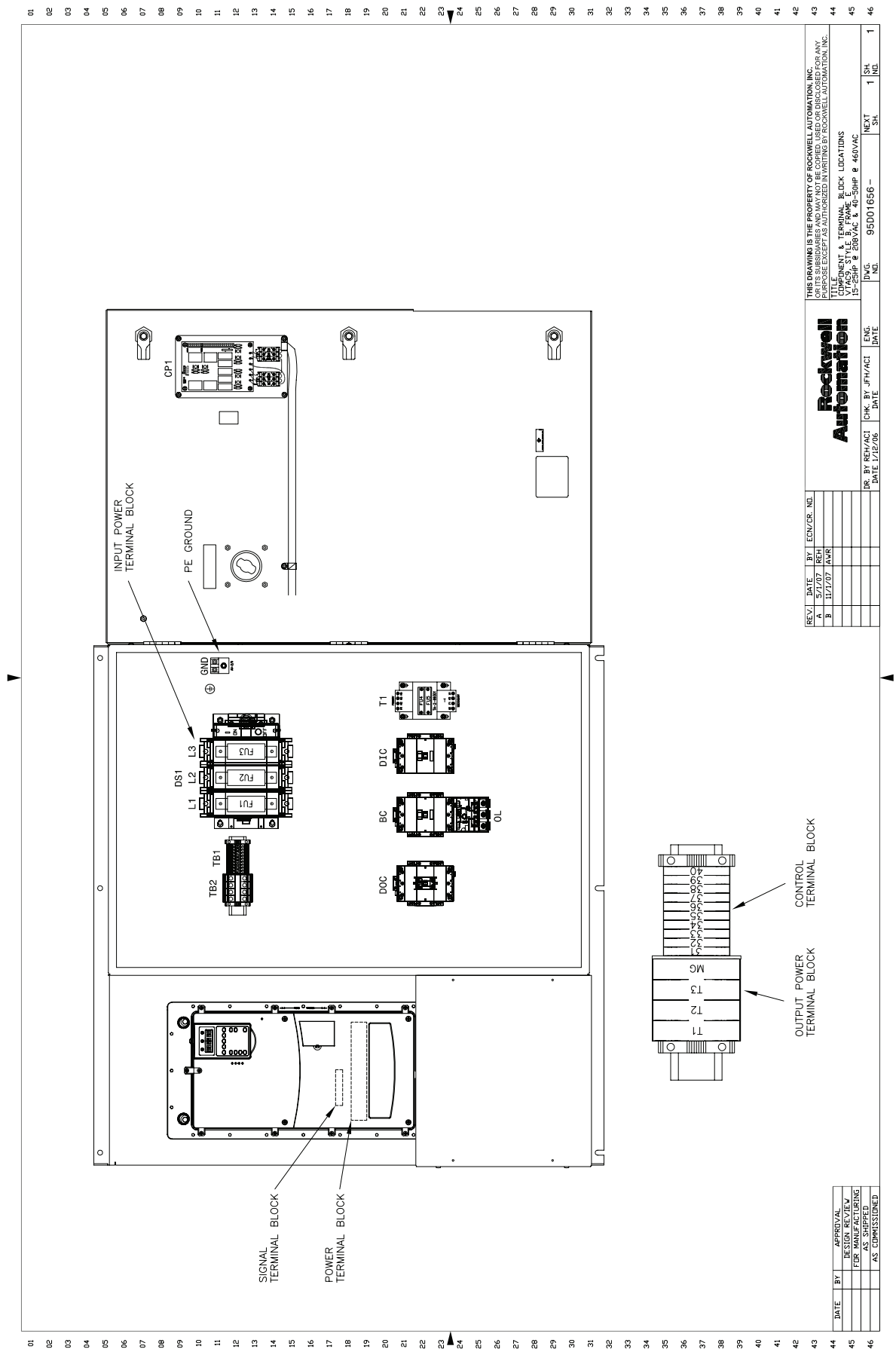


Figure 2.23 30 HP, 208V AC and 60 HP, 460V AC Drives NEMA/UL Type 1

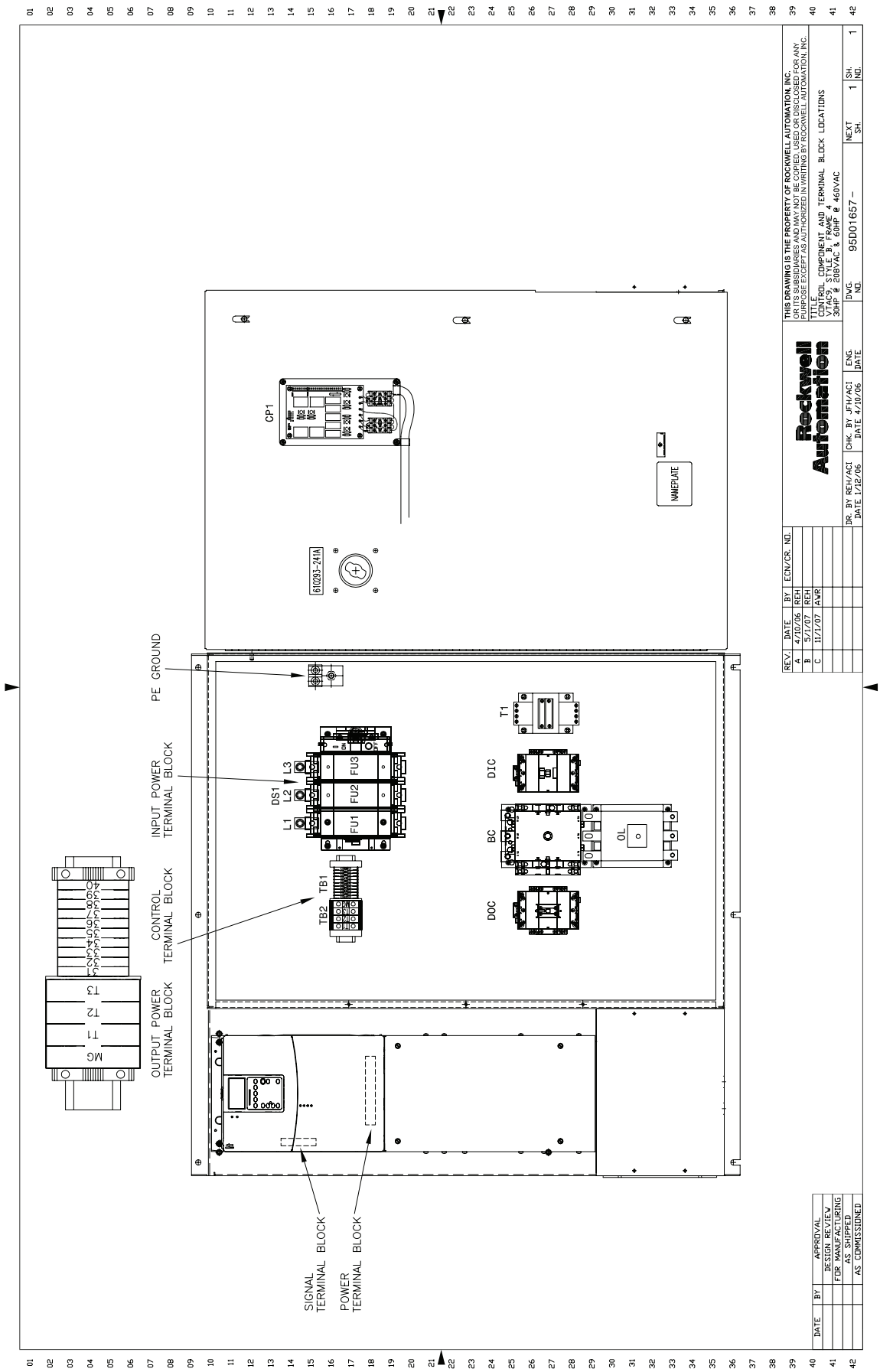


Figure 2.24 40 HP, 208V AC and 75-100 HP, 460V AC Drives NEMA/UL Type 1

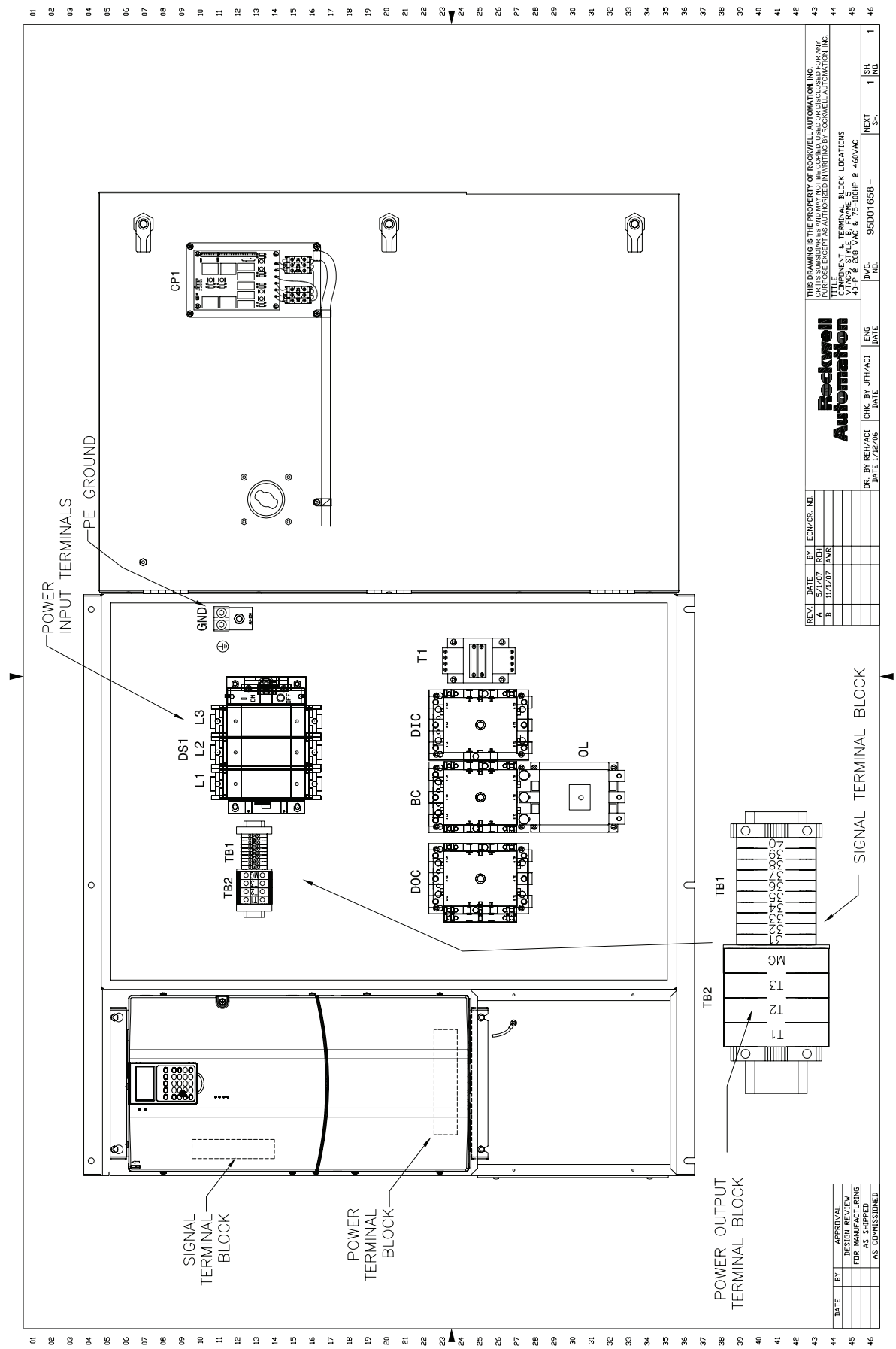


Figure 2.25 125-200 HP, 460V AC Drives
NEMA/UL Type 1

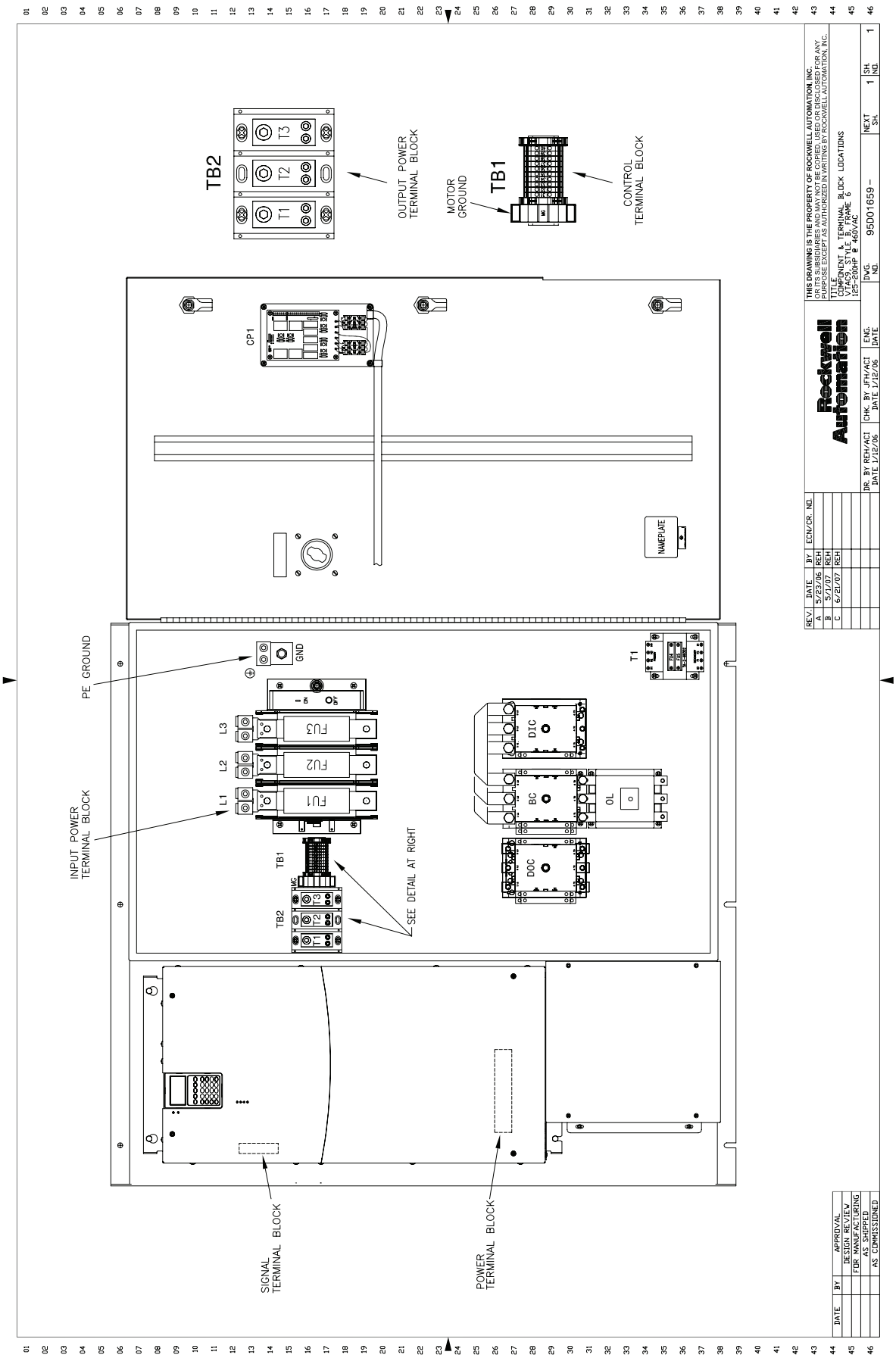


Figure 2.26 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

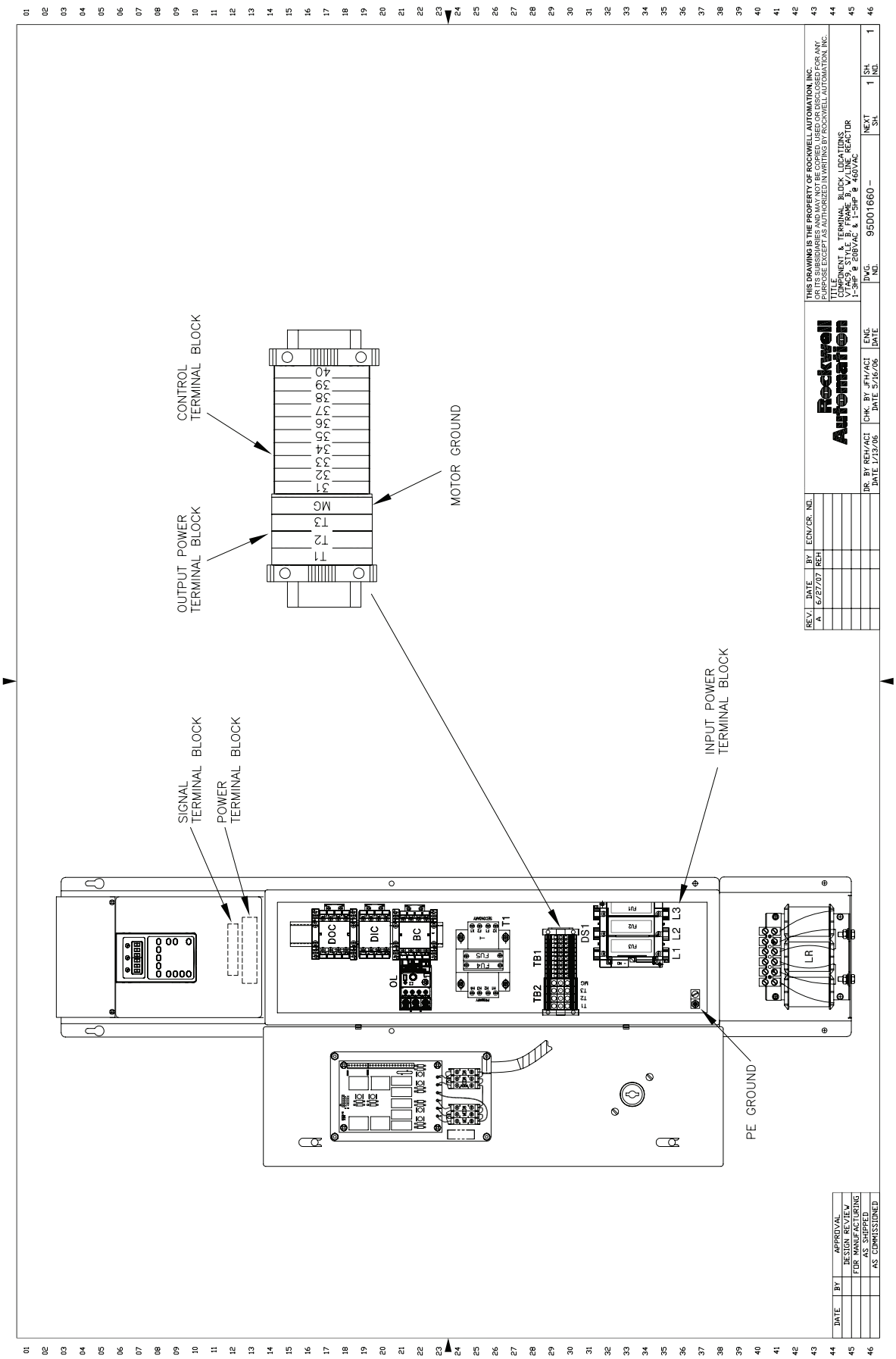


Figure 2.27 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

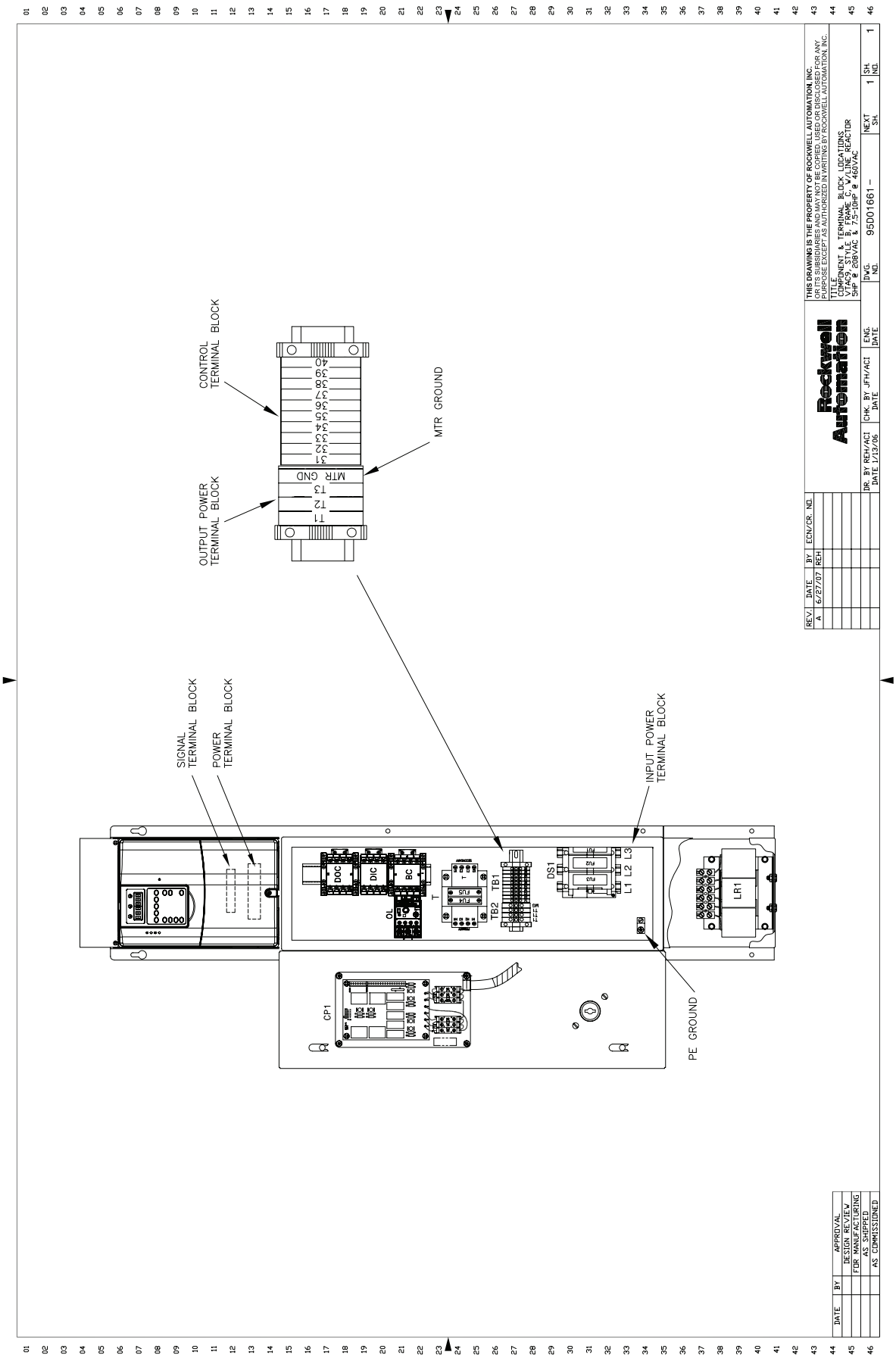


Figure 2.28 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

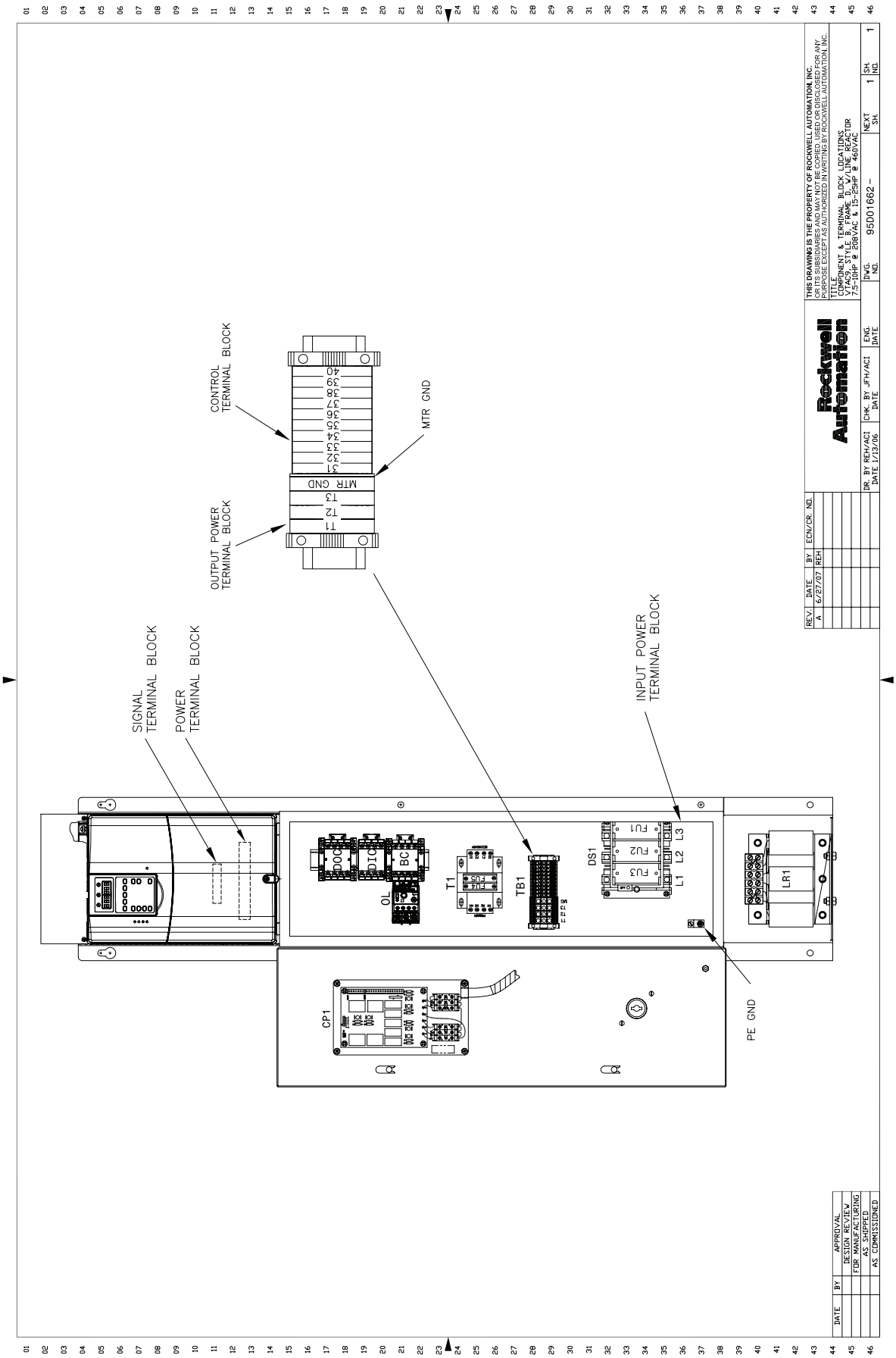


Figure 2.29 30 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

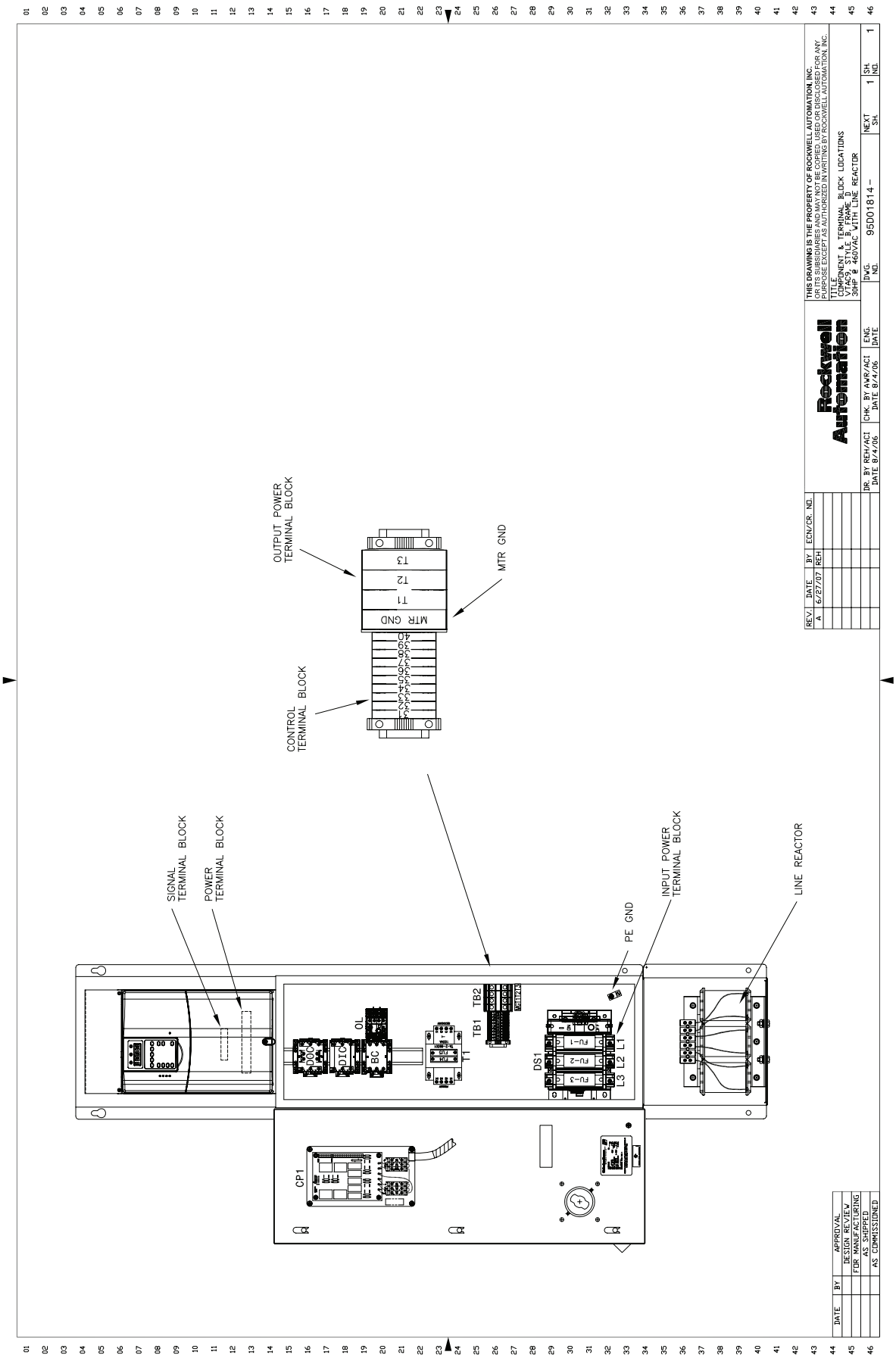


Figure 2.30 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

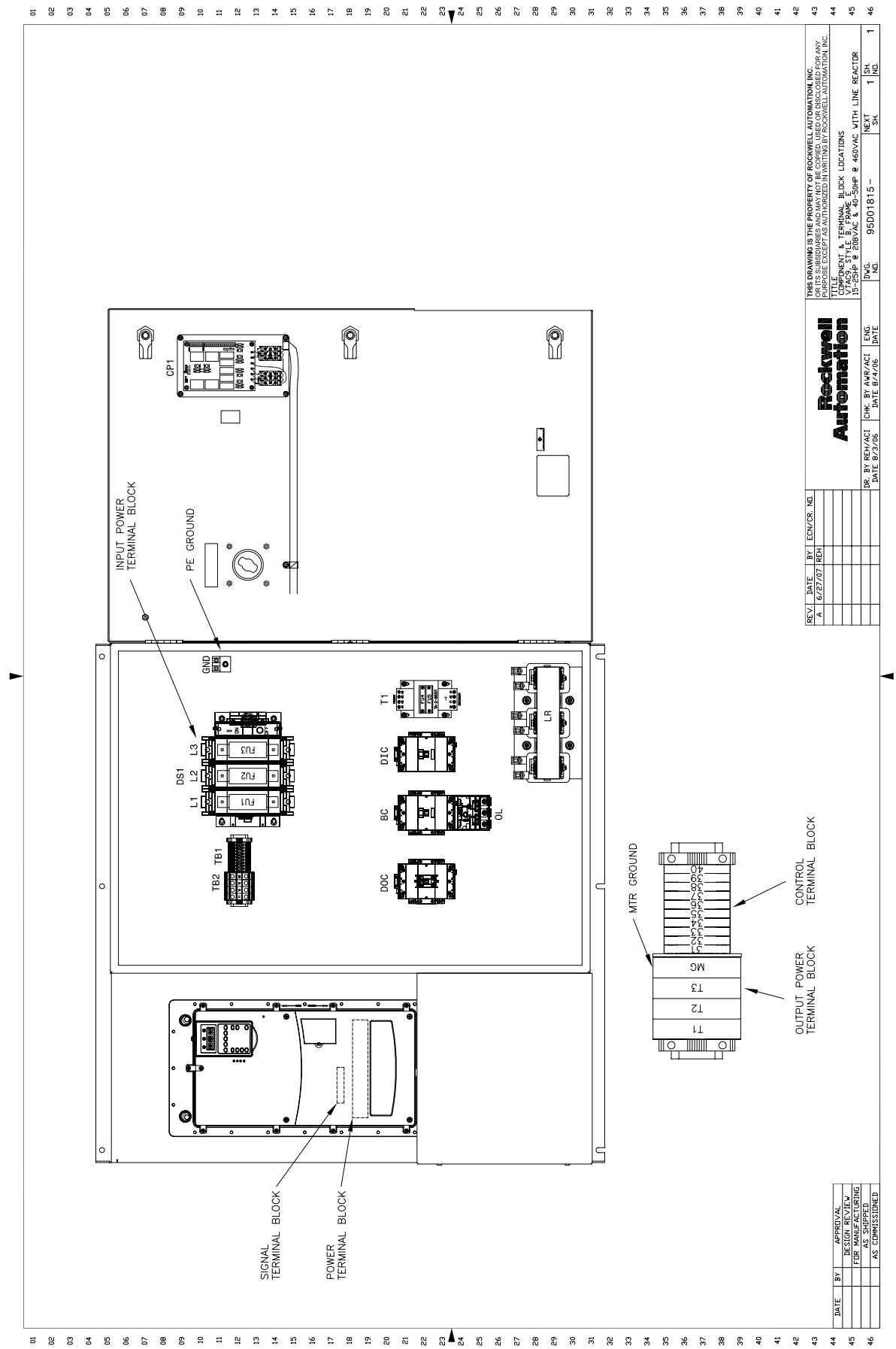


Figure 2.31 30 HP, 208V AC and 60 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

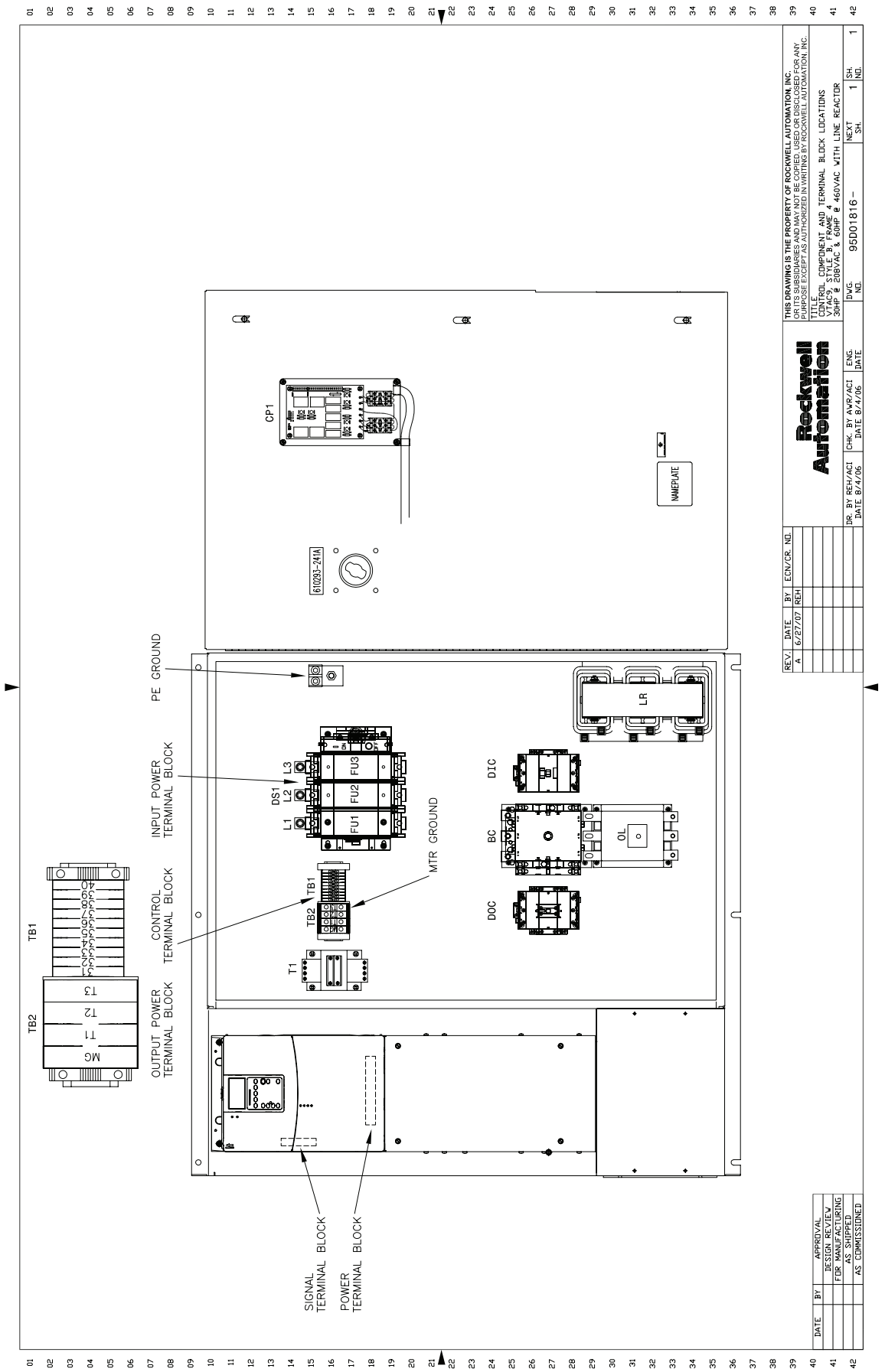


Figure 2.32 40 HP, 208V AC and 75-100 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

