Altivar® 61/71 Adjustable Speed Drive Controllers in Motor Control Centers

1–500 hp, 480 V or 1–50 hp, 208/240 V
Class 8998

Instruction Bulletin

80444-233-01D

Retain for future use.

SQUARE D

by Schneider Electric

Hazard Categories and Special Symbols

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

CAUTION

CAUTION, used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** property damage.

Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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Section 1—Introduction

This instruction bulletin provides supplementary installation and maintenance information for Square D® Altivar® 61/71 (ATV61/71) adjustable speed drive controllers in Square D Class 8998 motor control centers (MCCs) manufactured by Schneider Electric. Read the information provided in this bulletin in addition to all other documents shipped with the MCC.

Several features of the MCC Altivar 61/71 drive controller units require the instructions contained in this document in addition to the instructions for standard MCC units.

Reference documents shipped with Altivar 61/71 drive controllers and Class 8998 motor control centers include:

- Model 6 Motor Control Center Instruction Bulletin (80459-641-01)

  This bulletin is referred to herein as “MCC instruction bulletin.”

- ATV61/71 Documentation CD (W8175554301011A01)
- Drawings specific to the order

This equipment is shipped with the appropriate instructional literature. To replace missing documents, contact your local field sales representative.

References in this bulletin regarding additional information found in other literature may be obtained at www.us.SquareD.com.

The motor control center Altivar 61/71 drive controller unit consists of a pre-engineered MCC unit with a disconnect and an Altivar 61/71 AC drive controller for adjustable speed control of a standard 3-phase asynchronous motor.

Each MCC drive controller unit contains a circuit breaker or provisions for customer supplied fuses to achieve the short circuit rating of the unit. Each unit also contains a cooling system for thermal management. Various control and power contactor options may be included with the unit. Drawings shipped with the unit list all included options.

The Altivar 61/71 drive controller is factory set for use in most common applications. Many settings are programmed according to the power or control options ordered with the MCC drive controller unit and should not be adjusted. If adjustments to the drive controller are necessary for a particular installation, refer to the drawings included with the order and to the Altivar 61/71 Programming Manual included on the ATV61/71 Documentation CD supplied with the equipment.

The “Minimum Start-Up Procedure” section is on page 36.

Section 2—Receiving, Handling, and Storing

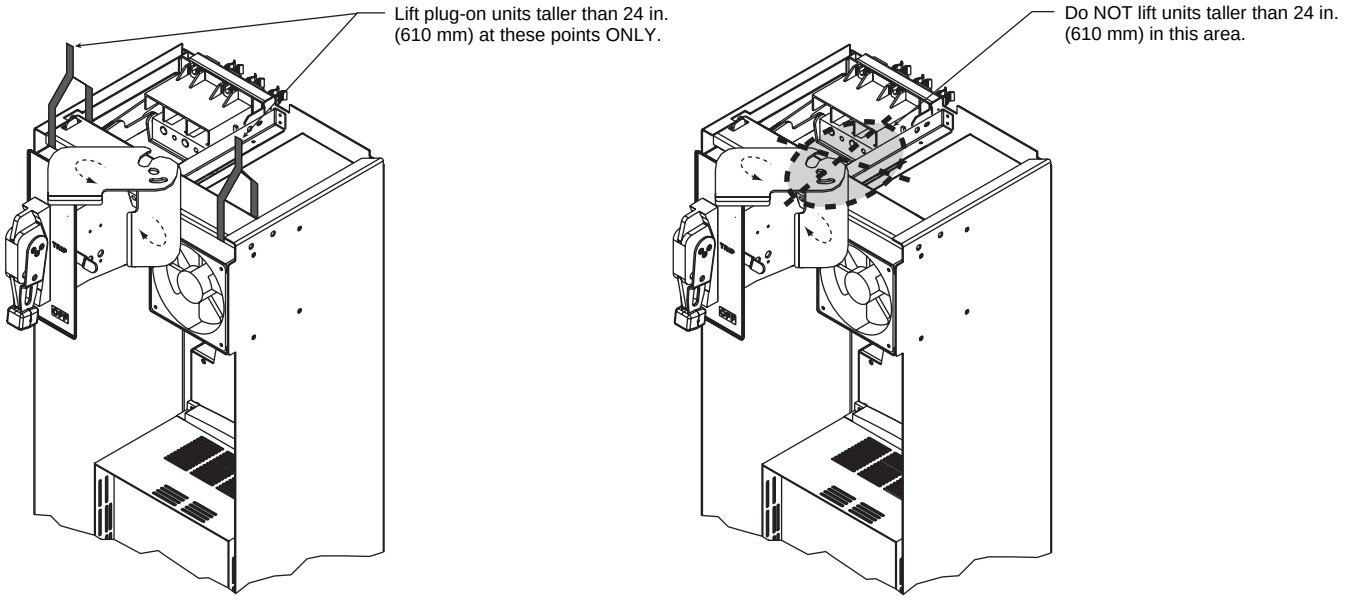
Observe the following precautions for MCC drive controller units shipped to the site as a plug-on unit.

- Lifting plug-on units taller than 24 in. (610 mm) requires two or more persons using special handling precautions and lifting devices.
- If lifting devices are used, refer to Figure 1 for proper lifting points.

Refer to the MCC instruction bulletin for information about receiving, handling, and storing of any MCC units and enclosures.

Before installing any MCC control units, locate and retighten or retorque any connections that may have loosened during shipment and handling. Refer to the procedures in the “Maintenance” section of the MCC instruction bulletin.

Figure 1: Proper/Improper Lifting Points for Plug-On Units for Units Taller than 24 in. (610 mm)



Section 3—Installation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- After disconnecting power, WAIT FIFTEEN MINUTES until the dc bus capacitors discharge. Then follow the Bus Voltage Measurement Procedure beginning on page 38 to verify the dc voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of dc bus voltage.
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

This section covers the installation of the Altivar® 61/71 drive controller plug-on unit into an MCC. For details on installing MCC full sections, refer to the “Installation” section in the MCC instruction bulletin.

Unit Rating and Frames

Table 1: Frame Sizes for 480 V MCC Altivar 61/71 Drive Controller Units

MCC Unit Frame Size	Altivar 61/71 Drive Controller Catalog No.	Horsepower Rating @ 480 V	Maximum Continuous Output (Amps)
2	ATV61H075N4 [1]	1 hp variable torque	2.1
2	ATV71H075N4 [2]	1 hp constant torque	2.1
2	ATV61HU15N4 [1]	2 hp variable torque	3.4
2	ATV71HU15N4 [2]	2 hp constant torque	3.4
2	ATV61HU15N4 [1]	3 hp variable torque	4.8
2	ATV71HU22N4 [2]	3 hp constant torque	4.8
3	ATV61HU30N4 [1]	5 hp variable torque	7.6
3	ATV71HU40N4 [2]	5 hp constant torque	7.6
3	ATV61HU40N4 [1]	7.5 hp variable torque	11
4	ATV71HU55N4 [2]	7.5 hp constant torque	11
4	ATV61HU55N4 [1]	10 hp variable torque	14
4	ATV71HU75N4 [2]	10 hp constant torque	14
4	ATV61HU75N4 [1]	15 hp variable torque	21
5A	ATV71HD11N4 [2]	15 hp constant torque	21
5A	ATV61HD11N4 [1]	20 hp variable torque	27
5B	ATV71HD15N4 [2]	20 hp constant torque	27

Table 1: Frame Sizes for 480 V MCC Altivar 61/71 Drive Controller Units *(continued)*

MCC Unit Frame Size	Altivar 61/71 Drive Controller Catalog No.	Horsepower Rating @ 480 V	Maximum Continuous Output (Amps)
5B	ATV61HD15N4 [1]	25 hp variable torque	34
5B	ATV71HD18N4 [2]	25 hp constant torque	34
5B	ATV61HD18N4 [1]	30 hp variable torque	40
6	ATV71HD22N4 [2]	30 hp constant torque	40
6	ATV61HD22N4 [1]	40 hp variable torque	52
7A	ATV71HD30N4 [2]	40 hp constant torque	52
7A	ATV61HD30N4 [1]	50 hp variable torque	65
7A	ATV71HD37N4 [2]	50 hp constant torque	65
7A	ATV61HD37N4 [1]	60 hp variable torque	77
8	ATV71HD45N4 [2]	60 hp constant torque	77
8	ATV61HD45N4 [1]	75 hp variable torque	96
8	ATV71HD55N4 [2]	75 hp constant torque	96
8	ATV61HD55N4 [1]	100 hp variable torque	124
8	ATV71HD75N4 [2]	100 hp constant torque	124
8	ATV61HD75N4 [1]	125 hp variable torque	156
9	ATV71HD90N4D [2]	125 hp constant torque	156
9B	ATV61HC11N4D [2]	150 hp variable torque	180
10	ATV71HC11N4D [2]	150 hp constant torque	180
10B	ATV61HC13N4D [2]	200 hp variable torque	240
11	ATV71HC13N4D [2]	200 hp constant torque	240
11B	ATV61HC16N4D [2]	250 hp variable torque	302
12	ATV71HC16N4D [2]	250 hp constant torque	302
12B	ATV61HC22N4D [2]	300 hp variable torque	361
12B	ATV61HC22N4D [2]	350 hp variable torque	414
13	ATV71HC20N4D [2]	300 hp constant torque	361
13	ATV71HC25N4D [2]	350 hp constant torque	414
13	ATV71HC25N4D [2]	400 hp constant torque	477
13A	ATV61HC25N4D [2]	400 hp variable torque	477
13	ATV71HC28N4D [2]	450 hp constant torque	515
13B	ATV61HC31N4D [2]	450 hp variable torque	515
13B	ATV61HC31N4D [2]	500 hp variable torque	590

[1] If a preferred replacement drive controller is available, order it by replacing the "H" in the catalog number with a "K", and adding suffix "(S)" to the end of the catalog number. For example, ATV61**K**075N4**(S)**

[2] If a preferred replacement drive controller is available, order it by adding suffix "(S)" to the end of the catalog number. For example, ATV71H075N4**(S)**

Table 2: Frame Sizes for 208/240 V MCC Altivar® 61/71 Drive Controller Units

MCC Unit Frame Size	Altivar 61/71 Drive Controller Catalog No.	Horsepower Rating	Maximum Continuous Output (Amps)
2	ATV61H075M3 [1]	1 hp @ 240V variable torque	4.2
2	ATV61HU15M3 [1]	1 hp @ 208V variable torque	4.6
2	ATV71H075M3 [2]	1hp @ 208/240V constant torque	4.6/4.2
2	ATV61HU15M3 [1]	2 hp @ 240V variable torque	6.8
2	ATV61HU30M3 [1]	2 hp @ 208V variable torque	7.5
2	ATV71HU15M3 [2]	2 hp @ 208/240V constant torque	7.5/6.8
2	ATV61HU15M3 [1]	3 hp @ 240V variable torque	9.6
2	ATV61HU30M3 [1]	3 hp @ 208V variable torque	10.6
3	ATV71HU22M3 [2]	3 hp @ 208/240V constant torque	10.6/9.6
3	ATV61HU30M3 [1]	5 hp @ 240V variable torque	15.2
3	ATV61HU40M3 [1]	5 hp @ 208V variable torque	16.7

Table 2: Frame Sizes for 208/240 V MCC Altivar® 61/71 Drive Controller Units *(continued)*

MCC Unit Frame Size	Altivar 61/71 Drive Controller Catalog No.	Horsepower Rating	Maximum Continuous Output (Amps)
3	ATV71HU40M3 [2]	5 hp @ 208/240V constant torque	16.7/15.2
3	ATV61HU40M3 [1]	7.5 hp @ 240V variable torque	22
3	ATV61HU55M3 [1]	7.5 hp @ 208V variable torque	24.2
4	ATV71HU55M3 [2]	7.5 hp @ 208/240V constant torque	24.2/22
4	ATV61HU55M3 [1]	10 hp @ 240V variable torque	28
4	ATV61HU75M3 [1]	10 hp @ 208V variable torque	30.8
5A	ATV71HU75M3 [2]	10 hp @ 208/240V constant torque	30.8/28
5A	ATV61HD11M3X [1]	15 hp @ 208V variable torque	46.2
5A	ATV61HU75M3 [1]	15 hp @ 240V variable torque	42
5B	ATV71HD11M3X [2]	15 hp @ 208/240V constant torque	46.2/42
5B	ATV61HD11M3X [1]	20 hp @ 240V variable torque	54
5B	ATV61HD15M3X [1]	20 hp @ 208V variable torque	59.4
5B	ATV71HD15M3X [2]	20 hp @ 208/240V constant torque	59.4/54
6	ATV71HD18M3X [2]	25 hp @ 208/240V constant torque	74.8/68
5B	ATV61HD15M3X [1]	25 hp @ 240V variable torque	68
5B	ATV61HD18M3X [1]	25 hp @ 208V variable torque	74.8
6	ATV61HD18M3X [1]	30 hp @ 240V variable torque	80
6	ATV61HD22M3X [1]	30 hp @ 208V variable torque	88
6	ATV71HD22M3X [2]	30 hp @ 208/240V constant torque	88/80
6	ATV61HD22M3X [1]	40 hp @ 240V variable torque	104
6	ATV61HD30M3X [1]	40 hp @ 208V variable torque	114
7B	ATV71HD30M3X [2]	40 hp @ 208/240V constant torque	114/104
7B	ATV61HD30M3X [1]	50 hp @ 240V variable torque	130

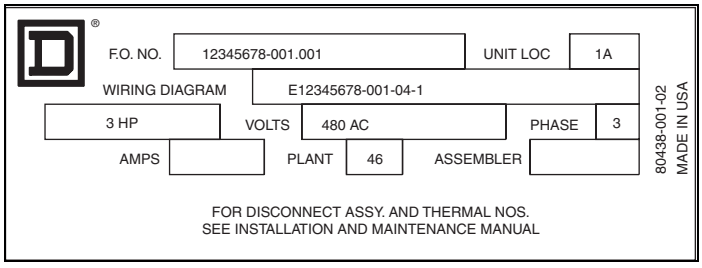
[1] If a preferred replacement drive controller is available, order it by replacing the "H" in the catalog number with a "K", and adding suffix "(S)" to the end of the catalog number. For example, ATV61**K**075N4**(S)**

[2] If a preferred replacement drive controller is available, order it by adding suffix "(S)" to the end of the catalog number. For example, ATV71H075N4**(S)**

Unit Identification

The unit identification label (shown in Figure 2 below) is located on the inside wall of the MCC drive controller unit (see Figures 3–9 on pages 12–17). The unit identification label contains typical information such as the factory order number (F.O. NO.), original location of the unit when factory installed in the MCC (UNIT LOC), factory electrical drawing for the unit (WIRING DIAGRAM), horsepower rating, unit voltage rating (VOLTS), and number of phases for which the unit is rated (PHASE). In addition, each drive controller has a catalog number label located on the front of the drive assembly. The catalog number label contains the catalog number for the open type drive controller (for example, HTV71HU40N4).