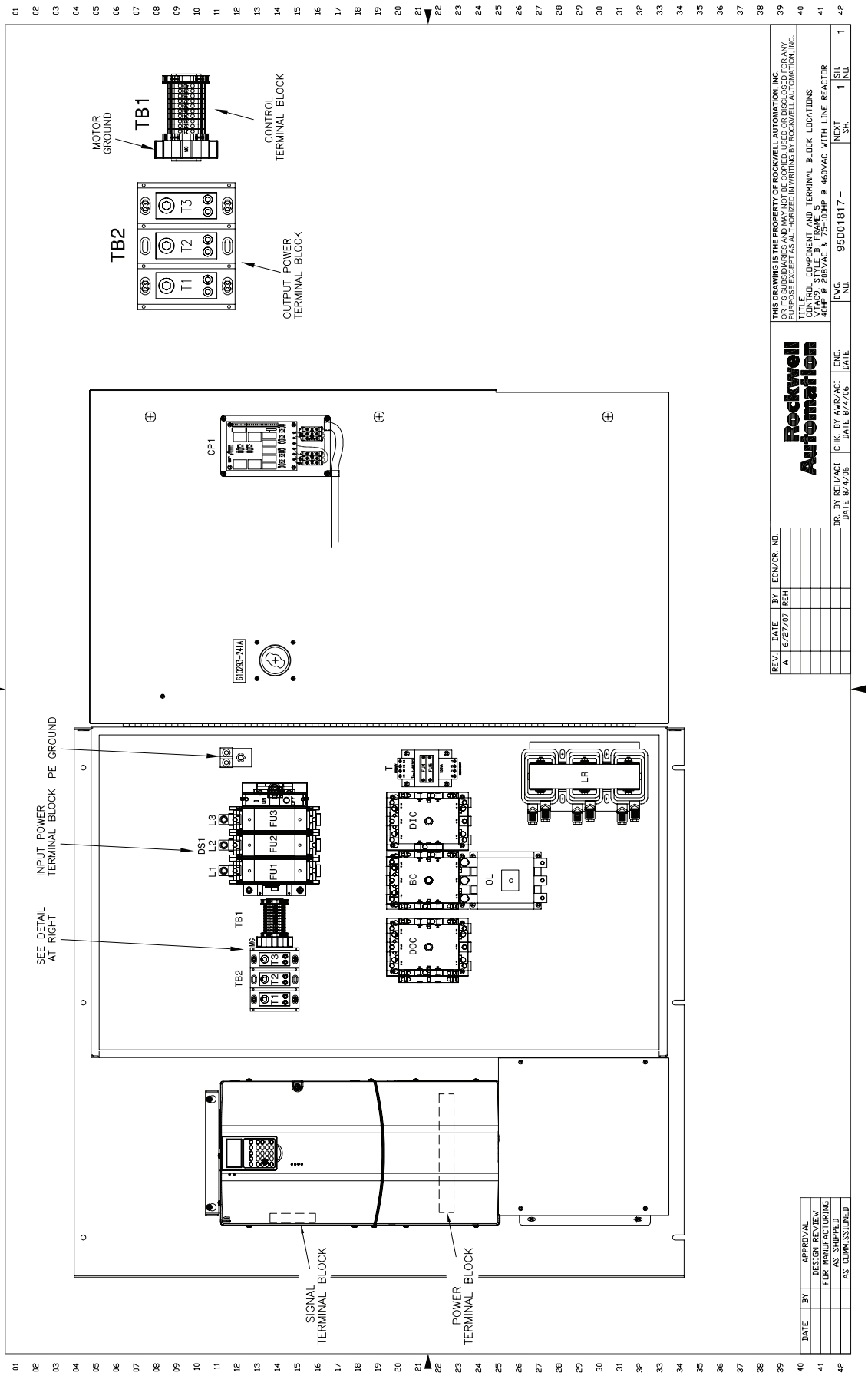


Figure 2.33 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 12

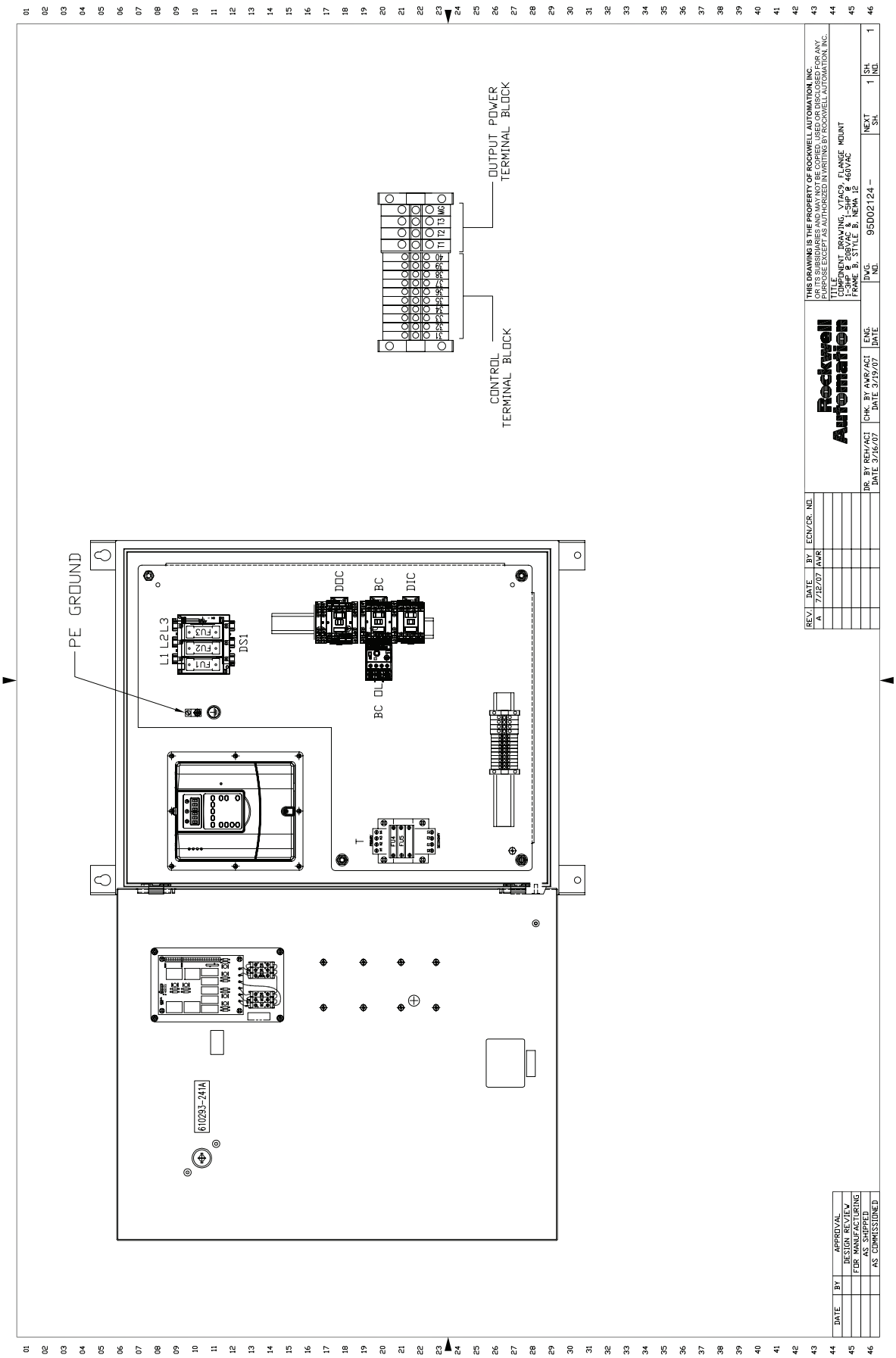


Figure 2.34 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 12

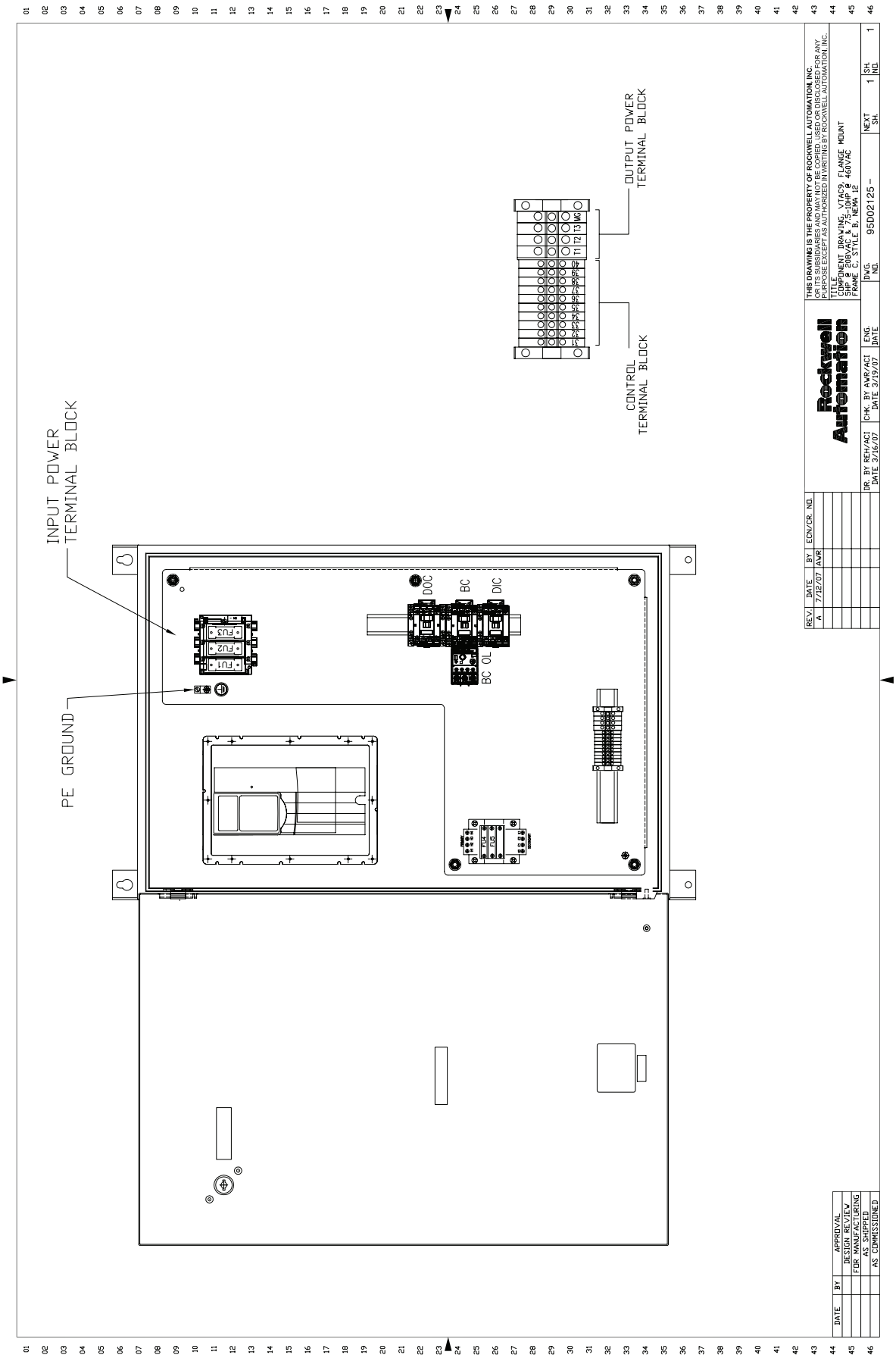


Figure 2.35 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives NEMA/UL Type 12

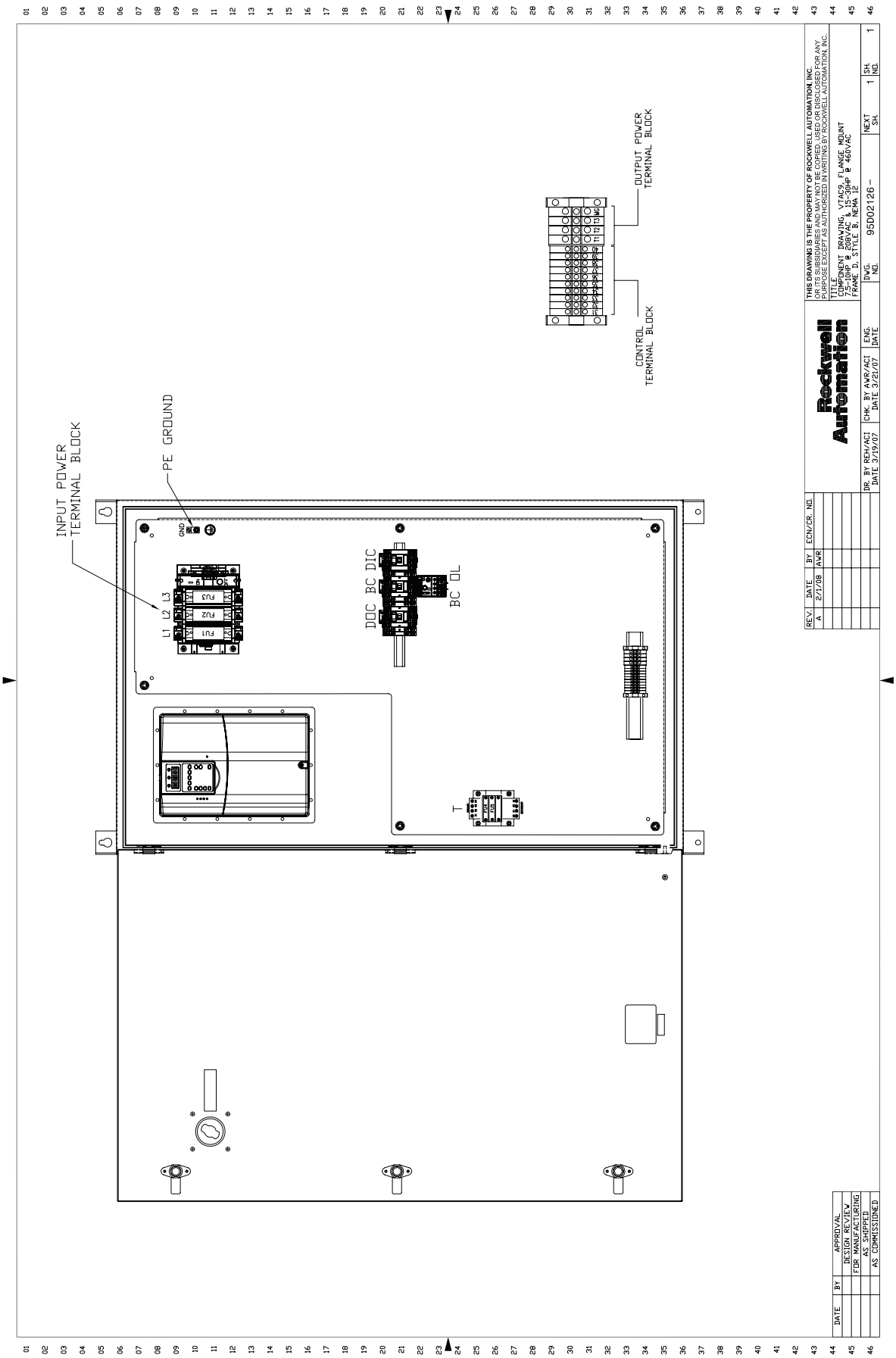


Figure 2.36 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 12

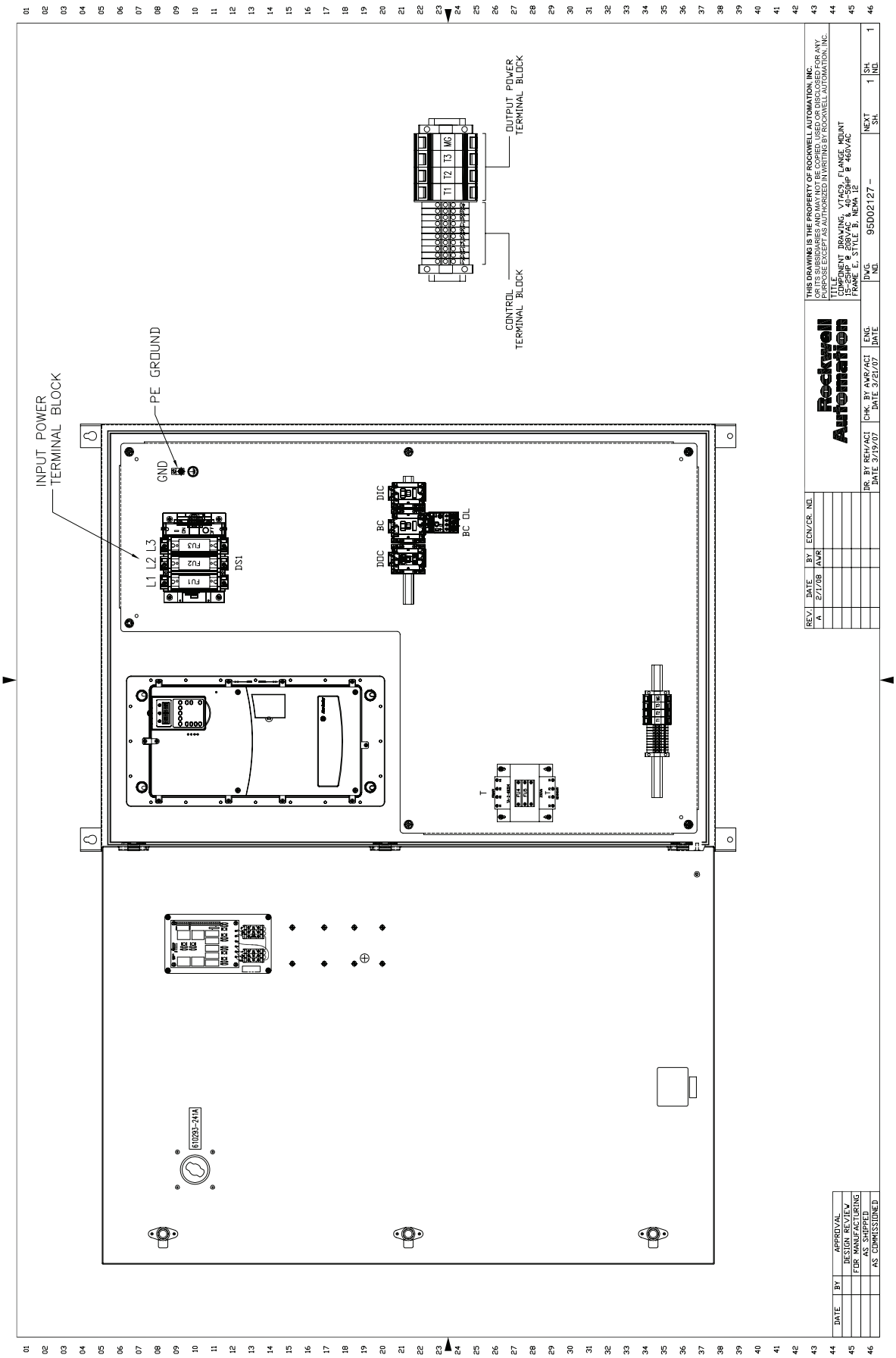


Figure 2.37 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives with Line Reactor NEMA/UL Type 12

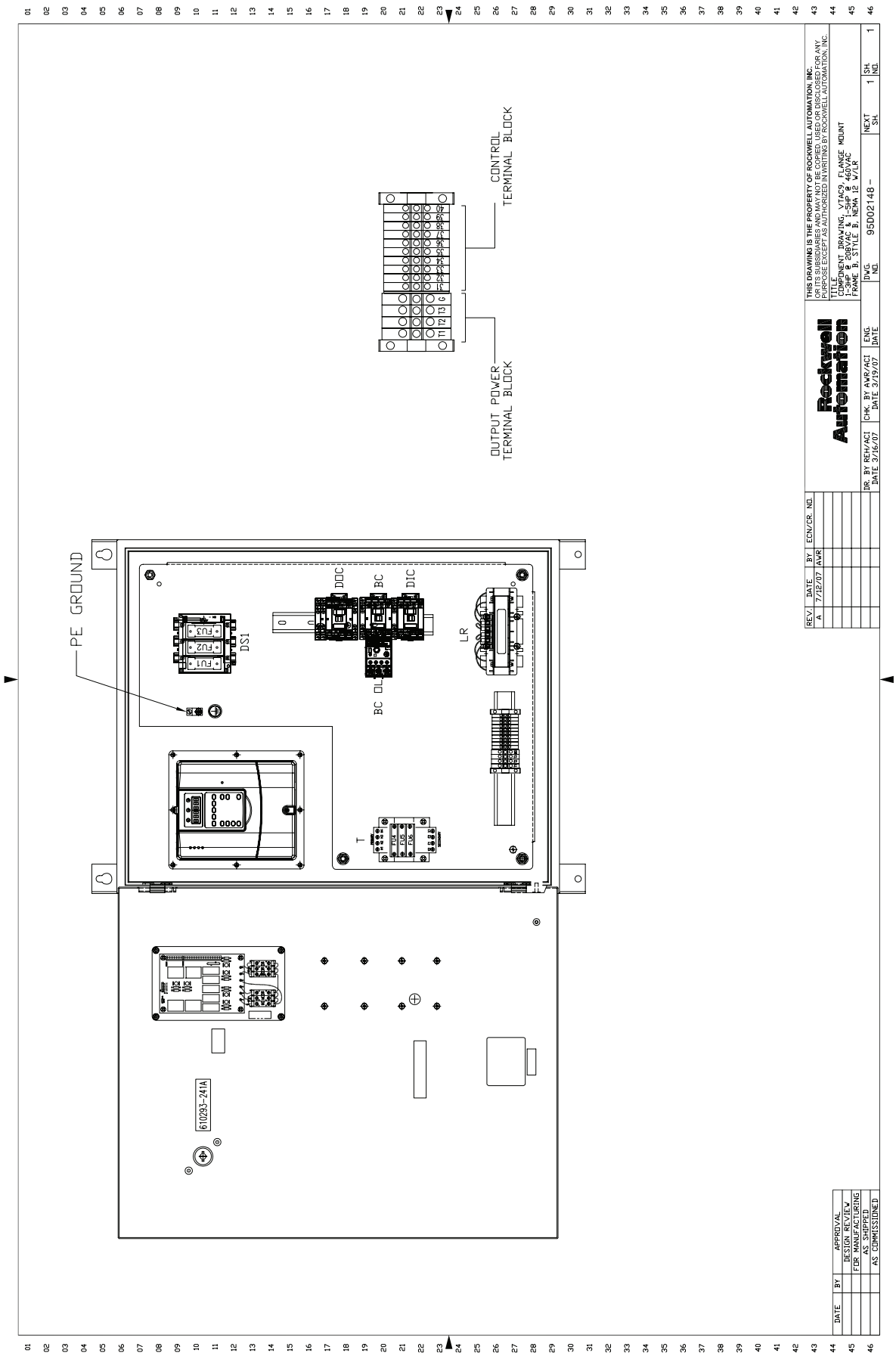


Figure 2.38 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives with Line Reactor NEMA/UL Type 12

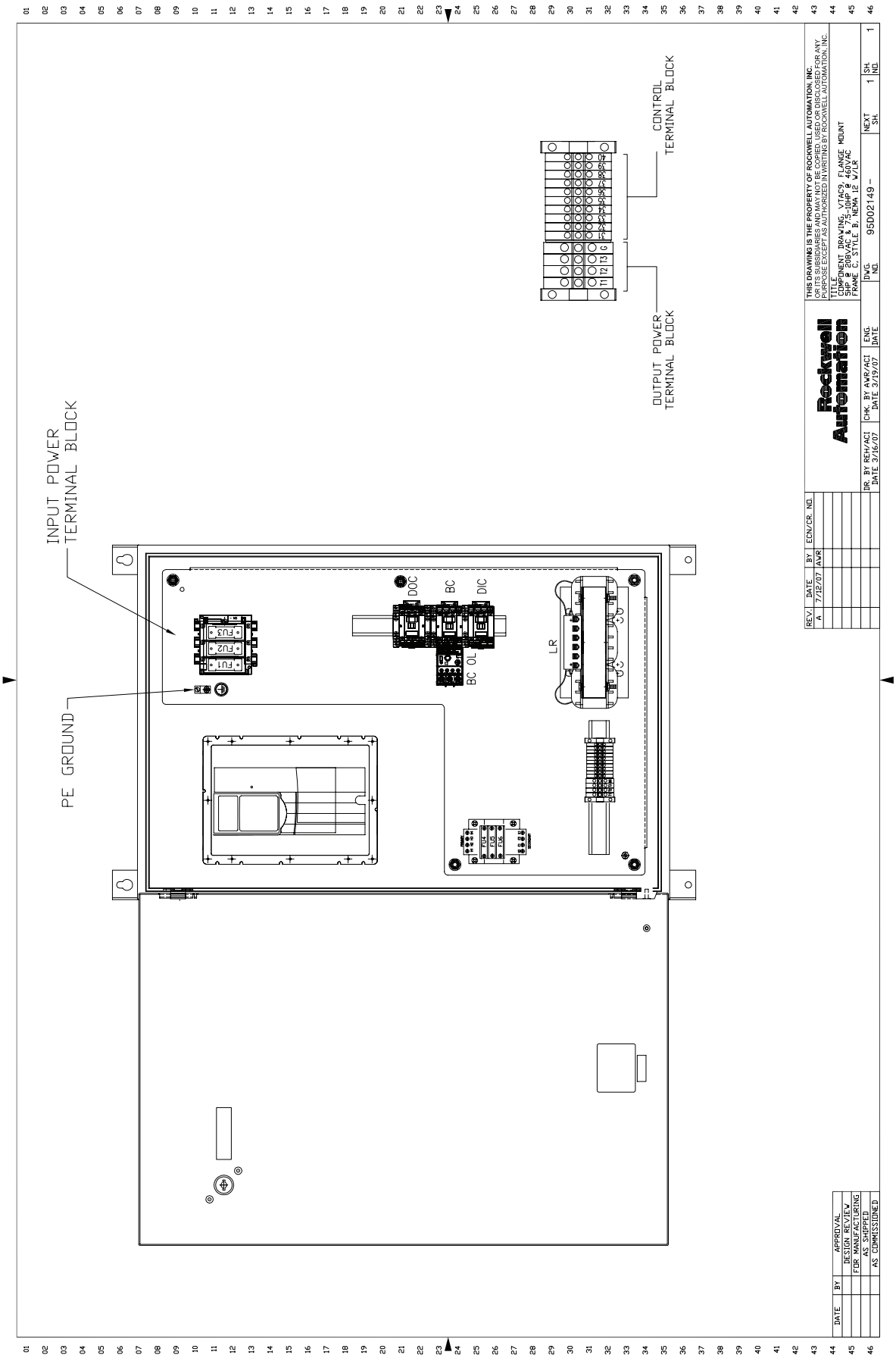


Figure 2.39 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives with Line Reactor NEMA/UL Type 12

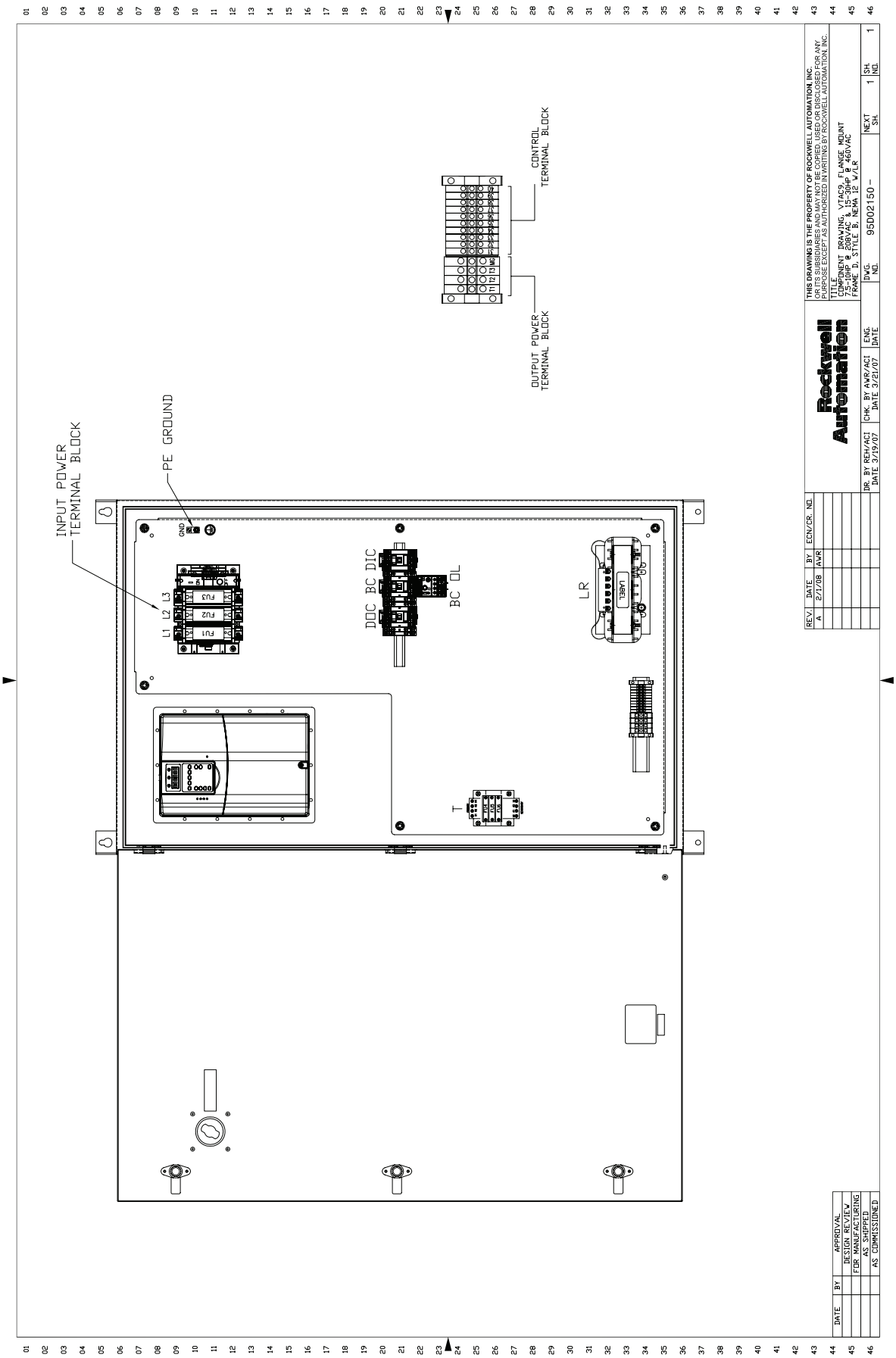


Figure 2.40 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives with Line Reactor NEMA/UL Type 12

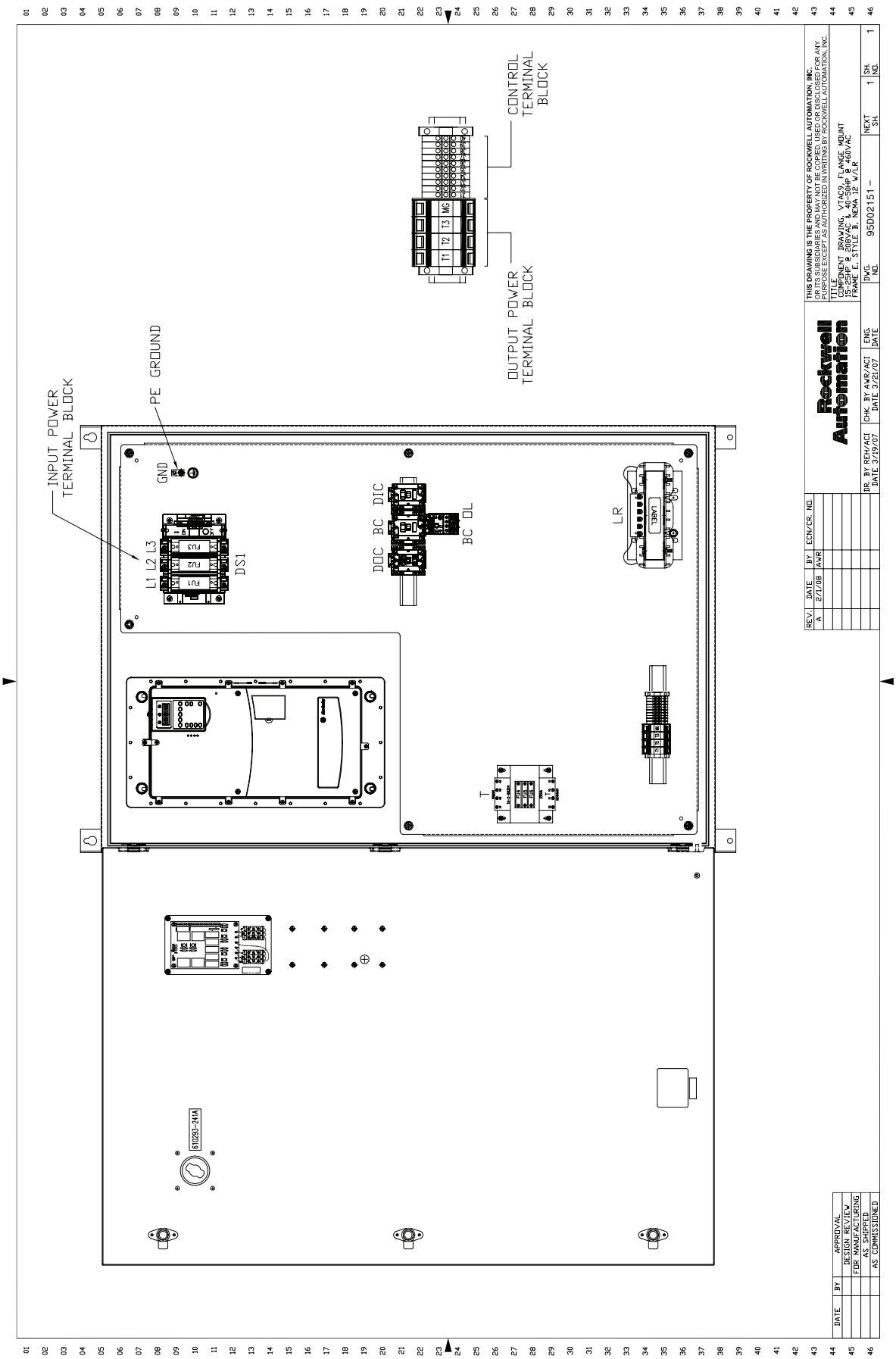


Figure 2.41 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 4/3R

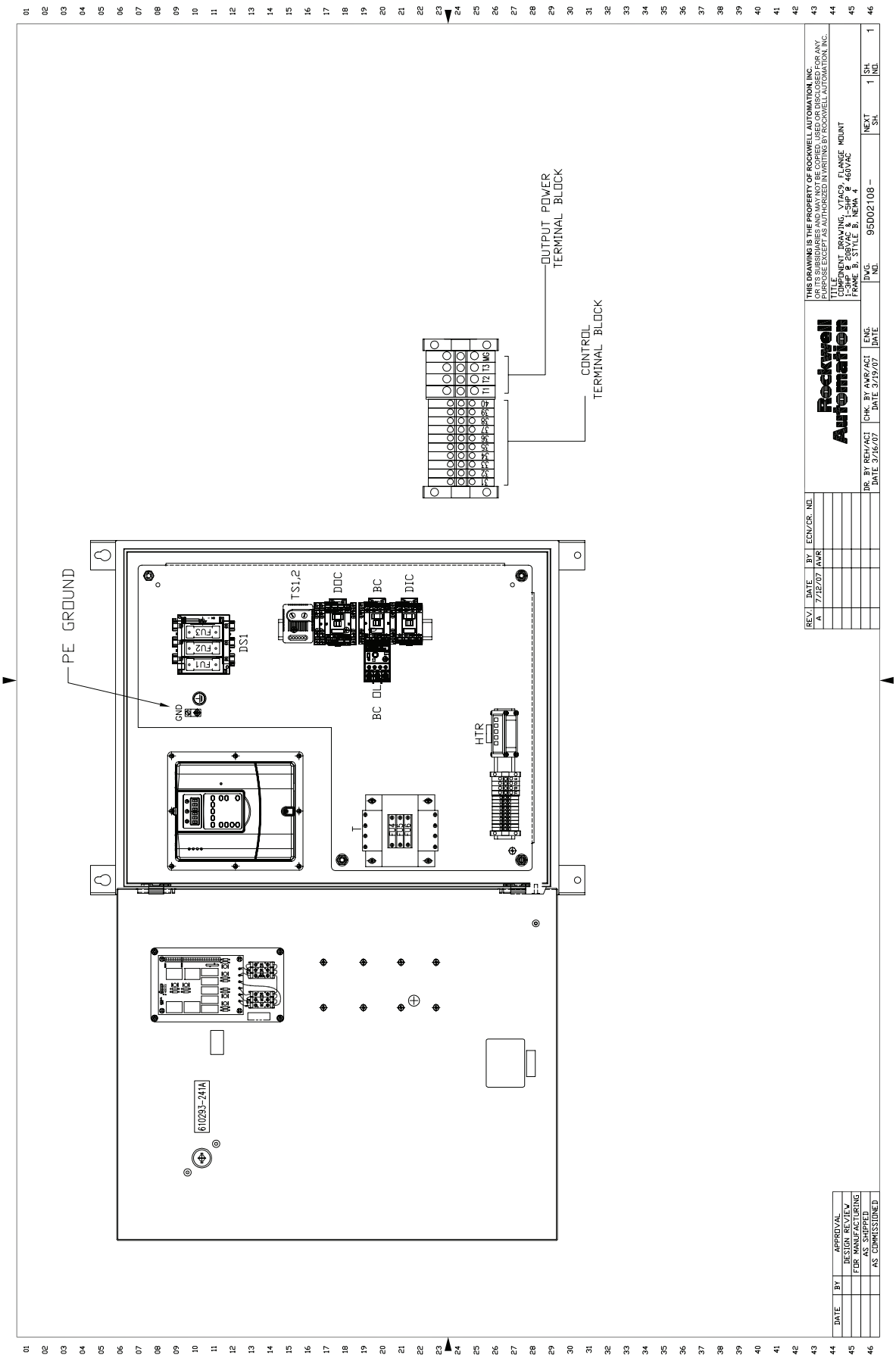


Figure 2.42 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 4/3R

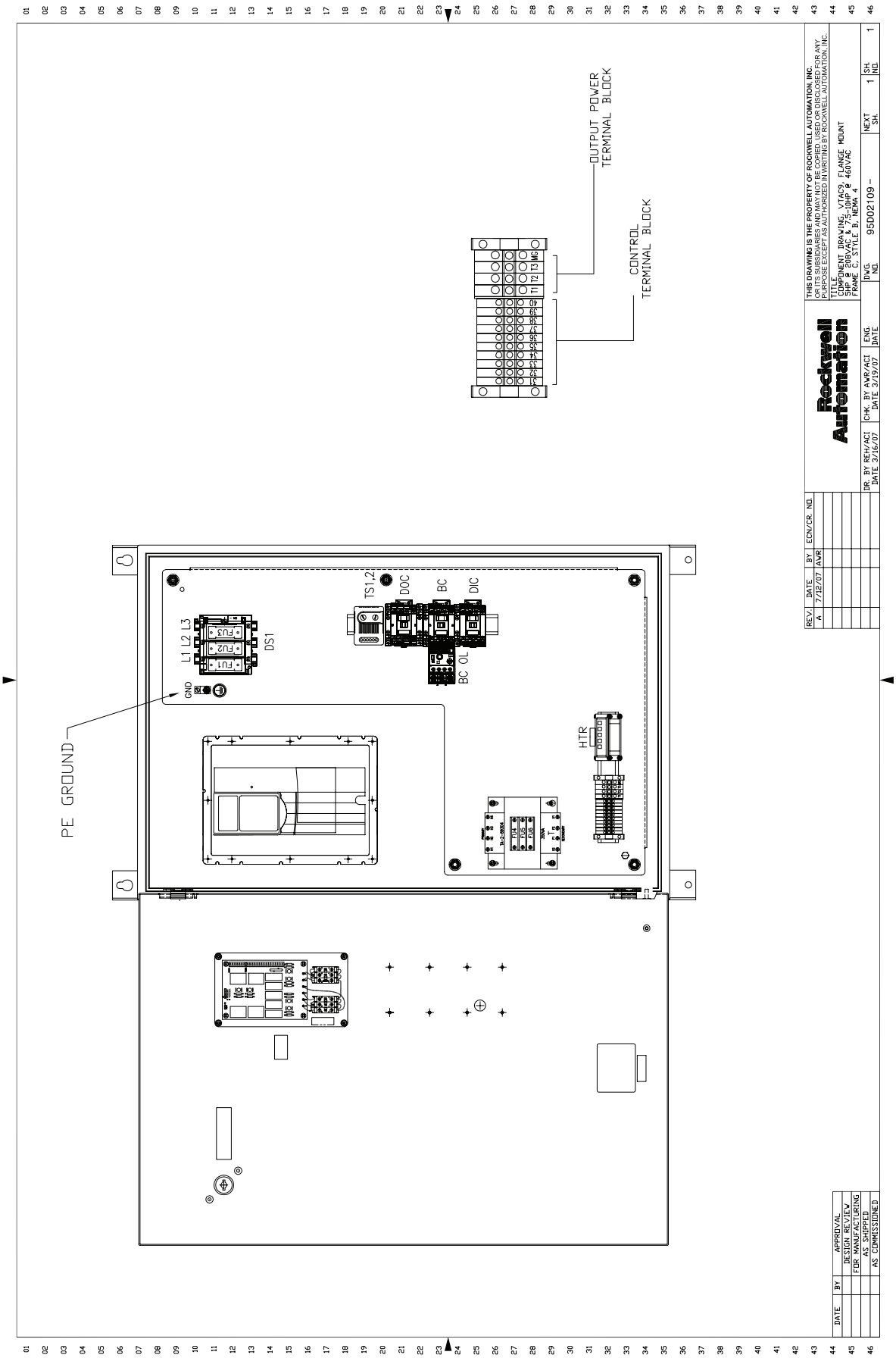


Figure 2.43 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives NEMA/UL Type 4/3R

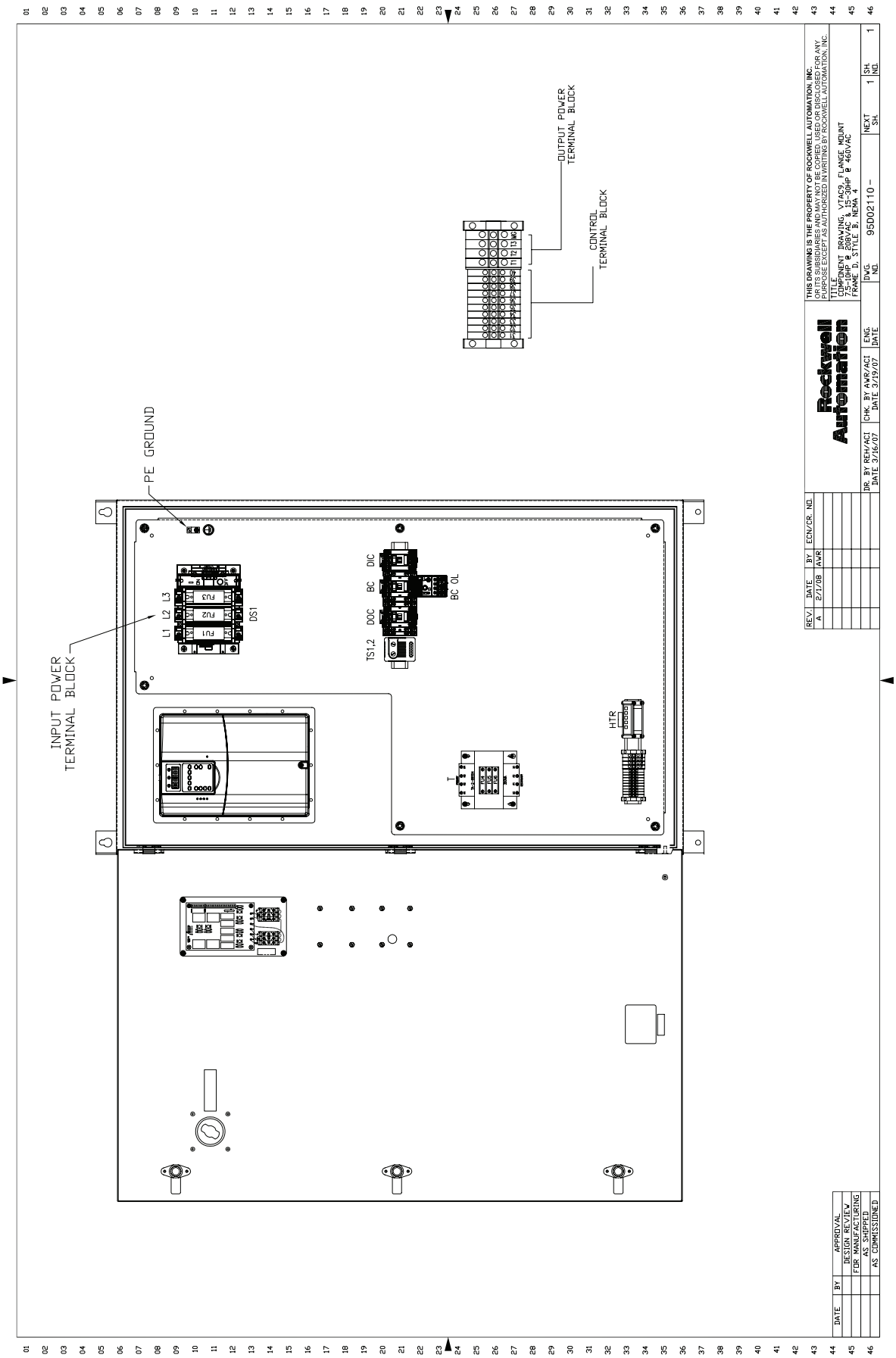


Figure 2.44 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 4/3R

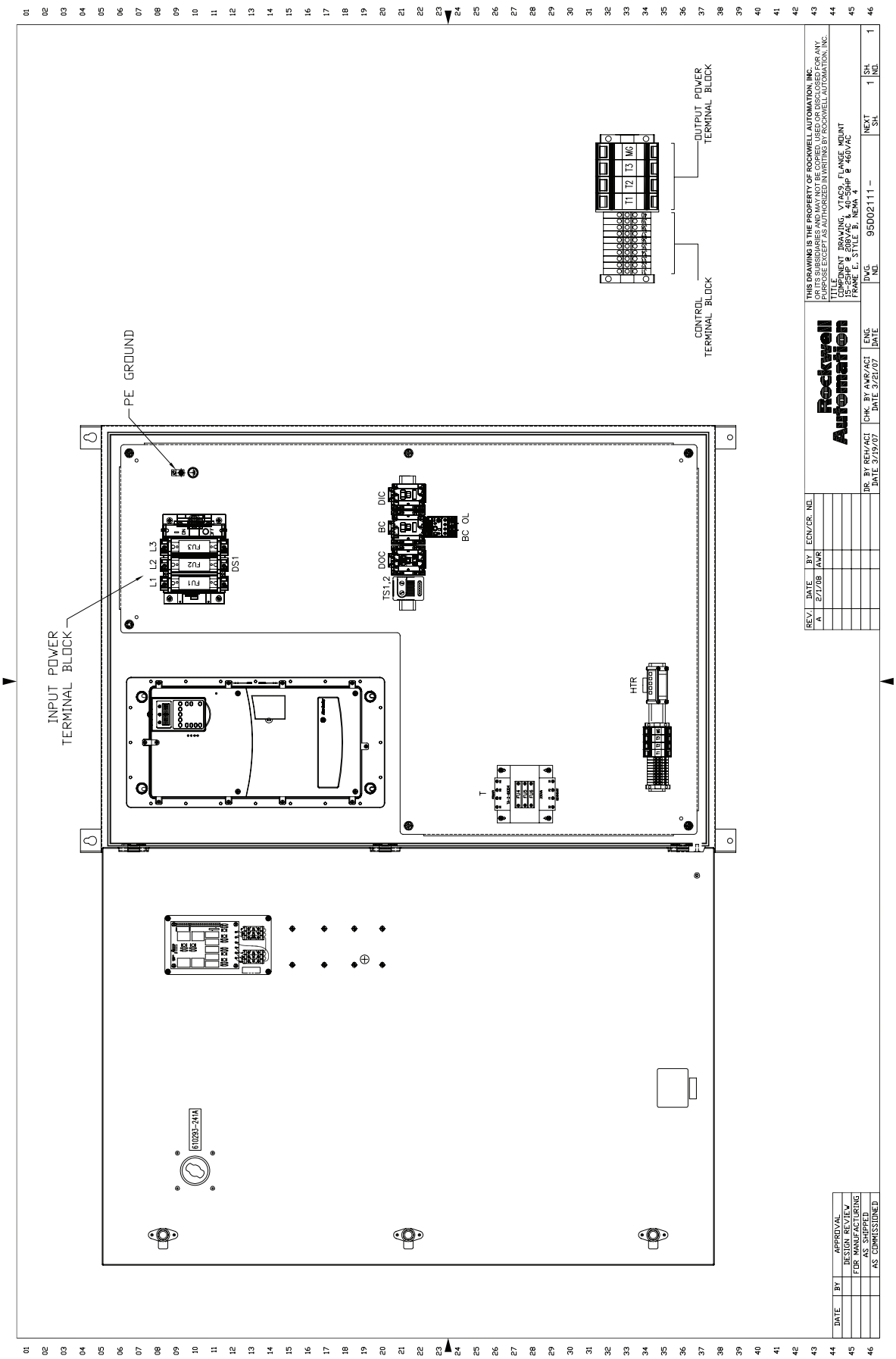


Figure 2.45 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives with Line Reactor NEMA/UL Type 4/3R

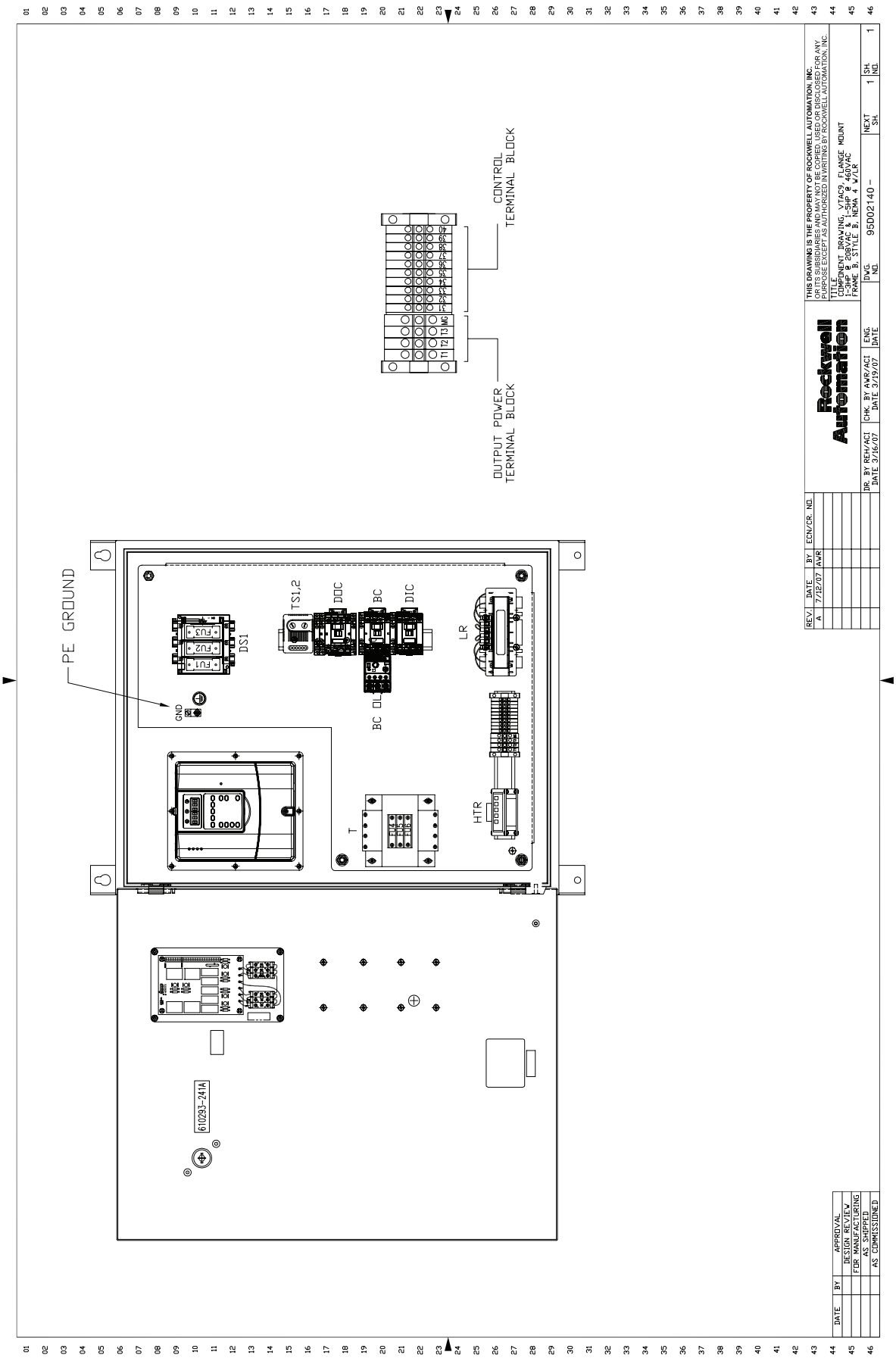


Figure 2.46 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives with Line Reactor NEMA/UL Type 4/3R

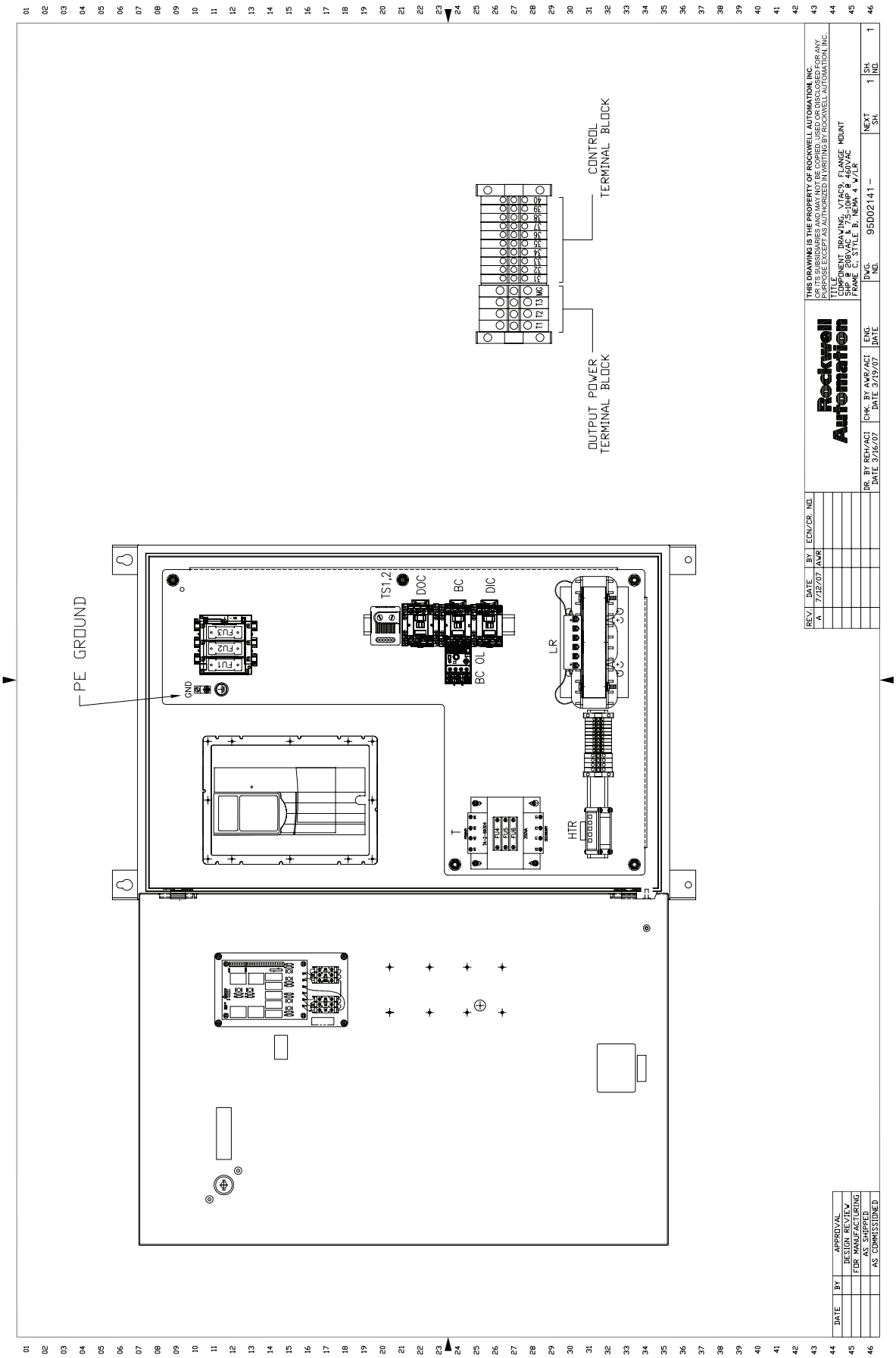


Figure 2.47 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives with Line Reactor NEMA/UL Type 4/3R

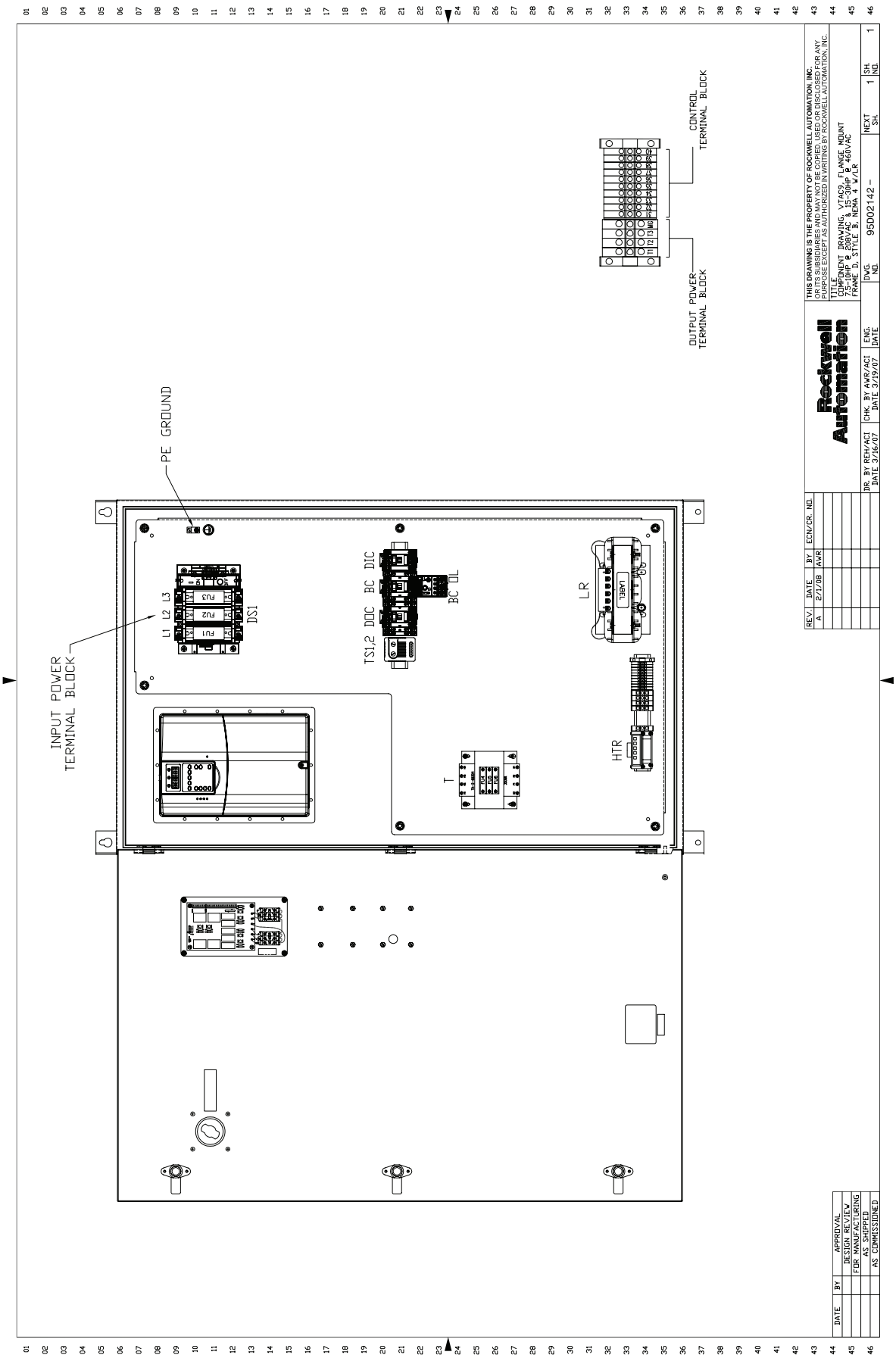
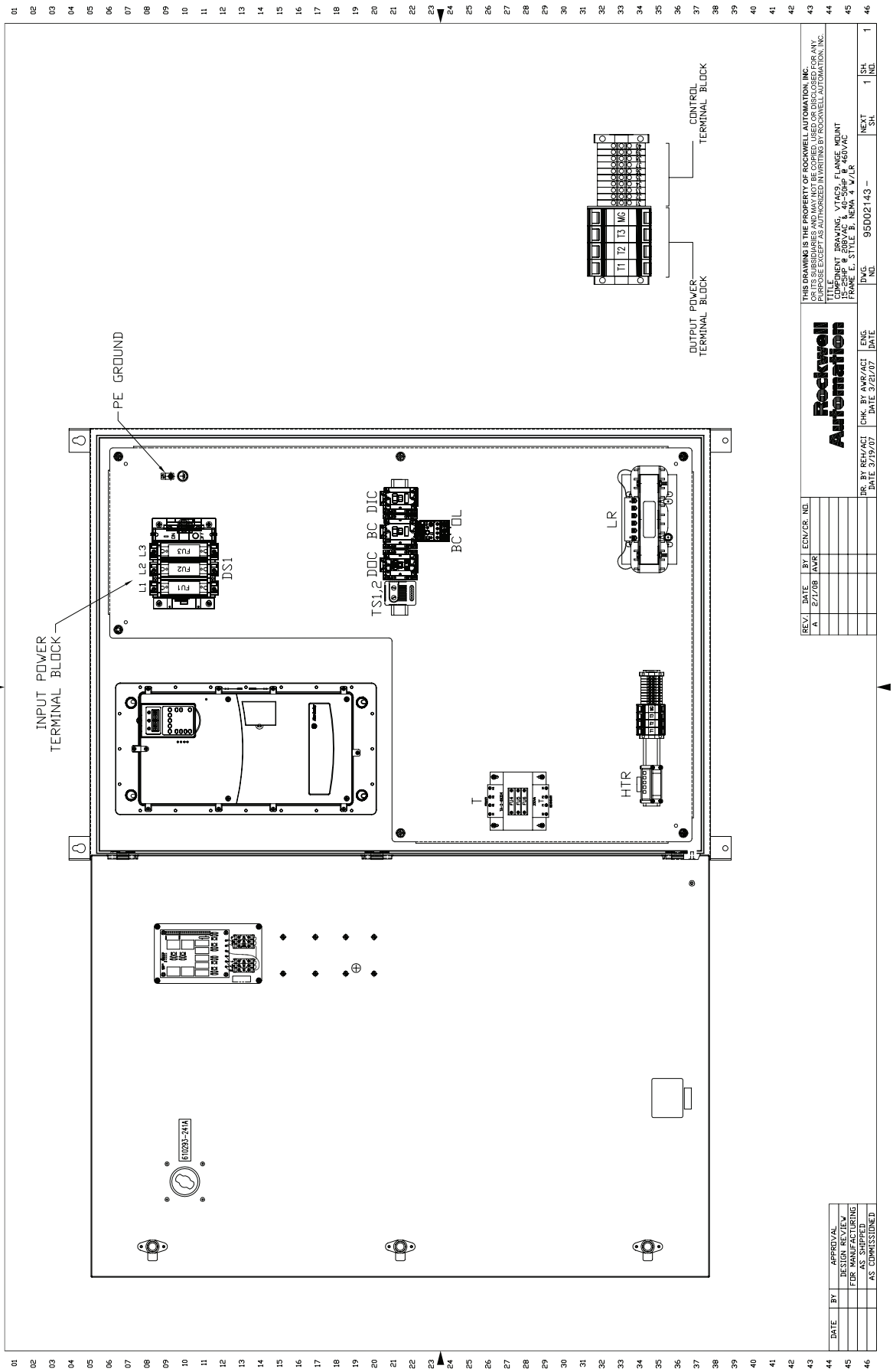


Figure 2.48 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives with Line Reactor NEMA/UL Type 4/3R



Outline Drawings

Figure 2.49 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 1

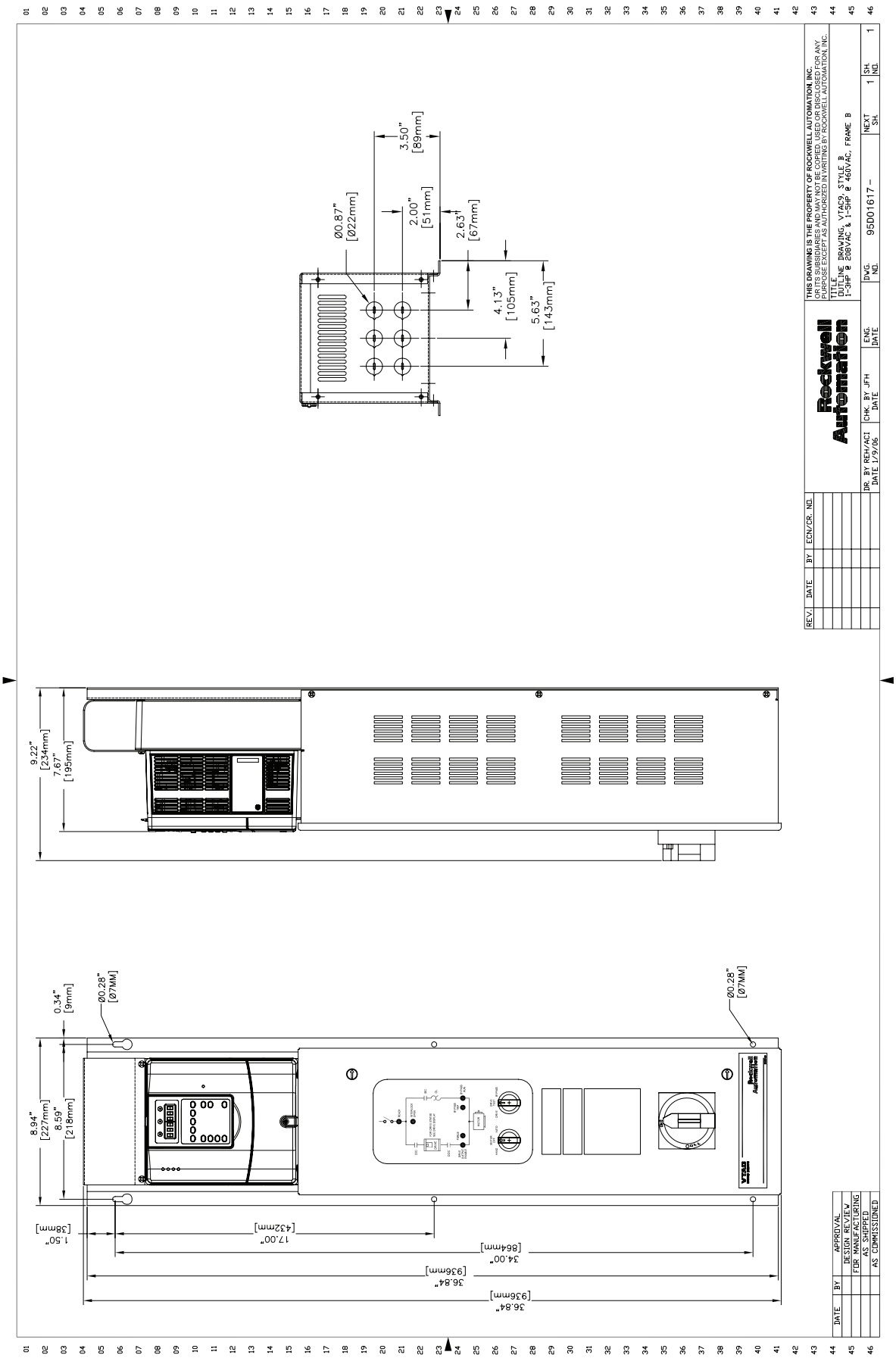


Figure 2.50 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 1

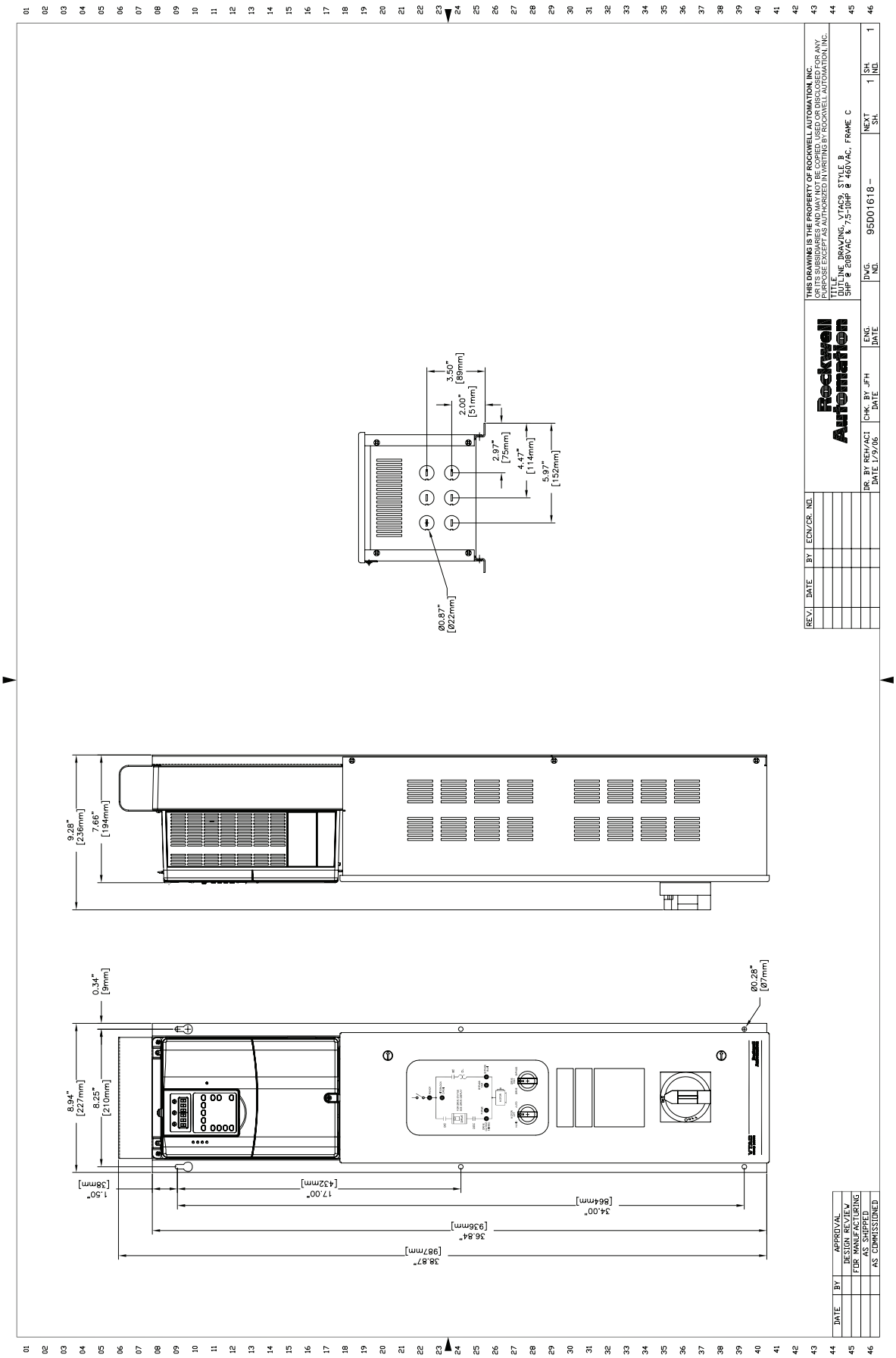


Figure 2.51 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives NEMA/UL Type 1