Figure 2: Typical MCC Unit Identification Label



Note the information on the unit identification label while reading this bulletin to determine which items are applicable to the installation. This information is also necessary when communicating with the factory.

Figure 3: Unit Label Locations (Typical for NEMA 1/1A MCCs, Frame Sizes 2–5B)

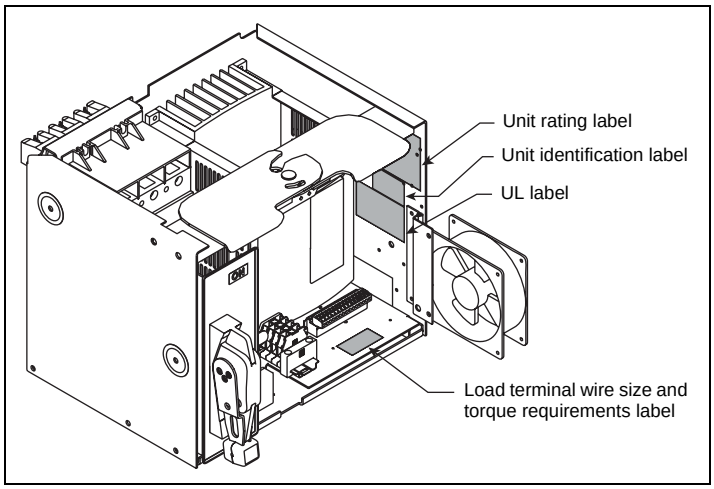


Figure 4: Unit Label Locations (Typical for NEMA 1/1A MCCs, Frame Size 6)

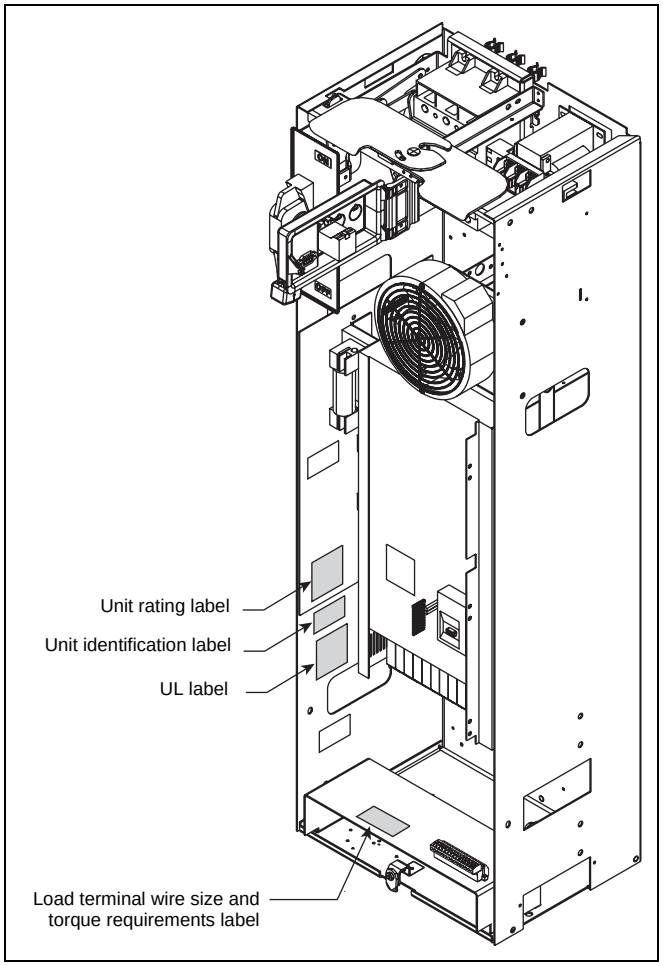


Figure 5: Unit Label Locations (Typical for NEMA 1/1A MCCs, Frame Sizes 7A–8)

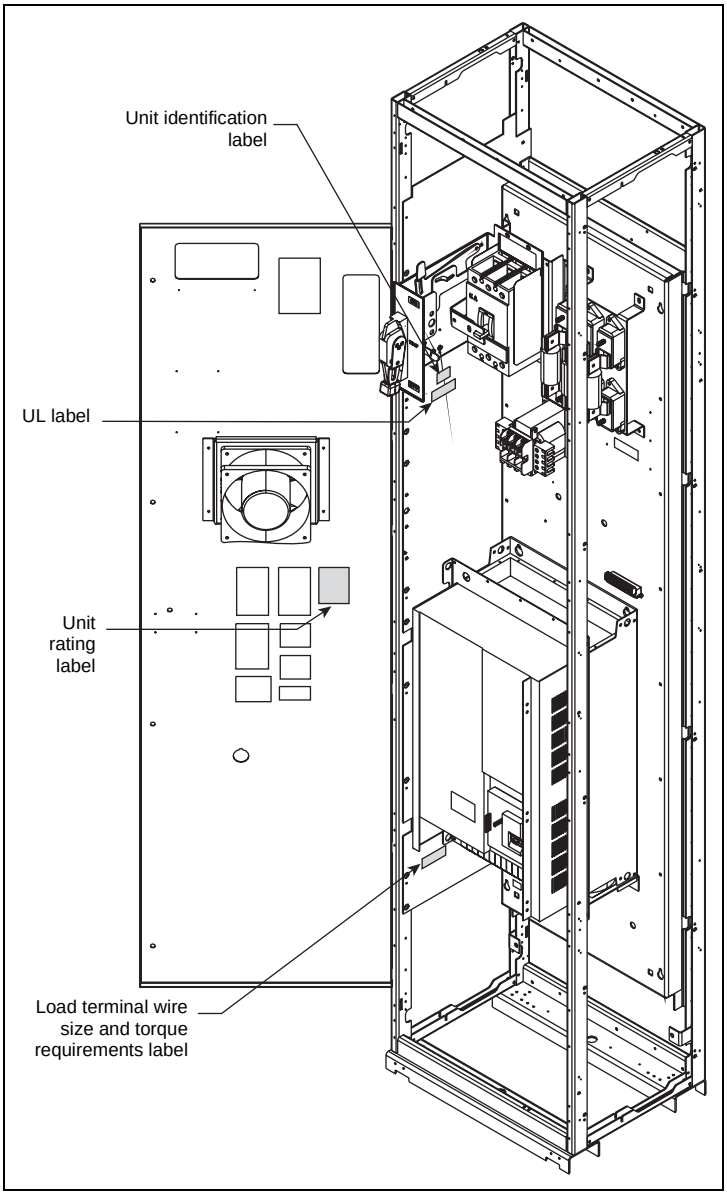


Figure 6: Unit Label Locations (Typical for NEMA 1/1A MCCs, Frame Sizes 9–13B)

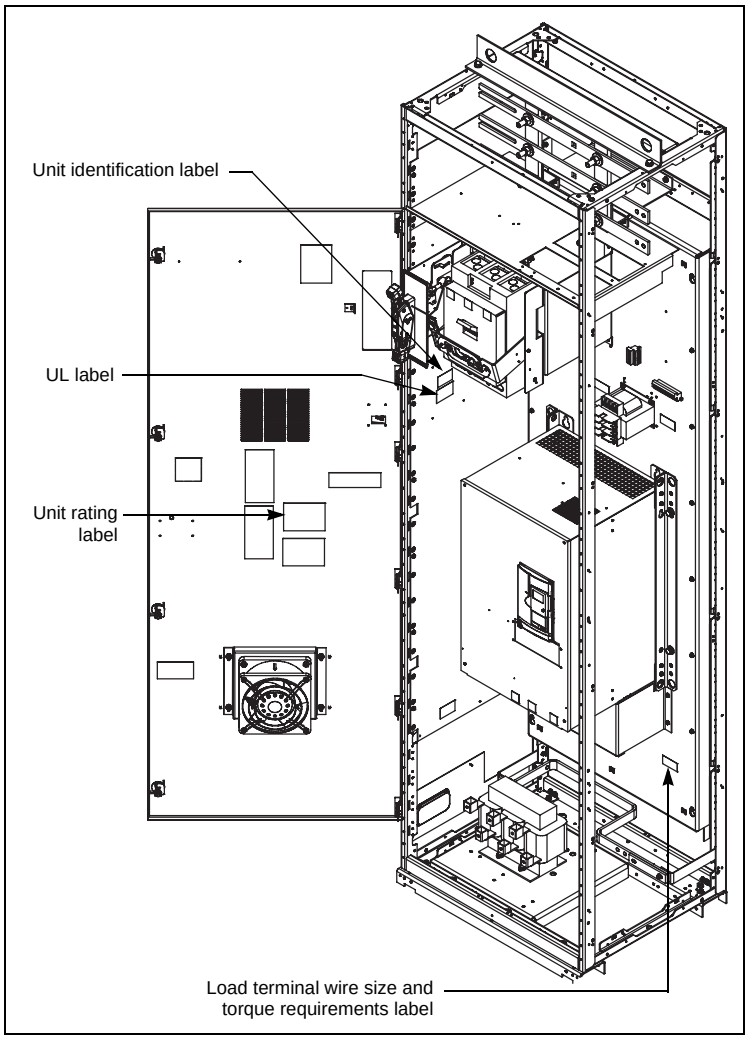


Figure 7: Unit Label Locations (Typical for NEMA 12 MCCs, Frame Sizes 2–5B)

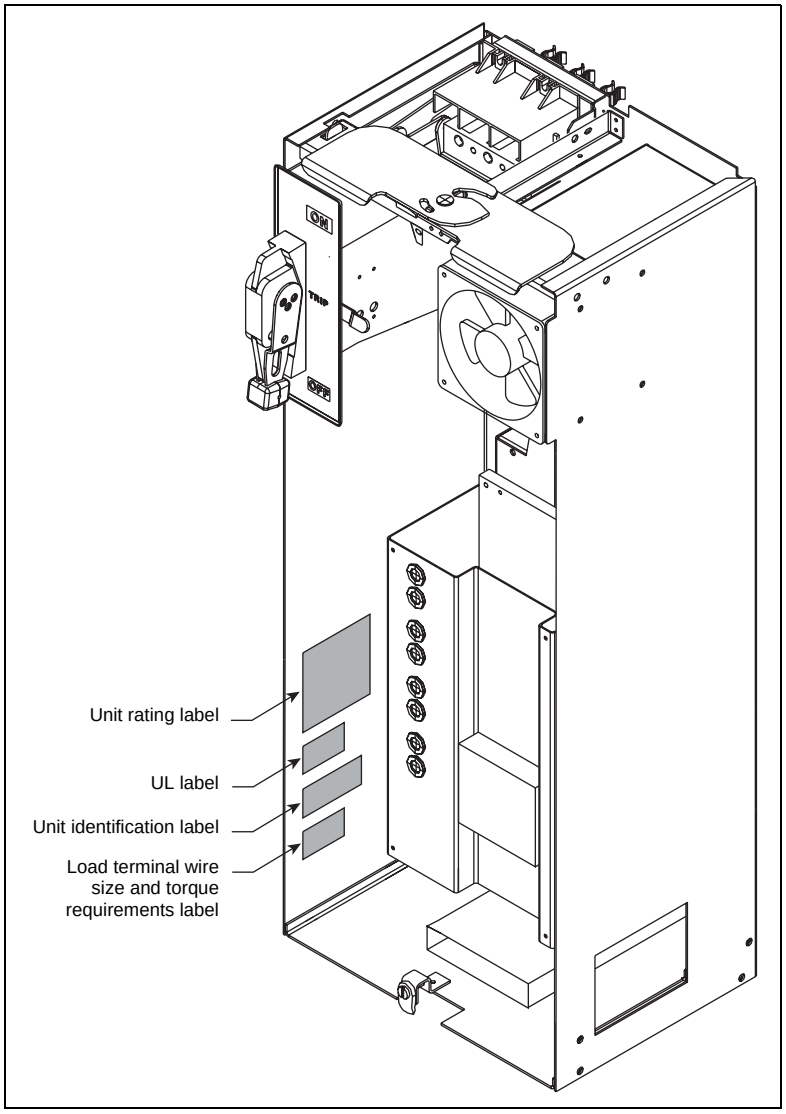


Figure 8: Unit Label Locations (Typical for NEMA 12 MCCs, Frame Size 6)