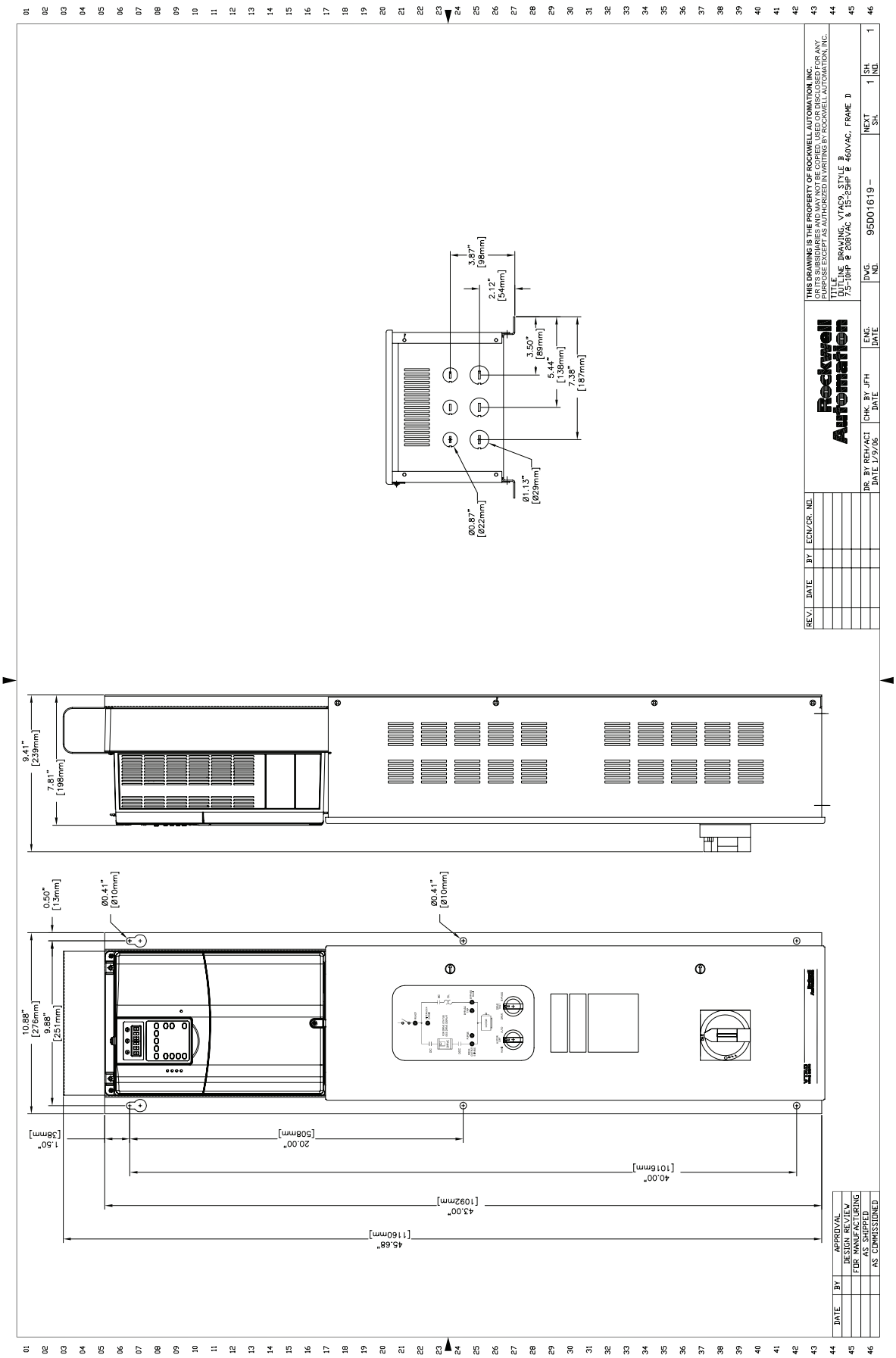


Figure 2.52 25 HP, 460V AC Drives NEMA/UL Type 1

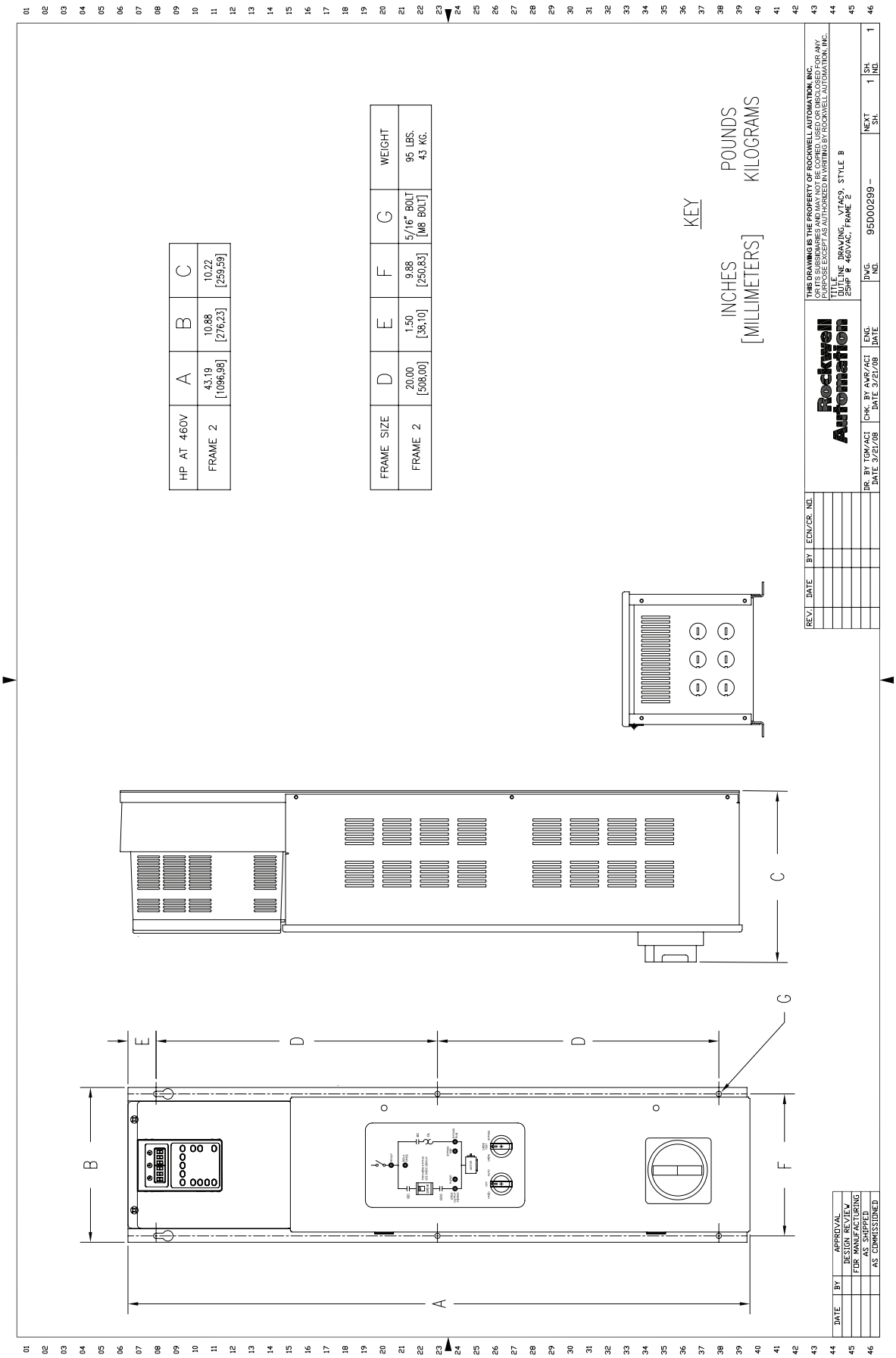


Figure 2.53 30 HP, 460V AC Drives
NEMA/UL Type 1

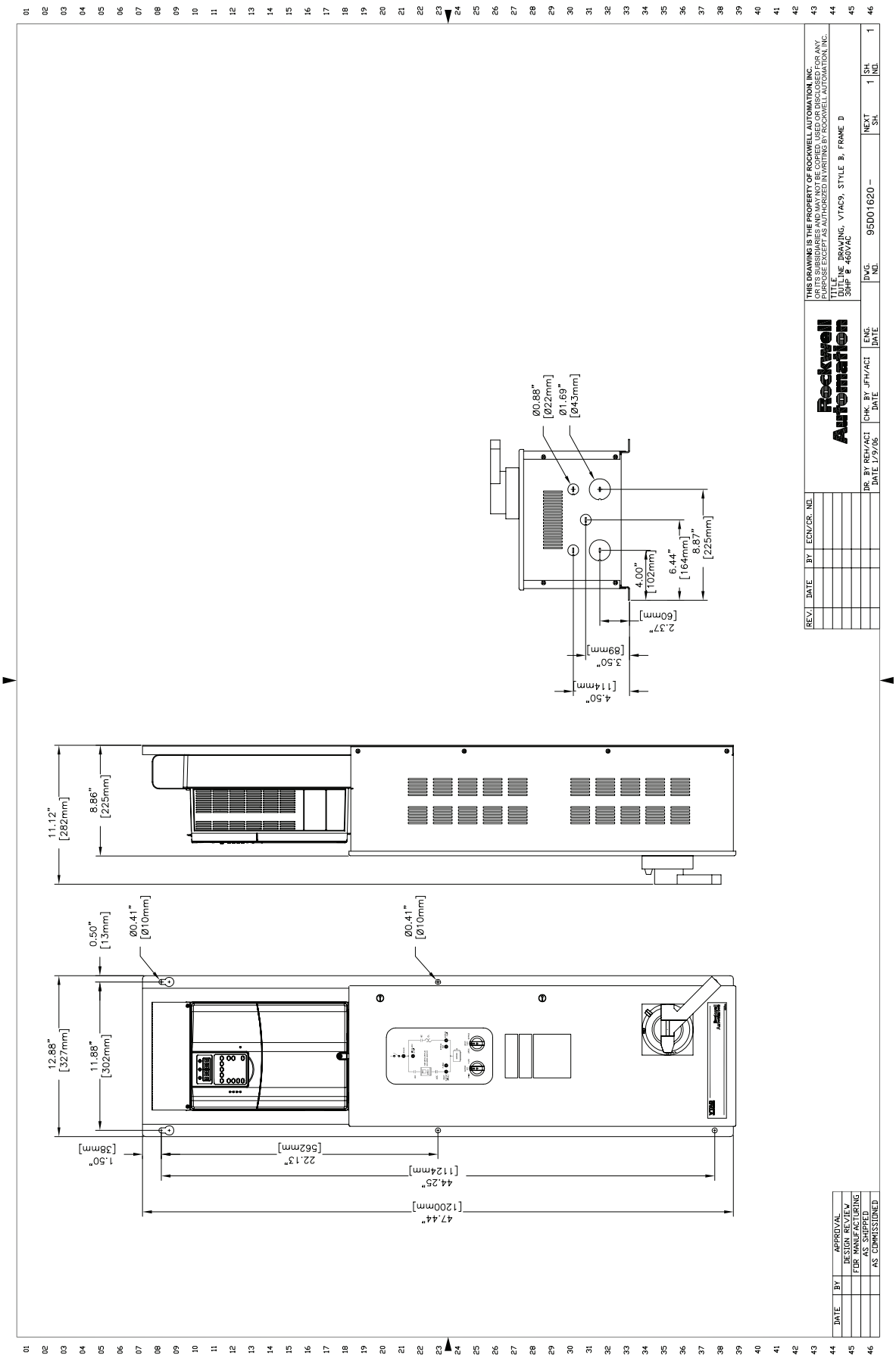


Figure 2.54 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 1

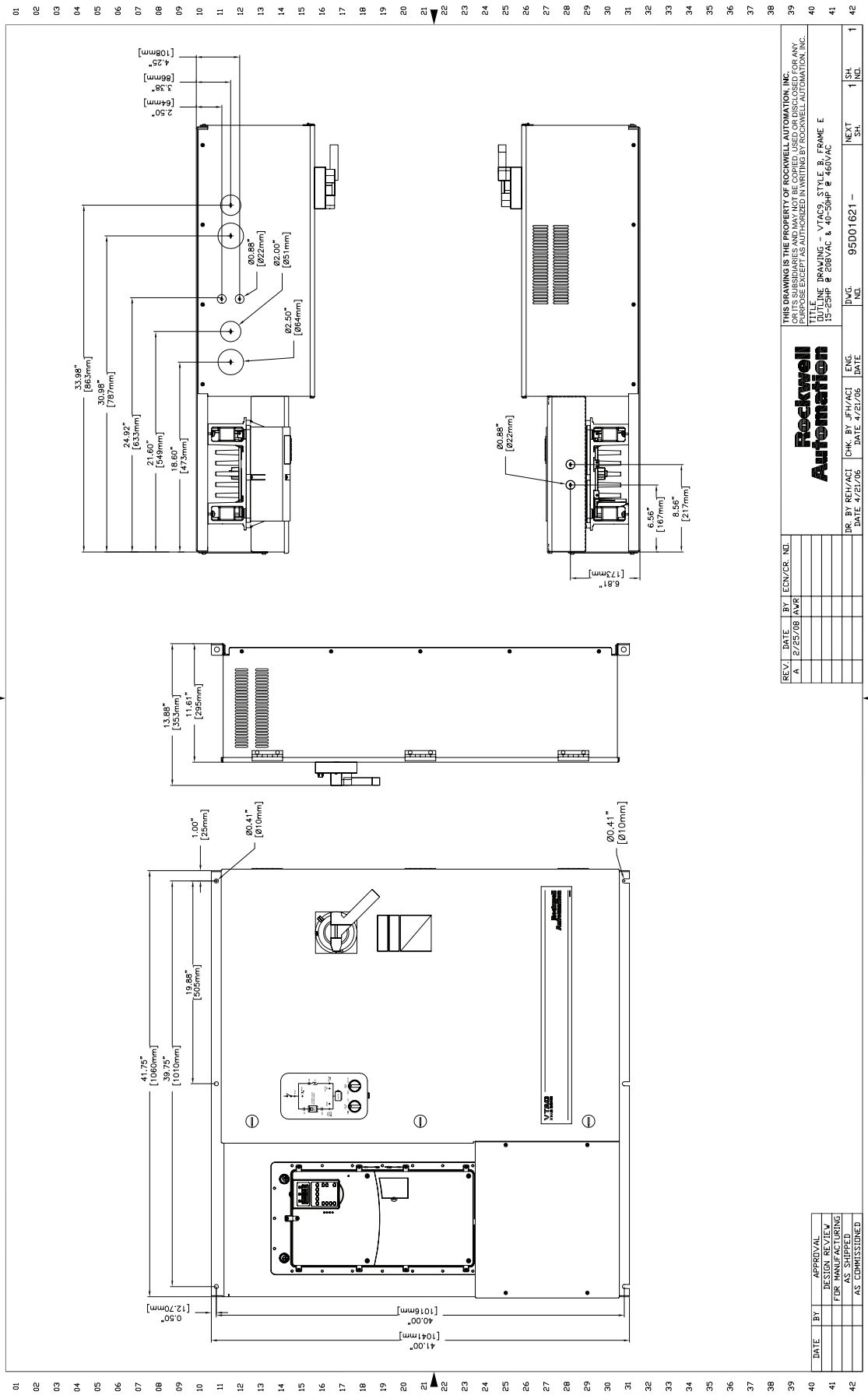


Figure 2.55 30-50 HP, 460V AC Drives
NEMA/UL Type 1

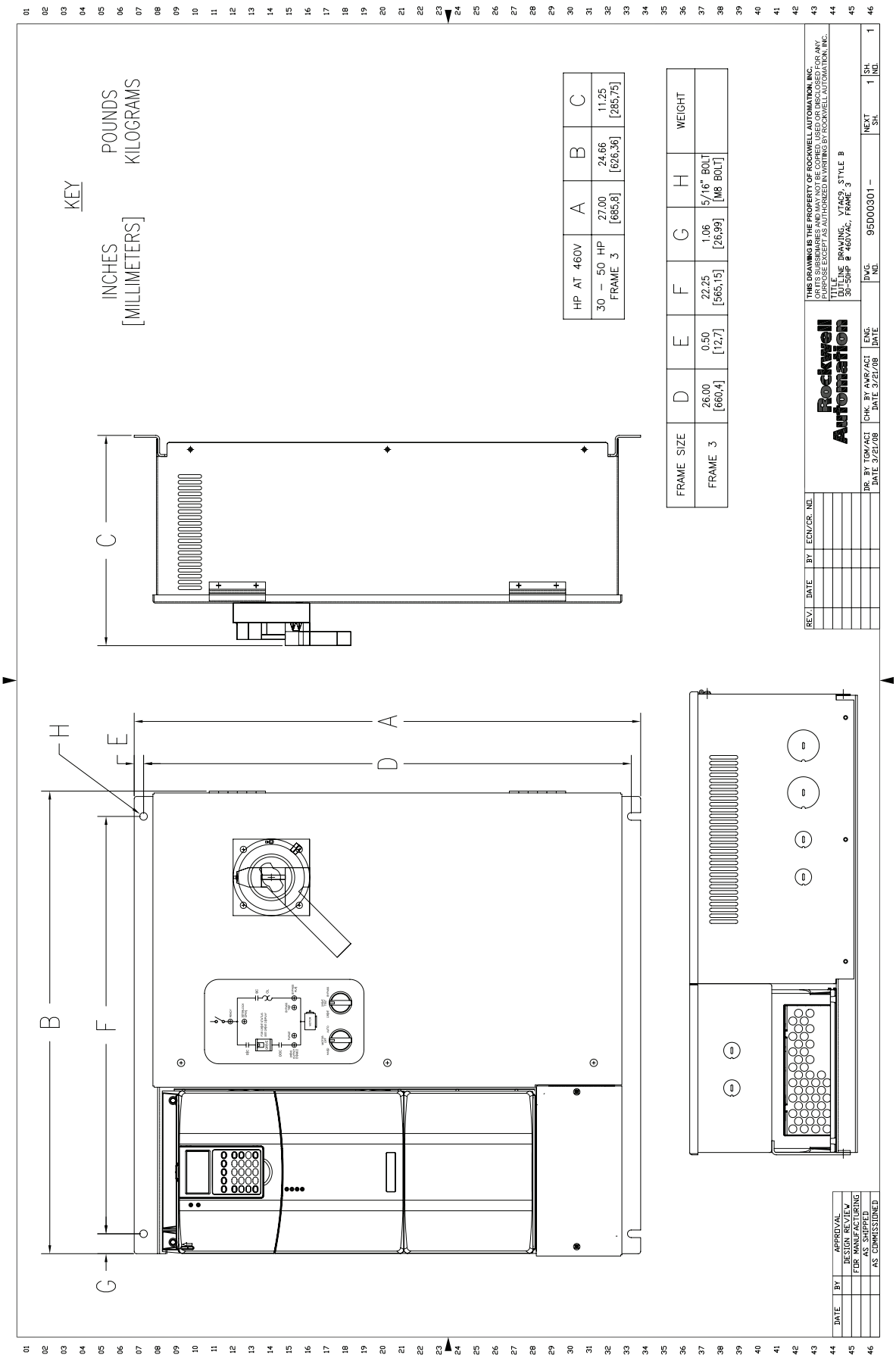


Figure 2.56 30 HP, 208V AC and 60 HP, 460V AC Drives NEMA/UL Type 1

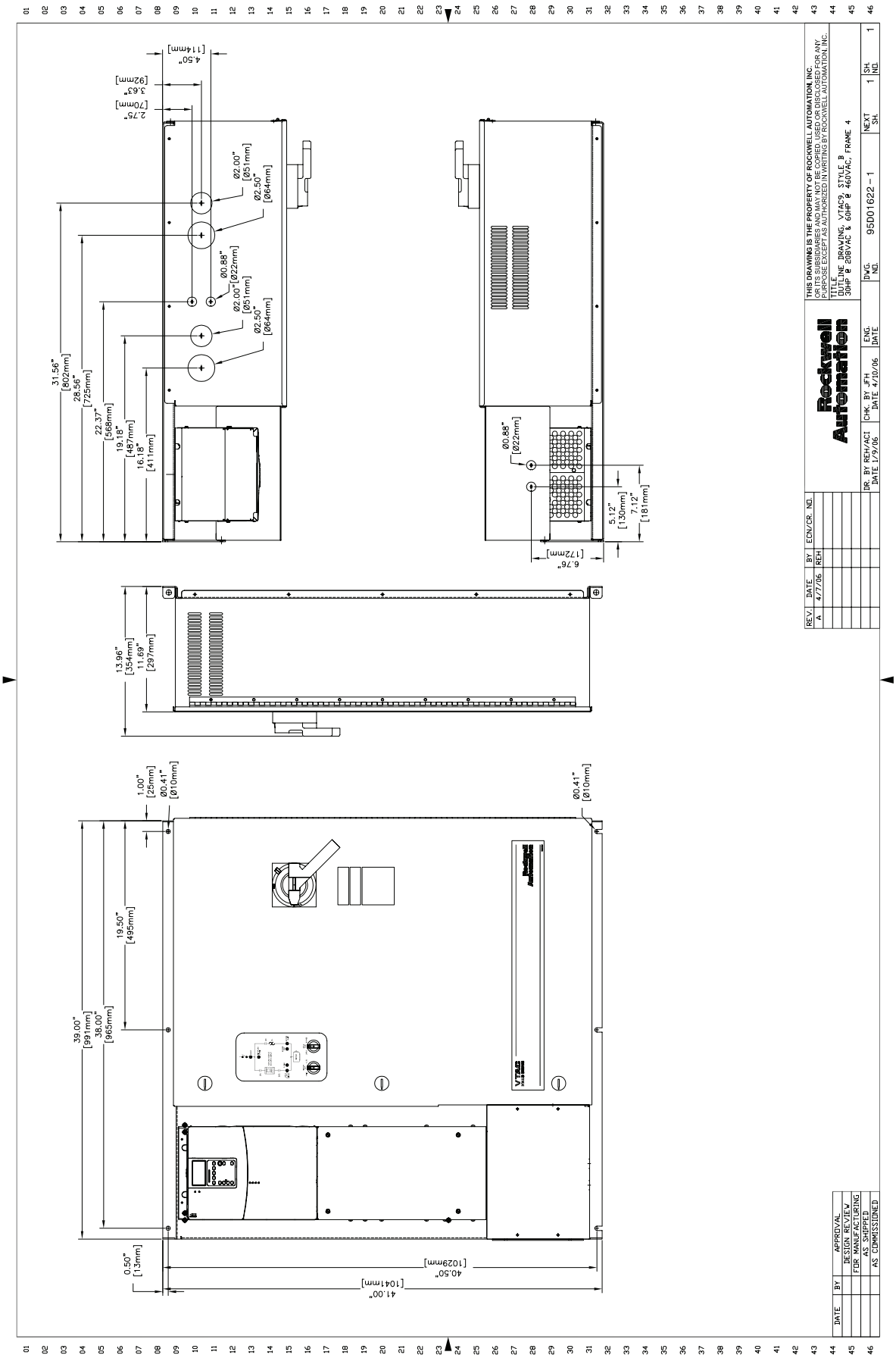


Figure 2.57 40 HP, 208V AC and 75-100 HP, 460V AC Drives NEMA/UL Type 1

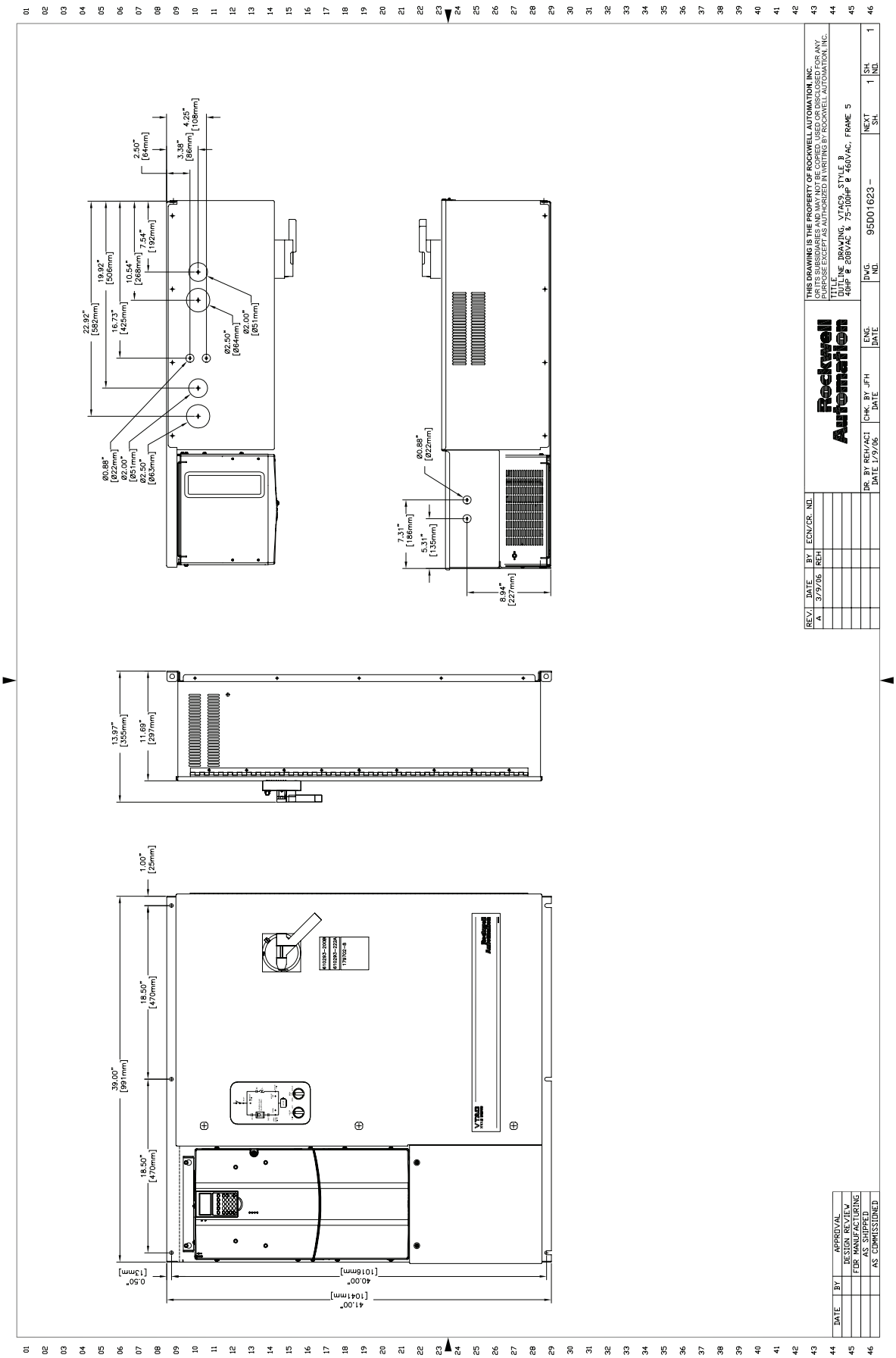


Figure 2.58 125-200 HP, 460V AC Drives NEMA/UL Type 1

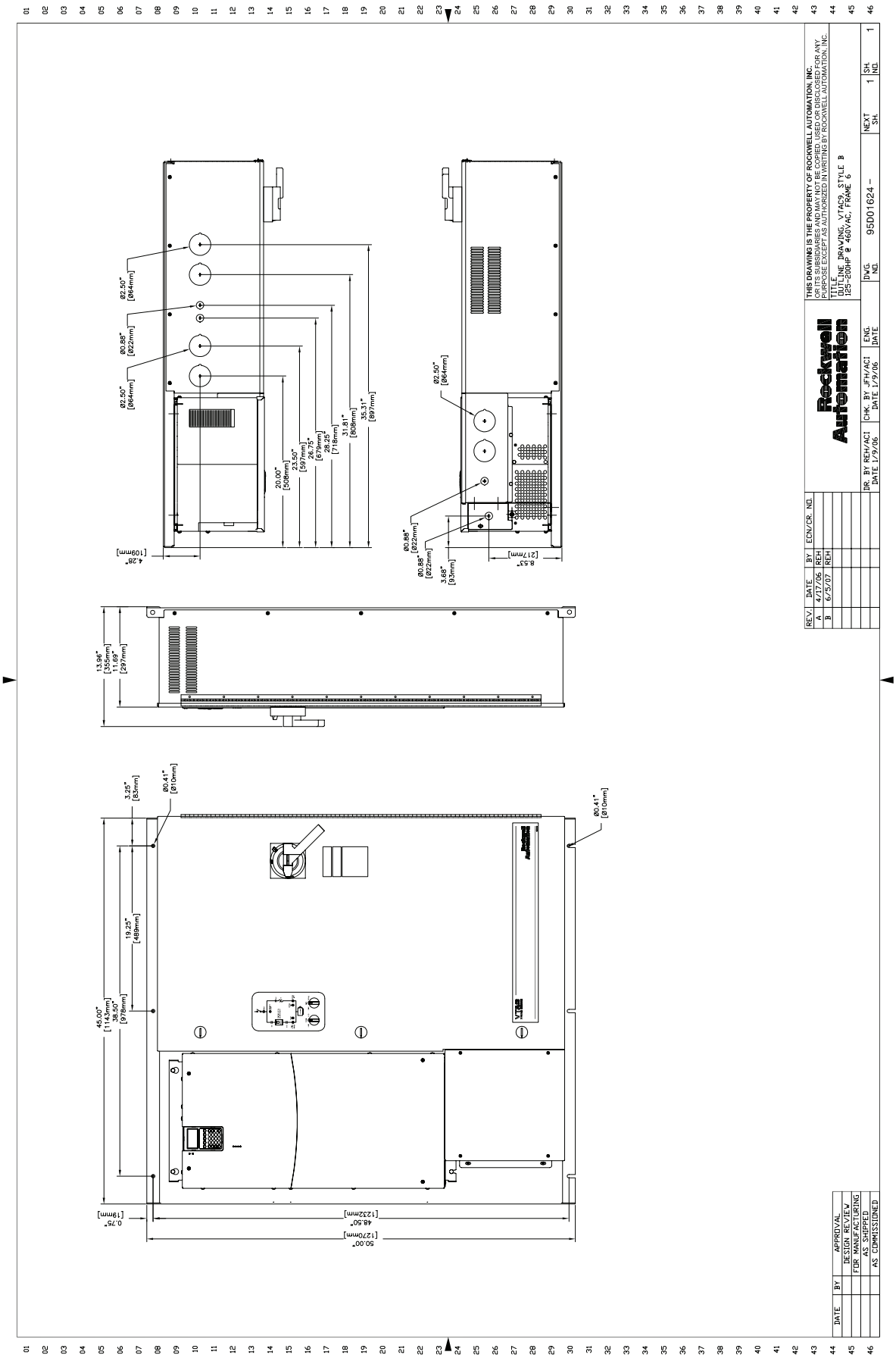


Figure 2.59 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

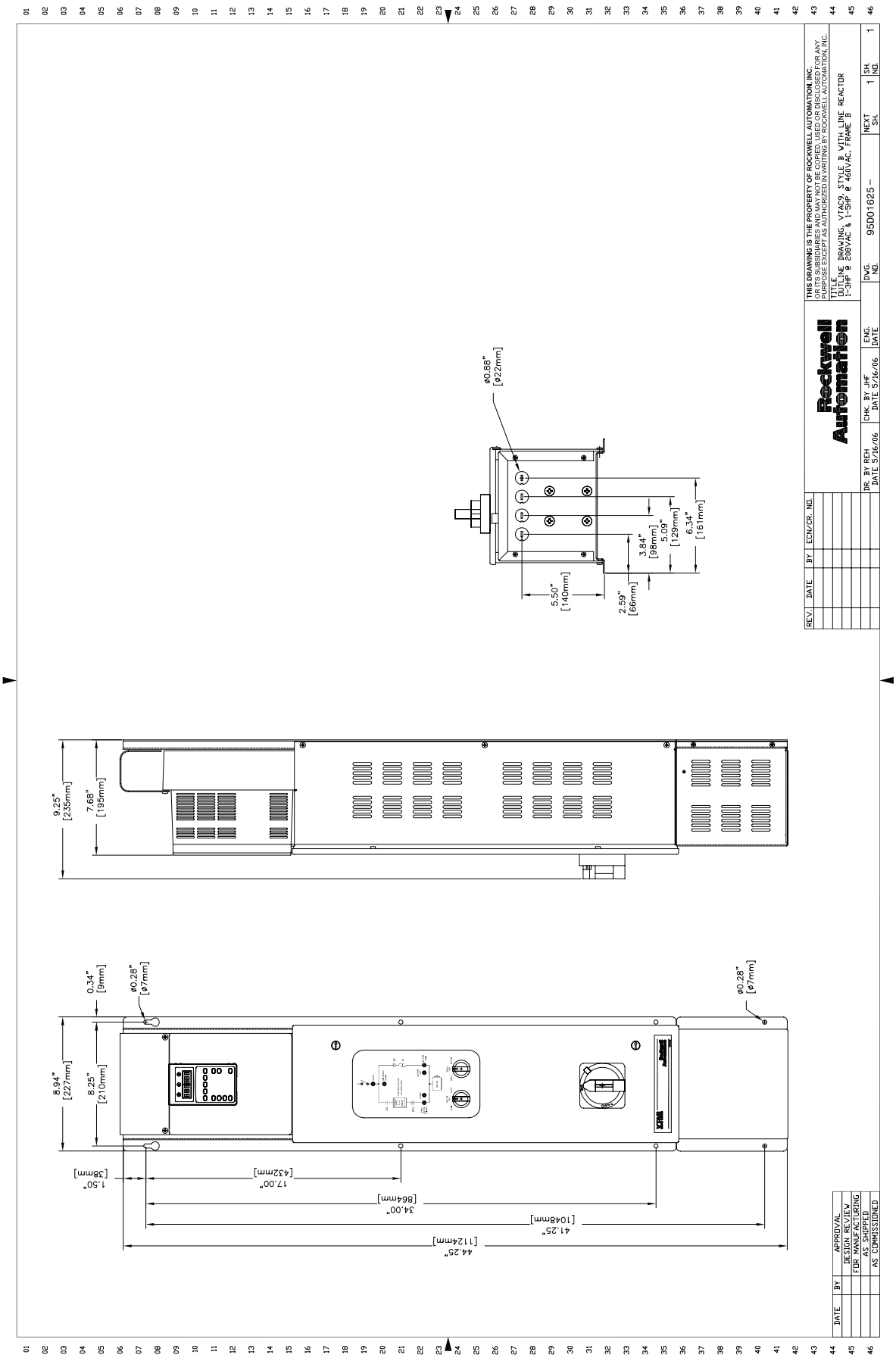


Figure 2.60 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

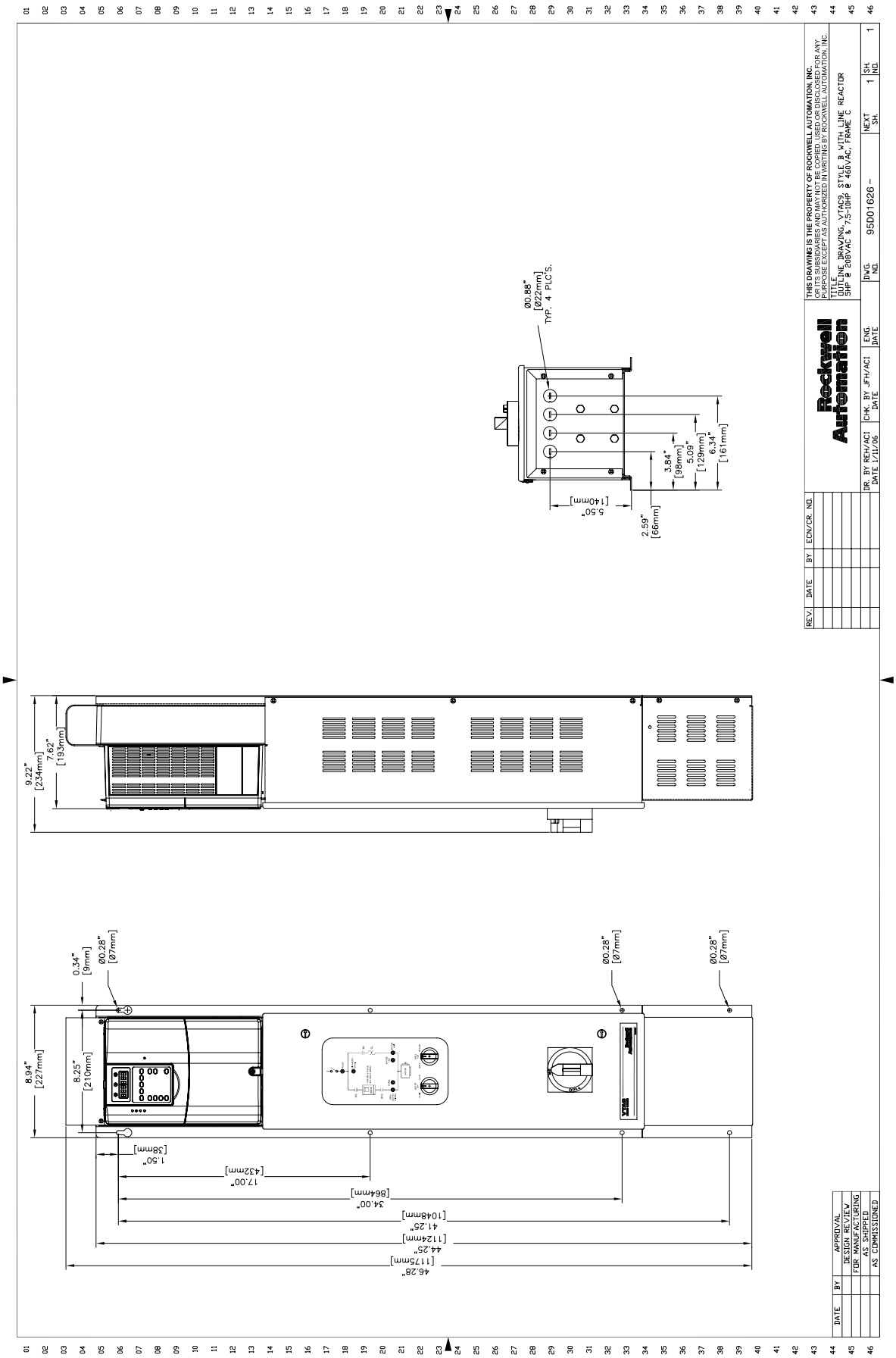


Figure 2.61 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

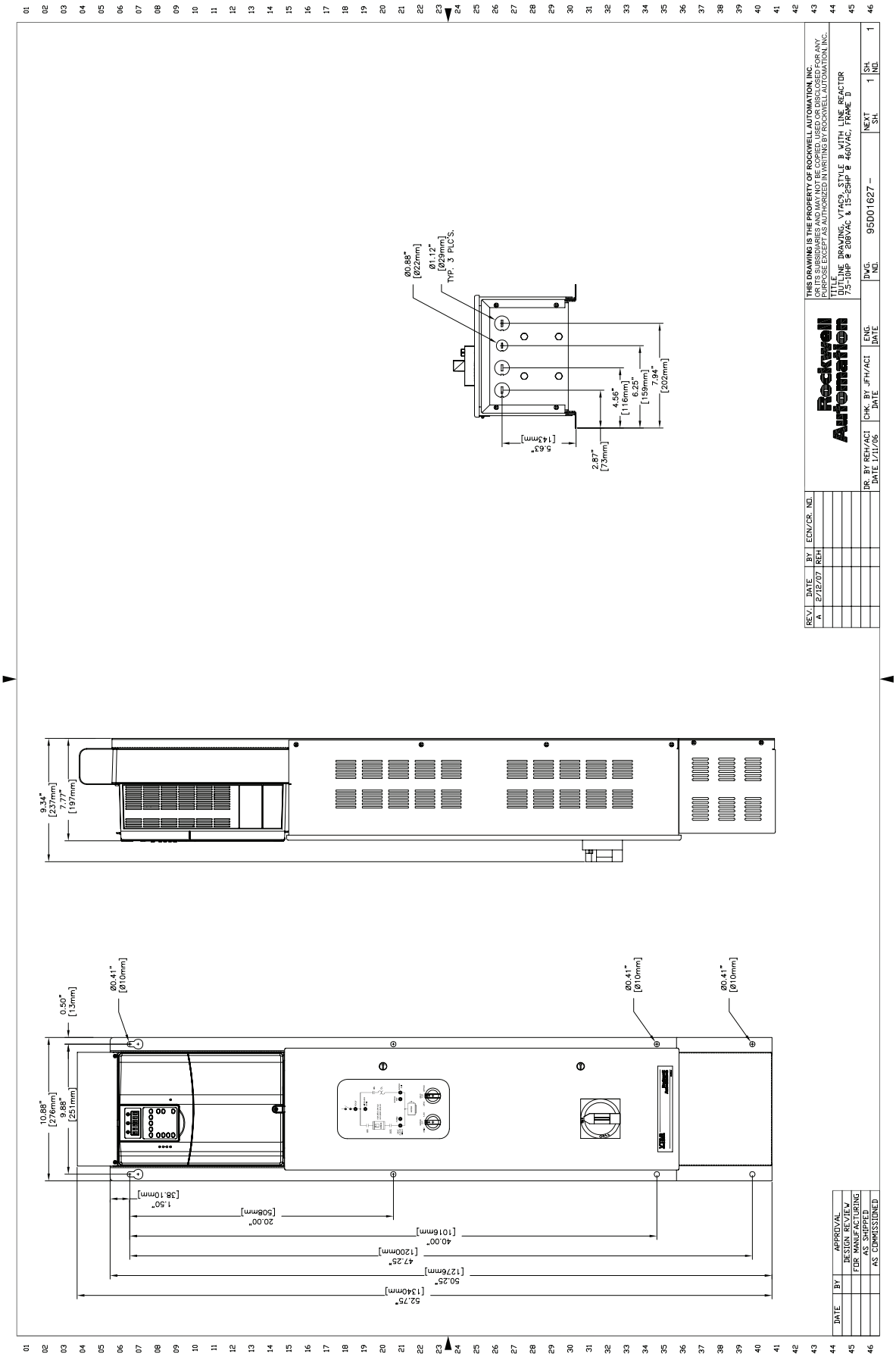


Figure 2.62 30 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

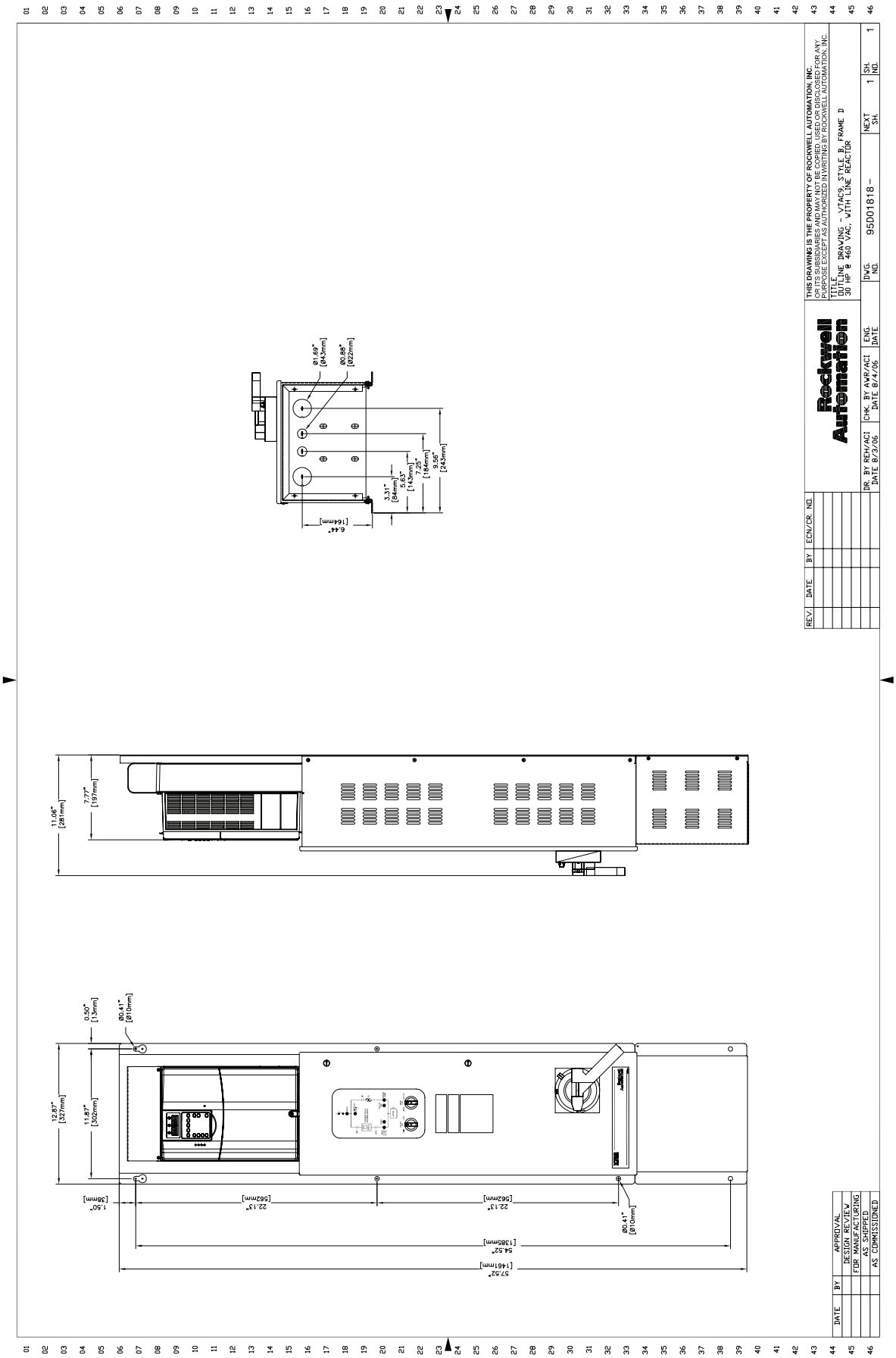


Figure 2.63 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

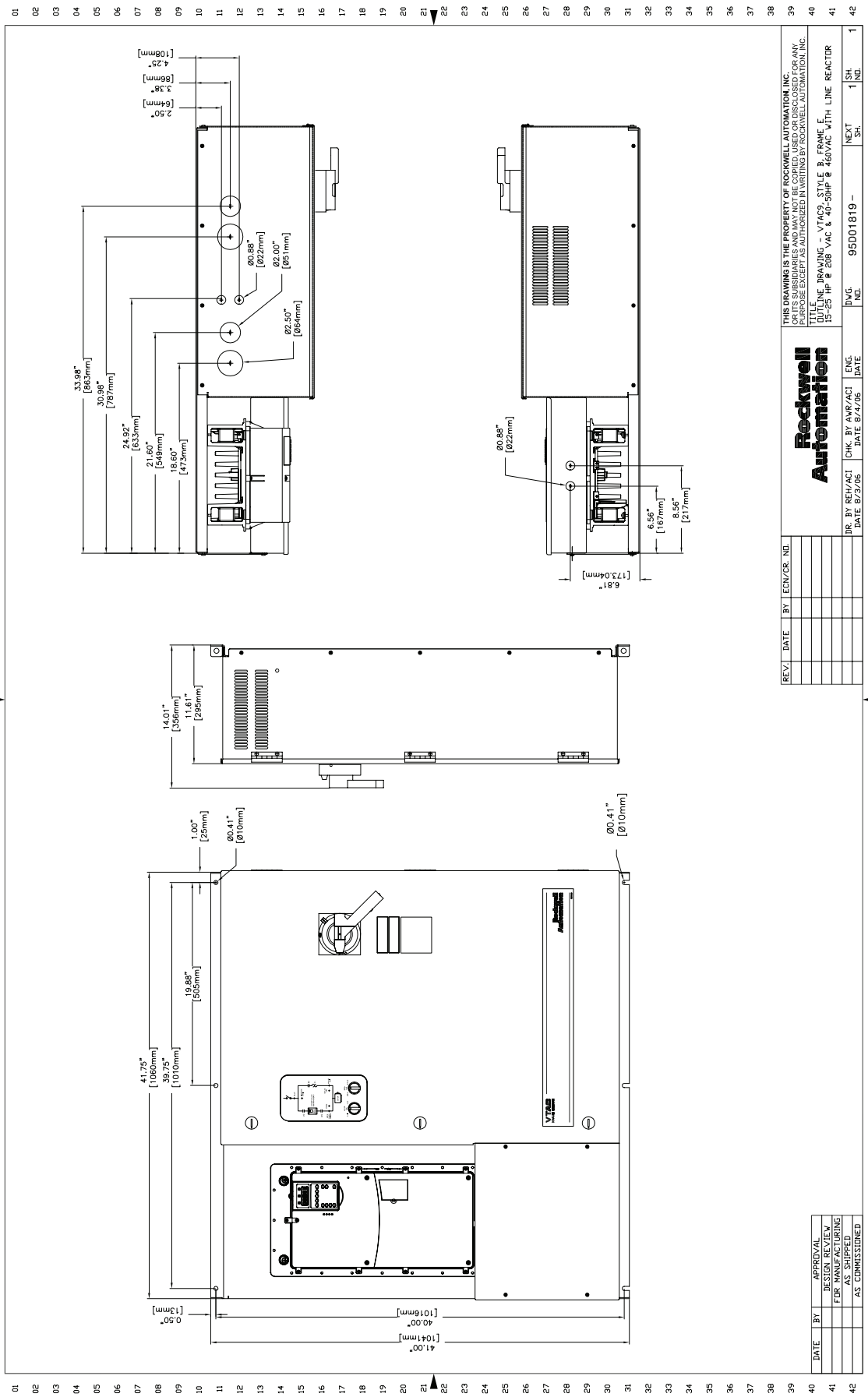


Figure 2.64 30 HP, 208V AC and 60 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

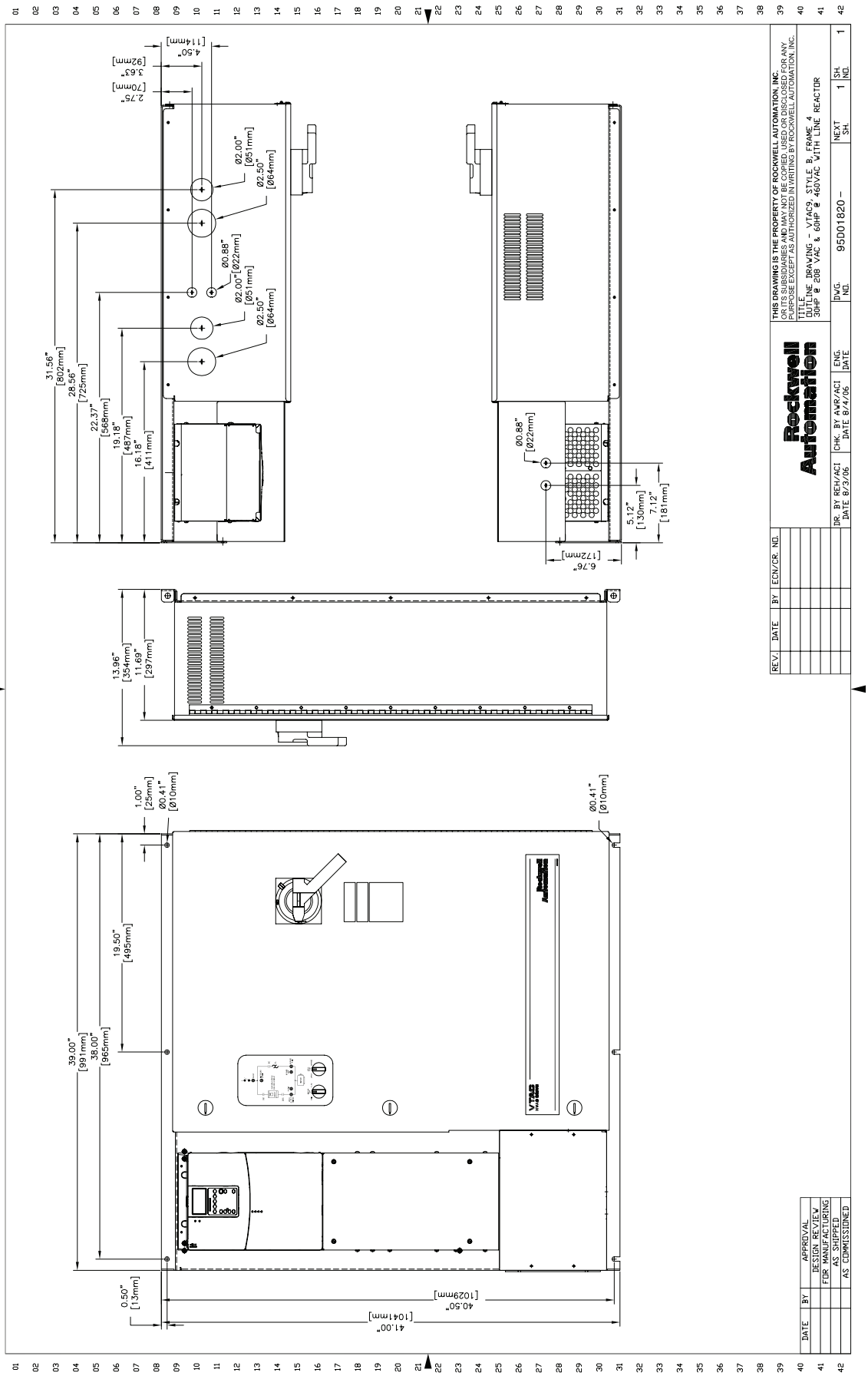


Figure 2.65 40 HP, 208V AC and 75-100 HP, 460V AC Drives with Line Reactor NEMA/UL Type 1

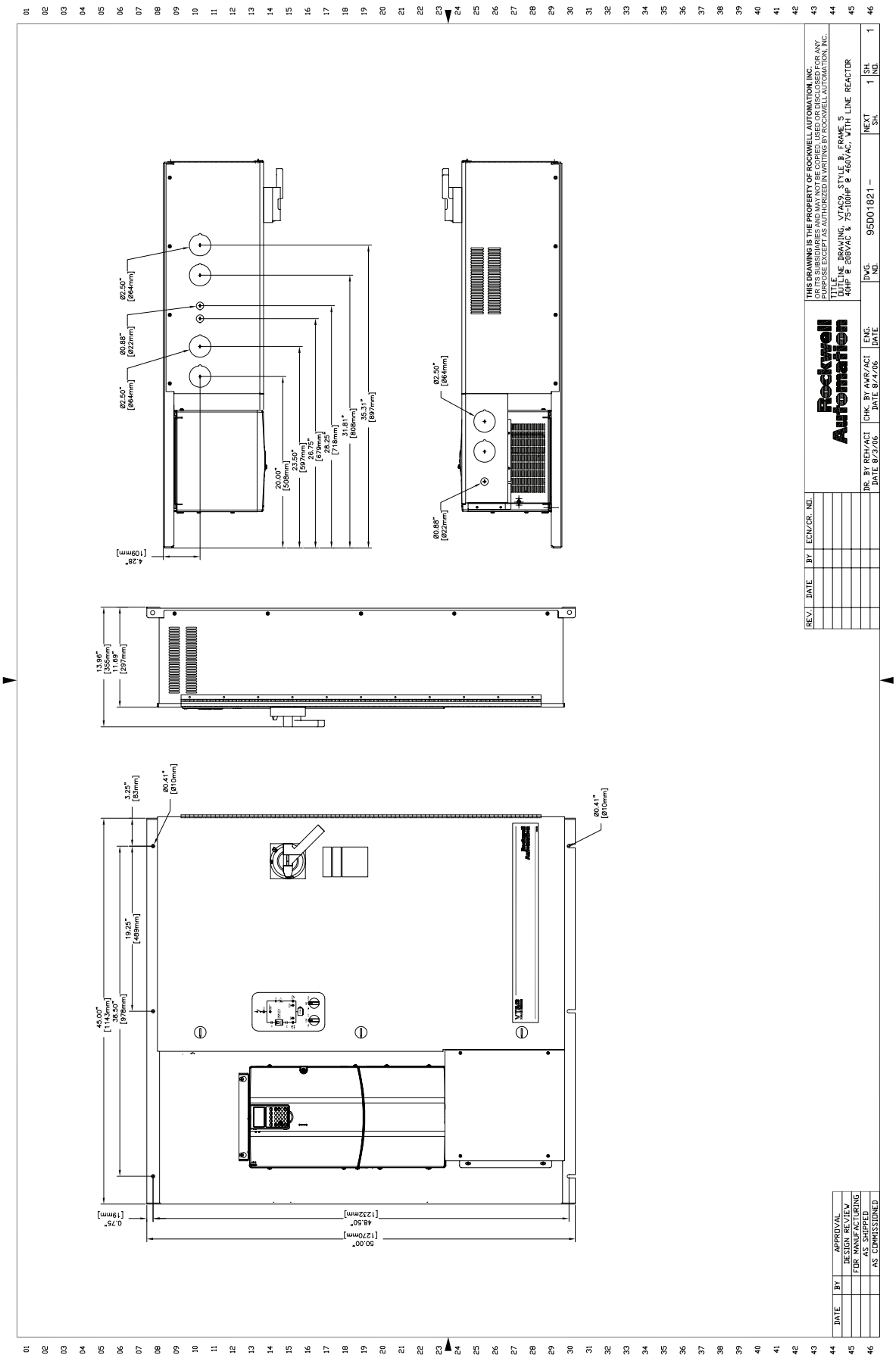


Figure 2.66 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 12

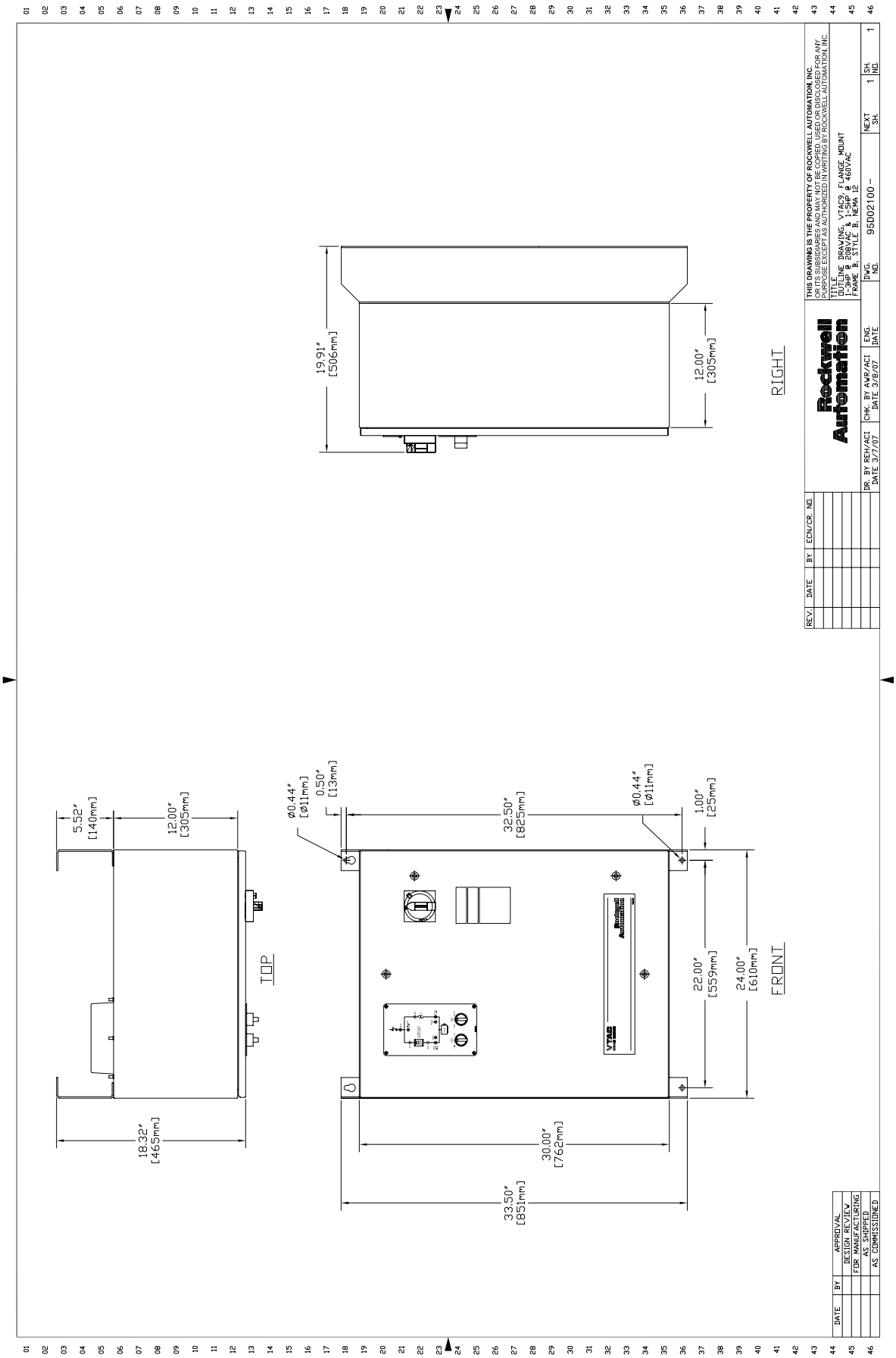


Figure 2.67 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 12

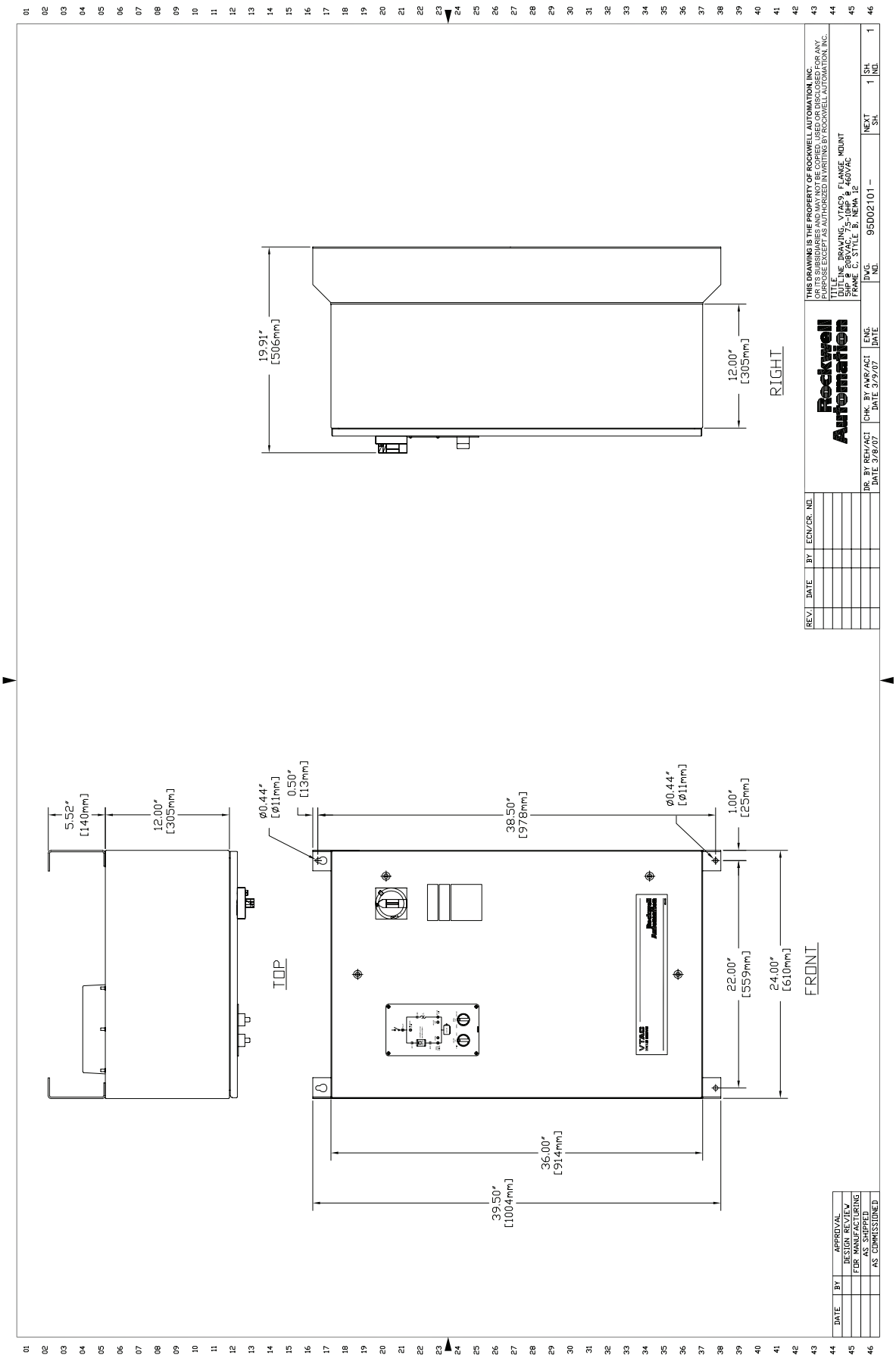


Figure 2.68 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives NEMA/UL Type 12

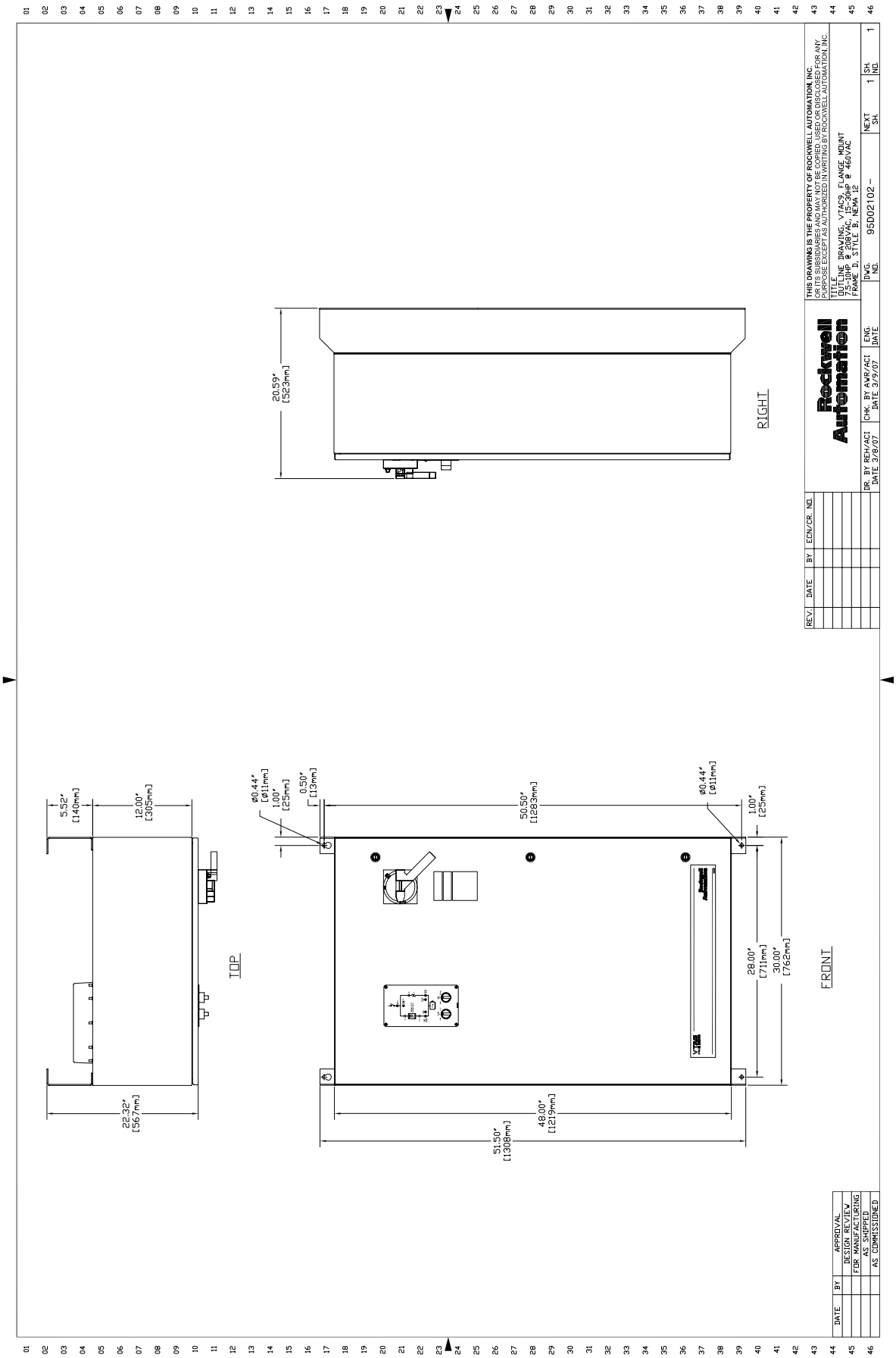


Figure 2.69 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 12

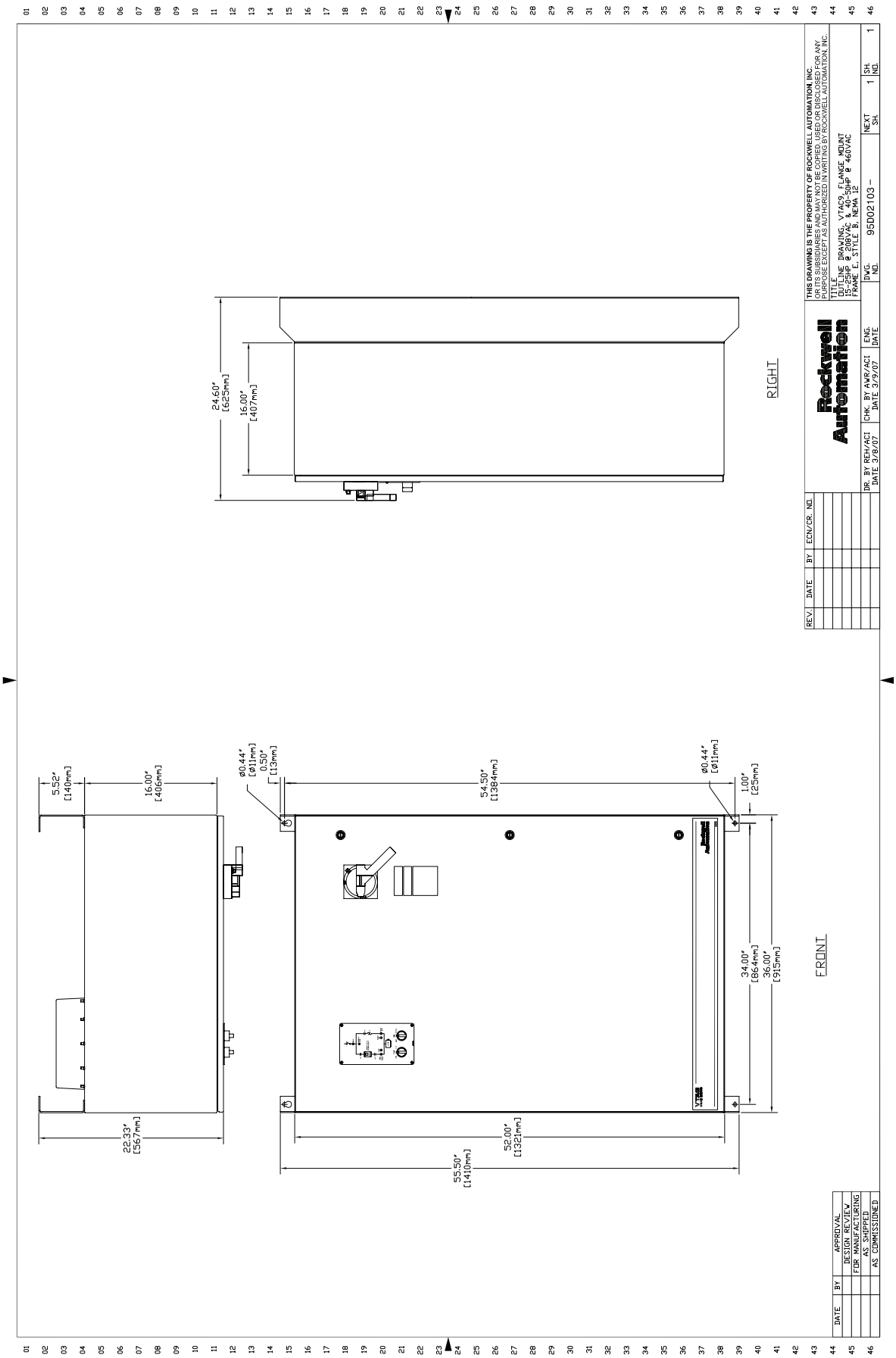


Figure 2.70 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 4/3R

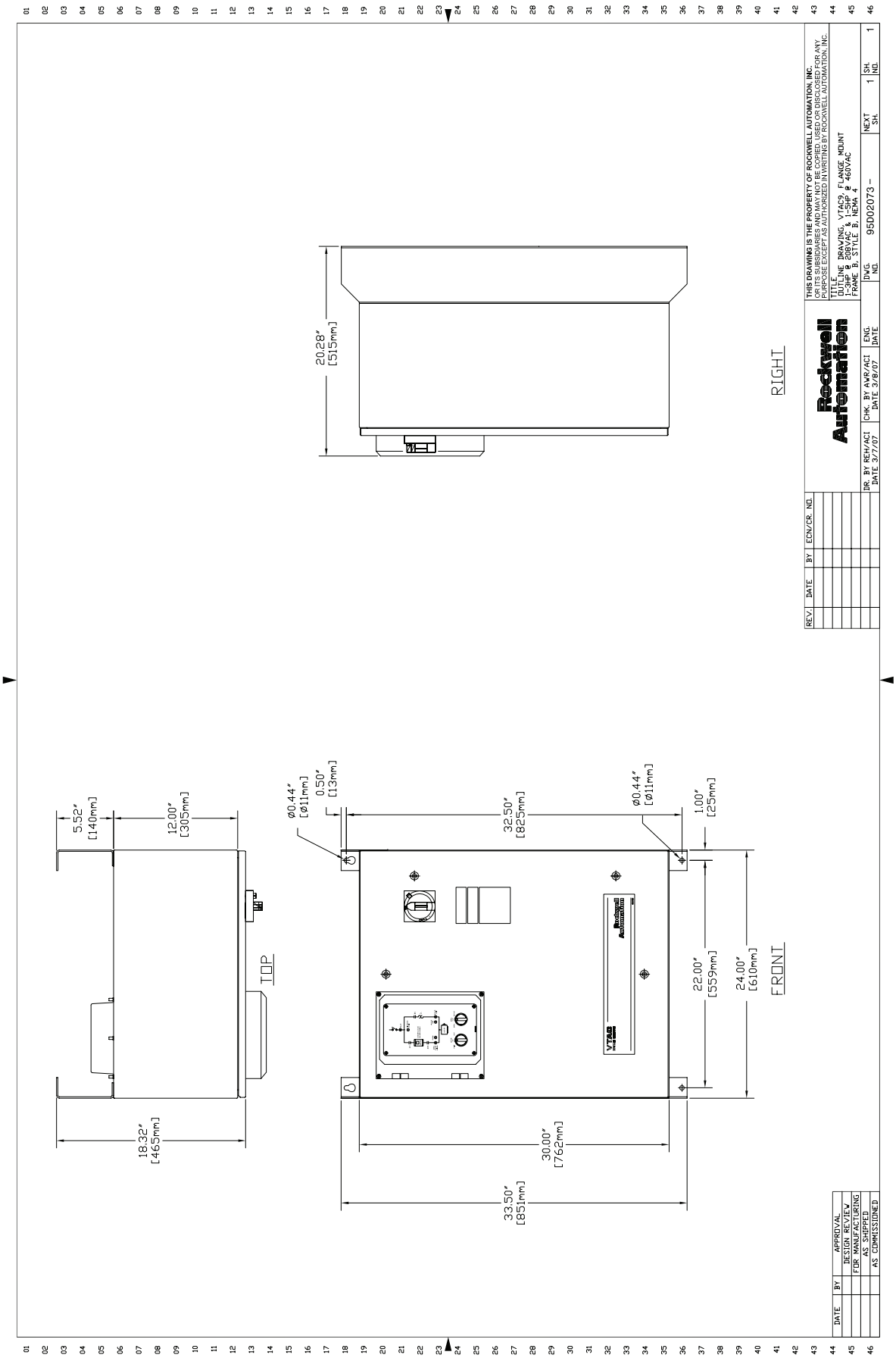


Figure 2.71 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 4/3R

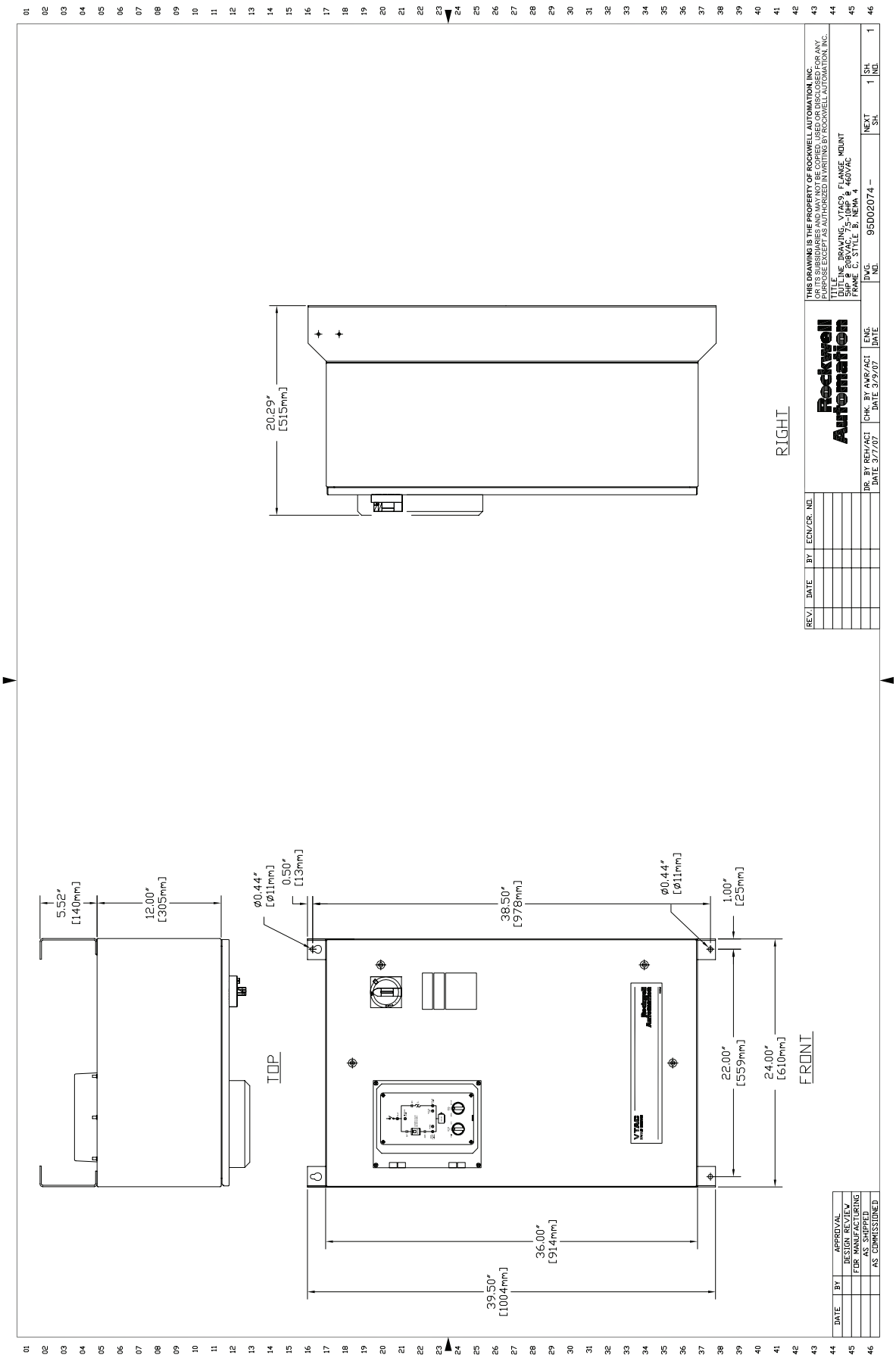


Figure 2.72 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives NEMA/UL Type 4/3R

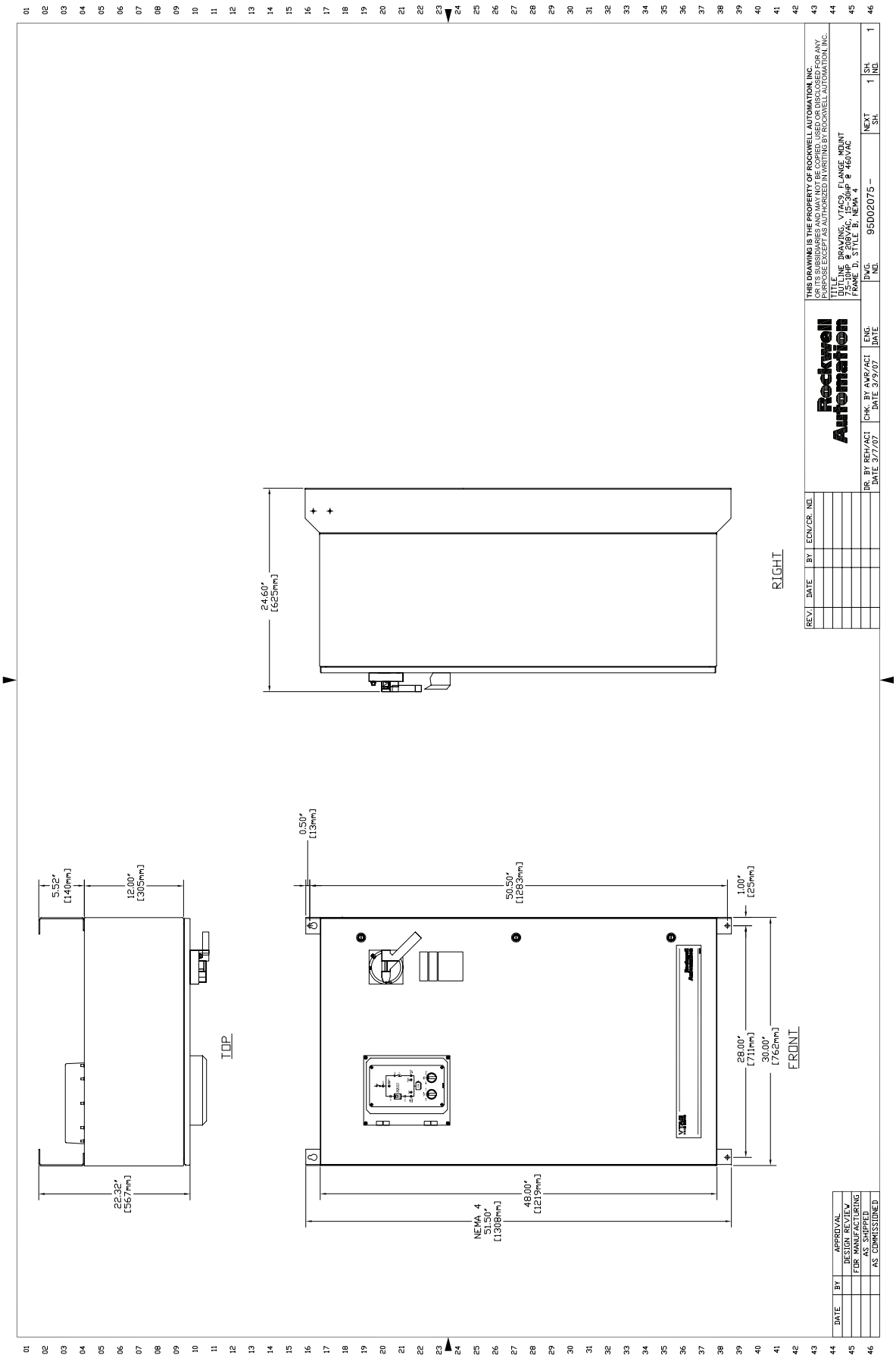
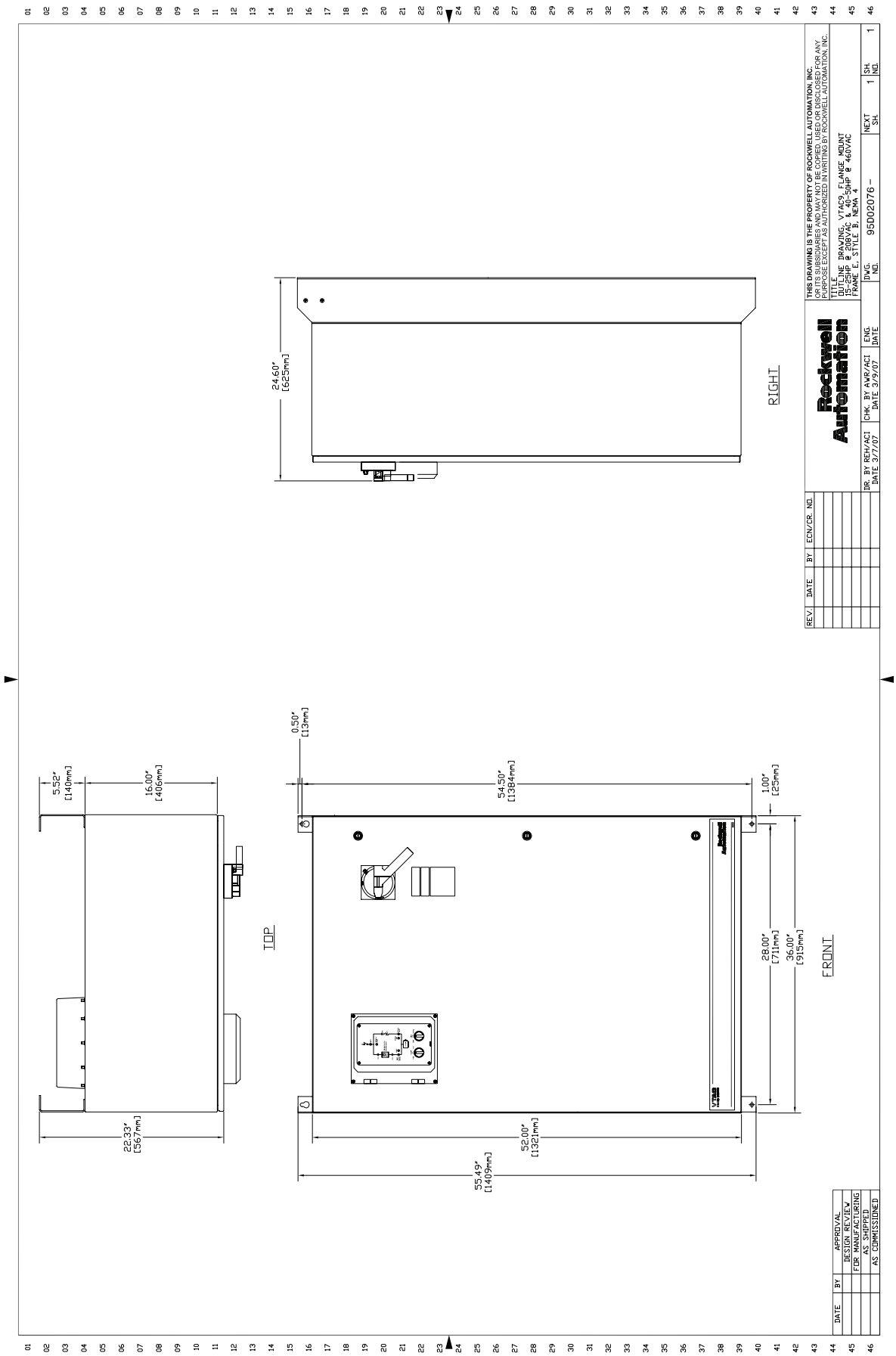


Figure 2.73 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 4/3R



Manual Bypass Package *(Style M)*

Chapter Objectives

This chapter describes the features and operation for the Manual Bypass Package (Style M).

Hardware Overview

The Manual Bypass Package (Style M) allows the motor be manually transferred from the drive output to the AC line, or from the AC line to the drive. Remote or automatic bypass operation is not provided with this option. A single door-mounted 4-position selector switch determines the state of operation. Additionally, a user-powered “Drive/Bypass” enable relay is provided for remote shut down of the unit.

Main Disconnect Switch (DS1 or MP1)

Allen-Bradley Bulletin 140M Motor Protectors are provided for all ratings through 50 HP. The Bulletin 140M provides short circuit and overload protection. A lockable door-mounted operator handle is provided. The door-mounted handle accepts up to three (3) padlocks.

For ratings 60 HP and larger, an Allen-Bradley Bulletin 194R fused disconnect switch with lockable rotary-mounted operator handle is provided. The disconnect switch is designed to meet disconnect switch requirements for branch circuit protection. The door-mounted handle accepts up to three (3) padlocks.

Main Fuses (FU1-FU3)

ATTENTION: Most codes require that upstream branch circuit protection be provided to protect input power wiring. Install the fuses recommended in Table 3.A. Do not exceed the fuse ratings. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

For ratings 60 HP and larger, input line branch circuit protection fuses must be used to protect the input power lines. If input fuses are not provided with your drive, recommended fuse values are shown in Table 3.A. The input fuse ratings listed in Table 3.A are applicable for one drive per branch circuit. No other load may be applied to that fused circuit.

The recommended fuse type for all VTAC 9 Drive Packages is UL Class J, 600V.

Table 3.A Fuse Recommendations

Drive Rating		Fuse Rating
Input Voltage	**HP**	**Amps**
460V AC – 3-Phase	60	150
	75	175
	100	200

Contactors (DIC, DOC, BC)

Allen-Bradley Bulletin 100 Contactors are provided for all ratings. The contactors function as follows:

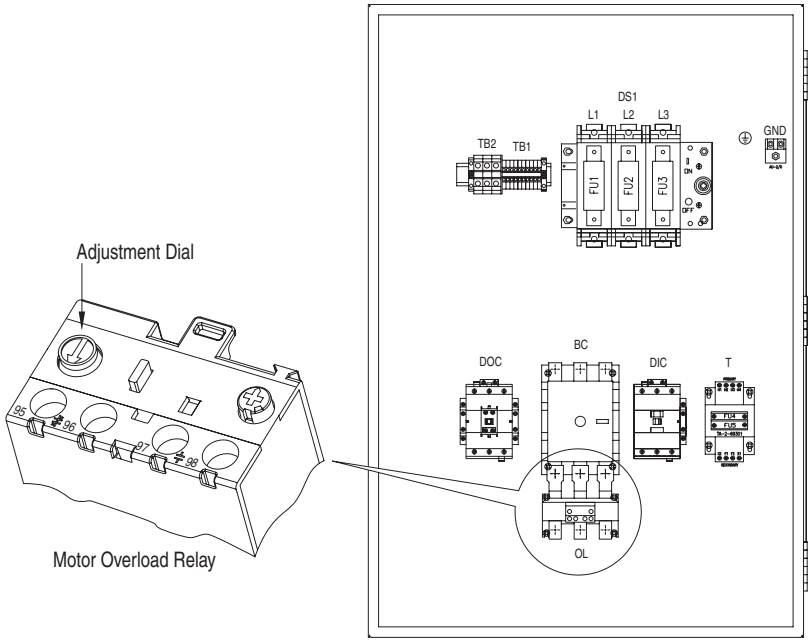
- Drive Input Contactor (DIC) opens and closes input to the drive.
- Drive Output Contactor (DOC) opens and closes the connection between the drive and the motor.
- Bypass Contactor (BC) opens and closes the connection to the line-start the motor.

Motor Overload Relay (OL)

For units supplied with a fused disconnect switch, a motor overload relay is supplied. The motor overload relay is set at the factory to 100% of the drive output current. In many cases, this setting matches the motor full load amps (FLA). However, before starting the drive, you should check the setting on the motor overload relay to assure that it is set properly for your motor.

- For motors with a service factor less than 1.15, set the motor overload relays to 0.9x motor FLA.
- For motors with a service factor equal to, or greater than 1.15, set the motor overload relay to the motor FLA.

Figure 3.1 Setting Motor Overload



Drive/Bypass Relay (CR)

A user-powered (24V AC) “Drive/Bypass” enable relay is provided for remote shut down of the unit. This relay can be used to turn off the motor whether the selector switch is in Drive or Bypass positions. It can also be used for an safety-input interlocks (freeze/fire stats, smoke purge, etc.). To utilize this function, factory-installed jumpers must be removed and Normally Closed contacts must be field wired to the appropriate input terminals.

Electrical Installation

Input Power Wiring

Refer to the VTAC 9 *User Manual* for additional detailed information about input power wiring recommendations and selection.

ATTENTION: Protect the contents of the options cabinet from metal chips and other debris while drilling the conduit openings. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

ATTENTION: Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

To connect AC input power to the drive package:

❑ **1.** Select the proper wire size according to NEC and all applicable local codes and standards. Note that you must punch openings in the Option Cabinet of the desired conduit size, following NEC and all applicable local codes and standards. Power terminal block specifications are listed in Table 3.B.

❑ **2.** Connect the three-phase AC input power leads (three-wire VAC) to the appropriate terminals. For ratings provided with a Motor Protector, connect the AC input power leads to terminals L1, L2, L3 on the Input Power Terminal Block. For ratings provided with a fused disconnect, connect the AC input power leads to terminals L1, L2, L3 on the fused disconnect switch.

❑ **3.** Tighten the AC input terminal power terminals to the proper torque according to drive type as shown in Table 3.B.

Table 3.B AC Input Power Terminal Block Specification

Voltage Rating	Drive Frame	HP	Maximum Wire Size[1]	Minimum Wire Size	Recommended Torque
208V AC	B, C	1…5	8 AWG	22 AWG	13 lb.-in.
	D	7.5…10	4 AWG	14 AWG	20 lb.-in.
460V AC	B, C, D	1…15	8 AWG	22 AWG	13 lb.-in.
	D, 2, 3	20…30	4 AWG	14 AWG	20 lb.-in.
	E, 3	40…50	1//0 AWG	14 AWG	22 lb.-in.
	4, 5	60…100	2 AWG	12 AWG	120 lb.-in.

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations. If national or local codes require sizes outside the range, lugs may be used.

Output Power Wiring

Refer to the VTAC 9 *User Manual* for additional detailed information about output power wiring recommendations and selection.

ATTENTION: Unused wires in conduit must be grounded at both ends to avoid a possible shock hazard caused by induced voltages. Also, if a drive sharing a conduit is being serviced or installed, all drives using this conduit should be disabled to eliminate the possible shock hazard from cross-coupled motor leads. Failure to observe these precautions could result in bodily injury.

ATTENTION: Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

To connect AC output power wiring from the drive to the motor:

❑ **1.** Wire the three-phase AC output power motor leads by routing them according to the drive option type. Note that you must punch openings in the option cabinet of the desired conduit size, following NEC and all applicable local codes and standards. Output power terminal block specifications are listed in Table 3.C.

Do not route more than three sets of motor leads through a single conduit. This will minimize cross-talk that could reduce the effectiveness of noise reduction methods. If more than three drive/motor connections per conduit are required, shielded cable must be used. If possible, each conduit should contain only one set of motor leads.

❑ **2.** Connect the three-phase AC output power motor leads to terminals T1, T2, T3 on the output power terminal block located inside the Option Cabinet.

❑ **3.** Tighten the three-phase AC output power terminals to the proper torque according to drive type as shown in Table 3.C.

Table 3.C Output Power Terminal Block Specification

Voltage Rating	Drive Frame	HP	Maximum Wire Size(1)	Minimum Wire Size	Recommended Torque
208V AC	B, C	1…5	8 AWG	22 AWG	13 lb.-in.
	D	7.5…10	4 AWG	14 AWG	20 lb.-in.
460V AC	B, C, D	1…15	8 AWG	22 AWG	13 lb.-in.
	D, 2, 3	20…30	4 AWG	14 AWG	20 lb.-in.
	E, 3, 4, 5	40…75	1/0 AWG	14 AWG	22 lb.-in.
	5	100	350 MCM	6 AWG	275 lb.-in.

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations. If national or local codes require sizes outside the range, lugs may be used.

Control and Signal Wiring

Refer to the VTAC 9 *User Manual* for additional detailed information about control and signal wiring.

The Signal Terminal Block (I/O Terminals 1-26 for Frames B, C, D, E and I/O Terminals 1-32 for Frames 2, 3, 4, 5, 6) located on the drive Main Control Board and Control Terminal Block (TB1 Terminals 19-24) located inside the Option Cabinet provide terminals for interfacing customer supplied control inputs and outputs. All analog and discrete control wiring will be made at these terminals. Typical customer control and signal wiring is shown on the Inter-Connect drawings, Figure 3.5, Figure 3.6 and Figure 3.8.

To connect control and signal wiring to the drive package:

❑ **1.** Wire the control and signal leads by routing them according to the drive option type. Note that you must punch openings in the option cabinet of the desired conduit size, following NEC and all applicable local codes and standards. Control and signal terminal block specifications are listed in Table 3.D.

Control and signal wires should be separated from power wires by at least 0.3 meters (1 foot).

❑ **2.** Connect the analog and relay output signal wiring to the I/O Terminal Block located on the drive Main Control Board.

❑ **3.** Connect the control wiring listed below to terminals 19-24 located inside the Option Cabinet.
- Drive Start/Stop
- Drive/Bypass Enable
- Bypass Run

❑ **4.** Tighten the I/O terminals to the proper torque according to drive type as shown in Table 3.D.

Table 3.D Control and Signal Terminal Block Specifications

Voltage Rating	Drive Frame	HP	Maximum Wire Size(1)	Minimum Wire Size	Recommended Torque
All	B, C, D, E	1…50	16 AWG	30 AWG	4.4 lb.-in.
	2, 3, 4, 5	25…100	14 AWG	22 AWG	5.2 lb.-in.
	All	1…100	10 AWG	22 AWG	5…5.6 lb.-in.

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations. If national or local codes require sizes outside the range, lugs may be used.

Alternate Customer Connection Considerations

A “Freeze/Fire Stat” input is typically connected to terminals T31-T33. Factory default parameter settings cause the drive to fault on an F2 “Function Loss” if the “Freeze/Fire Stat” input opens or if there is a momentary loss of power to the drive. A manual reset to restart is required once the input closes or power is restored.

To restart the drive automatically when the “Freeze/Fire Stat” input closes or power is restored, the F2 “Function Loss” fault can be automatically cleared by one of the following methos.

1. Jumper I/O Terminals 2 (Clear Faults) and 3 (Function Loss) on drives with 26 terminals (Frames B…E) or jumper I/O Terminals 28 (Clear Faults) and 29 (Function Loss) on drives with 32 terminals (Frames 2…6).
2. Set parameter 363 [Digital In3 Sel] to option 1 "Enable" which will start the drive on an enable command if the "Freeze/Fire Stat" input is closed and a Run or Start digital input is present.

If a purge command is intended to follow a "Freeze/Fire Stat" input trip/reset without requiring a manual reset to restart, the above alternate customer connections should be used.

Operating Modes

Drive Mode

For this mode to be active, the door-mounted selector switch needs to be in the DRIVE position. The DIC and DOC are energized and the BC is de-energized.

When the drive is in HAND configuration, the start command comes from the integral keypad Start/Hand key. The speed reference come from the Digital Increment and Decrement keys.

When the drive is in AUTO configuration, the start command is set for two-wire control. The drive runs when there is a closed contact between terminals 19-20 located inside the Option Cabinet and stops when the contact is open. Parameter P038 [Speed Reference] determines the source of the speed reference. The drive package ships with the speed reference configured for Analog In1 which would be wired to signal terminals 13-14 located on the drive. Refer to the VTAC 9 User manual for information on other control schemes.

Test Mode

For this mode to be active, the door-mounted selector switch needs to be in the "Test" position. The DIC is energized and the DOC and BC are de-energized.

Off Mode

For this mode to be active, the door-mounted selector switch needs to be in the "Off" position. The DIC, DOC and BC are all de-energized. The PowerFlex drive will not be powered and the motor will not run.

Bypass Mode

In the Bypass Mode the BC is energized and the DIC and DOC are de-energized. The motor is powered by the AC line. The motor will immediately be powered when the selector switch is in the "Bypass" position unless the "Drive/Bypass Enable" relay, CR, is used and is not picked up.