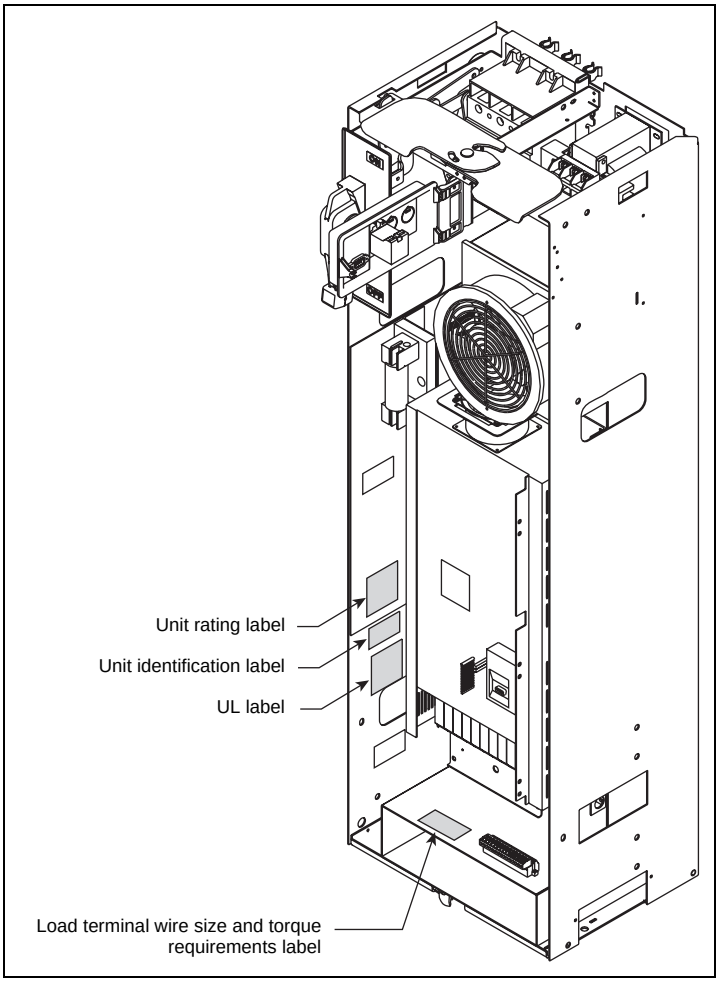
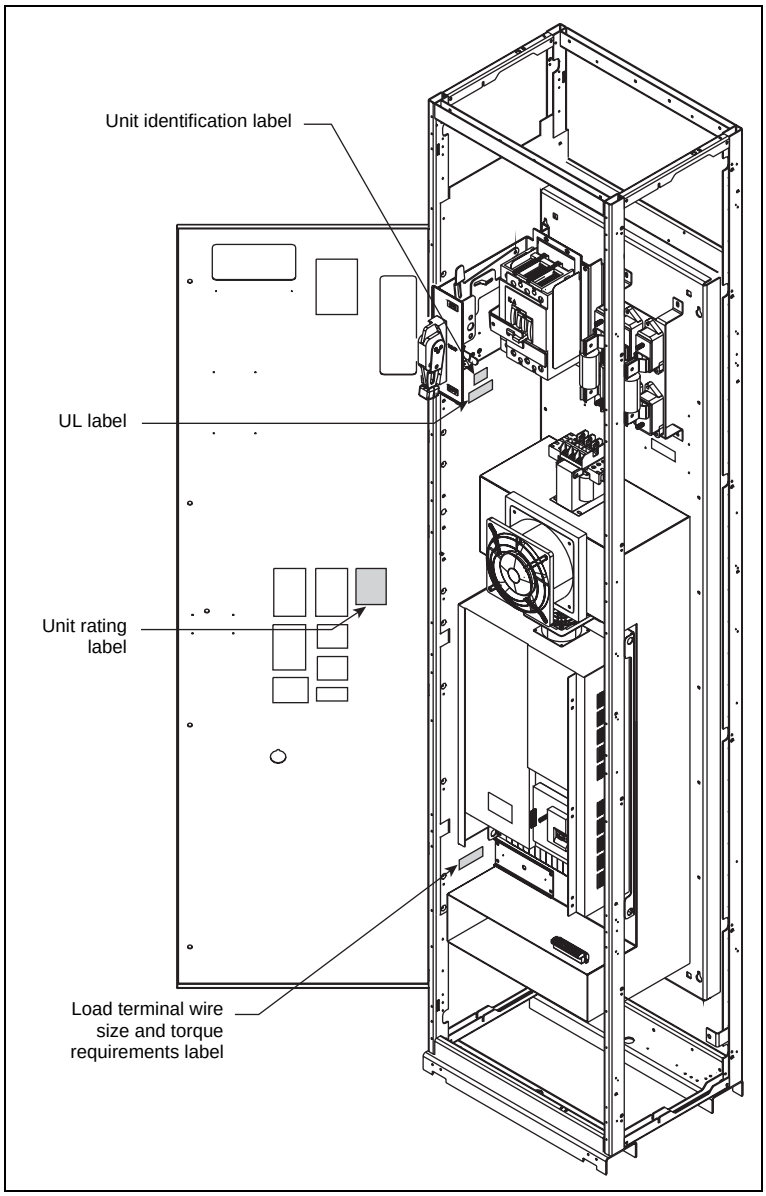


Figure 9: Unit Label Locations (Typical for NEMA 12 MCCs, Frame Sizes 7A–8)



Recommended Power Fuses

Table 3: Recommended Power Fuses[1] — MCC Altivar 61/71 AC Drives

Voltage	CT/VT	Horsepower	Schneider Electric Part Number	Bussman Catalog Number
480 V	CT	1	25423-10030	JKS-3
		2	25423-10050	JKS-5
		3	25423-10080	JKS-8
		5	25423-10120	JKS-12
		7.5	25423-10200	JKS-20
		10		
		15	25423-10350	JKS-35
		20	25423-10400	JKS-40
		25	25423-10500	JKS-50
		30	25423-10600	JKS-60
		40	25423-10800	JKS-80
		50	25423-11000	JKS-100
		60	25423-11250	JKS-125
		75	25423-11500	JKS-150
		100	Not available with fusible switch disconnect	—
		125		
		150		
		200		
		250	25423-34000	LPJ-400
		300	25423-35000	LPJ-500
		350	25423-36000	LPJ-600
		400		
		450		
	VT	1	25423-10030	JKS-3
		2	25423-10050	JKS-5
		3	25423-10080	JKS-8
		5	25423-10120	JKS-12
		7.5	25423-10200	JKS-20
		10		
		15	25423-10350	JKS-35
		20	25423-10400	JKS-40
		25	25423-10500	JKS-50
		30	25423-10600	JKS-60
		40	25423-10800	JKS-80
		50	25423-11000	JKS-100
		60	25423-11250	JKS-125
		75	25423-11500	JKS-150
		100	25423-12000	JKS-200
		125	Not available with fusible switch disconnect	—
		150		
		200		
		250		
		300	25423-36000	LPJ-600
		350		
		400		
		450		
		500		

Continued on next page

Table 3: Recommended Power Fuses[1] — MCC Altivar 61/71 AC Drives *(continued)*

Voltage	CT/VT	Horsepower	Schneider Electric Part Number	Bussman Catalog Number
240 V	CT	1	25423-10050	JKS-5
		2	25423-10120	JKS-12
		3	25423-10150	JKS-15
		5	25423-10250	JKS-25
		7.5	25423-10350	JKS-35
		10	25423-10400	JKS-40
		15	25423-10600	JKS-60
		20	25423-10800	JKS-80
		25	25423-11000	JKS-100
		30	25423-11250	JKS-125
		40	25423-11750	JKS-175
	VT	1	25423-10050	JKS-5
		2	25423-10120	JKS-12
		3	25423-10150	JKS-15
		5	25423-10250	JKS-25
		7.5	25423-10350	JKS-35
		10	25423-10400	JKS-40
		15	25423-10600	JKS-60
		20	25423-10800	JKS-80
		25	25423-11000	JKS-100
		30	25423-11250	JKS-125
		40	25423-11750	JKS-175
		50	25423-12000	JKS-200
208 V	CT	1	25423-10050	JKS-5
		2	25423-10120	JKS-12
		3	25423-10150	JKS-15
		5	25423-10250	JKS-25
		7.5	25423-10350	JKS-35
		10	25423-10500	JKS-50
		15	25423-10700	JKS-70
		20	25423-11000	JKS-100
		25	25423-11250	JKS-125
		30	25423-11500	JKS-150
		40	25423-12000	JKS-200
	VT	1	25423-10050	JKS-5
		2	25423-10120	JKS-12
		3	25423-10150	JKS-15
		5	25423-10250	JKS-25
		7.5	25423-10350	JKS-35
		10	25423-10500	JKS-50
		15	25423-10700	JKS-70
		20	25423-11000	JKS-100
		25	25423-11250	JKS-125
		30	25423-11500	JKS-150
		40	25423-12000	JKS-200

[1] Fuses are required on all drives with fusible switch disconnects and on circuit breaker disconnect drives rated 250–450 hp constant torque or 300–500 hp variable torque as shown below. All power fuses for ATV61/71 drives 1–100 hp are Class J and are supplied by the customer. All power fuses for ATV61/71 drives 250–500 hp are Class L and are installed by the MCC factory.

Control Wiring

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- After disconnecting power, WAIT FIFTEEN MINUTES until the dc bus capacitors discharge. Then follow the Bus Voltage Measurement Procedure beginning on page 38 to verify the dc voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of dc bus voltage.
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Pull-apart terminal blocks for field control wiring are typically mounted near or on the floor of the unit (see Figures 10–14 on pages 21–24). Terminate field control wiring to the removable (top) portion of the terminal block. To separate or remove the top portion of the terminal block from the base, grasp the top half and pull up (see Figure 15 on page 25). The terminal block is designated “FTB” in the figures in this bulletin and in the wiring diagram supplied with the MCC drive controller unit.

Each terminal is rated for one 16–12 AWG wire or two 16 AWG wires. Torque the terminal screws to 5 lb-in (0.6 N•m).

Depending on the power and control options ordered, several analog or digital inputs and outputs may be available at the control terminal blocks located on the Altivar® 61/71 drive controller. For I/O availability, refer to the wiring diagram supplied with the MCC drive controller unit. For I/O specifications and adjustments, refer to the Altivar 61/71 drive controller reference documents listed on page 7.

Figure 10: Location of PTB and FTB Terminal Blocks (Typical for NEMA 1/1A MCCs, Frame Sizes 2–5B)

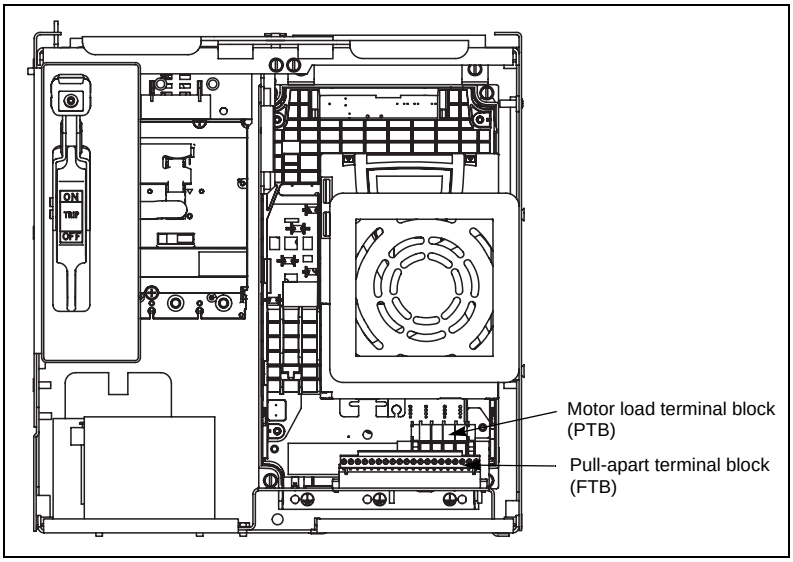


Figure 11: Location of FTB Terminal Block (Typical for NEMA 1/1A MCCs, Frame Size 6)

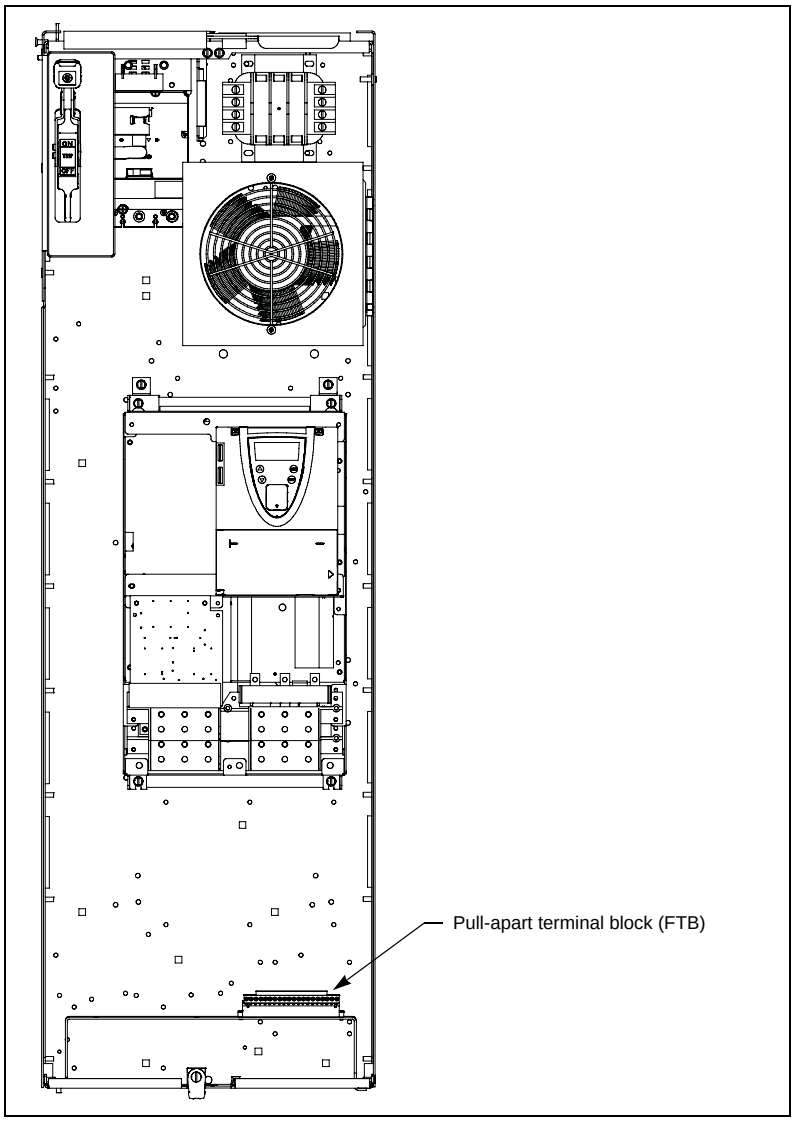


Figure 12: Location of FTB Terminal Block (Typical for NEMA 1/1A MCCs, Frame Sizes 7A–8)

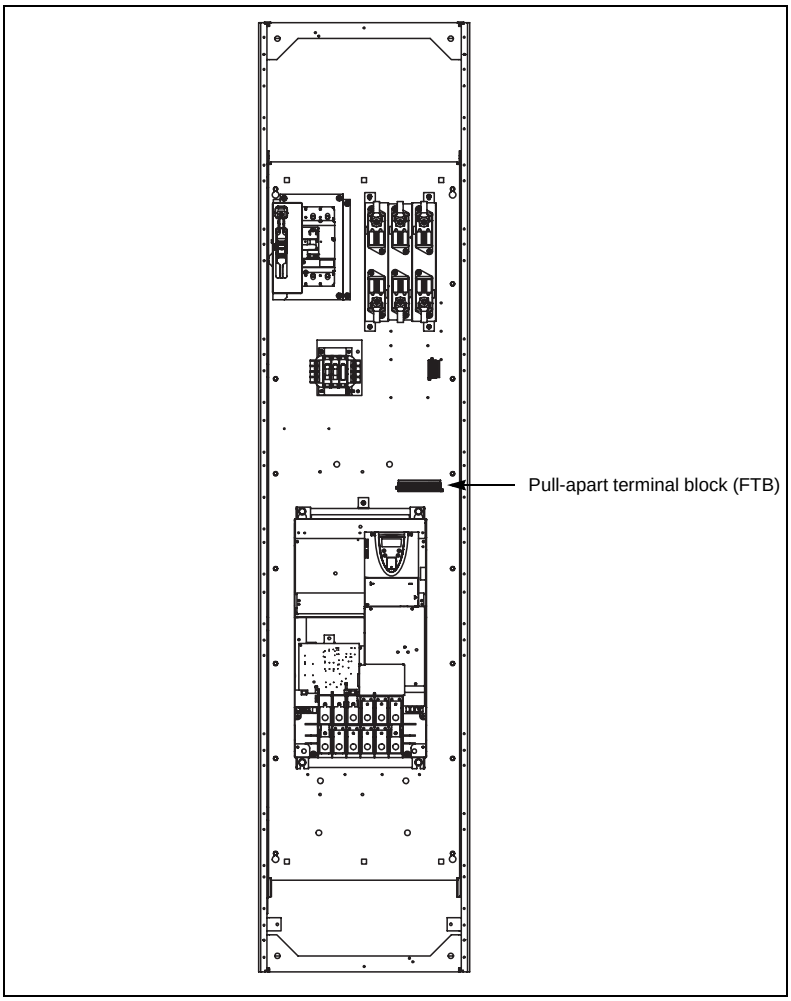


Figure 13: Location of FTB Terminal Block (Typical for NEMA 1/1A MCCs, Frame Sizes 9–13B)

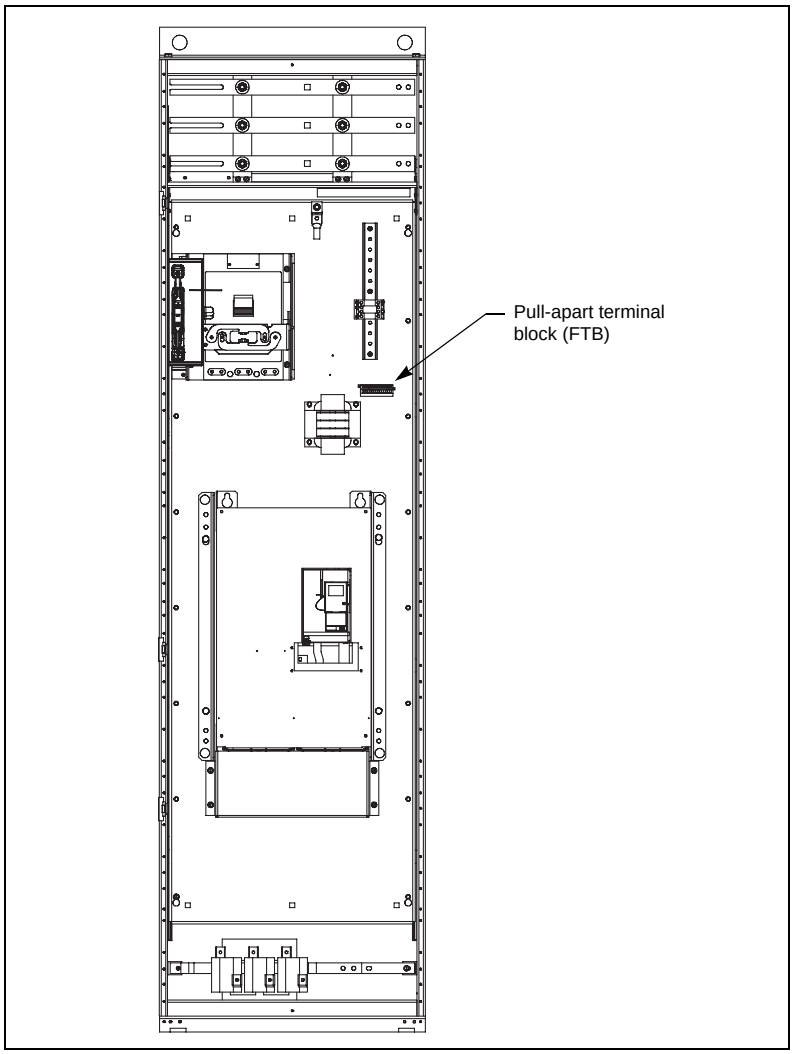


Figure 14: Location of FTB Terminal Block (Typical for NEMA 12 MCCs, Frame Sizes 2–7A)

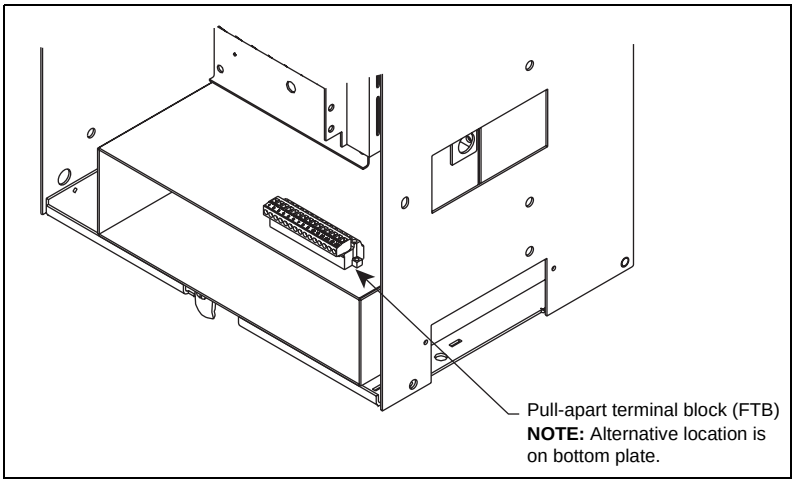
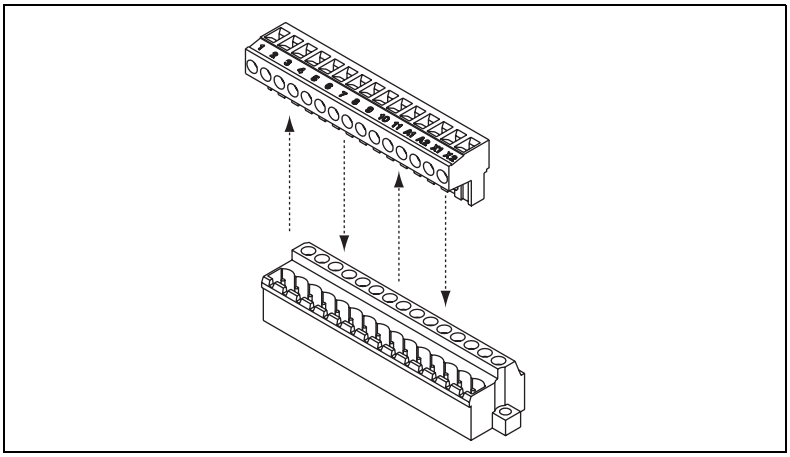


Figure 15: Pull-Apart Field Terminal Block



If a barriered bypass is supplied, additional pull-apart field terminal blocks are provided in the bypass starter unit (see Figures 16, 17, and 18 for the location of these terminal blocks). Some control schemes require connection to the terminal blocks in the bypass starter unit for field control wiring. In these cases, the wiring diagram shows the bypass starter unit location number above the terminal block number.

Figure 16: Application-Rated Compac™ 6 Barriered Bypass Unit

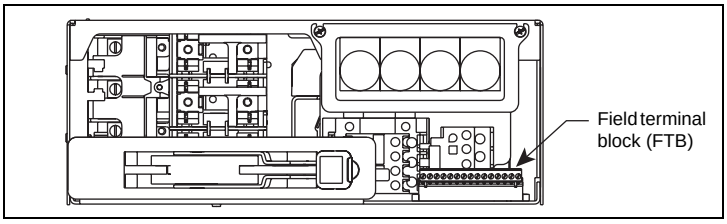


Figure 17: Typical Barriered Bypass Unit

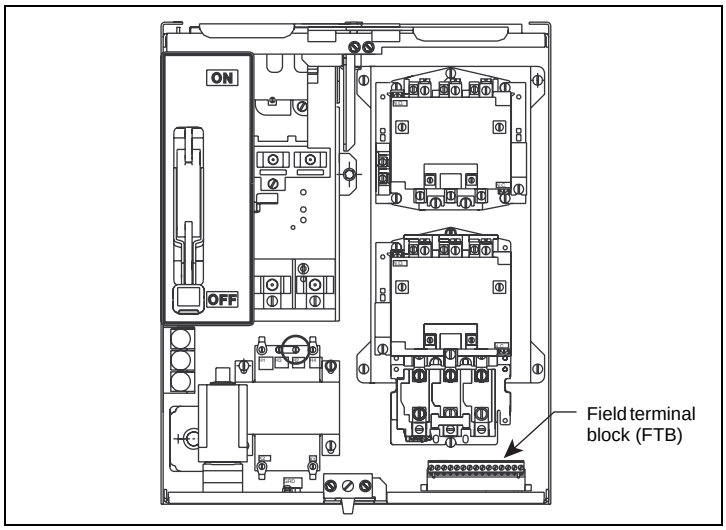
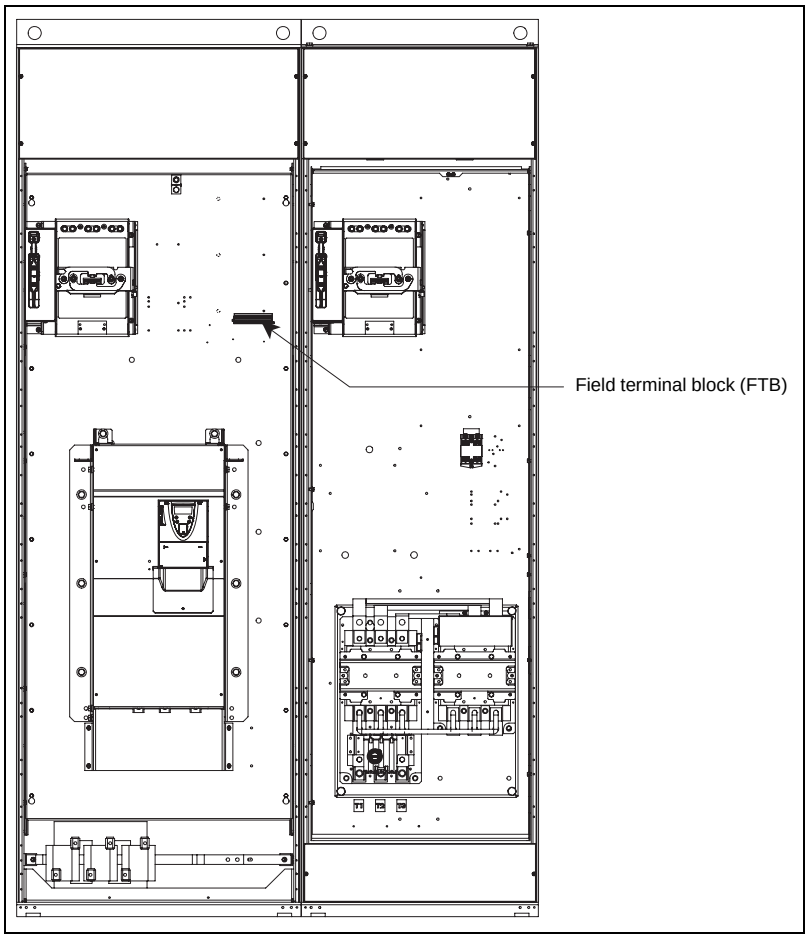
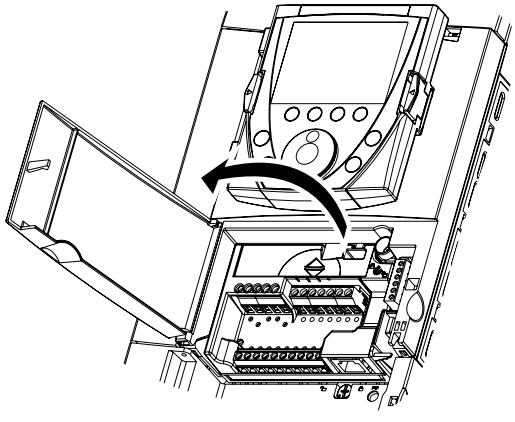


Figure 18: Full Section Barriered Bypass Unit with Altivar® 61/71 Drive



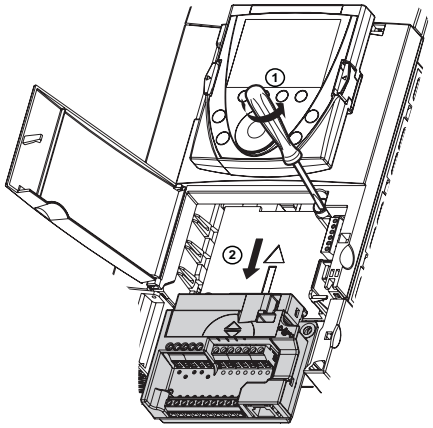
Drive I/O Terminals

Figure 19: Access to the Drive I/O Terminals



To access the control terminals, open the cover on the control front panel.

Figure 20: Removing the Terminal Card



To make it easier to wire the drive control section, the control terminal card can be removed.

- Back out the captive screw until the spring is fully extended.
- Remove the card by sliding it downwards.

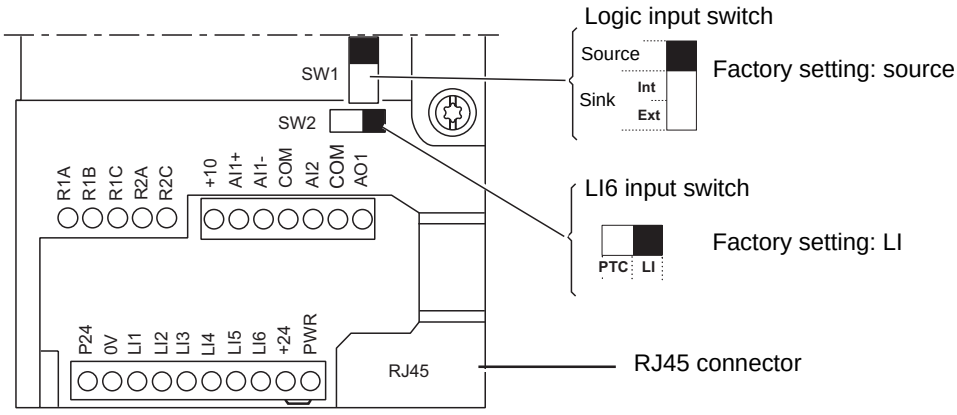
CAUTION

IMPROPERLY SECURED TERMINAL CARD

When replacing the control terminal card, it is essential to fully tighten the captive screw.