Parameter Defaults
Manual Bypass Package
(Style M)

Parameter Name	Number	Default
Output Freq	001	Read Only
Commanded Freq	002	Read Only
Output Current	003	Read Only
Torque Current	004	Read Only
Flux Current	005	Read Only
Output Voltage	006	Read Only
Output Power	007	Read Only
Output Powr Fctr	008	Read Only
Elapsed MWh	009	Read Only
Elapsed Run Time	010	Read Only
MOP Frequency	011	Read Only
DC Bus Voltage	012	Read Only
DC Bus Memory	013	Read Only
Analog In1 Value	016	Read Only
Analog In2 Value	017	Read Only
Rated kW	026	Read Only
Rated Volts	027	Read Only
Rated Amps	028	Read Only
Control SW Ver	029	Read Only
Motor Type	040	0 “Induction”
Motor NP Volts	041	Drive Rating Based
Motor NP FLA	042	Drive Rating Based
Motor NP Hertz	043	60 Hz
Motor NP RPM	044	1740 RPM
Motor NP Power	045	Drive Rating Based
Mtr NP Pwr Units	046	Drive Rating Based
Motor OL Hertz	047	Motor NP Hz/3
Motor OL Factor	048	1.00
Torque Perf Mode	053	3 “Fan/Pmp V/Hz”
Maximum Voltage	054	Drive Rated Volts
Maximum Freq	055	130.0 Hz
Compensation	056	xxxxxxxxxxxx011
Flux Up Mode	057	0 “Manual”
Flux Up Time	058	0.00 Secs
SV Boost Filter	059	500
Autotune	061	3 “Calculate”
IR Voltage Drop	062	[Motor NP Volts] x 0.25
Flux Current Ref	063	Drive Rating Based
Ixo Voltage Drop	064	Drive Rating Based
Start/Acc Boost	069	[Motor NP Volts] x 0.25
Run Boost	070	[Motor NP Volts] x 0.25
Break Voltage	071	[Motor NP Volts] x 0.25
Break Frequency	072	[Motor NP Hertz] x 0.25
Speed Mode	080	0 “Open Loop”
Minimum Speed	081	0.0 Hz
Maximum Speed	082	60.0 Hz
Overspeed Limit	083	10.0 Hz
Skip Frequency 1	084	0.0 Hz
Skip Frequency 2	085	0.0 Hz
Skip Frequency 3	086	0.0 Hz
Skip Freq Band	087	1.0 Hz
Logic Source Sel	089(1)	1 “Local OIM”
Speed Ref A Sel	090(1)	1 “Analog In 1”
Speed Ref A Hi	091	[Maximum Speed]

Parameter Name	Number	Default
Speed Ref A Lo	092	0.0 Hz
TB Man Ref Sel	096	1 “Analog In 1”
TB Man Ref Hi	097	[Maximum Speed]
TB Man Ref Lo	098	0.0 Hz
Preset Speed 1	101	5.0 Hz
Preset Speed 2	102	10.0 Hz
Preset Speed 3	103	20.0 Hz
Preset Speed 4	104	30.0 Hz
Preset Speed 5	105	40.0 Hz
Preset Speed 6	106	50.0 Hz
Purge Speed	107	5.0 Hz
Trim In Select	117	2 “Analog In 2”
Trim Out Select	118	xxxxxxxxxxxx000
Trim Hi	119	60.0 Hz
Trim Lo	120	0.0 Hz
Slip RPM @ FLA	121	Based on [Motor NP RPM]
Slip Comp Gain	122	40.0
Slip RPM Meter	123	Read Only
PI Configuration	124	xxxxxxxx00000000
PI Control	125	xxxxxxxxxxxx000
PI Reference Sel	126	0 “PI Setpoint”
PI Setpoint	127	50.00%
PI Feedback Sel	128	2 “Analog In 2”
PI Integral Time	129	2.00 Secs
PI Prop Gain	130	1.00
PI Lower Limit	131	–[Maximum Freq]
PI Upper Limit	132	+[Maximum Freq]
PI Preload	133	0.0 Hz
PI Status	134	xxxxxxxxxxxx0000
PI Ref Meter	135	Read Only
PI Fdback Meter	136	Read Only
PI Error Meter	137	Read Only
PI Output Meter	138	Read Only
Accel Time 1	140	20.0 Secs
Accel Time 2	141	20.0 Secs
Decel Time 1	142	20.0 Secs
Decel Time 2	143	20.0 Secs
S Curve %	146	20%
Current Lmt Sel	147	0 “Cur Lim Val”
Current Lmt Val	148	[Rated Amps] x 1.5
Current Lmt Gain	149	200
Drive OL Mode	150	3 “Both–PWM 1st”
CarrierFrequency	151	4 kHz
Stop Mode A	155	0 “Coast”
Stop Mode B	156	1 “Ramp”
DC Brake Lvl Sel	157	0 “DC Brake Lvl”
DC Brake Level	158	[Rated Amps]
DC Brake Time	159	0.0 Secs
Bus Reg Ki	160	450
Bus Reg Mode A	161	1 “Adjust Freq”
Bus Reg Mode B	162	0 “Disabled”
DB Resistor Type	163	0 “Internal Res”
Bus Reg Kp	164	1200
Bus Reg Kd	165	1000
LevelSense Start	168	1 “Enabled”

Parameter Name	Number	Default
Flying Start En	169	1 “Enabled”
Flying StartGain	170	4000
Auto Rstrt Tries	174	0
Auto Rstrt Delay	175	30.0 Secs
Sleep Wake Mode	178	0 “Disabled”
Sleep Wake Ref	179	2 “Analog In 2”
Wake Level	180	6.000 mA, 6.000 Volts
Wake Time	181	1.0 Secs
Sleep Level	182	5.000 mA, 5.000 Volts
Sleep Time	183	1.0 Secs
Power Loss Mode	184	0 “Coast”
Power Loss Time	185	0.5 Secs
Power Loss Level	186	0.0 VDC
Direction Mode	190	2 “Reverse Dis”
Save OIM Ref	192	xxxxxxxxxxxxxx1
Man Ref Preload	193	0 “Disabled”
Save MOP Ref	194	xxxxxxxxxxxxx01
MOP Rate	195	1.0 Hz/s
Param Access Lvl	196	Read Only
Reset To Defalts	197	0 “Ready”
Load Frm Usr Set	198	0 “Ready”
Save To User Set	199	0 “Ready”
Reset Meters	200	0 “Ready”
Language	201	0 “Not Selected”
Voltage Class	202	Based on Drive Cat. No.
Drive Checksum	203	Read Only
Drive Status 1	209	0000111000001100
Drive Status 2	210	xx000000x0000000
Drive Alarm 1	211	xxxxx0000x000000
Drive Alarm 2	212	xx00000000000000
Speed Ref Source	213	Read Only
Start Inhibits	214	Read Only
Last Stop Source	215	Read Only
Dig In Status	216	xxxxxxxxxx000000
Dig Out Status	217	xxxxxxxxxxxxxx00
Drive Temp	218	Read Only
Drive OL Count	219	Read Only
Motor OL Count	220	Read Only
Fault Frequency	224	Read Only
Fault Amps	225	Read Only
Fault Bus Volts	226	Read Only
Status 1 @ Fault	227	Read Only
Status 2 @ Fault	228	Read Only
Alarm 1 @ Fault	229	Read Only
Alarm 2 @ Fault	230	Read Only
Testpoint 1 Sel	234	499
Testpoint 1 Data	235	Read Only
Testpoint 2 Sel	236	499
Testpoint 2 Data	237	Read Only
Fault Config 1	238	xxxxxxxxx1001x10
Fault Clear	240	0 “Ready”
Fault Clear Mode	241	1 “Enabled”
Power Up Marker	242	Read Only
Alarm Config 1	259	xxxxx0111x11x111
Drive Logic Rslt	271	Read Only
Drive Ref Rslt	272	Read Only
Drive Ramp Rslt	273	Read Only
Manual Mask	286	xxxxxxxxxx1x1111
Stop Owner	288	Read Only
Manual Owner	298	xxxxxxxxxx0x0000
Data In A1	300	0 “Disabled”
Data In A2	301	0 “Disabled”
Data In B1	302	0 “Disabled”
Data In B2	303	0 “Disabled”
Data In C1	304	0 “Disabled”
Data In C2	305	0 “Disabled”
Data In D1	306	0 “Disabled”
Data In D2	307	0 “Disabled”
Data Out A1	310	0 “Disabled”
Data Out A2	311	0 “Disabled”
Data Out B1	312	0 “Disabled”
Data Out B2	313	0 “Disabled”
Data Out C1	314	0 “Disabled”
Data Out C2	315	0 “Disabled”
Data Out D1	316	0 “Disabled”
Data Out D2	317	0 “Disabled”
Anlg In Config	320	xxxxxxxxxxxxx01
Anlg In Sqr Root	321	xxxxxxxxxxxxx00
Analog In 1 Hi	322	20.000 mA
Analog In 1 Lo	323	4.000 mA
Analog In 1 Loss	324	0 “Disabled”
Analog In 2 Hi	325	10.000 Volt
Analog In 2 Lo	326	0.000 Volt
Analog In 2 Loss	327	0 “Disabled”
Anlg Out Config	340	xxxxxxxxxxxxxx0
Anlg Out Absolut	341	xxxxxxxxxxxxxx1
Analog Out1 Sel	342	0 “Output Freq”
Analog Out1 Hi	343	10.000 Volts/20.000 mA
Analog Out1 Lo	344	0.000 Volts/4.000 mA
Digital In1 Sel	361	7 “Run”
Digital In2 Sel	362	2 “Clear Fault”
Digital In3 Sel	363	3 “Function Loss”
Digital In4 Sel	364	1 “Enable”
Digital In5 Sel	365	25 “OIM Control”
Digital In6 Sel	366	31 “Purge”
Dig Out1 Sel	380	1 “Fault”
Dig Out1 Level	381	0.0
Dig Out1 OnTime	382	0.00 Secs
Dig Out1 OffTime	383	0.00 Secs
Dig Out2 Sel	384	4 “Run”
Dig Out2 Level	385	0.00
Dig Out2 OnTime	386	0.00 Secs
Dig Out2 OffTime	387	0.00 Secs

(1) For enclosure mounted NEMA/UL Type 1 OIM’s using bezel kit number VT-REBZL-N1, set P089 [Logic Source Select] to 3 “DPI Port 3” and P090 [Speed Ref A Sel] to 20 “DPI Port 3.”
For enclosure mounted NEMA/UL Type 4/12 OIM’s, kit number VT-RE4ALCDH, set P089 [Logic Source Select] to 2 “DPI Port 2” and P090 [Speed Ref A Sel] to 19 “DPI Port 2.”

Drawing Index

Manual Bypass Package (Style M)

208V AC – NEMA/UL Type 1

Input Voltage	HP	Input Line Reactor	Drawing							
			Schematic	*Page*	Inter-Connect	*Page*	Layout	*Page*	Outline	*Page*
208V AC	1		98D01598	3-11	97D01604	3-14	95D01663	3-16	95D01628	3-23
	2		98D01598	3-11	97D01604	3-14	95D01663	3-16	95D01628	3-23
	3		98D01598	3-11	97D01604	3-14	95D01663	3-16	95D01628	3-23
	5		98D01598	3-11	97D01604	3-14	95D01664	3-17	95D01629	3-24
	7.5	No	98D01598	3-11	97D01604	3-14	95D01665	3-18	95D01630	3-25
	10		98D01598	3-11	97D01604	3-14	95D01665	3-18	95D01630	3-25
	15		98D01671	3-12	–		95D01667	3-20	95D01632	3-27
	20		98D01671	3-12	–		95D01667	3-20	95D01632	3-27
	25		98D01671	3-12	–		95D01667	3-20	95D01632	3-27

460V AC – NEMA/UL Type 1

Input Voltage	HP	Input Line Reactor	Drawing							
			Schematic	*Page*	Inter-Connect	*Page*	Layout	*Page*	Outline	*Page*
460V AC	1	Yes	98D01598	3-11	97D01604	3-14	95D01663	3-16	95D01628	3-23
	2		98D01598	3-11	97D01604	3-14	95D01663	3-16	95D01628	3-23
	3		98D01598	3-11	97D01604	3-14	95D01663	3-16	95D01628	3-23
	5		98D01598	3-11	97D01604	3-14	95D01663	3-16	95D01628	3-23
	7.5		98D01598	3-11	97D01604	3-14	95D01664	3-17	95D01629	3-24
	10		98D01598	3-11	97D01604	3-14	95D01664	3-17	95D01629	3-24
	15		98D01598	3-11	97D01604	3-14	95D01665	3-18	95D01630	3-25
	20		98D01598	3-11	97D01604	3-14	95D01665	3-18	95D01630	3-25
	25		98D01598	3-11	97D01604	3-14	95D01665	3-18	95D01630	3-25
	30		98D01671	3-12	97D01604	3-14	95D01666	3-19	95D01631	3-26
	40		98D01671	3-12	97D01604	3-14	95D01667	3-20	95D01632	3-27
	50		98D01671	3-12	97D01604	3-14	95D01667	3-20	95D01632	3-27
	60		98D01599	3-13	97D01605	3-15	95D01668	3-21	95D01633	3-28
	75		98D01599	3-13	97D01605	3-15	95D01669	3-22	95D01634	3-29
	100		98D01599	3-13	97D01605	3-15	95D01669	3-22	95D01634	3-29

Schematic Drawings

Figure 3.2 1-10 HP, 208V AC and 1-25 HP, 460V AC Drives NEMA/UL Type 1

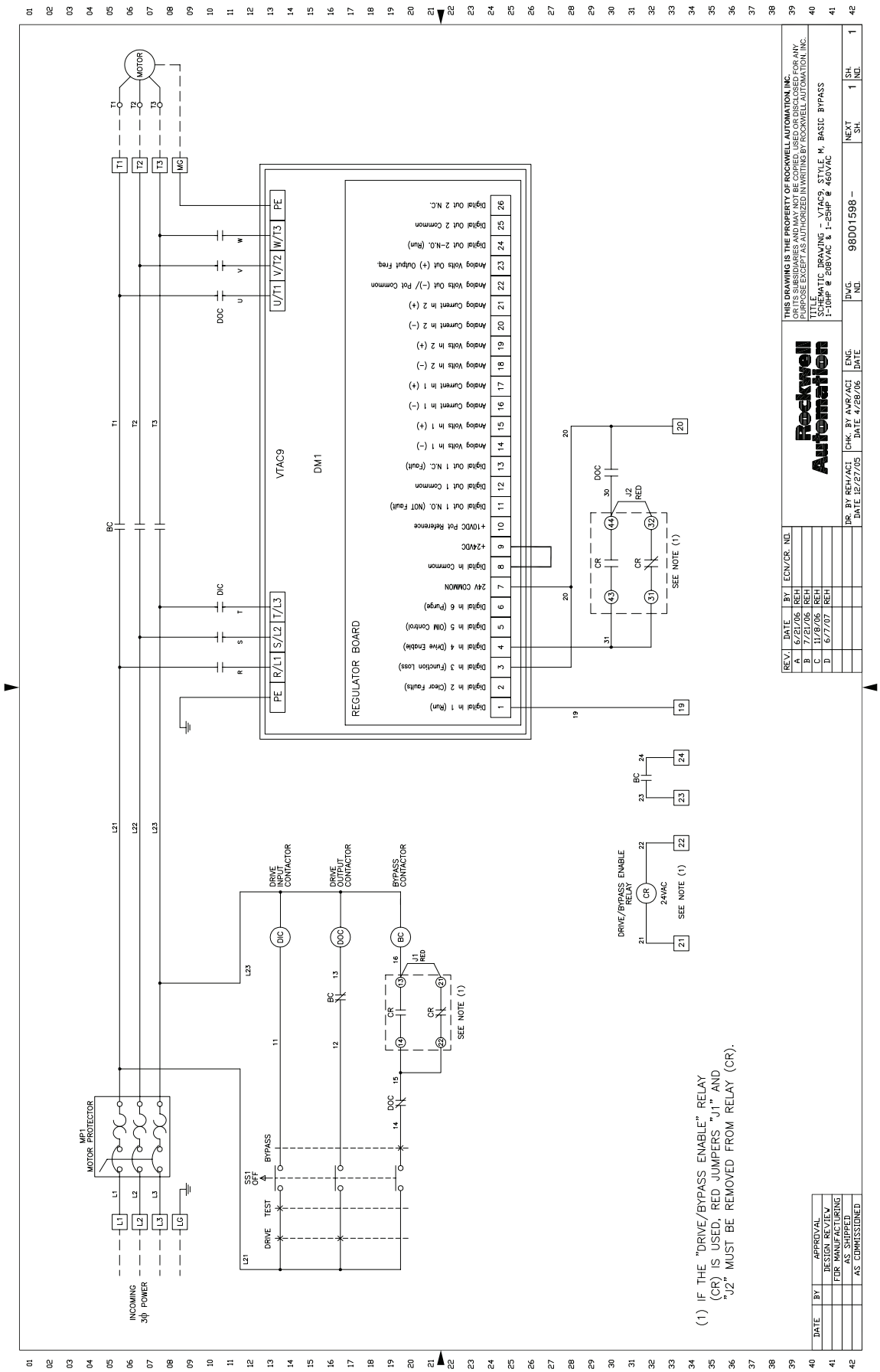


Figure 3.3 15-25 HP, 208V AC and 30-50 HP, 460V AC Drives NEMA/UL Type 1

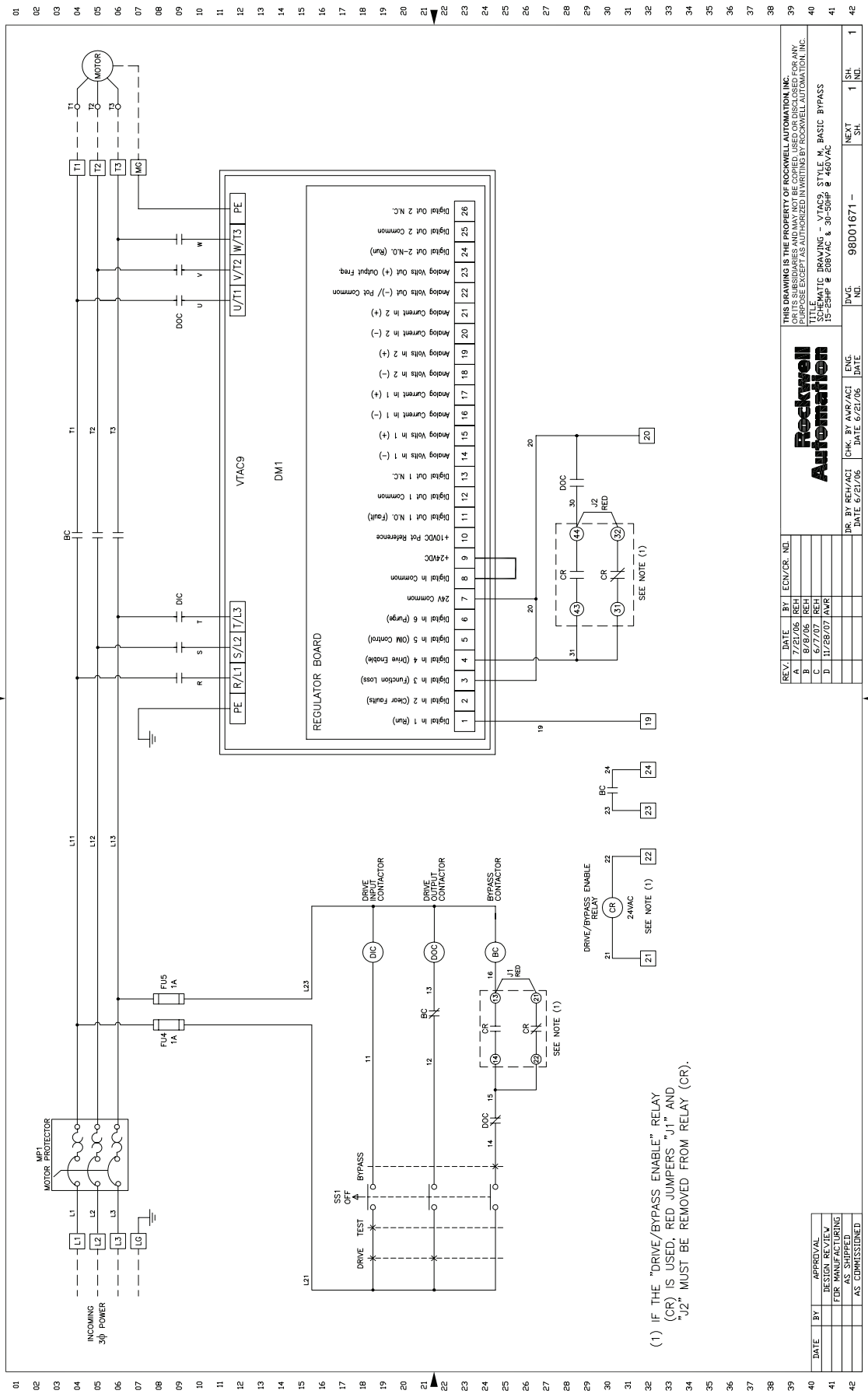
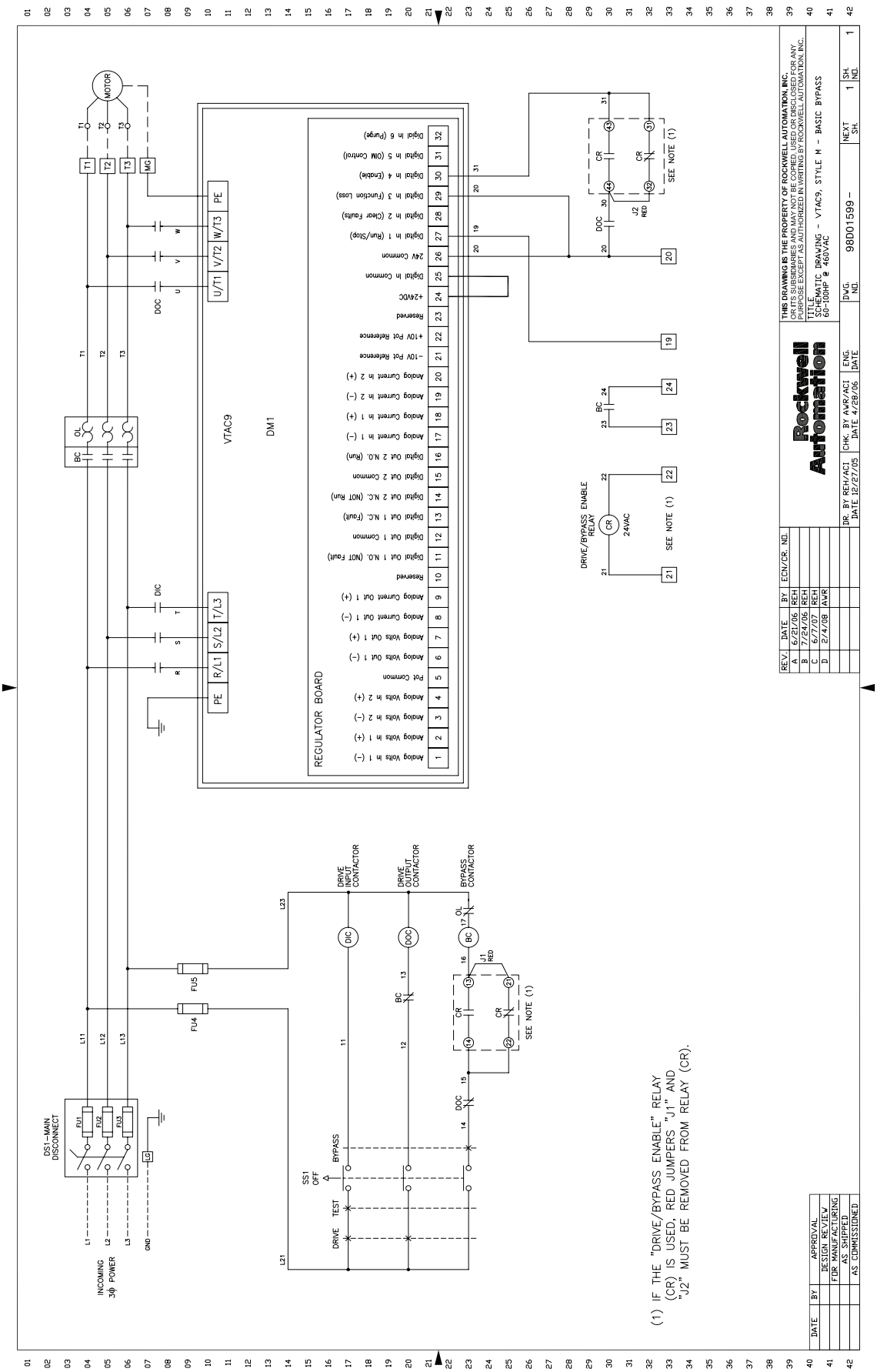


Figure 3.4 60-100 HP, 460V AC Drives NEMA/UL Type 1



Inter-Connect Drawings

Figure 3.5 1-10 HP, 208 and 1-50 HP, 460V AC Drives NEMA/UL Type 1

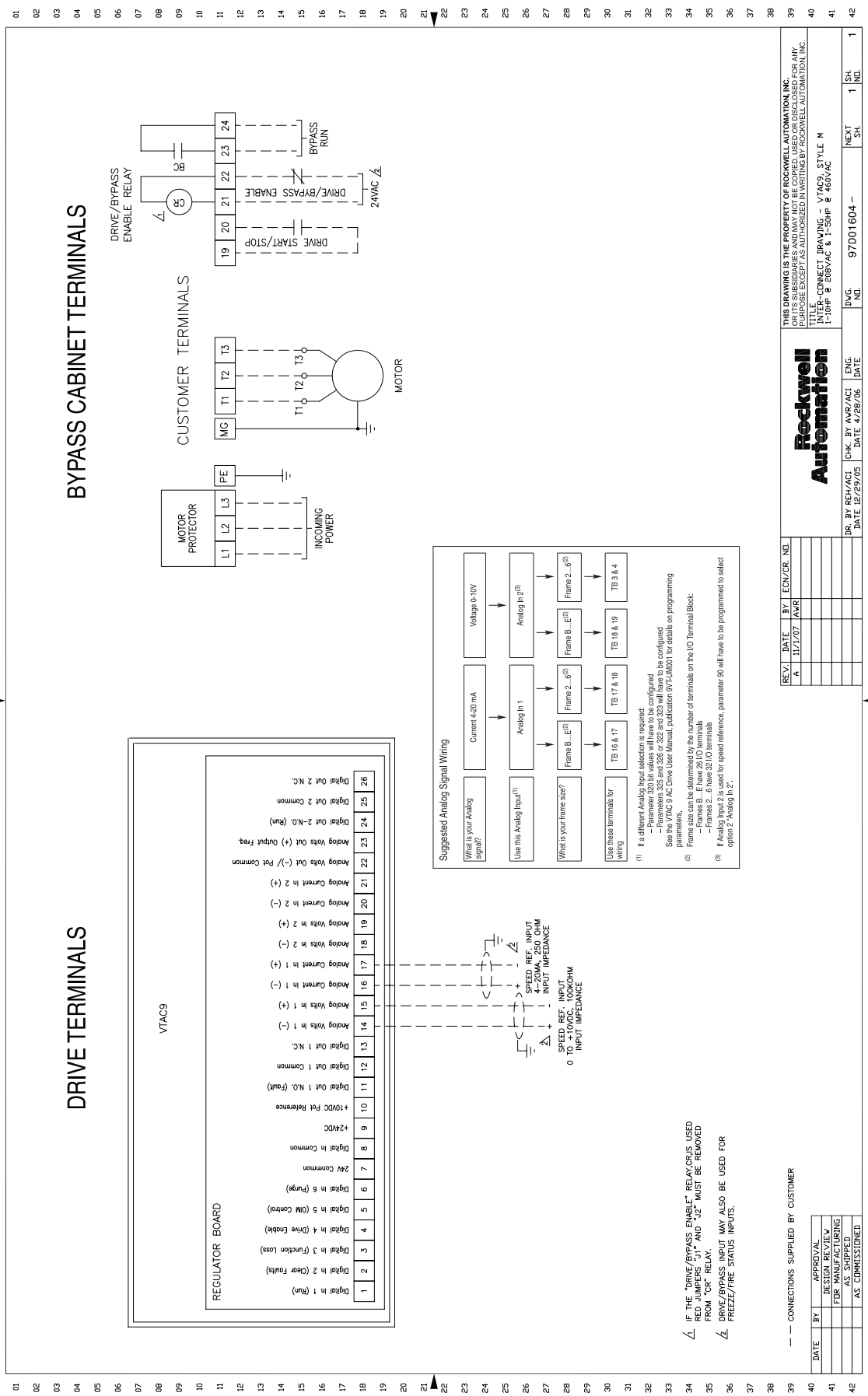
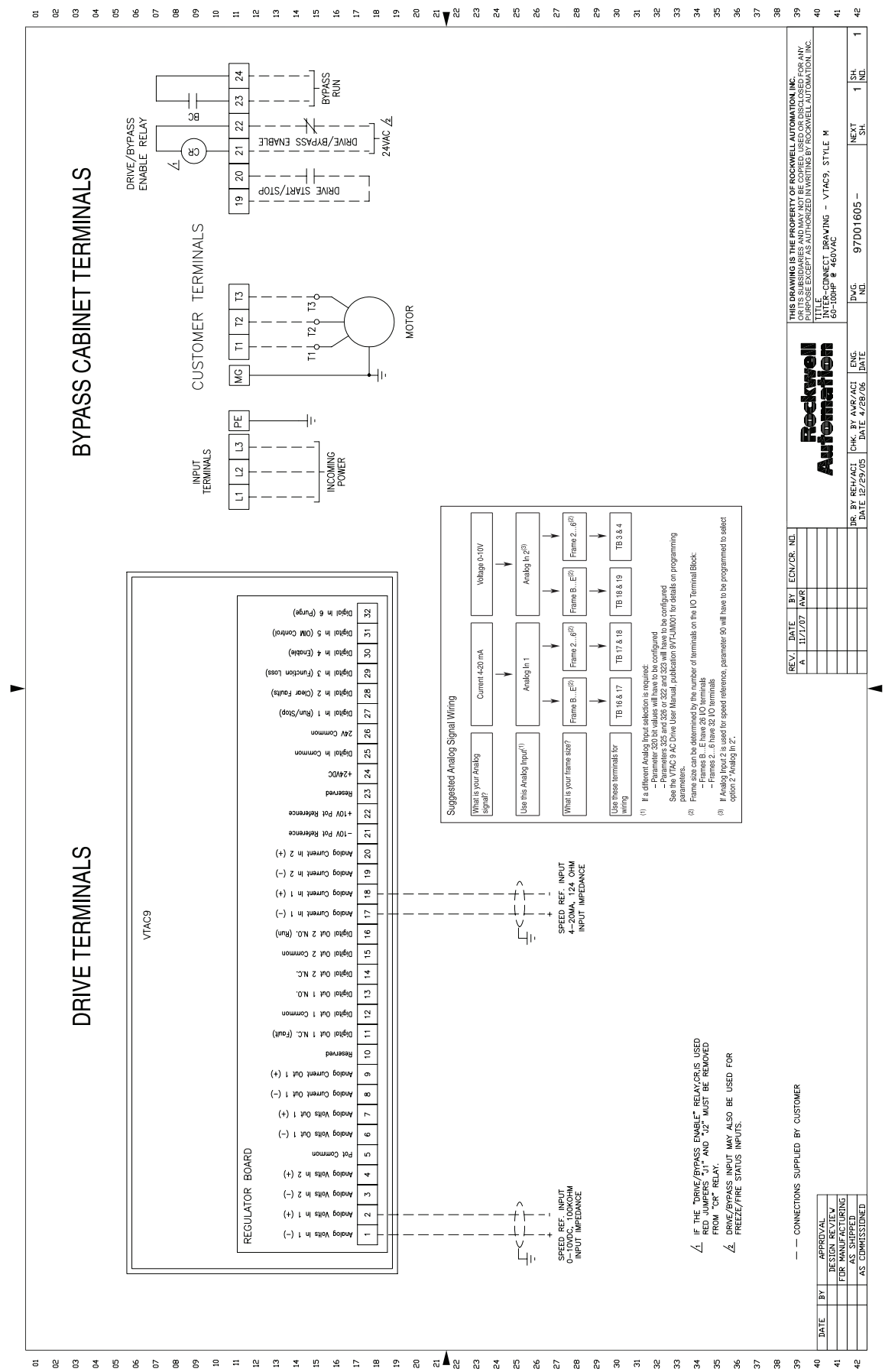


Figure 3.6 60-100 HP, 460V AC Drives NEMA/UL Type 1



Layout Drawings

Figure 3.7 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 1

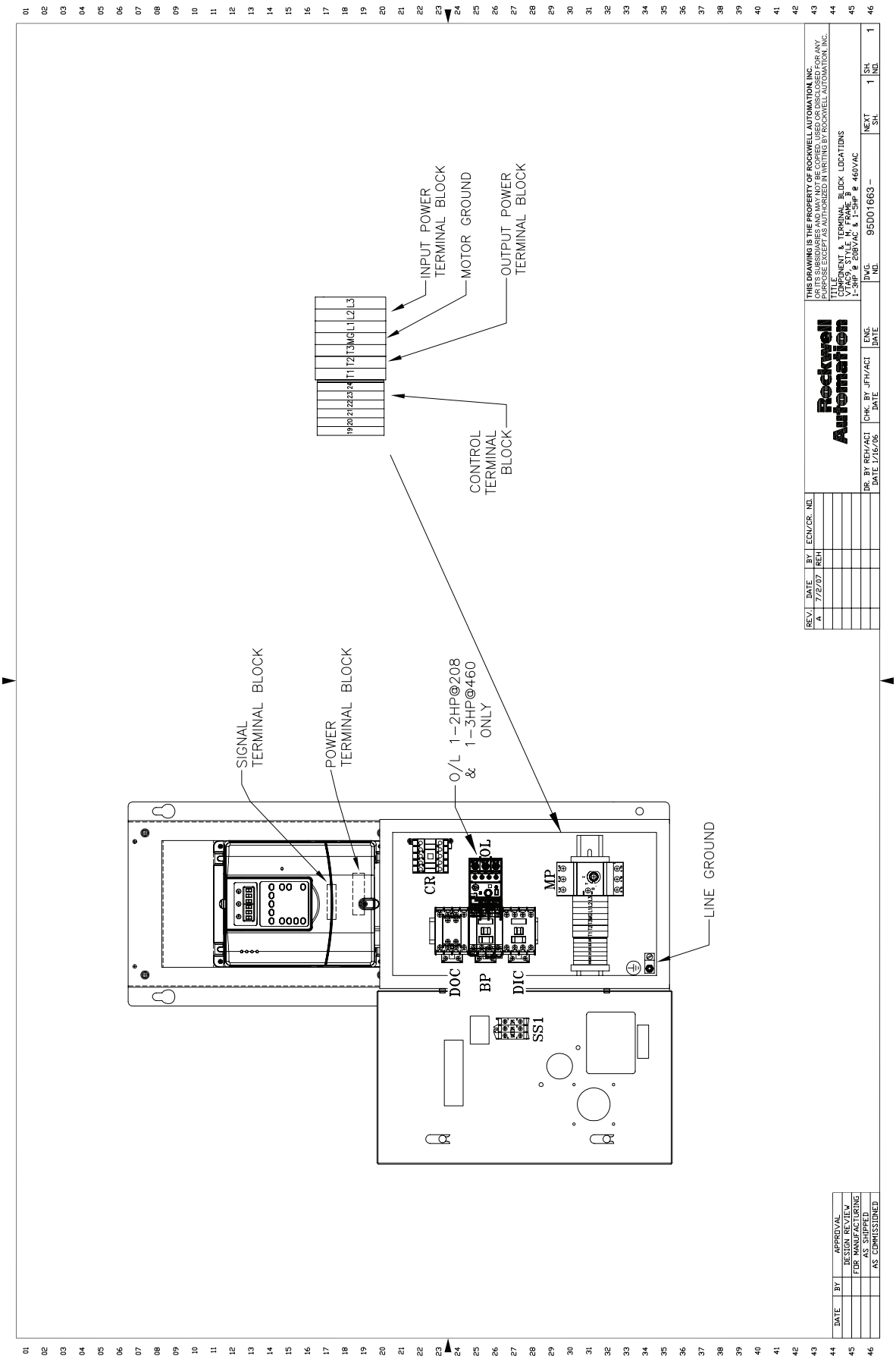


Figure 3.8 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 1

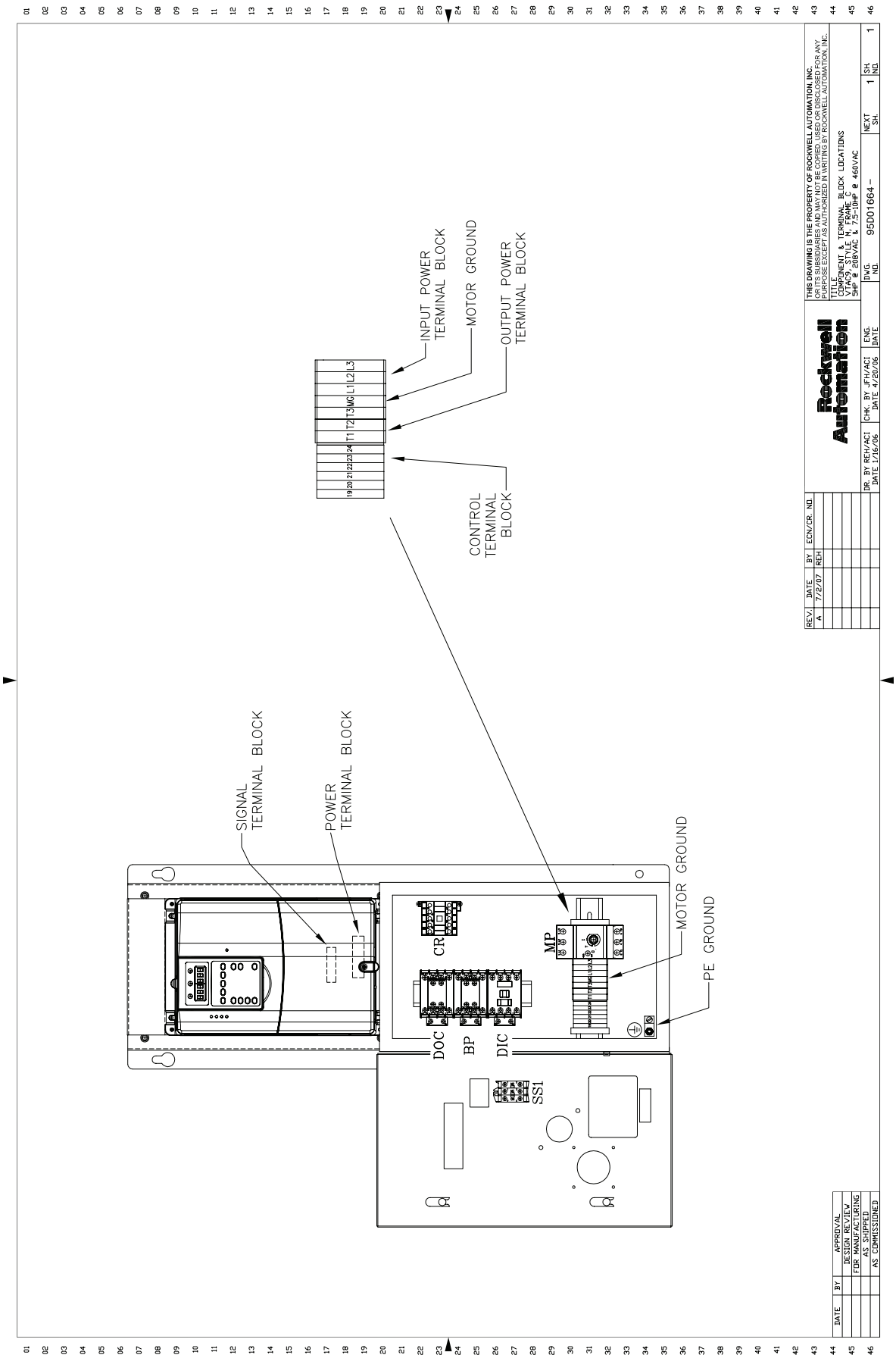


Figure 3.9 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives NEMA/UL Type 1