Failure to follow this instruction can result in equipment damage.

Figure 21: Control Terminals Arrangement



Maximum wire size:
2.5 mm² –AWG 14

Max. tightening torque:
0,6 Nm–5.3 lb.in

NOTES: The ATV61/71 is supplied with a link between the PWR and +24 terminals.
T1, T2, and T3 lugs are provided.

Load Wiring

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- After disconnecting power, WAIT FIFTEEN MINUTES until the dc bus capacitors discharge. Then follow the Bus Voltage Measurement Procedure beginning on page 38 to verify the dc voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of dc bus voltage.
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Frame sizes 2–5B, NEMA 1/1A MCC Altivar® 61/71 drive controller units have auxiliary power terminal blocks for motor load wiring. These terminal blocks are also mounted on the floor of the unit (see Figure 10 on page 21). Terminate load wiring to the terminal block. This terminal block is designated “PTB” in the figures in this bulletin and in the wiring diagram supplied with the MCC drive controller unit.

Frame sizes 6–13, NEMA 1/1A, and all NEMA 12 MCC Altivar 61/71 drive controller units connect motor load wiring directly to the drive controller’s power terminals (U/T1, V/T2, and W/T3). See Figures 22–28 on pages 29–32 for the location of a typical drive controller’s power terminals.

Figure 22: Location of a Typical Drive Controller's Power Terminals for NEMA 1/1A MCCs (Frame Sizes 6–8) and NEMA 12 (All Frame Sizes)

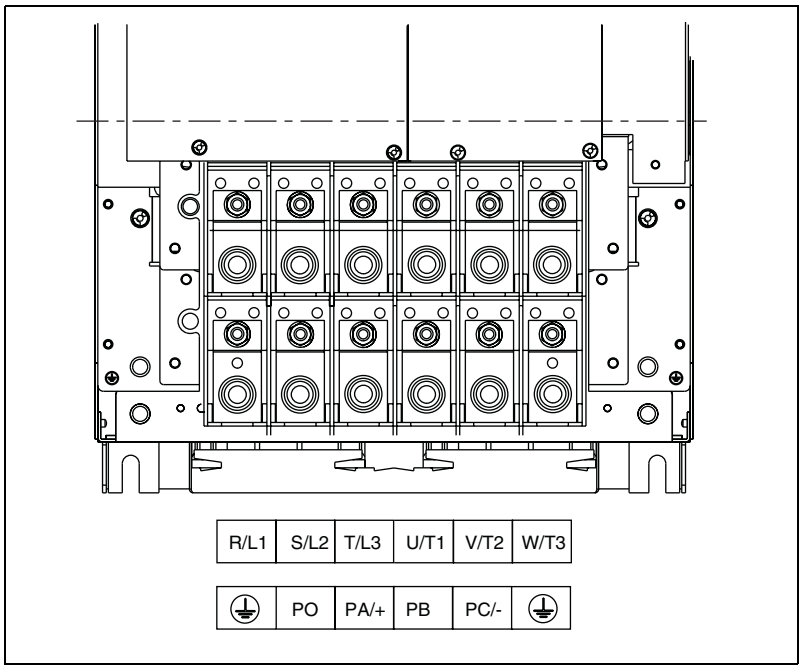


Table 4: Power Terminal Characteristics and Functions

Terminals	Function
⏚	Protective ground connection terminals
R/L1, S/L2, T/L3	Power section line supply
PO	Connection of the dc choke
PA/+	Dc bus + polarity and connection of the dc choke
PC/–	Dc bus – polarity
PA	Output to braking resistor
PB	Output to braking resistor
U/T1, V/T2, W/T3	Output to the motor

Figure 23: Power Terminal Access

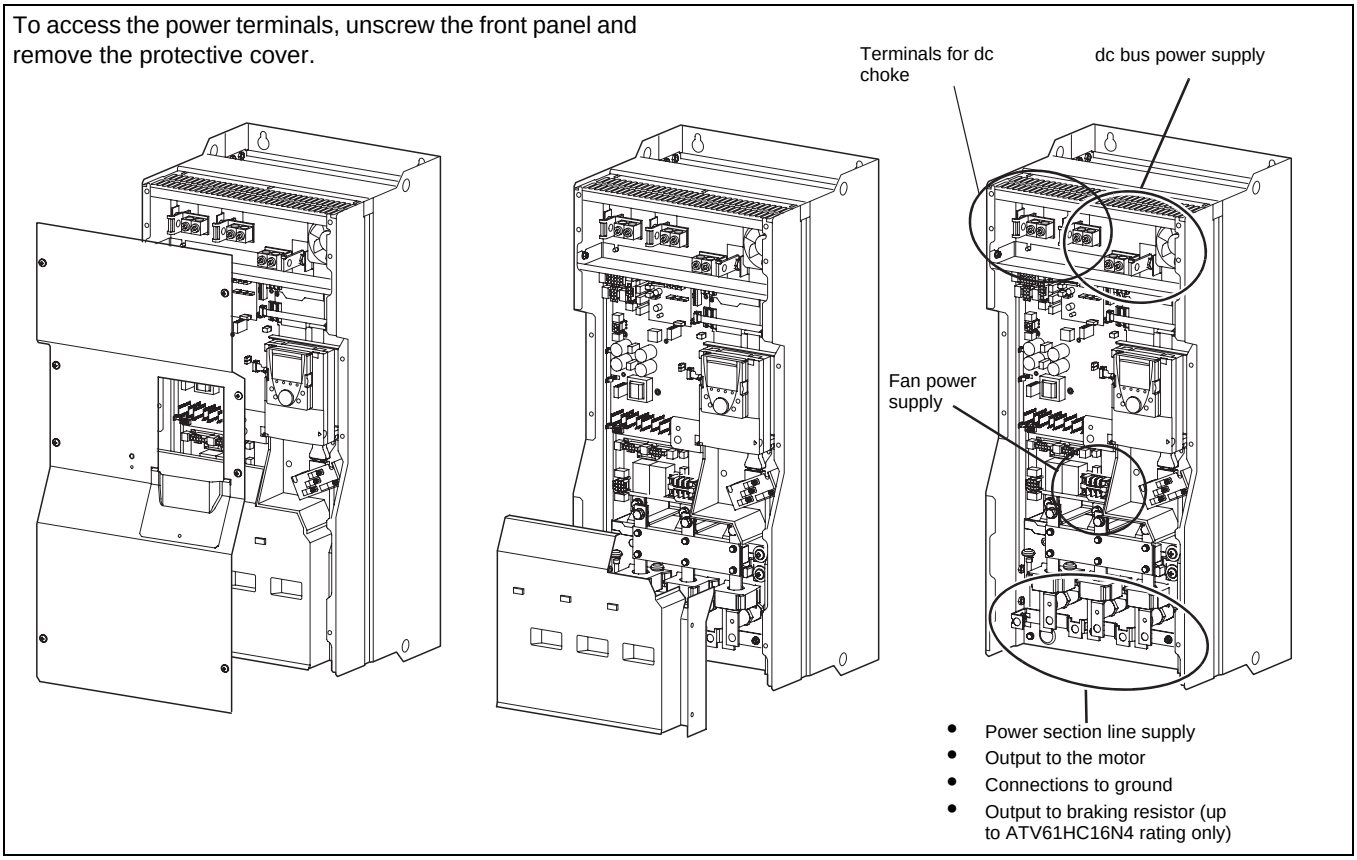


Figure 24: Location of Typical Drive Controller Power Terminals for Frame Sizes 9–9B

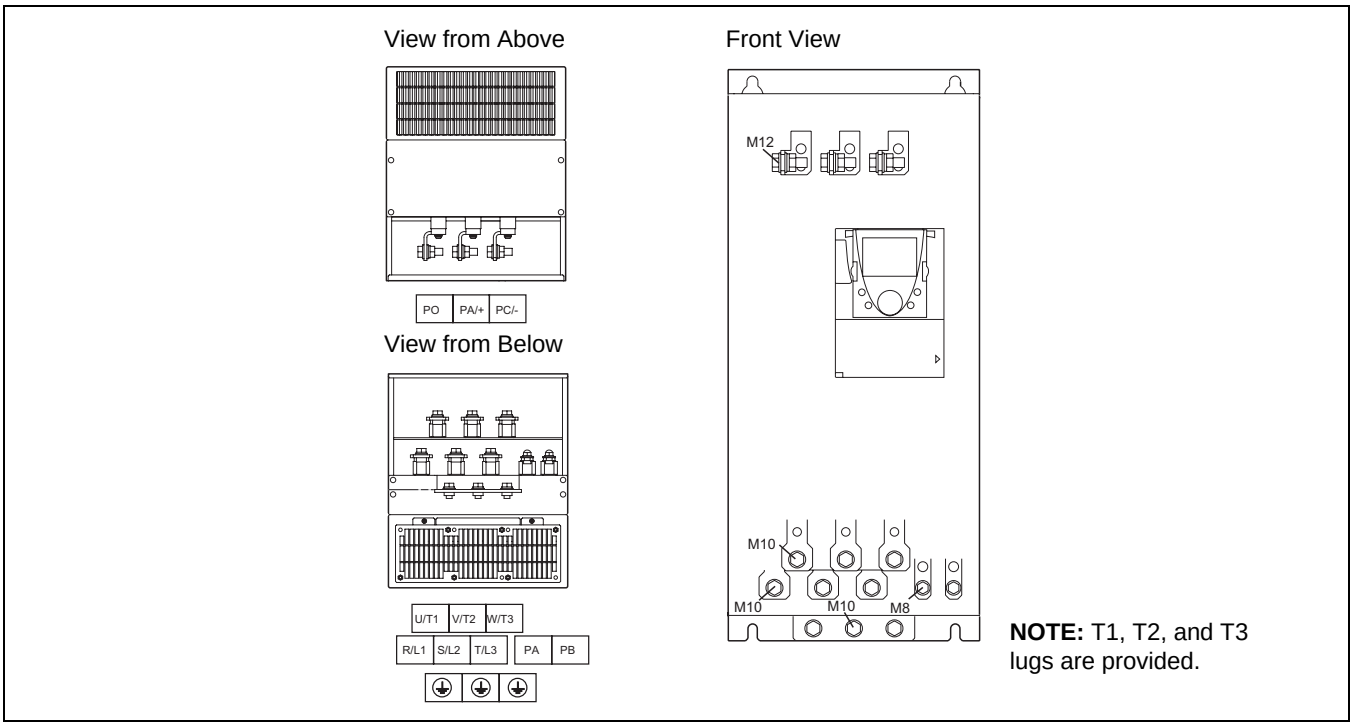


Figure 25: Location of Typical Drive Controller Power Terminals for Frame Sizes 10–10B

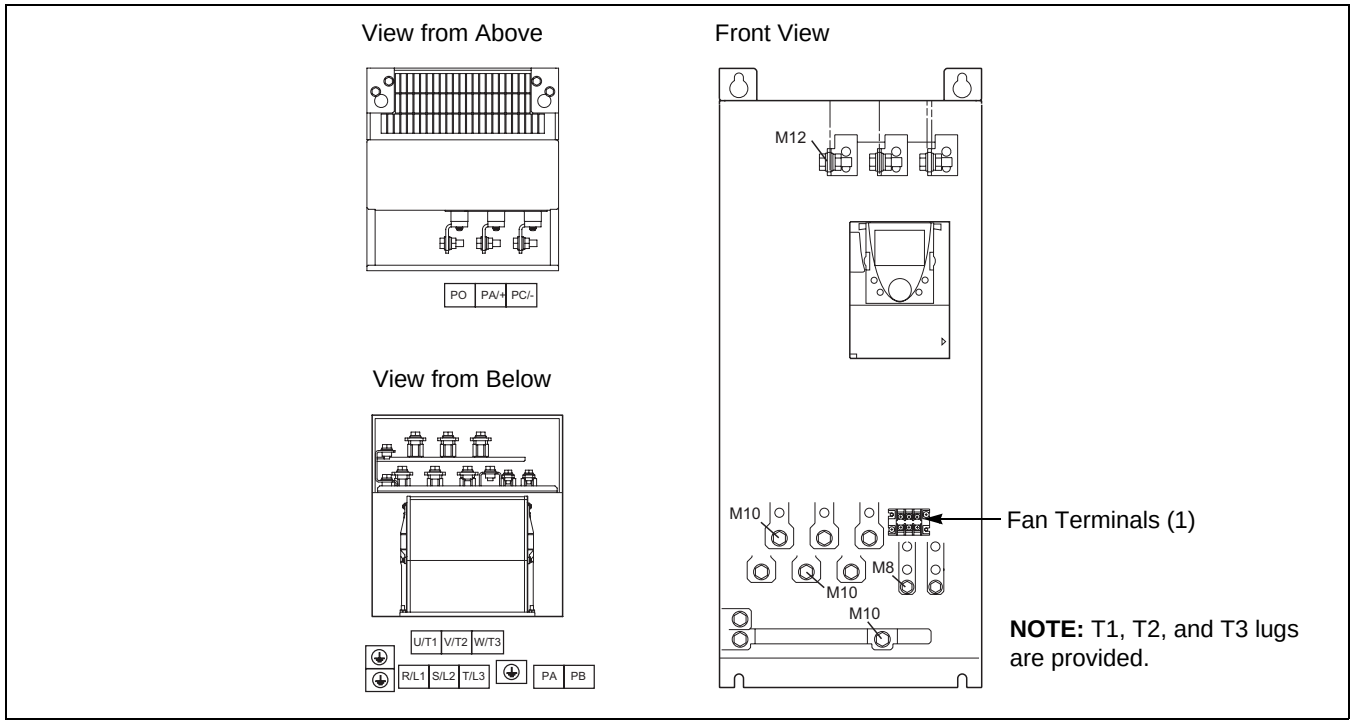


Figure 26: Location of Typical Drive Controller Power Terminals for Frame Sizes 11–11B