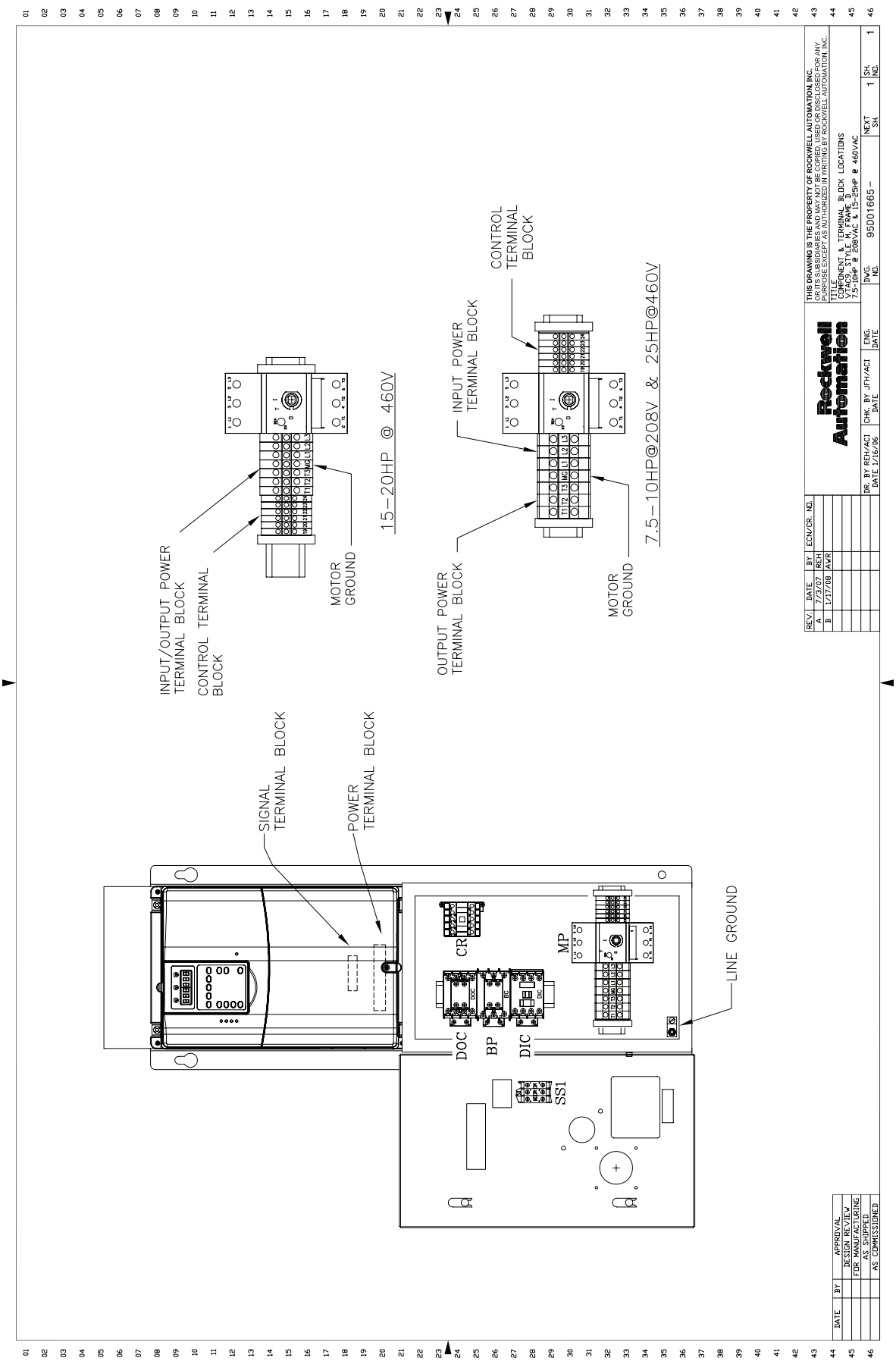


Figure 3.10 30 HP, 460V AC Drives
NEMA/UL Type 1

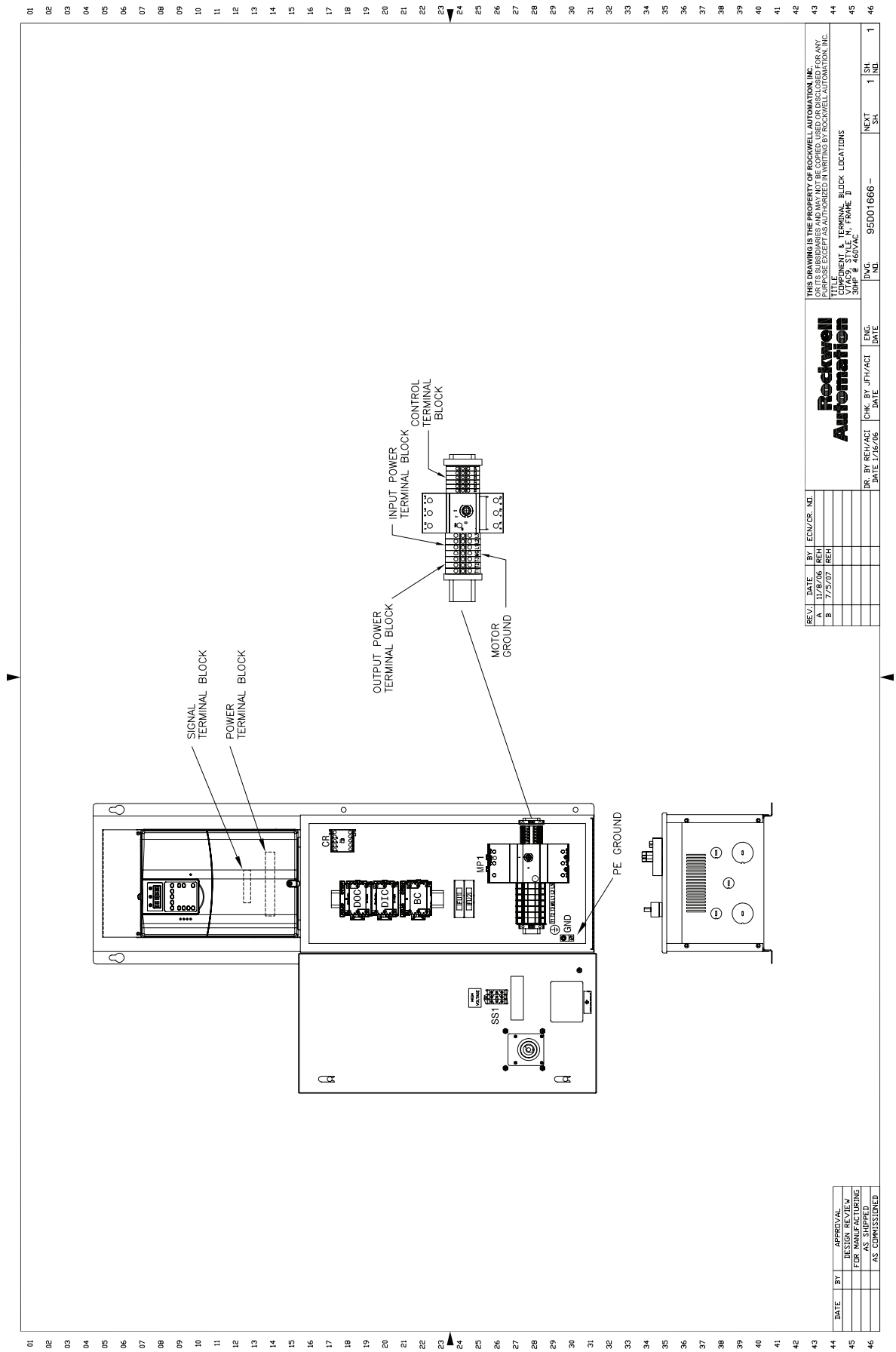


Figure 3.11 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 1

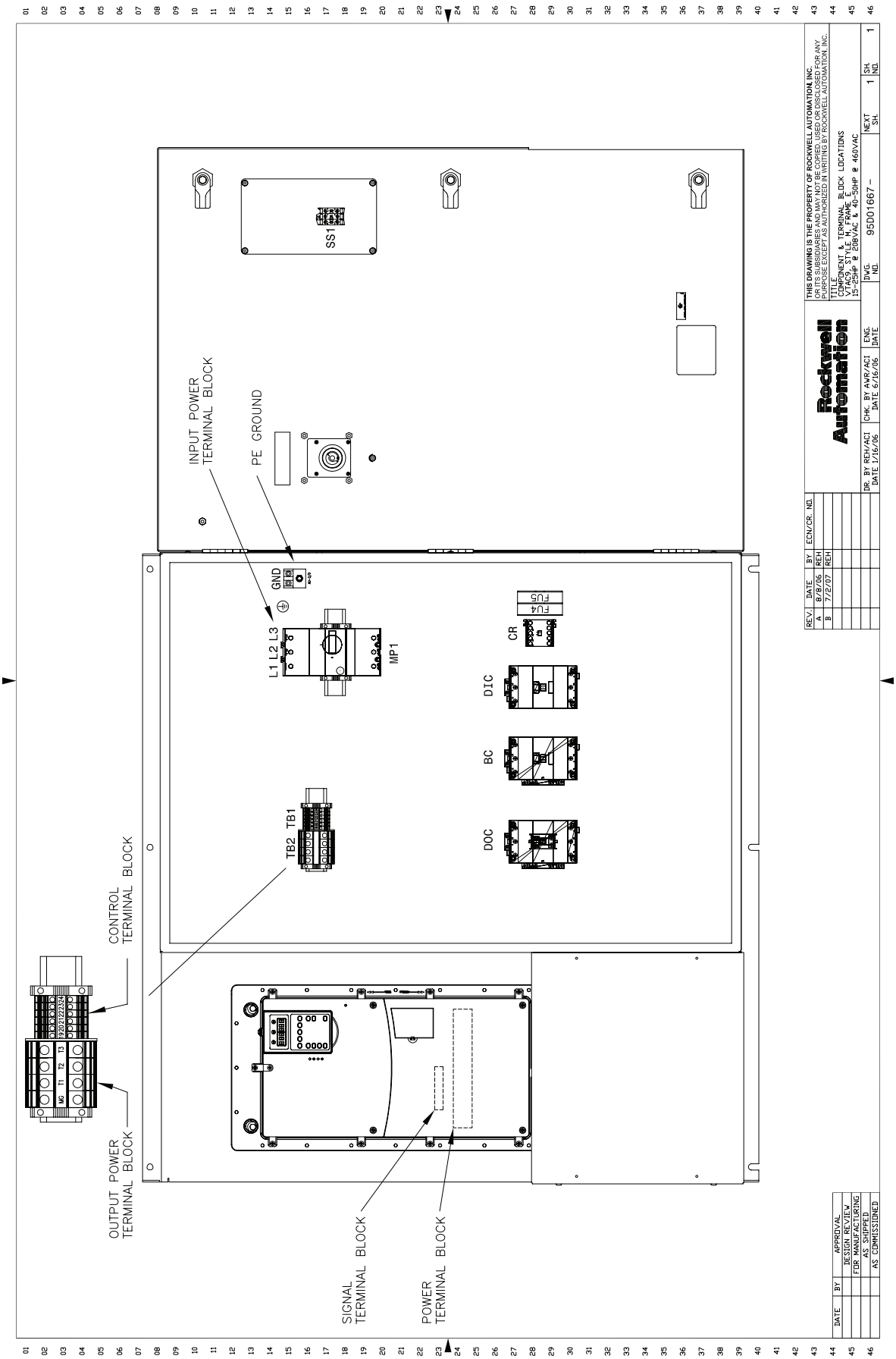


Figure 3.12 60 HP, 460V AC Drives
NEMA/UL Type 1

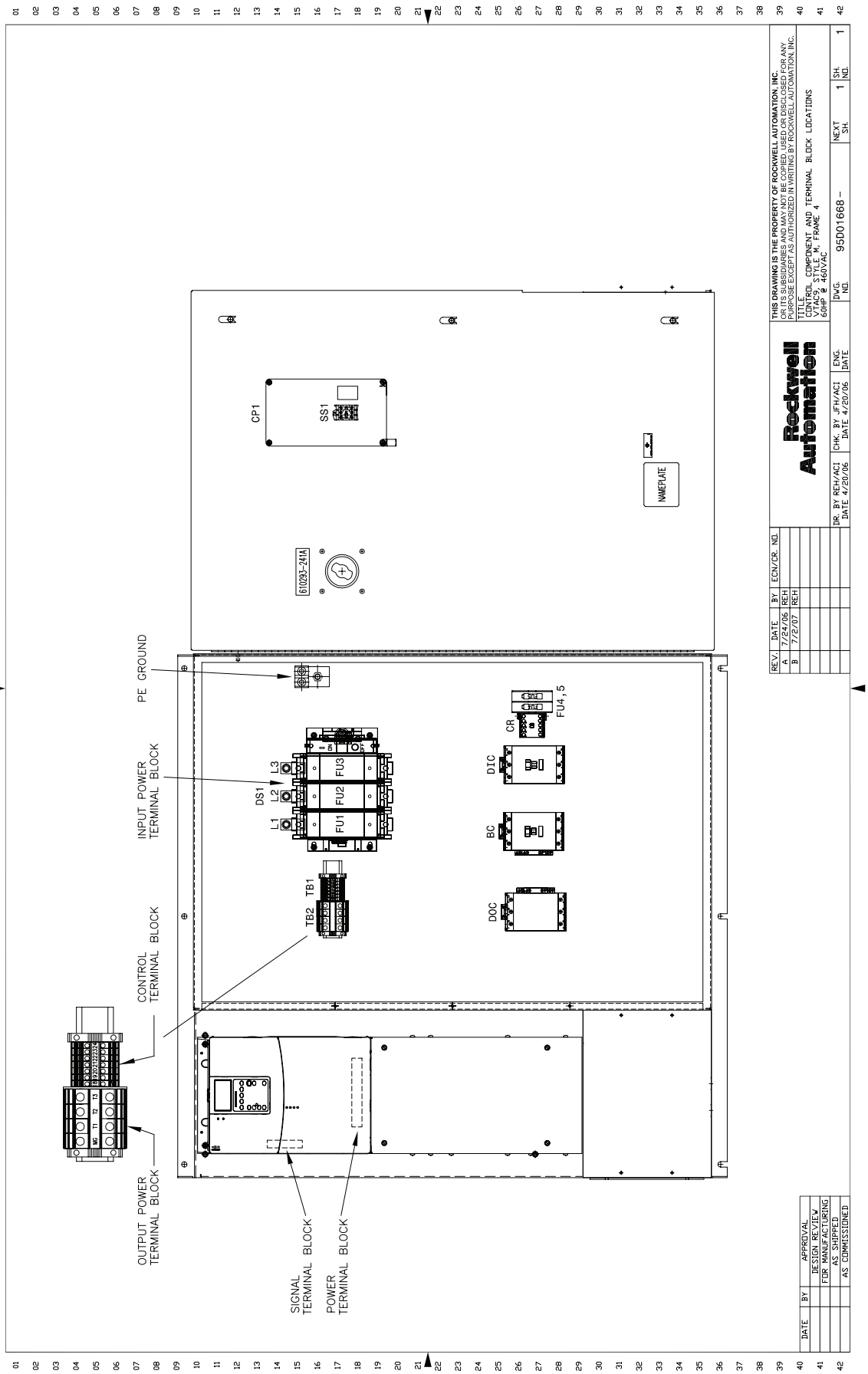
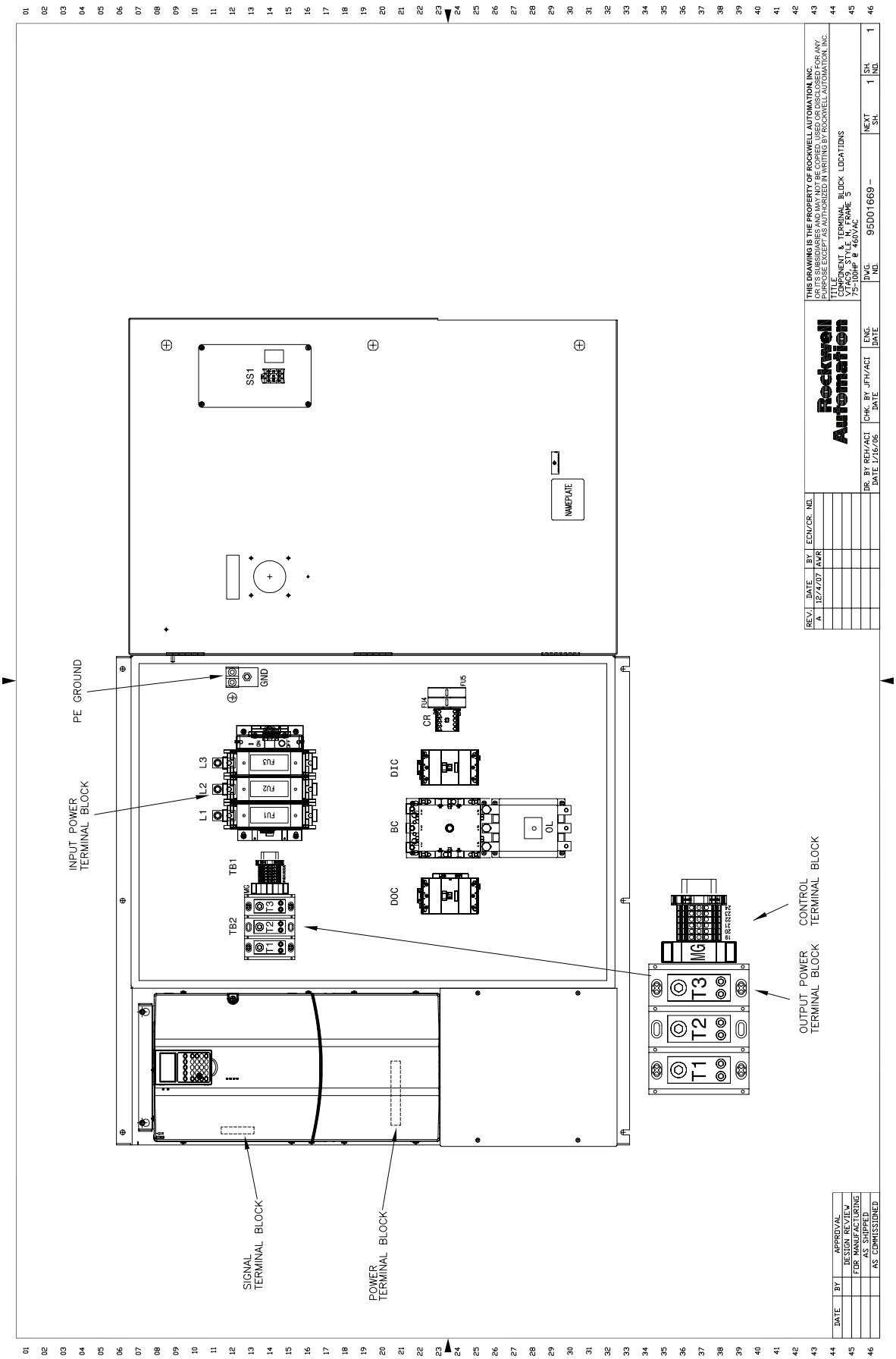


Figure 3.13 75-100 HP, 460V AC Drives
NEMA/UL Type 1



Outline Drawings

Figure 3.14 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 1

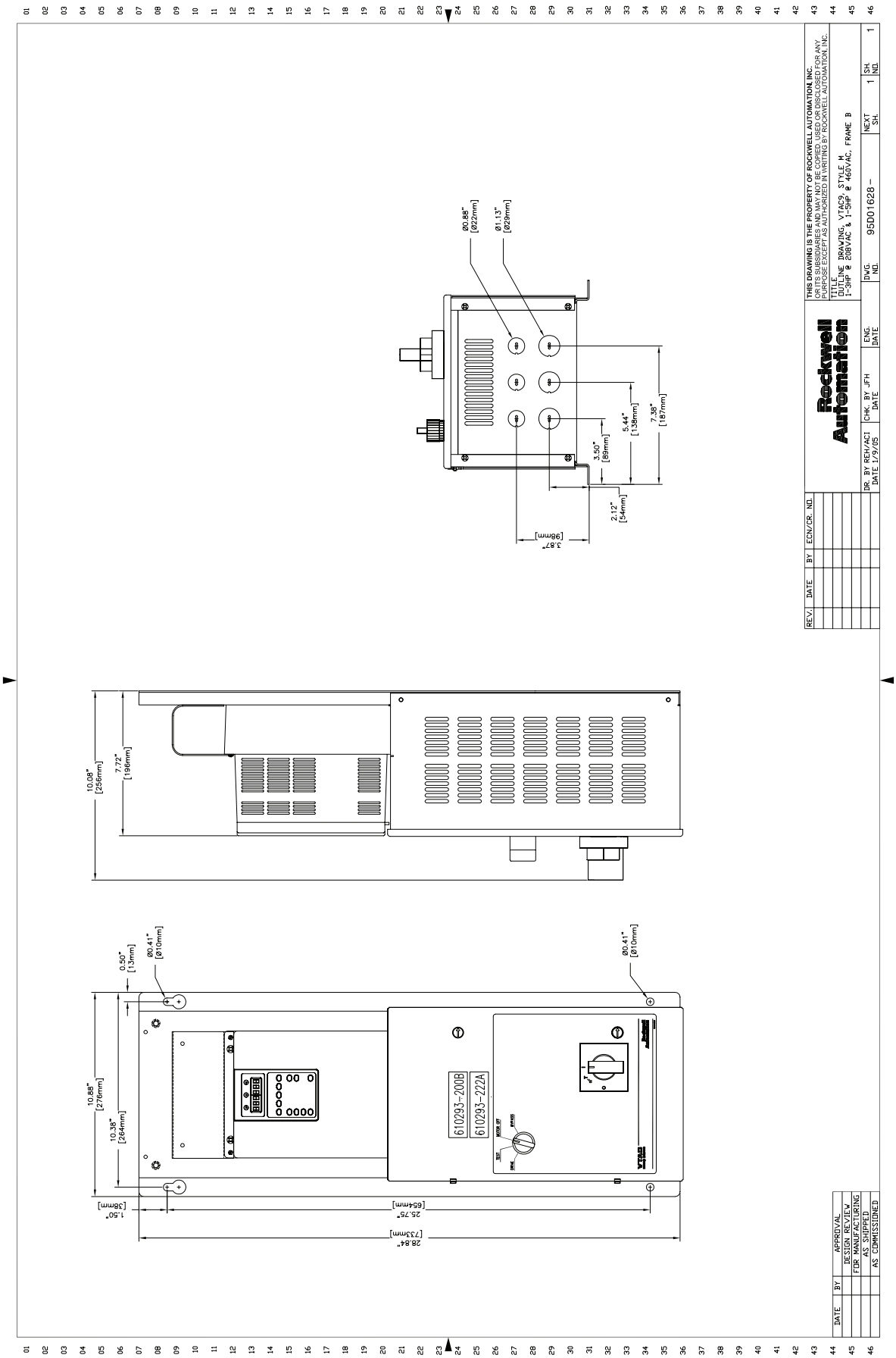


Figure 3.15 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 1

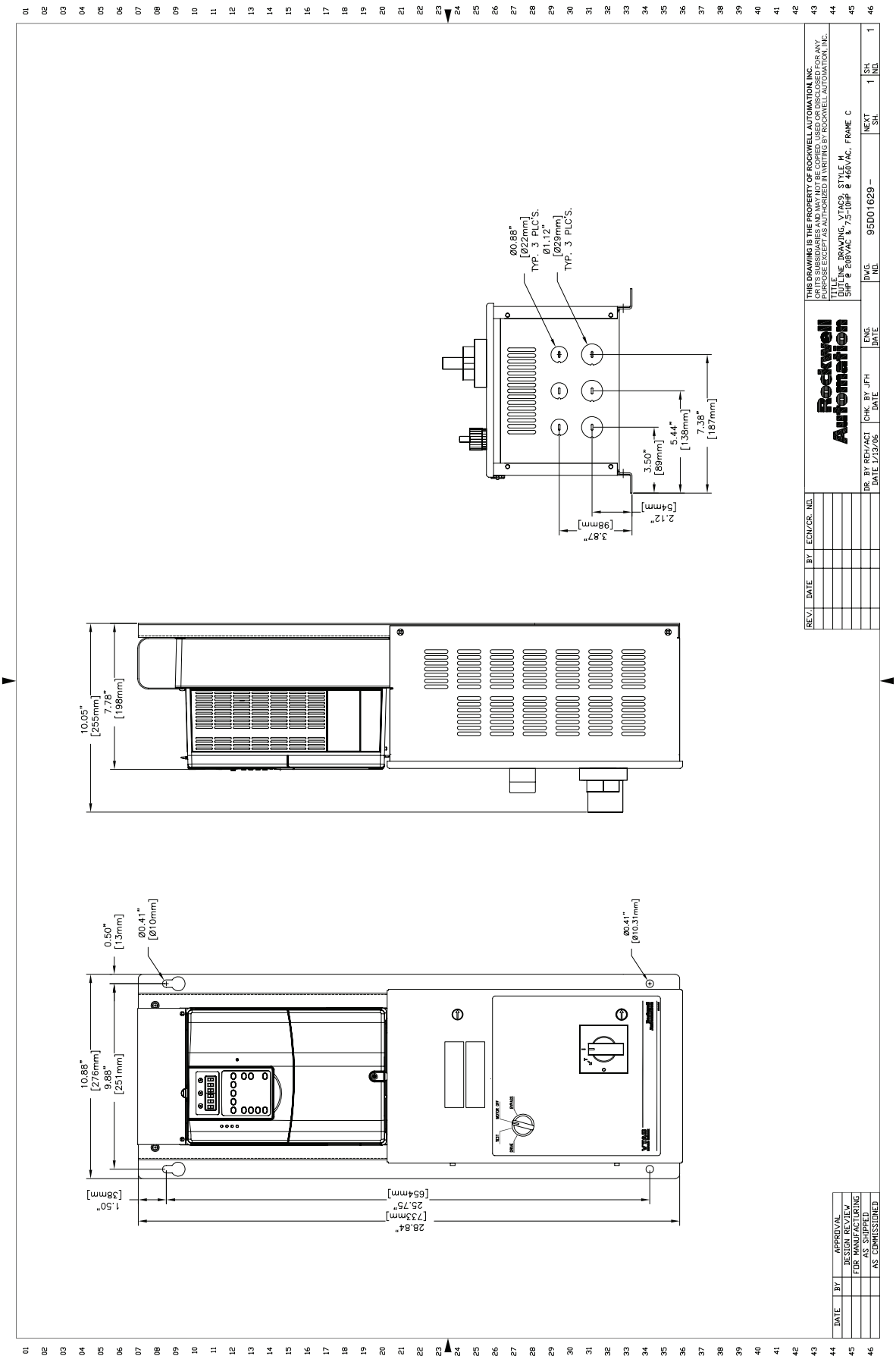


Figure 3.16 7.5-10 HP, 208V AC and 15-25 HP, 460V AC Drives NEMA/UL Type 1

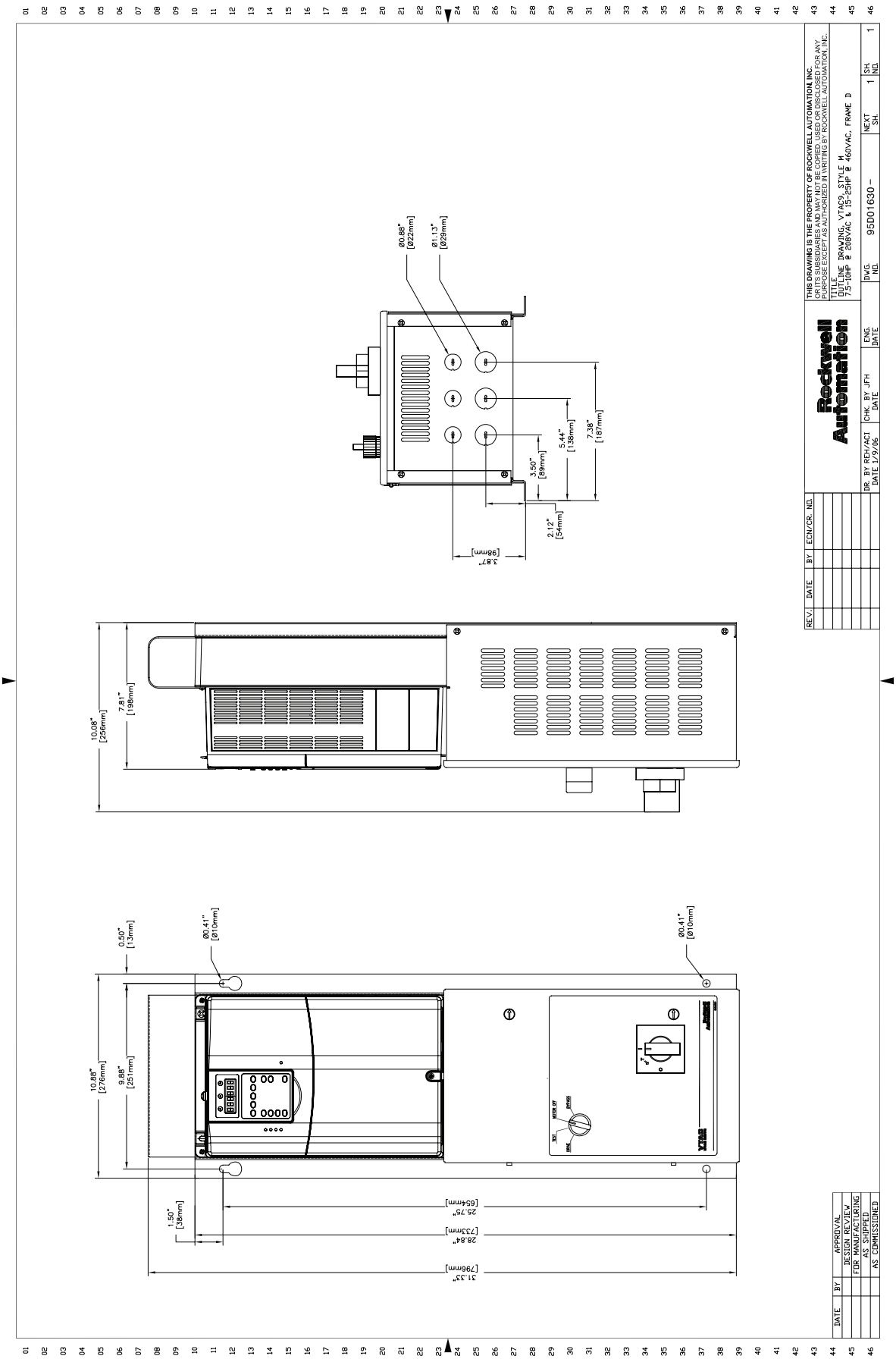


Figure 3.17 30 HP, 460V AC Drives
NEMA/UL Type 1

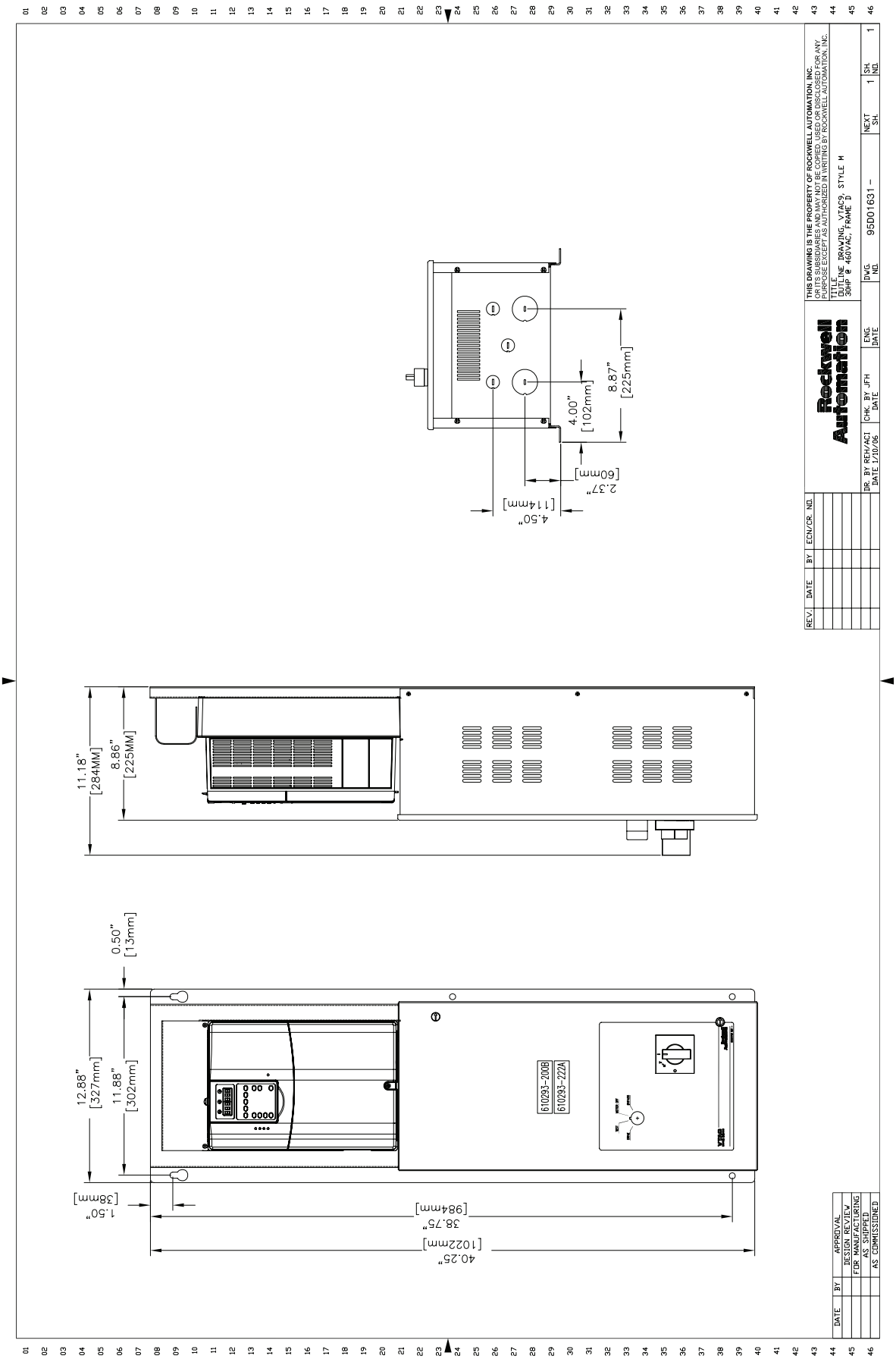


Figure 3.18 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 1

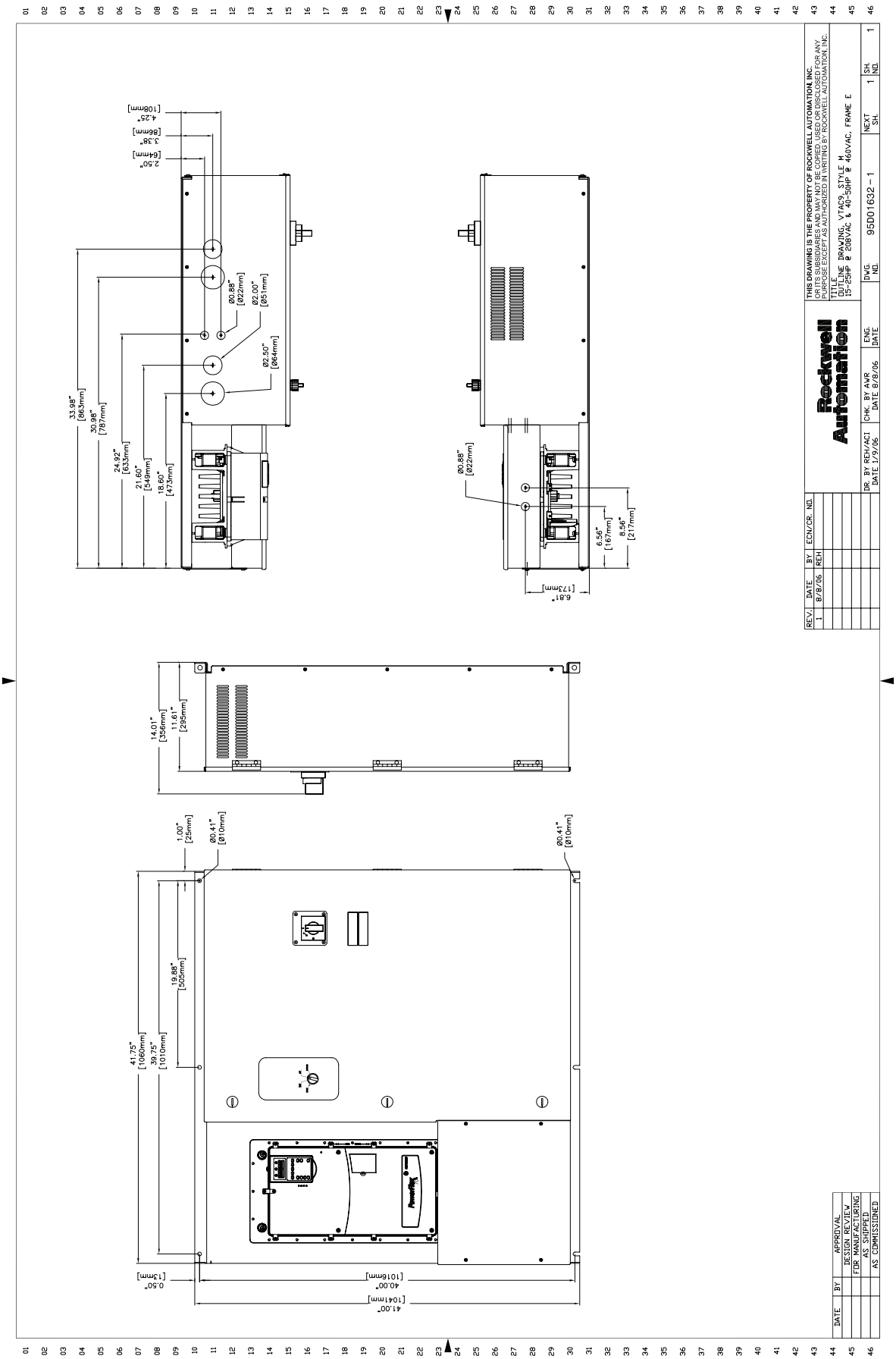


Figure 3.19 60 HP, 460V AC Drives
NEMA/UL Type 1

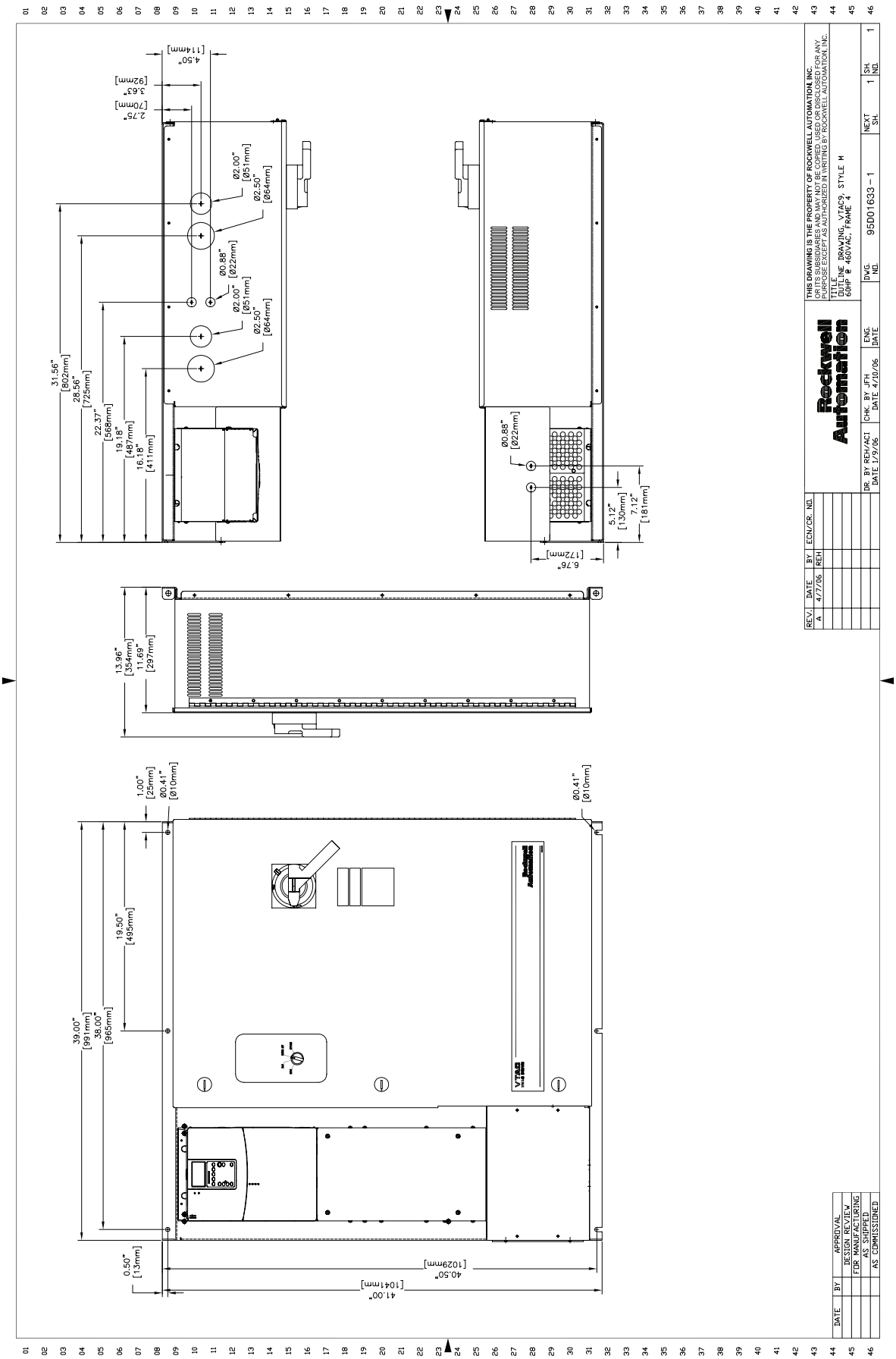
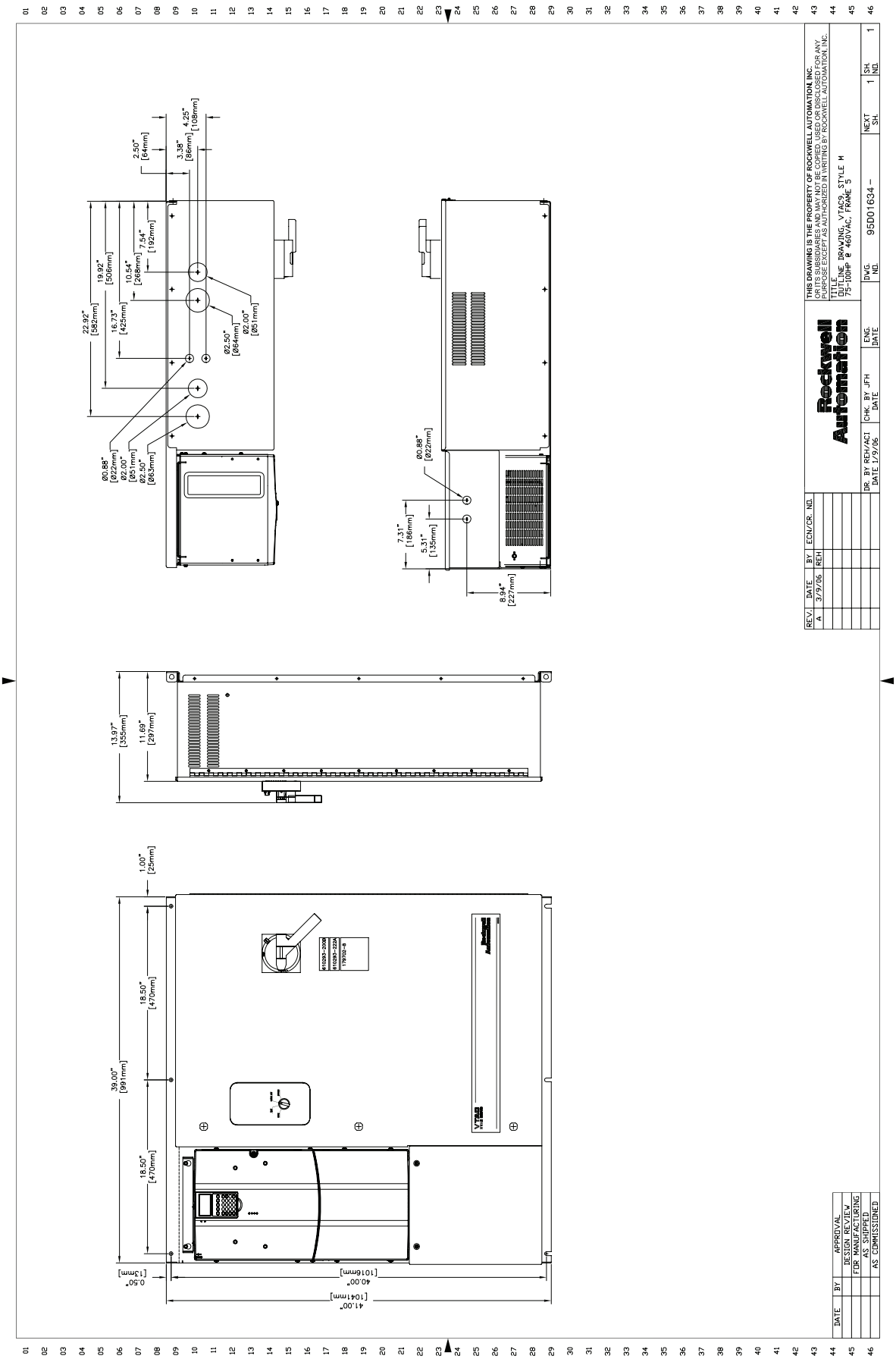


Figure 3.20 75-100 HP, 460V AC Drives
NEMA/UL Type 1



Notes:

Mechanical Installation

Chapter Objectives

This chapter provides information on mounting a VTAC 9 Adjustable Frequency Drive Package.

ATTENTION: The following information is merely a guide for proper installation. Rockwell Automation cannot assume responsibility for the compliance or the noncompliance to any code, national, local or otherwise for the proper installation of this drive or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored during installation.

Mounting Considerations

Environment

Before deciding on an installation site, verify that the VTAC 9 Adjustable Frequency Drive Package can be kept clean, cool and dry. The drives should be kept away from oil, coolants or other airborne contaminants.

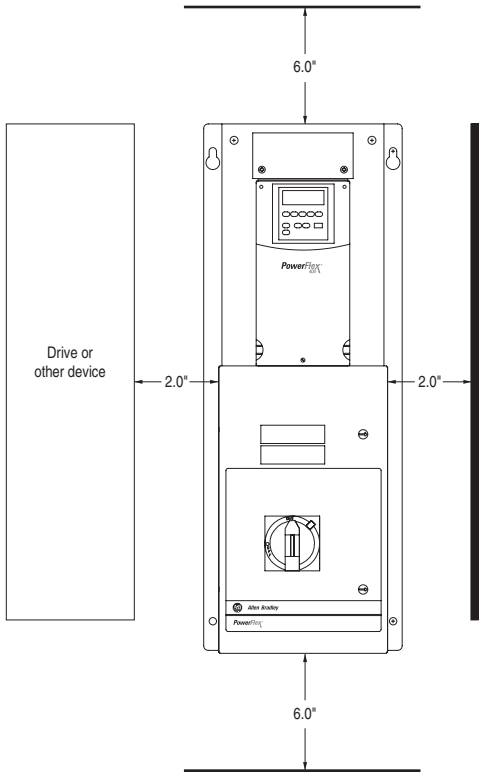
Maximum Surrounding Air Temperature

VTAC 9 Adjustable Frequency Drive Packages are designed to operate at 0° to 40°C (32° to 104°F) surrounding air temperature.

Minimum Mounting Clearances

Be sure there is adequate clearance for air circulation around the drive. For best air movement, do not mount drives directly above each other. Note that no devices are to be mounted behind the drive. This area must be kept clear of all control and power wiring.