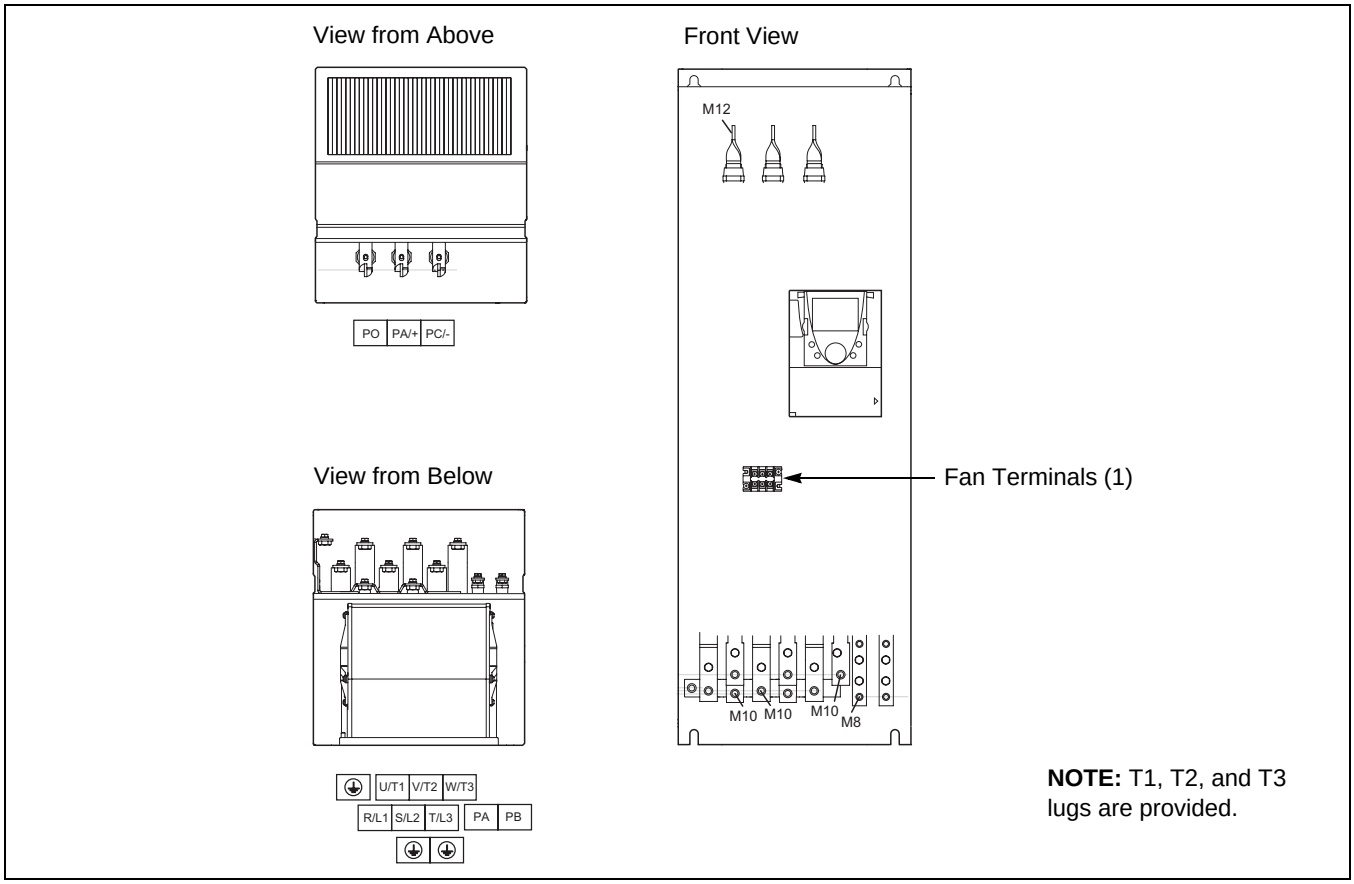


Figure 27: Location of Typical Drive Controller Power Terminals for Frame Sizes 12–12B

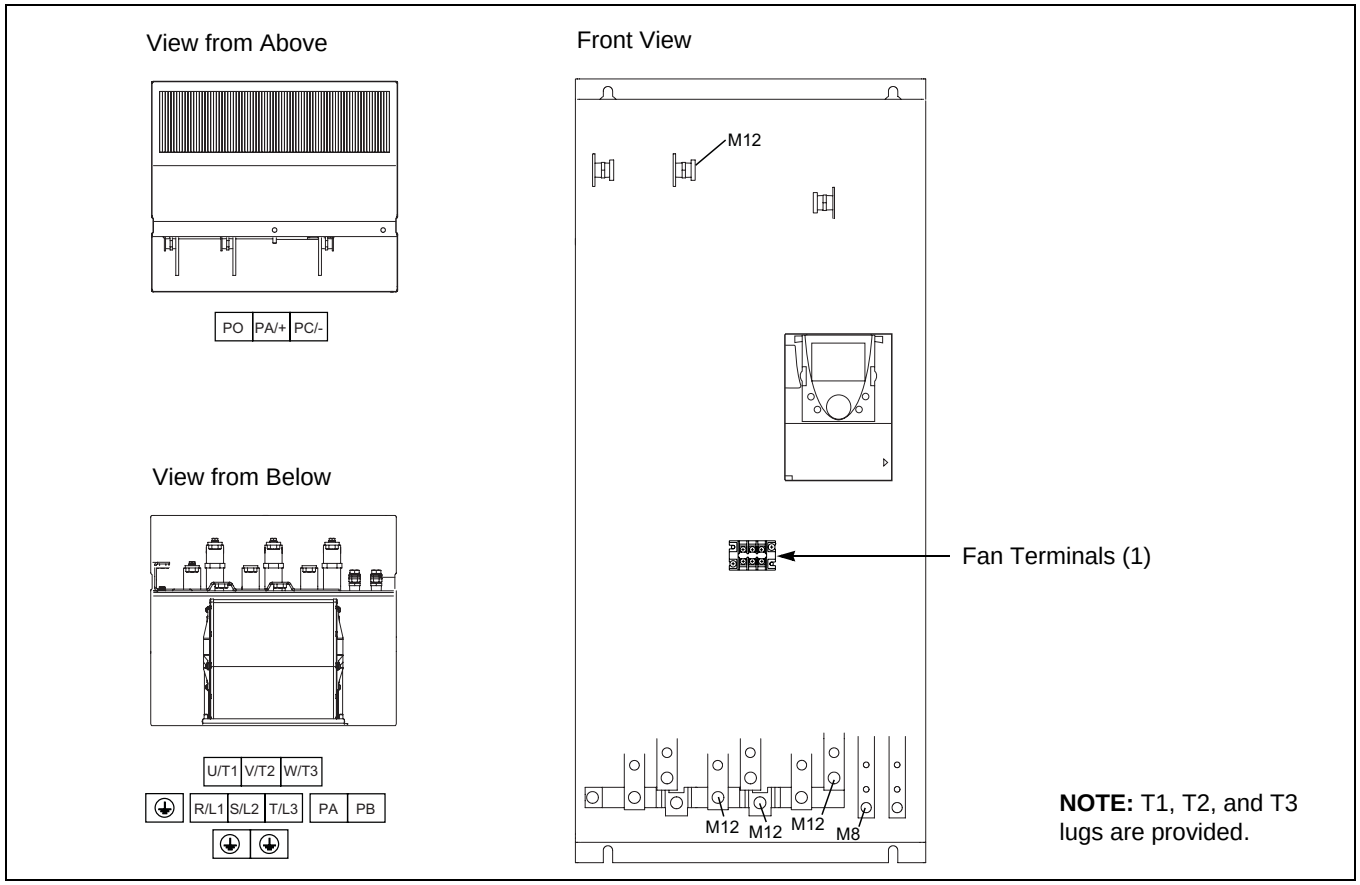
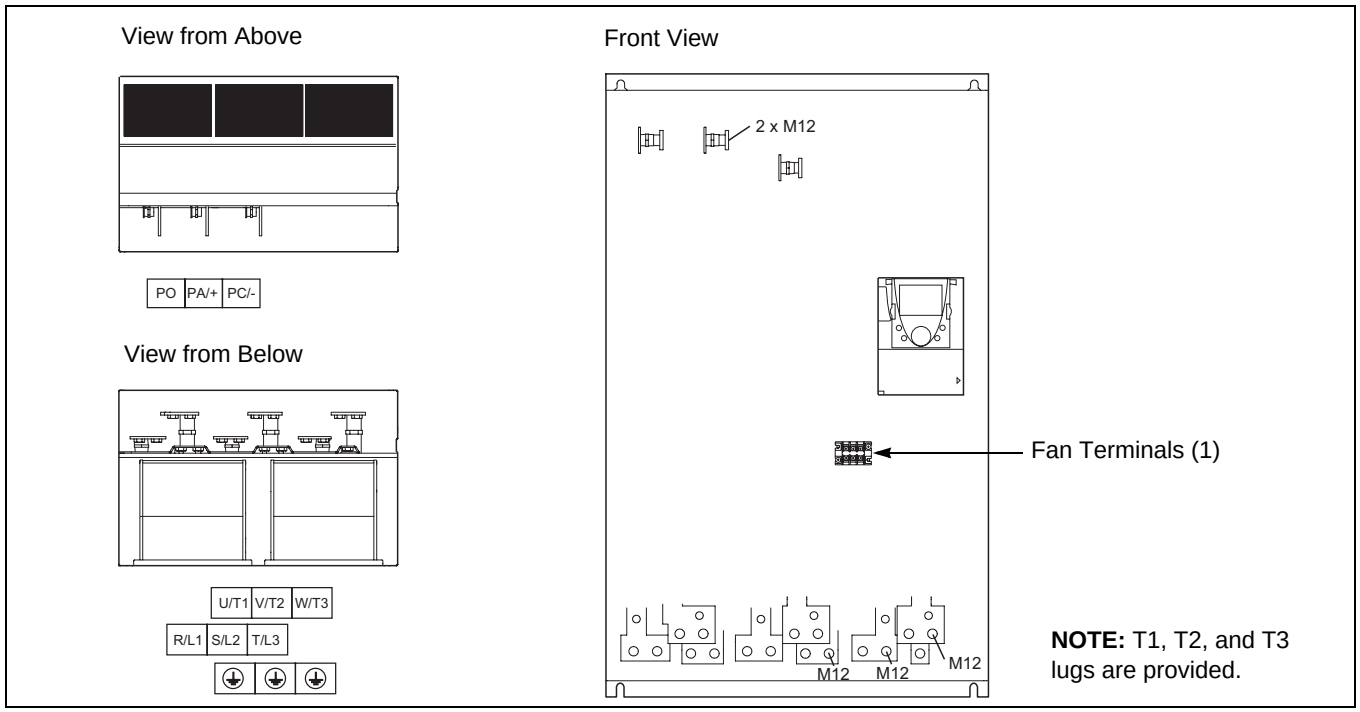


Figure 28: Location of Typical Drive Controller Power Terminals for Frame Sizes 13, 13A, and 13B



Cable Connection Torque Values

Load terminal wire size and torque requirements are listed on the torque label located inside the MCC drive controller unit, adjacent to the load terminals (see Figures 3–9 on pages 12–17). Appendix A on page 54 also lists this information.

Wire Routing and Interconnection

The drive controller Field Wiring Termination information, in Appendix A on page 54, provides the required torque and maximum allowable wire size for each field wiring terminal. This information also provides requirements for the Conductor Temperature Rating, Noise Class, and Voltage Class of the field-connected conductors. These classes are described below.

Conductor Temperature Rating

Conductor Temperature Rating describes the compatibility of the field wiring terminal with the conductor material and insulation system. When used with the required conductor current rating and controller-rated ambient temperature, the Conductor Temperature Rating forms the basis for the selection of a conductor size, which limits the temperature on the conductor insulation at the field wiring terminal to an acceptable range. Conductors with operating temperatures exceeding those specified by the Conductor Temperature Rating may be used, but the conductor size must be selected based on Conductor Temperature Rating limits.

Noise Class

Electromagnetic properties of the voltages and currents present are categorized by Noise Class. Wiring is classified into the following six noise classes for selection of wiring methods and physical segregation purposes.

Quiet Wiring 1 (QW1)

High susceptibility analog and digital control signals.

Signals in this classification include digital communication and network circuits, controller analog input/output (I/O), and analog process signals.

Quiet Wiring 2 (QW2)

Medium susceptibility, analog, and digital control signals.

Signals in this classification include 24 Vdc and 24 Vac control circuits.

Standard Wiring 1 (SW1)

Low susceptibility control or power circuits rated less than 600 Vac (250 Vdc) and less than 15 A.

Voltage and current spectra are generally contained within 0.05–9 kHz.

Signals in this classification include 120 Vac control circuits.

Standard Wiring 2 (SW2)

Power circuits rated greater than 15 A.

Voltage and current spectra are generally contained within 0.05–9 kHz.

Signals falling under this classification include line power to controllers.

Standard Wiring 3 (SW3)

Reserved.

Pulse Wiring 1 (PW1)

Control or power circuits whose voltage or current spectra significantly exceed 9 kHz.

Signals in this classification include motor and dynamic braking circuits fed from pulse width modulated (PWM) power converters.

Voltage Class

The voltages present at the field wiring terminals are categorized by Voltage Class. Voltage is classified into recognized conductor insulation categories (30 V, 150 V, 300 V, 600 V, and 1000 V) for the selection of conductor insulation voltage rating and physical segregation purposes.

Based on the noise class and voltage class of the conductors, apply the wiring methods listed in Table 5 (below) to the drive system.

Table 5: Wire Routing and Interconnection

Wiring Methods and Considerations		Noise Class of Conductors				
		QW1	QW2	SW1	SW2	PW1
Conductor Grouping in Wireways/Conduits						
1. All conductors of a 1- or 3-phase power circuit must be bundled to minimize stray magnetic fields.				X	X	X
2. All conductors of a dc power circuit must be bundled to minimize stray magnetic fields.				X	X	X
3. When paralleled conductors must be run in separate wireways or conduit, minimize stray magnetic fields by bundling the conductors into groups.					X	X
4. Maintain conductor runs as short as practical.		X	X	X	X	X
Separation of Circuits						
1. DO NOT run different Noise Class conductors in the same conduit.		X	X	X	X	X
2. DO NOT run different Voltage Class conductors in the same conduit unless all conductors are insulated for maximum Voltage Class present.		X	X	X	X	X
3. Outside the enclosure, all PW conductor groups must be individually segregated using metallic conduit.						X
4. Segregate all conductors by Noise Class. Use the following circuit separation when conductors can run parallel for more than 12 in.						
Conductor Type	**Circuit Separation Distance**					
Metallic conduit	3 in. between QW and SW/PW	X	X	X	X	X
Metallic tray	3 in. between SW and PW			X	X	X
Metallic tray	6 in. between QW and SW/PW	X	X	X	X	X
Against continuous metal surface	3 in. between SW and PW			X	X	X
Against continuous metal surface	6 in. between QW and SW/PW	X	X	X	X	X
Metallic conduit housing of QW	12 in. to non-metallic conduit SW/PW	X	X	X	X	X
Non-metallic conduit	3 in. between SW and PW			X	X	X
Non-metallic conduit	24 in. between QW to SW/PW	X	X	X	X	X
5. If QW and SW1 wiring must cross SW2 or PW1 wiring, the bundles must cross at right angles.		X	X	X	X	X
Common Mode Noise Issues						
1. Provide adjacent signal returns using twisted pair cable.		X	X			
2. Galvanically isolate signal and associated signal return path when possible.		X	X			
Shielding						
1. Use metallic conduit for all power and control circuits external to the controller enclosure.		X	X	X	X	X
2. Shields should be continuous and equipped with a drain wire.		X	X	X		
3. DO NOT group different Noise Class conductors within the same shield.		X	X	X	X	X
4. Minimize the non-shielded portion of conductor at the ends of shielded cable.		X	X	X	X	X
5. When shielding ac or dc power conductors, group conductors to minimize magnetic field in shield.				X	X	X
Grounding						
1. Ground shields at one end only (controller end).		X	X	X	X	X
2. Use separate ground wire for each shield ground.		X	X	X	X	X
3. Provide a ground wire with all conductor groups whether in a tray or conduit.				X	X	X
4. When multiple grounds must be made to a shielded power cable, the shield must have the same short circuit withstand capability as the ground conductor in the power cable.				X	X	X
5. Terminate all power grounds and shield grounds to the controller grounding point or bar.				X	X	X
6. Terminate all signal shield grounds to the terminals provided.		X	X			
7. Always supply a separate equipment grounding conductor with the controller power feed. DO NOT depend upon metallic conduit for ground connection.				X	X	X

Section 4—Start-Up

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Read and understand the Altivar 61/71 Programming Manual before using the keypad display. Parameter changes affect drive controller operation. Most parameter changes require pressing ENT. Some parameter changes, such as reference frequency, take effect as soon as you press the up or down arrow keys.
- Lock the keypad after making parameter adjustments.
- Do not reset drive parameters to configurations other than those specified on the wiring diagrams supplied with the drive controller. Some factory-set drive parameters are critical for MCC drive controller unit power and control configurations.
- Do not alter the programming of factory-installed control devices or power contactors.

Failure to follow these instructions can result in death or serious injury.

Before operating the drive controller, perform the procedures listed in “Factory Settings” on page 36.

For complete information regarding MCC Altivar® 61/71 drive controller unit operation, refer to the Altivar 61/71 Programming Manual (included on the ATV61/71 Documentation CD supplied with the equipment) and any drawings supplied with the unit.

If an optional I/O extension card or communication card was provided, also refer to the card’s instruction bulletin for complete information.

Factory Settings

The Altivar® 61/71 drive controller is software driven. The drive controller has been pre-programmed to match the power and control options purchased with the MCC drive controller unit.

Do not change the “MCC Factory Drive Controller Parameter Settings” indicated on the wiring diagram(s) supplied with the MCC drive controller unit. Several settings are critical to the unit power and control configurations.

For information regarding MCC factory settings, refer to the parameter notes on the wiring diagram of the unit, which is in the “Installation/Maintenance” packet included with your shipment.

Before powering up the unit for the first time, compare the motor nameplate current rating with the output current (based on the drive controller voltage and torque rating) in Table 1 on page 9 and Table 2 on page 10. If the motor nameplate current rating is not within 25 to 105% of the value in the table, a different drive controller must be used.

Minimum Start-Up Procedure

For MCC factory settings, refer only to the MCC unit wiring diagram(s) included in your shipment.

The MCC factory settings listed on the MCC unit diagrams supersede any parameter information shown in other Altivar 61/71 drive controller information.

1. Check and adjust the following key parameters to match actual motor nameplate currents before running the motor:
   - — `Rated mot. current – A (nCr):` Nominal motor current
   - — `Mot. therm. current – A (ItH):` Current used for motor thermal protection

   Adjust both of these parameters to the nominal current that appears on the motor nameplate. Information for accessing these parameters via the keypad is provided in the Altivar 61/71 Simplified Manual included on the ATV61/71 Documentation CD supplied with the equipment.
2. If necessary, adjust the parameters in the “Simply Start” menu (ramps, motor thermal protection, etc.). See the “Simply Start” table in the “Simply Start” chapter of the Altivar 61/71 Programming Manual.
3. The self-tuning feature of the drive controller allows optimal control of the motor. When starting the motor with the drive controller for the first time, run the Autotuning function.

If you change the macro-configuration, review the MCC factory parameter settings documented on the MCC unit diagrams to ensure that the macro-configuration has not altered any of the settings noted on the wiring diagrams.

For multi-motor applications, consult the factory.

User Supplied Shutdown Interlock

MCC drive units with a factory installed “Hand-Off-Auto” selector switch include the provision for a User Supplied Shutdown Interlock feature which will shutdown the drive when the contact opens. For connection locations for the shutdown interlock contact, reference the wiring diagram provided with the unit.

The user should remove the factory installed jumper to use the shutdown circuit. The user should also be aware that the ATV61/71 Power Removal function is used for the shutdown feature. A “Power removal” fault will appear on the keypad display when the shutdown has occurred. Whenever a shutdown is initiated using the Power Removal function, the drive immediately shuts power off to the motor and no start commands will be accepted until the cause of the shutdown is removed, the contact is closed, and the power is cycled to the drive.

Programming for Communication

Drives with Hand Off-Auto Installed

If a serial network is being used to communicate to the drive, the drive can be set up for monitoring only or monitoring and control. If the network will only be monitoring the drive parameters, then no further programming is required. However, if the network will be controlling the drive, the “Hand-Off-Auto” selector switch can be used to switch between the local control via the hand position and the network control via the auto position. If the auto position will be used for controlling the drive from a communication network connection, the Reference 1 Channel (“Ref 1 chan”) parameter in the drive must be changed to the network setting (i.e., Modbus, CANopen or Com.Card). For more information, refer to the “Command” menu section of the Altivar Programming Manual included on the documentation CD shipped with the equipment. Also refer to the specific documentation for the communication card used.

Drives without Hand-Off-Auto Installed

If a serial network is being used to communicate to the drive, the drive can be set up for monitoring only or monitoring and control. If the network will be controlling the drive, the provision for switching between local terminal control and network control must be considered. The drive's Forced Local function allows local terminal control while ignoring network commands. For example, in a case where a “Hand-Off-Auto” selector switch is used and the auto mode selects control from the network, the hand mode can be used to engage the Forced Local function and prohibit network commands, if desired. For more information, refer to the “Forced Local” section of the Altivar Communication Parameters User's Manual included on the documentation CD shipped with the equipment.

Altivar® 58 to Altivar 61/71 Migration

Use of the ATV58 interchangeability setting (8 serie) in the Profile function is only recommended for the monitoring of drives over a network. For controlling drives over a network, it is not recommended to use the 8 serie setting in the Profile function because of differences in the Forced Local operation. The local versus network command hierarchy should be considered and parameters should be manually entered. It is essential to follow the Altivar 58 Register Access Guide (document no. VVDED397058US) and the ATV58 to ATV71 Transition Manual (document no. atv71_migration_en on the documentation CD shipped with the equipment).

Section 5—Maintenance

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- After disconnecting power, WAIT FIFTEEN MINUTES until the dc bus capacitors discharge. Then follow the Bus Voltage Measurement Procedure procedure below to verify the dc voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of dc bus voltage.
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Perform maintenance on the MCC drive controller unit a minimum of once per year, or more frequently if indicated by service conditions and your established maintenance policy. This section contains maintenance procedures for the MCC Altivar® 61/71 drive controller units. For maintenance procedures for the MCC itself, refer to the MCC instruction bulletin.

Bus Voltage Measurement Procedure

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand the Bus Voltage Measurement Procedure before performing the procedure. Measurement of bus capacitor voltage must be performed by qualified personnel.
- DO NOT short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Failure to follow these instructions will result in death or serious injury.

The dc bus voltage level is determined by monitoring the (PA/+) and (PC/-) measurement points.

Before working on the drive, switch it off, wait until the red capacitor charging LED has gone out, then measure the dc bus voltage. See Figures 29 and 30 on page 39.

The dc bus voltage can exceed 1000 Vdc. Use a properly rated voltage sensing device when performing this procedure. To measure the dc bus voltage:

1. Turn OFF all power supplying this equipment and follow lockout/tagout procedures before working on or inside it.
2. Disconnect all power from the drive controller including external control power that may be present on the control board and the optional board terminals.
3. Wait fifteen minutes for the dc bus capacitors to discharge.
4. Open the door or cover of the drive controller.
5. Set the voltmeter to the 1000 Vdc scale. Measure the voltage of the dc bus between the PA/+ and PC/- terminals to verify that the dc bus voltage has discharged below 45 V before servicing the drive controller.
6. If the dc bus capacitors will not discharge below 45 V, contact your local field sales representative. **Do not operate the drive controller.**
7. Replace all of the covers after servicing the drive controller.

Figure 29: Location of the Red Capacitor Charging LED for Frame Sizes 2–8

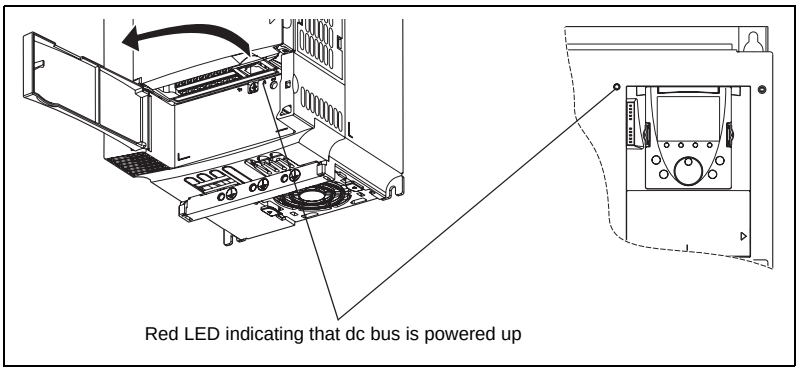
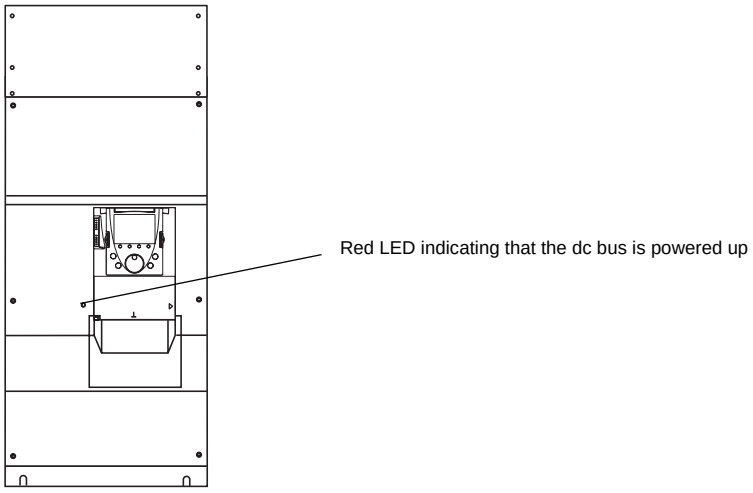


Figure 30: Location of the Red Capacitor Charging LED for Frame Sizes 9–13



Plug-On Unit Removal (Frame Sizes 2–7A)

Drives larger than Frame 7A are mounted in non-plug-on units. To repair and replace these drives in a section, see “Drive Controller Replacement” on page 50.

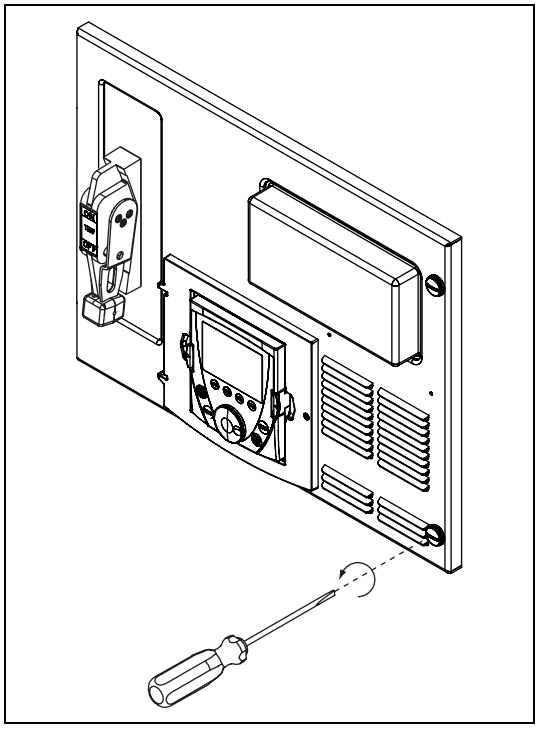
To remove the plug-on unit:

1. Turn OFF all power supplying this equipment and follow lockout/tagout procedures before working on or inside it. Move the unit operating mechanism to the OFF position.
2. After disconnecting the power, wait fifteen minutes until the dc bus capacitors discharge.
3. Test the plug-on unit to ensure that it is de-energized. To do this:
   a. Loosen the captive quarter-turn fasteners on the unit door (see Figure 31).
   b. Open the door.
   c. Perform steps 5–6 in the “Bus Voltage Measurement” section on page 39.

Do not short across the capacitor terminals with voltage present. Check for other live circuits using a properly rated voltage sensing device. De-energize all voltage sources.

If the bus capacitors are not discharged below 45 V, do not operate the drive controller. Contact your local Schneider Electric representative.