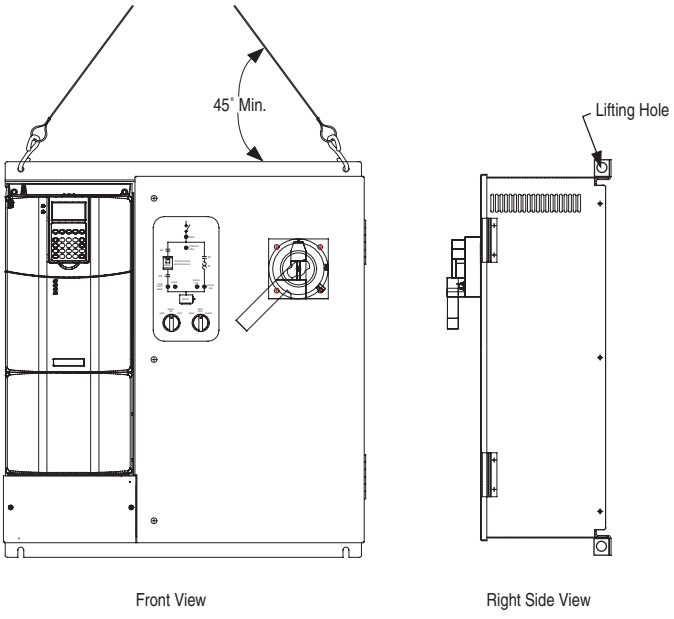
Figure 4.1 Minimum Mounting Clearances



Lifting and Mounting the Drive

Care should be used to prevent damage due to dropping or jolting when moving the drive. A fork lift truck or similar mains of lifting and transporting may be used. Sling in a manner that will equalize the load at the pickup points. Use a spreader bar if the angle of the sling is less than 45 degrees relative to horizontal. Do no jolt while lifting.

Figure 4.2 Lifting the Drive



Use the following procedure to lift and mount the drive.

1. Attach a sling with safety hooks or clevis clamps to the two lifting holes. Make certain that the angle of the sling is not less than 45 degrees relative to horizontal.
2. Using an overhead or portable hoist, attach a free-fall chain to the chain secured to the drive. Take up any vertical slack in the chain.
3. Using the hoist, lift the drive from the horizontal shipping pallet.
4. Position the drive.
5. Attach the drive to a vertical surface using the mounting holes provided. Use washers under the bolt heads.

Watts Loss

The following table lists watt loss data for VTAC 9 Adjustable Frequency Drive Packages running at full load, full speed and a factory default PWM frequency of 4kHz.

Table 4.A Watts Loss at Full Load/Speed, 4 kHz

		Total Watts		
Voltage	HP	Style A	Style B	Style M
208V AC	1.0	51	61	61
	2.0	67	77	77
	3.0	93	103	103
	5.0	175	185	185
	7.5	240	250	250
	10	319	329	329
	15	426	436	436
	20	540	550	550
	25	702	712	712
	30	876	886	886
	40	967	977	977
460V AC	1.0	47	57	57
	2.0	65	75	75
	3.0	89	99	99
	5.0	128	138	138
	7.5	168	178	178
	10	225	235	235
	15	340	350	350
	20	476	486	486
	25	404	414	414
	30	438	448	448
	40	551	561	561
	50	690	700	700
	60	930	940	940
	75	1107	1117	1117
	100	1479	1489	1489
	125	1845	1855	1855
	150	2204	2214	2214
	200	2513	2513	2513

Weights

The following tables list weights for VTAC 9 Adjustable Frequency Drive Packages. Weights are approximate.

Table 4.B Main Input Disconnect Package *(Style A)*

Voltage	Input Line Reactor	HP	Weight: kg (lbs)
208V AC	No	1.0…3.0	32
		5.0	39
		7.5…10	47
		15…25	98
		30	191
		40	Consult Factory
	Yes	1.0…3.0	45
		5.0	46
		7.5…10	71
		15…25	187
		30	242
		40	Consult Factory
460V AC	No	1.0…5.0	32
		7.5…10	39
		15…25	47
		30	58
		40…50	98
		60	191
		75…100	174
		125…200	364
	Yes	1.0…5.0	45
		7.5…10	46
		15…25	71
		30	78
		40…50	187
		60	242
		75…100	293

Table 4.C Bypass Package *(Style B)*

Voltage	Input Line Reactor	HP	Weight: kg (lbs)
208V AC	No	1.0…3.0	46
		5.0	54
		7.5…10	65
		15…25	181
		30	229
	Yes	1.0…3.0	65
		5.0	76
		7.5…10	91
		15…25	232
		30	280
460V AC	No	1.0…5.0	46
		7.5…10	54
		15…25	65
		30	74
		40…50	181
		60	229
		75…100	284
		125…200	432
	Yes	1.0…5.0	65
		7.5…10	76
		15…25	91
		30	106
		40…50	232
		60	280
		75…100	351

Table 4.D Manual Bypass Package *(Style M)*

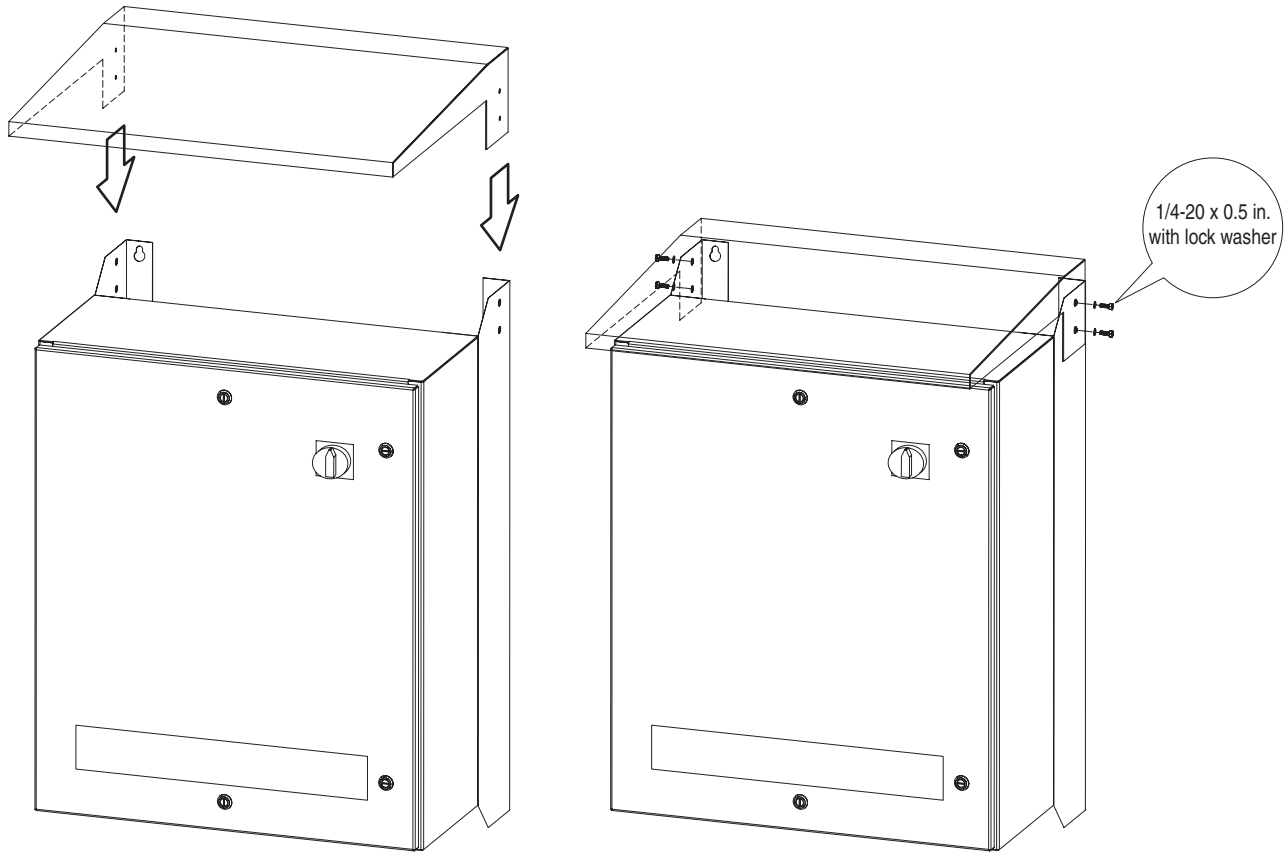
Voltage	Input Line Reactor	HP	Weight kg (lbs)
208V AC	No	1.0…3.0	42
		5.0	50
		7.5…10	55
		15…25	176
		30	216
460V AC	No	1.0…5.0	42
		7.5…10	50
		15…25	55
		30	68
		40…50	176
		75…100	269

Enclosure Sunshade

Mounting

1. Align the bolt holes on the sunshade and enclosure mounting legs.
2. Secure the sunshade with the supplied bolts and lock washers.

Figure 4.3 Fasten Sunshade to Enclosure Mounting Legs



Sunshade Dimensions

Figure 4.4 1-3 HP, 208V AC and 1-5 HP, 460V AC Drives NEMA/UL Type 4/3R

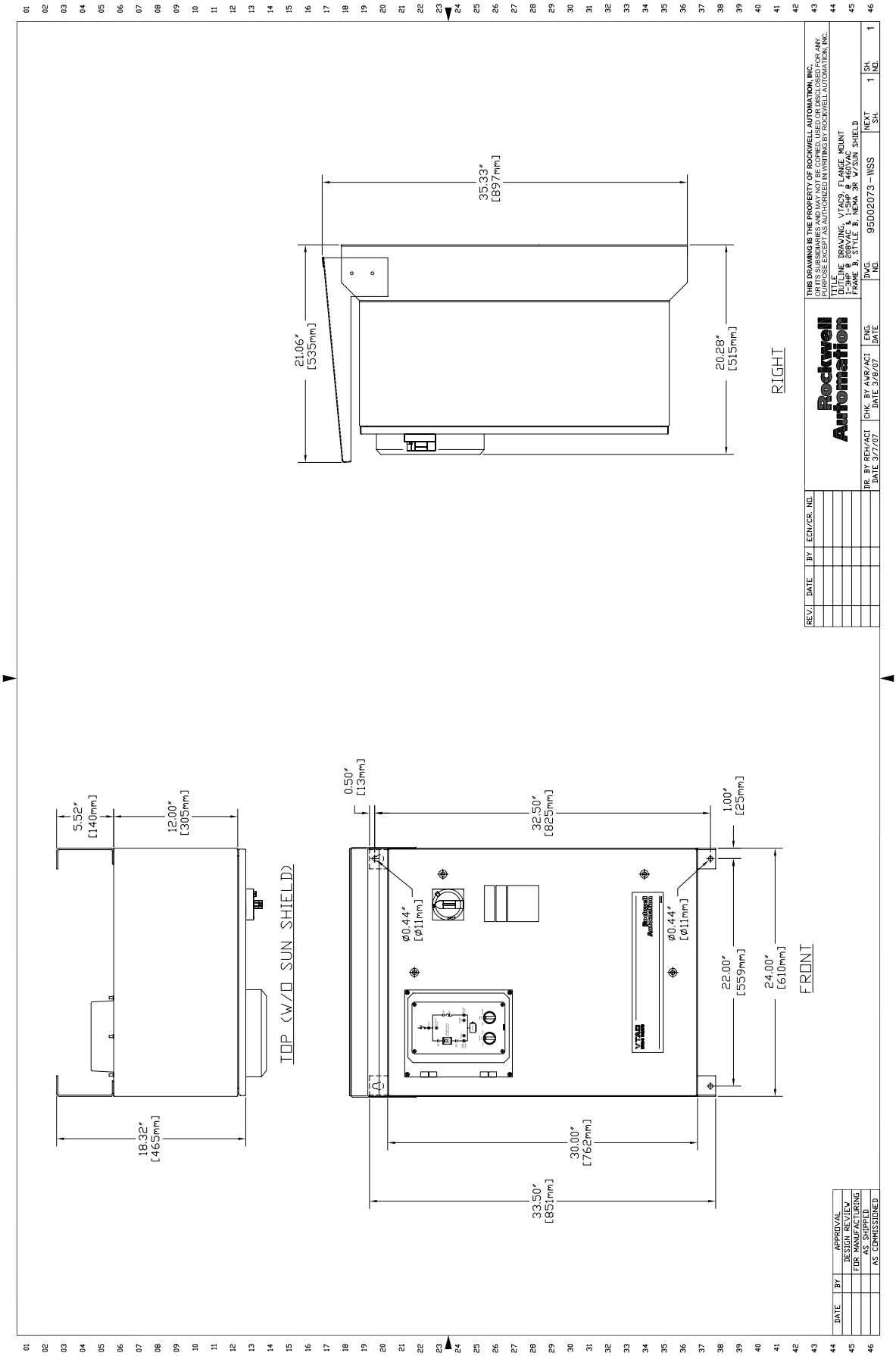


Figure 4.5 5 HP, 208V AC and 7.5-10 HP, 460V AC Drives NEMA/UL Type 4/3R

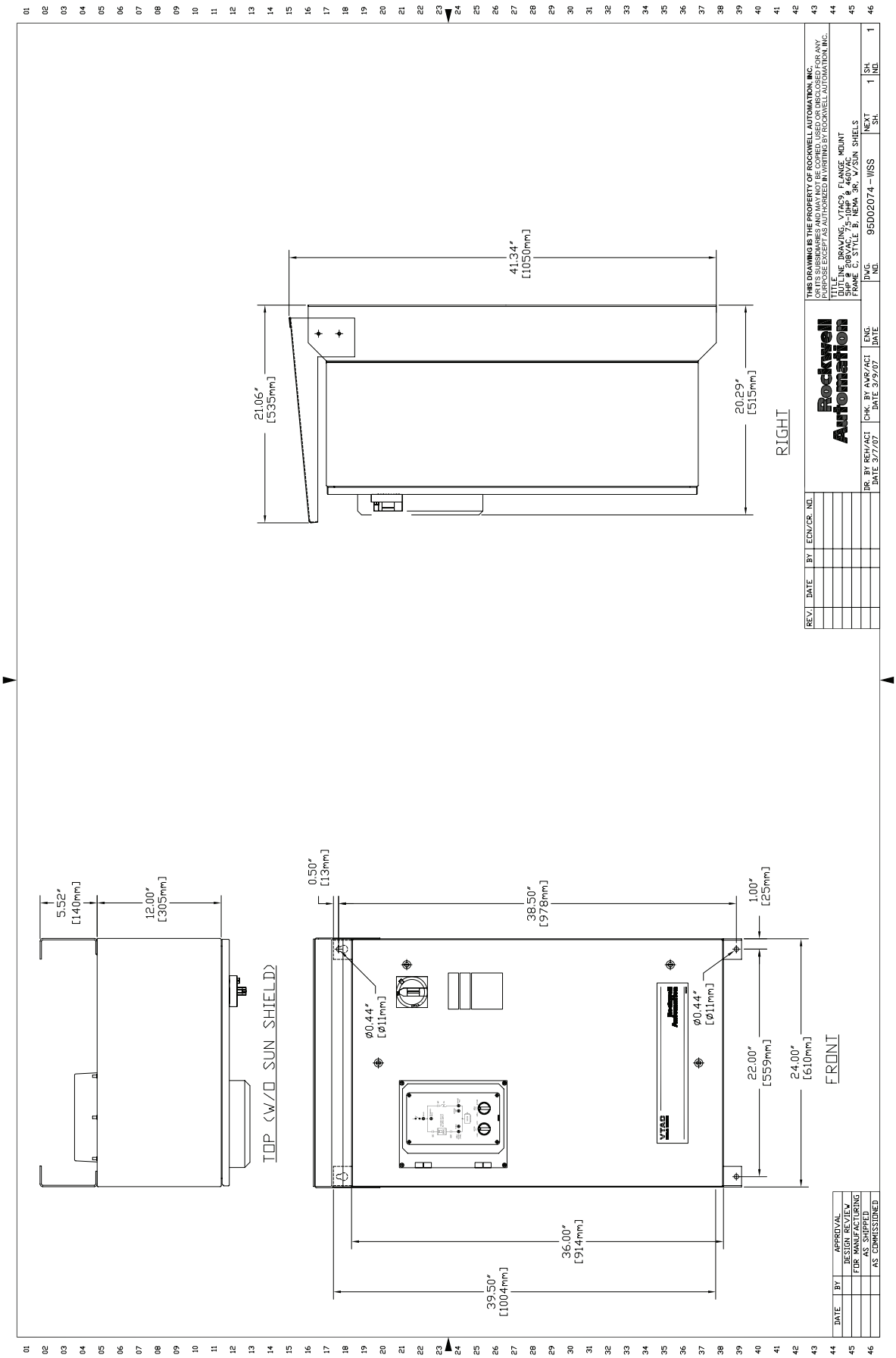


Figure 4.6 7.5-10 HP, 208V AC and 15-30 HP, 460V AC Drives NEMA/UL Type 4/3R

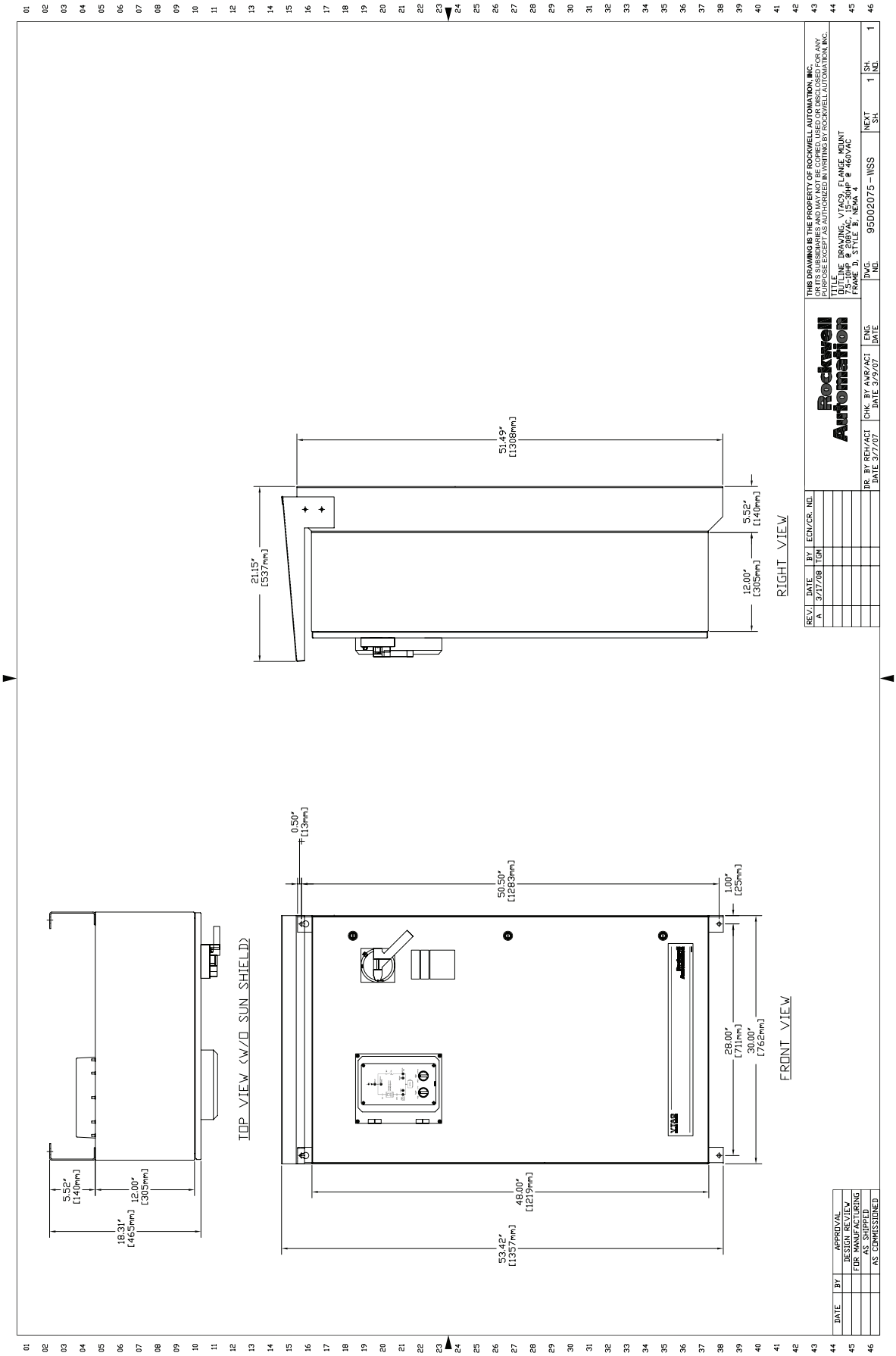
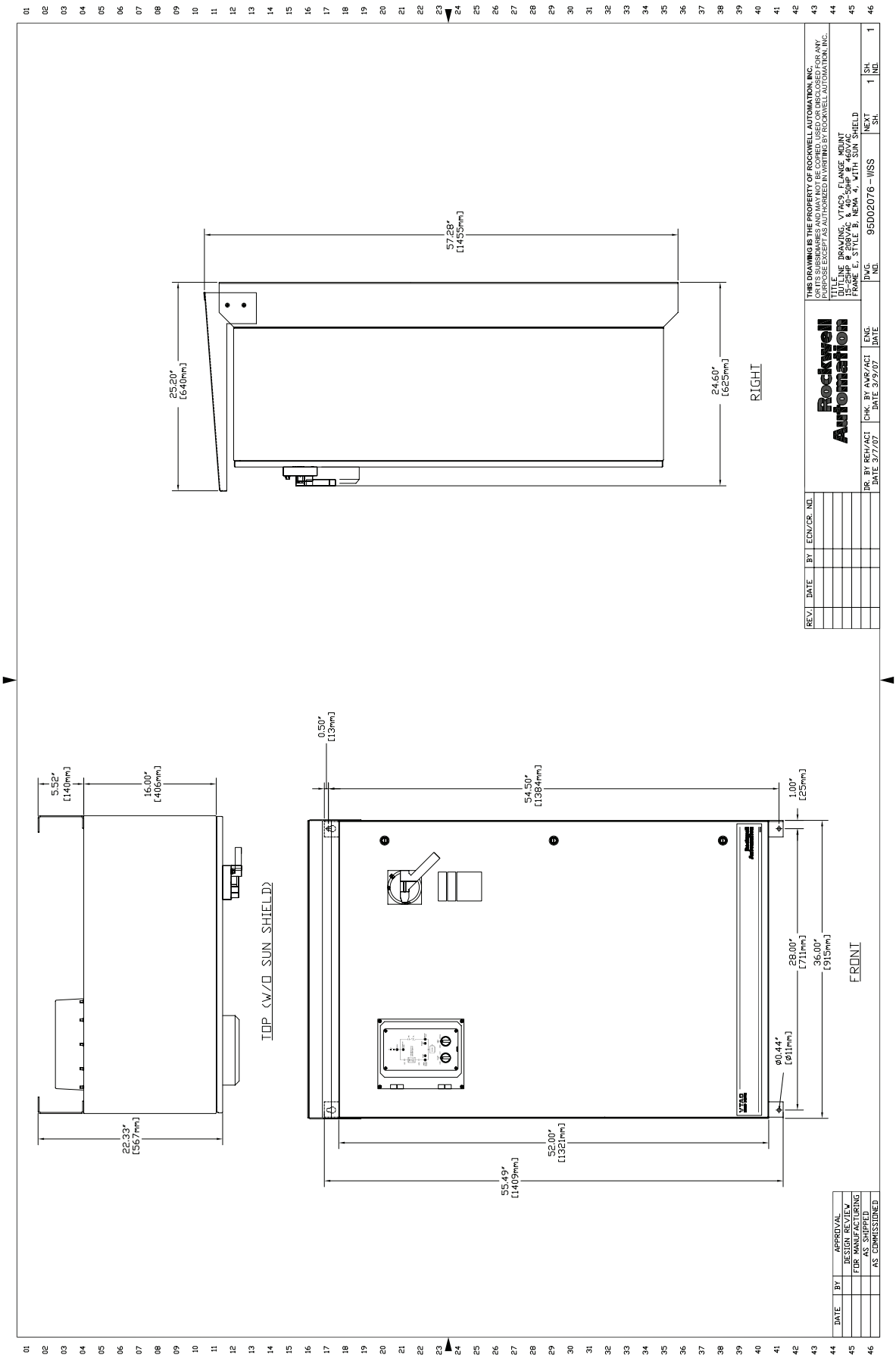


Figure 4.7 15-25 HP, 208V AC and 40-50 HP, 460V AC Drives NEMA/UL Type 4/3R



Notes:

Supplemental Information

Chapter Objectives

This chapter lists the replacement parts for the drive packages.

Specifications

Category	Specification	
Environment	Altitude:	1000 m (3300 ft.) max. without derating
	Surrounding Air Temperature without Derating:	0 to 40° C (32 to 104° F)
	Storage Temperature (all const.):	-40 to 70° C (-40 to 158° F)
	Relative Humidity:	5 to 95% non-condensing
	Shock:	15 G peak for 11 ms duration (+/- 1.0 ms)
	Vibration:	0.152 mm (0.006 in.) displacement, 1 G peak, 5.5 Hz
All Others	Refer to the VTAC 9 User Manual.	

Notes:

Replacement Parts

Main Input Disconnect Package (Style A)

Description	Designation	Voltage	HP	Part Number	Manufacturer
Disconnect Switch	DS	208V AC	1.0-5.0	194R-NJ30P3	Allen-Bradley
			7.5-10	194R-NJ60P3	Allen-Bradley
			15-20	194R-NJ100P3	Allen-Bradley
			25-40	194R-NJ200P3	Allen-Bradley
		460V AC	1.0-10	194R-NJ30P3	Allen-Bradley
			15-25	194R-NJ60P3	Allen-Bradley
			30-50	194R-NJ100P3	Allen-Bradley
			60-100	194R-NJ200P3	Allen-Bradley
			125-150	194R-NJ400P3	Allen-Bradley
Operator Handle		208V AC	1.0-10	194R-HS1	Allen-Bradley
			15-40	194R-HM1	Allen-Bradley
		460V AC	1.0-25	194R-HS1	Allen-Bradley
			30-150	194R-HM1	Allen-Bradley
Operator Shaft		208V AC	1.0-10	194R-R2	Allen-Bradley
			15-40	194R-R4	Allen-Bradley
		460V AC	1.0-25	194R-R2	Allen-Bradley
			30-100	194R-R4	Allen-Bradley
			125-150	194R-R6	Allen-Bradley
Main Fuses	FU1-FU3	208V AC	1.0	AJT-10	Gould-Shawmut
			2.0	AJT-15	Gould-Shawmut
			3.0	AJT-20	Gould-Shawmut
			5.0	AJT-20	Gould-Shawmut
			7.5	AJT-35	Gould-Shawmut
			10	AJT-40	Gould-Shawmut
			15	AJT-80	Gould-Shawmut
			20	AJT-100	Gould-Shawmut
			25	AJT-125	Gould-Shawmut
			30	AJT-150	Gould-Shawmut
			40	AJT-200	Gould-Shawmut
		460V AC	1.0	AJT-6	Gould-Shawmut
			2.0	AJT-10	Gould-Shawmut
			3.0	AJT-10	Gould-Shawmut
			5.0	AJT-15	Gould-Shawmut
			7.5-10	AJT-20	Gould-Shawmut
			15-20	AJT-35	Gould-Shawmut
			25	AJT-60	Gould-Shawmut
			30	AJT-70	Gould-Shawmut
			40	AJT-80	Gould-Shawmut
			50	AJT-100	Gould-Shawmut
			60	AJT-150	Gould-Shawmut
			75	AJT-175	Gould-Shawmut
			100	AJT-200	Gould-Shawmut
			125	AJT-250	Gould-Shawmut
			150	AJT-350	Gould-Shawmut
Drive Module	DM1	208V AC	1-2	9VT-221H0N-D00	VTAC
			3	9VT-321H0N-D00	VTAC
			5	9VT-521H0N-D00	VTAC
			7.5	9VT-721H0N-D00	VTAC
			10	9VT-1021H0N-D00	VTAC
			15-20	9VT-2021H0N-D00	VTAC
			25	9VT-2521H0N-D00	VTAC
			30	9VT-3021H0A-D00	VTAC
			40	9VT-4021H0A-D00	VTAC
		460V AC	1-3	9VT-341H0N-D00	VTAC
			5	9VT-541H0N-D00	VTAC
			7.5	9VT-741H0N-D00	VTAC
			10	9VT-1041H0N-D00	VTAC
			15	9VT-1541H0N-D00	VTAC
			20	9VT-2041H0N-D00	VTAC
			25	9VT-2541H0N-D00	VTAC
			30	9VT-3041H0N-D00	VTAC
			40	9VT-4041H0N-D00	VTAC
			50	9VT-5041H0N-D00	VTAC
			60	9VT-6041H0A-D00	VTAC
			75	9VT-7541H0A-D00	VTAC
			100	9VT-10041H0A-D00	VTAC
			125	9VT-12541H0A-D00	VTAC
			150	9VT-15041H0A-D00	VTAC

Bypass Package (Style B)

Description	Designation.	Voltage	HP	Part Number	Manufacturer
Disconnect Switch	DS	208V AC	1.0-5.0	194R-NJ30P3	Allen-Bradley
			7.5-10	194R-NJ60P3	Allen-Bradley
			15-20	194R-NJ100P3	Allen-Bradley
			25-40	194R-NJ200P3	Allen-Bradley
		460V AC	1.0-10	194R-NJ30P3	Allen-Bradley
			15-25	194R-NJ60P3	Allen-Bradley
			30-50	194R-NJ100P3	Allen-Bradley
			60-100	194R-NJ200P3	Allen-Bradley
			125-150	194R-NJ400P3	Allen-Bradley
Operator Handle		208V AC	1.0-10	194R-HS1	Allen-Bradley
			15-40	194R-HM1	Allen-Bradley
		460V AC	1.0-25	194R-HS1	Allen-Bradley
			30-150	194R-HM1	Allen-Bradley
Operator Shaft		208V AC	1.0-10	194R-R2	Allen-Bradley
			15-40	194R-R4	Allen-Bradley
		460V AC	1.0-25	194R-R2	Allen-Bradley
			30-100	194R-R4	Allen-Bradley
			125-150	194R-R6	Allen-Bradley
Main Fuses	FU1-FU3	208V AC	1.0	AJT-10	Gould-Shawmut
			2.0	AJT-15	Gould-Shawmut
			3.0	AJT-20	Gould-Shawmut
			5.0	AJT-20	Gould-Shawmut
			7.5	AJT-35	Gould-Shawmut
			10	AJT-40	Gould-Shawmut
			15	AJT-80	Gould-Shawmut
			20	AJT-100	Gould-Shawmut
			25	AJT-125	Gould-Shawmut
			30	AJT-150	Gould-Shawmut
			40	AJT-200	Gould-Shawmut
		460V AC	1.0	AJT-6	Gould-Shawmut
			2.0	AJT-10	Gould-Shawmut
			3.0	AJT-10	Gould-Shawmut
			5.0	AJT-15	Gould-Shawmut
			7.5-10	AJT-20	Gould-Shawmut
			15-20	AJT-35	Gould-Shawmut
			25	AJT-60	Gould-Shawmut
			30	AJT-70	Gould-Shawmut
			40	AJT-80	Gould-Shawmut
			50	AJT-100	Gould-Shawmut
			60	AJT-150	Gould-Shawmut
			75	AJT-175	Gould-Shawmut
			100	AJT-200	Gould-Shawmut
			125	AJT-250	Gould-Shawmut
			150	AJT-350	Gould-Shawmut
Control Transformer	T1	208V AC	1.0-10	TB-2-69300	ACME
			15-30	TB-2-69301	ACME
			40	TB-2-69302	ACME
		460V AC	1.0-20	TB-2-69300	ACME
			25-60	TB-2-69301	ACME
			75-150	TB-2-69302	ACME
Control Transformer Fuses	FU4-FU5	208V AC	1.0-10	ATQR-1	Gould-Shawmut
			15-30	ATQR-2	Gould-Shawmut
			40	ATQR-3	Gould-Shawmut
		480V AC	1.0-60	ATQR-1	Gould-Shawmut
			75-150	ATQR-2	Gould-Shawmut
Bypass Contactor	BC	208V AC	1.0-5.0	100-C23D10	Allen-Bradley
			7.5-10	100-C37D00	Allen-Bradley
			15	100-C60D00	Allen-Bradley
			20	100-C72D00	Allen-Bradley
			25	100-C85D00	Allen-Bradley
			30-40	100-D110ED11	Allen-Bradley
		460V AC	1.0-10	100-C16D10	Allen-Bradley
			15-25	100-C37D10	Allen-Bradley
			30	100-C43D00	Allen-Bradley
			40-50	100-C72D00	Allen-Bradley
			60	100-C85D00	Allen-Bradley
			75	100-D110ED11	Allen-Bradley
			100	100-D140ED11	Allen-Bradley
			125-150	100-D180ED11	Allen-Bradley

Description	Designation.	Voltage	HP	Part Number	Manufacturer
Drive Input Contactor	DIC	208V AC	1.0-10	100-C16D10	Allen-Bradley
			15	100-C37D00	Allen-Bradley
			20	100-C43D00	Allen-Bradley
			25-30	100-C72D00	Allen-Bradley
			40	100-D110ED11	Allen-Bradley
		460V AC	1.0-20	100-C16D10	Allen-Bradley
			25-30	100-C37D00	Allen-Bradley
			40	100-C43D00	Allen-Bradley
			50-60	100-C72D00	Allen-Bradley
			75	100-C85D00	Allen-Bradley
			100-125	100-D110ED11	Allen-Bradley
			150	100-D140ED11	Allen-Bradley
Drive Output Contactor	DOC	208V AC	1.0-7.5	100-C16D10	Allen-Bradley
			10	100-C23D10	Allen-Bradley
			15	100-C37D00	Allen-Bradley
			20	100-C43D00	Allen-Bradley
			25-30	100-C72D00	Allen-Bradley
			40	100-D110ED11	Allen-Bradley
		460V AC	1.0-20	100-C16D10	Allen-Bradley
			25-30	100-C37D00	Allen-Bradley
			40	100-C43D00	Allen-Bradley
			50-60	100-C72D00	Allen-Bradley
			75	100-C85D00	Allen-Bradley
			100-125	100-D110ED11	Allen-Bradley
			150	100-D140ED11	Allen-Bradley
Overload Relay	OL	208V AC	1.0	193-EA2EB	Allen-Bradley
			2.0-3.0	193-EA2FB	Allen-Bradley
			5.0	193-EA2GB	Allen-Bradley
			7.5-10	193-EA2HC	Allen-Bradley
			15-25	193-EA2KE	Allen-Bradley
			30-40	193-A5M5	Allen-Bradley
		460V AC	1.0-2.0	193-EA2EB	Allen-Bradley
			3.0-7.5	193-EA2FB	Allen-Bradley
			10	193-EA2GB	Allen-Bradley
			15-25	193-EA2HC	Allen-Bradley
			30	193-EA2JD	Allen-Bradley
			40-60	193-EA2KE	Allen-Bradley
			75-125	193-A5M5	Allen-Bradley
			150	193-E5M5	Allen-Bradley
Bypass Control Panel	CP1	208V AC	1.0-40	VT-RE1BCP	VTAC
		460V AC	1.0-150	VT-RE1BCP	VTAC
Power Terminal Blocks	T1-T3	208V AC	1.0-7.5	1492-W10	Allen-Bradley
			10-20	1492-W16S	Allen-Bradley
			25-30	1492-J35	Allen-Bradley
			40	67013	Gould-Shawmut
		460V AC	1.0-15	1492-W10	Allen-Bradley
			20-30	1492-W16S	Allen-Bradley
			40-75	1492-J35	Allen-Bradley
			100	67013	Gould-Shawmut
			125-150	67003	Gould-Shawmut
Control Terminal Blocks	T31-T40	208V AC	1.0-40	1492-W4	VTAC
		460V AC	1.0-150	1492-W4	VTAC
Drive Module	DM1	208V AC	1-2	9VT-221H0N-D00	VTAC
			3	9VT-321H0N-D00	VTAC
			5	9VT-521H0N-D00	VTAC
			7.5	9VT-721H0N-D00	VTAC
			10	9VT-1021H0N-D00	VTAC
			15-20	9VT-2021H0N-D00	VTAC
			25	9VT-2521H0N-D00	VTAC
			30	9VT-3021H0A-D00	VTAC
			40	9VT-4021H0A-D00	VTAC
		460V AC	1-3	9VT-341H0N-D00	VTAC
			5	9VT-541H0N-D00	VTAC
			7.5	9VT-741H0N-D00	VTAC
			10	9VT-1041H0N-D00	VTAC
			15	9VT-1541H0N-D00	VTAC
			20	9VT-2041H0N-D00	VTAC
			25	9VT-2541H0N-D00	VTAC
			30	9VT-3041H0N-D00	VTAC
			40	9VT-4041H0N-D00	VTAC
			50	9VT-5041H0N-D00	VTAC
			60	9VT-6041H0A-D00	VTAC
			75	9VT-7541H0A-D00	VTAC
			100	9VT-10041H0A-D00	VTAC
			125	9VT-12541H0A-D00	VTAC
			150	9VT-15041H0A-D00	VTAC

Manual Bypass Package (Style M)

Description	Designation	Voltage	HP	Part Number	Manufacturer
Disconnect Switch	DS	460V AC	60-100	194R-NJ200P3	Allen-Bradley
Motor Protector	MP1	208V AC	1.0	140M-D8N-B63	Allen-Bradley
			2.0	140M-D8N-C10	Allen-Bradley
			3.0	140M-D2E-C10	Allen-Bradley
			5.0	140M-D8E-C20	Allen-Bradley
			7.5	140M-D8E-C25	Allen-Bradley
			10	140M-F8E-C32	Allen-Bradley
			15-20	140-CMN6300	Allen-Bradley
			25	140-CMN9000	Allen-Bradley
		460V AC	1.0	140M-D8N-B23	Allen-Bradley
			2.0	140M-D8N-B40	Allen-Bradley
			3.0	140M-D8N-B63	Allen-Bradley
			5.0	140M-C2E-C10	Allen-Bradley
			7.5-10	140M-D8E-C16	Allen-Bradley
			15	140M-D8E-C25	Allen-Bradley
			20	140M-F8E-C32	Allen-Bradley
			25	140M-F8E-C45	Allen-Bradley
			30	140-CMN-4300	Allen-Bradley
			40	140-CMN-6300	Allen-Bradley
			50	140-CMN-9000	Allen-Bradley
Operator Handle		208V AC	1.0-10	140M-C-DN66	Allen-Bradley
			15-25	140-CDN66	Allen-Bradley
		460V AC	1.0-25	140M-C-DN66	Allen-Bradley
			30-50	140-CDN66	Allen-Bradley
			60-100	194R-HM1	Allen-Bradley
Operator Shaft		208V AC	1.0-10	140M-C-DS	Allen-Bradley
		460V AC	1.0-50	140M-C-DS	Allen-Bradley
			60-100	194R-R4	Allen-Bradley
Main Fuses	FU1-FU3	460V AC	60	AJT-150	Gould-Shawmut
			75	AJT-175	Gould-Shawmut
			100	AJT-200	Gould-Shawmut
Bypass Contactor	BC	208V AC	1.0-3.0	100-C16L10	Allen-Bradley
			5.0	100-C23L10	Allen-Bradley
			7.5-10	100-C37L10	Allen-Bradley
			15	100-C60L00	Allen-Bradley
			20	100-C72L00	Allen-Bradley
			25	100-C85L00	Allen-Bradley
		460V AC	1.0-10	100-C16B10	Allen-Bradley
			15-25	100-C37B00	Allen-Bradley
			30	100-C43B00	Allen-Bradley
			40-50	100-C72B00	Allen-Bradley
			60	100-C85B00	Allen-Bradley
			75	100-D110ED11	Allen-Bradley
			100	100-D140ED11	Allen-Bradley
Drive Input Contactor	DIC	208V AC	1.0-10	100-C16L10	Allen-Bradley
			15	100-C37L00	Allen-Bradley
			20	100-C43L00	Allen-Bradley
			25	100-C72L00	Allen-Bradley
		460V AC	1.0-20	100-C16B10	Allen-Bradley
			25-30	100-C37B00	Allen-Bradley
			40	100-C43B00	Allen-Bradley
			50-60	100-C72B00	Allen-Bradley
			75	100-C85B00	Allen-Bradley
			100	100-D110ED11	Allen-Bradley
Drive Output Contactor	DOC	208V AC	1.0-7.5	100-C16L10	Allen-Bradley
			10	100-C23L10	Allen-Bradley
			15	100-C37L00	Allen-Bradley
			20	100-C43L00	Allen-Bradley
			25	100-C72L00	Allen-Bradley
		460V AC	1.0-20	100-C16B10	Allen-Bradley
			25-30	100-C37B00	Allen-Bradley
			40	100-C43B00	Allen-Bradley
			50-60	100-C72B00	Allen-Bradley
			75	100-C85B00	Allen-Bradley
			100	100-D110ED11	Allen-Bradley
Overload Relay	OL	208V AC	1.0-2.0	193-EA2FB	Allen-Bradley
		460V AC	1.0-2.0	193-EA2EB	Allen-Bradley
			3.0	193-EA2FB	Allen-Bradley
			60-100	193-A5M5	Allen-Bradley
Enable Relay	CR	208V AC	1.0-25	700-M200A24S	Allen-Bradley
		460V AC	1.0-100	700-M200A24S	Allen-Bradley

Description	Designation	Voltage	HP	Part Number	Manufacturer
Power Terminal Blocks	T1-T3	208V AC	1.0-5.0	1492-W10	Allen-Bradley
			7.5-15	1492-W16S	Allen-Bradley
			20-25	1492-J35	Allen-Bradley
		460V AC	1.0-15	1492-W10	Allen-Bradley
			20-30	1492-W16S	Allen-Bradley
			40-75	1492-J35	Allen-Bradley
			100	67013	Gould-Shawmut
Control Terminal Blocks	T19-T24	208V AC	1.0-25	1492-W4	Allen-Bradley
		460V AC	1.0-100	1492-W4	Allen-Bradley
Drive Module	DM1	208V AC	1.0-2.0	9VT-221H0N-D00	VTAC
			3.0	9VT-321H0N-D00	VTAC
			5.0	9VT-521H0N-D00	VTAC
			7.5	9VT-721H0N-D00	VTAC
			10	9VT-1021H0N-D00	VTAC
			15-20	9VT-2021H0N-D00	VTAC
			25	9VT-2521H0N-D00	VTAC
		460V AC	1.0-3.0	9VT-341H0N-D00	VTAC
			5.0	9VT-541H0N-D00	VTAC
			7.5	9VT-741H0N-D00	VTAC
			10	9VT-1041H0N-D00	VTAC
			15	9VT-1541H0N-D00	VTAC
			20	9VT-2041H0N-D00	VTAC
			25	9VT-2541H0N-D00	VTAC
			30	9VT-3041H0N-D00	VTAC
			40	9VT-4041H0N-D00	VTAC
			50	9VT-5041H0N-D00	VTAC
			60	9VT-6041H0A-D00	VTAC
			75	9VT-7541H0AD00	VTAC
			100	9VT-10041H0A-D00	VTAC

Notes:

www.rockwellautomation.com/vtac/

VTAC Headquarters

Rockwell Automation, 6400 West Enterprise Drive, Mequon, Wisconsin 53092 USA, Tel: 910 262.512.8200

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