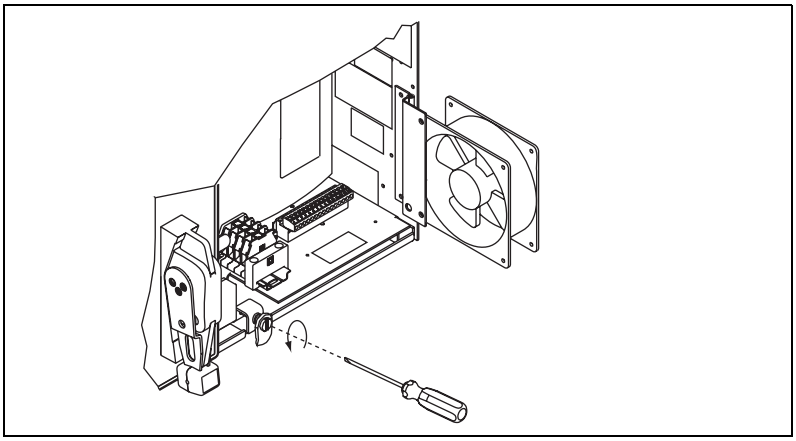
Figure 31: Loosening the Quarter-Turn Fasteners



4. As necessary, disconnect the wiring from the drive controller’s load terminals (U, V, and W) or auxiliary load terminals (T1, T2, and T3), and disconnect the drive controller pull-apart control terminals from the control board. Tag the terminations for reinstallation.
5. Insulate the power cable ends that were connected to the load terminals U, V, and W. Push the power leads and the top portion of the pull-apart control terminal blocks through the wiring port on the right side of the plug-on unit and into the vertical wire trough.

6. Remove the top portion of the pull-apart control field terminal blocks (FTB) (see Figure 15 on page 25).
7. Disconnect the keypad wiring from the lower edge of the keypad assembly located on the back of the unit door. Squeeze the wire connector and pull down to release the keypad cable from the assembly.
8. If the plug-on unit has a lock-in device at the bottom of the unit, release it by turning its screw counter-clockwise until the locking pawl is parallel to the bottom of the unit (see Figure 32).

Figure 32: Releasing the Lock-In Device



9. Some plug-on units with optional power contactors such as bypass or output contactors include a door-mounted “control station plate” for pilot devices. If the unit includes a door-mounted control station plate, remove the plate from the rear of the unit door by loosening the four nut fasteners from the rear of the plate (see Figure 33 and Figure 34). Retain all hardware and gaskets for remounting.

Figure 33: Close-up of Nut Fasteners (as viewed from above plate)

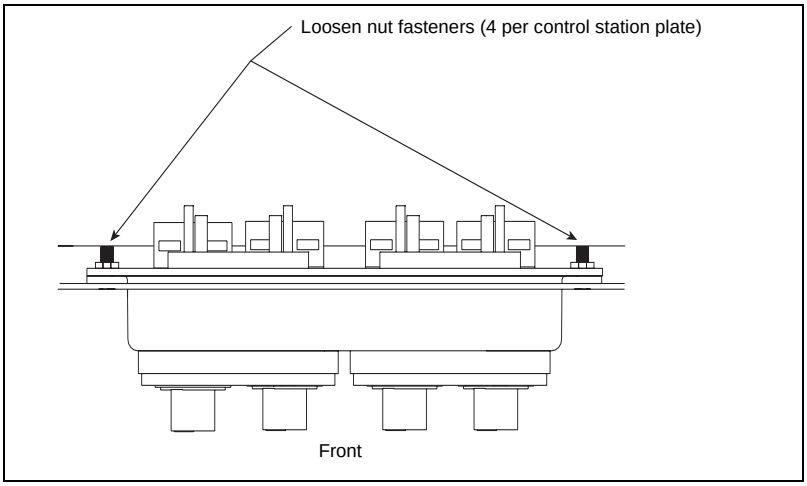
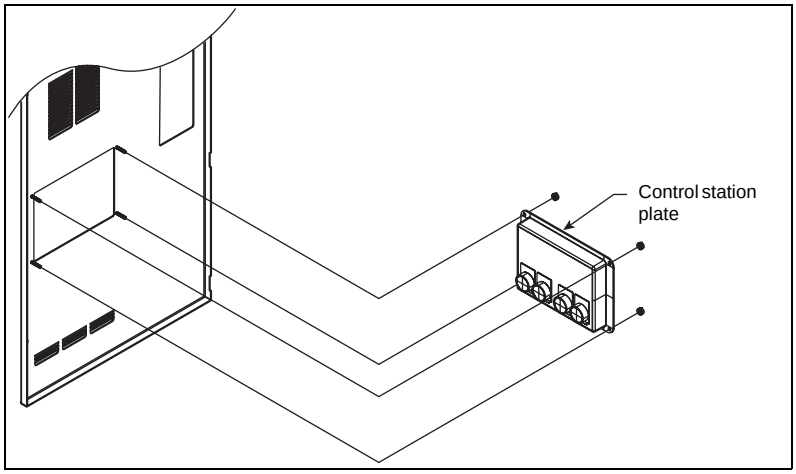


Figure 34: Removing the Control Station Plate from the Unit Door



10. Rack the plug-on unit partially out of the MCC structure by pulling forward on the twin-handle cam mechanism at the top front of the unit (see Figure 35). Continue pulling forward until the handles are fully extended.

The unit disconnect device must be in the OFF position. When the disconnect device is in the ON position, the operating mechanism-to-structure interlock prevents the MCC drive controller unit from being withdrawn or inserted (see Figure 36).

Figure 35: Twin-Handle Cam Mechanism (Unit Disconnect Switch in the OFF Position)

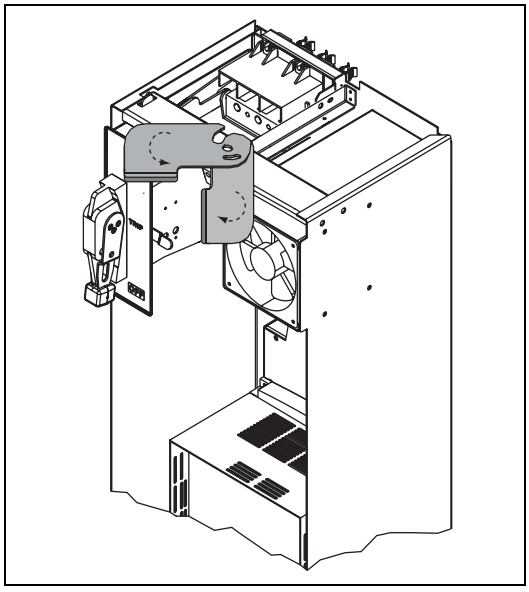
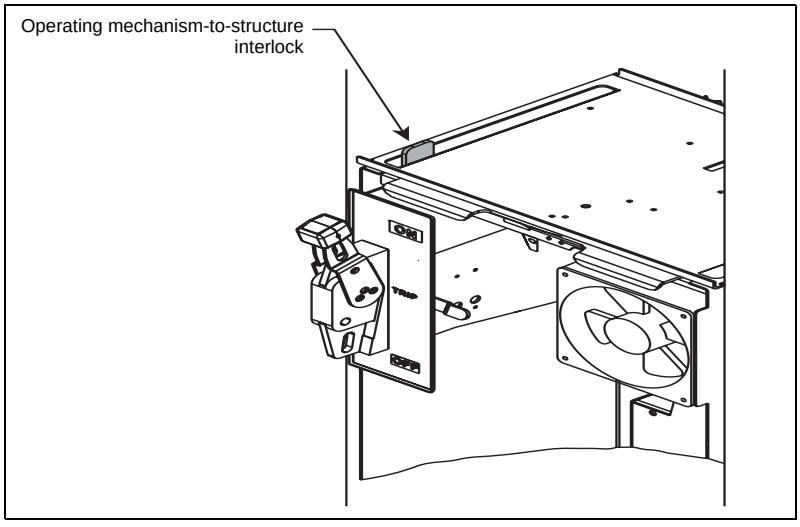


Figure 36: Operating Mechanism-to-Structure Interlock (Unit Disconnect Switch in the ON Position)



11. If the racked-out, plug-on unit is left in the structure, use appropriate lock-out procedures to help keep it from being racked in by non-authorized personnel.
12. Remove the plug-on unit from the structure for servicing. For additional accessibility to the components and wiring, fold the bottom plate down. To do so, lean the unit on its back, remove the two front screws, and fold the bottom plate down.

Lifting units taller than 24 in. (610 mm) requires two or more persons using special handling precautions. If lifting devices are used on an MCC drive controller unit, see Figure 1 on page 8, which shows the proper lifting points. Figure 1 also shows a lifting point that is NOT recommended when lifting larger units.

13. If necessary, the unit door can be removed. Refer to the procedures in the “Control Unit Removal” section of the MCC instruction bulletin.
14. For details on servicing components within the MCC drive controller unit, refer to the “Maintenance” section of the MCC instruction bulletin.

If the stab assembly, circuit breaker, or fusible switch must be replaced, contact your local field sales representative to obtain replacement parts.

Cooling System Maintenance

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- After disconnecting power, WAIT FIFTEEN MINUTES until the dc bus capacitors discharge. Then follow the Bus Voltage Measurement Procedure beginning on page 38 to verify the dc voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of dc bus voltage.
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

- Door vents require periodic cleaning. Vacuum all vented openings in the MCC drive controller unit door.

Do not use compressed air; it will redistribute contaminants to other surfaces.

- Cooling system fans do not require any scheduled maintenance. Do not remove the fans unless troubleshooting indicates fan replacement is necessary.
- Remove dust and debris from the drive controller, if necessary.

Filter Maintenance

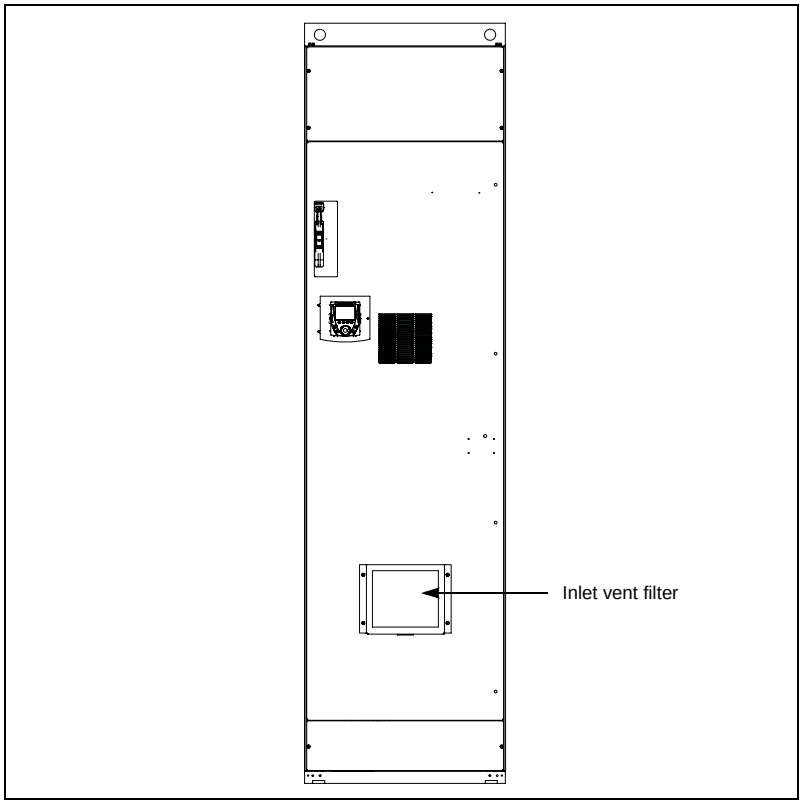
Frame Sizes 8–10 drive controllers in NEMA 1A (Gasketed) MCC enclosures include a filter over the lower door vents. See Figure 37. Inspect and clean the filter element every six months, or more frequently if indicated by service conditions and your established maintenance schedule.

To clean the filter element:

1. Remove the filter element from the front door bracket by pushing the filter element up from the bottom of the filter bracket, using the access slots in the bottom of the bracket. Once the filter element is partially above the bracket, remove it by pulling it out of the top of the bracket.
2. Vacuum and wash the filter thoroughly.
3. Dry the filter completely and re-install it.

If the filter element becomes damaged, or when it deteriorates, replace it. See Table 13 on page 73 for a list of replacement filter part numbers.

Figure 37: Filters on MCC Drive Controllers, Frame Sizes 8–10



Duct System Cleaning

Duct systems are included on NEMA 12 MCC Altivar® 61/71 drive controller units only. To ensure proper ventilation of the MCC drive controller unit, clean the duct system a minimum of once per year, or more frequently if indicated by service conditions and your established maintenance schedule.

To clean the duct system:

1. Remove the fan in front of the top duct.
2. Vacuum the top and bottom duct areas.

Do not use compressed air; it will redistribute contaminants to other surfaces.

3. Vacuum all vented openings in the MCC drive controller unit door.
4. Replace the fan onto the front of the top duct when vacuuming is complete.

Insulation Test

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

Disconnect all solid-state devices, capacitor units, and any other devices before performing high potential dielectric tests.

Failure to follow this instruction can result in injury or equipment damage.

Refer to the MCC instruction bulletin for MCC insulation test procedures.

Plug-On Unit Reinstallation

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- After disconnecting power, WAIT FIFTEEN MINUTES until the dc bus capacitors discharge. Then follow the Bus Voltage Measurement Procedure beginning on page 38 to verify the dc voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of dc bus voltage.
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

When maintenance is complete, reinstall all units. To reinstall the MCC drive controller unit:

1. Turn OFF all power supplying this equipment and follow lockout/tagout procedures before working on or inside it.
2. Reinstall the door if it was removed.
3. Temporarily secure the keypad wiring, control station plate, and associated wiring inside the unit, if they were removed.
4. Lift the unit and rest it on the bottom shelf of the space where it will be reinstalled. See Figure 1 on page 8 when lifting.

5. Align the top shelf guides and unit guides. Slide the unit into the structure. To prevent binding, keep the sides even when sliding the unit into the structure.
6. When the unit is partially inside the structure, pull the twin-handle cam mechanism forward to open the slot between the two handles (see Figure 35 on page 42).
7. Slide the unit into the structure until the twin-handle cam mechanism makes contact with the cam stud in the shelf above the unit. Push both handles until they are flush with the structure.
8. With the hardware and gaskets saved during removal, reinstall the control station plate (if supplied) onto the door.

Route the wires onto the door through the clip fasteners located on the inside of the door. Follow the wire routing instructions that are also located on the inside of the door.

9. Remove the temporary wire insulation that was added during removal, and reinstall the field control wiring, power wiring, and keypad wiring.
10. Close and secure the door with the quarter-turn fasteners.

Reinstallation is complete. Return the MCC to service.

Section 6—Troubleshooting

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- After disconnecting power, WAIT FIFTEEN MINUTES until the dc bus capacitors discharge. Then follow the Bus Voltage Measurement Procedure procedure on page 38 to verify the dc voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of dc bus voltage.
- Do not short across dc bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Figure 38 on page 48 shows the steps to take if the Altivar® 61/71 drive controller is overheating. If the drive controller will not run, see Figure 39 on page 49.

Figure 38: Drive Controller Overheating

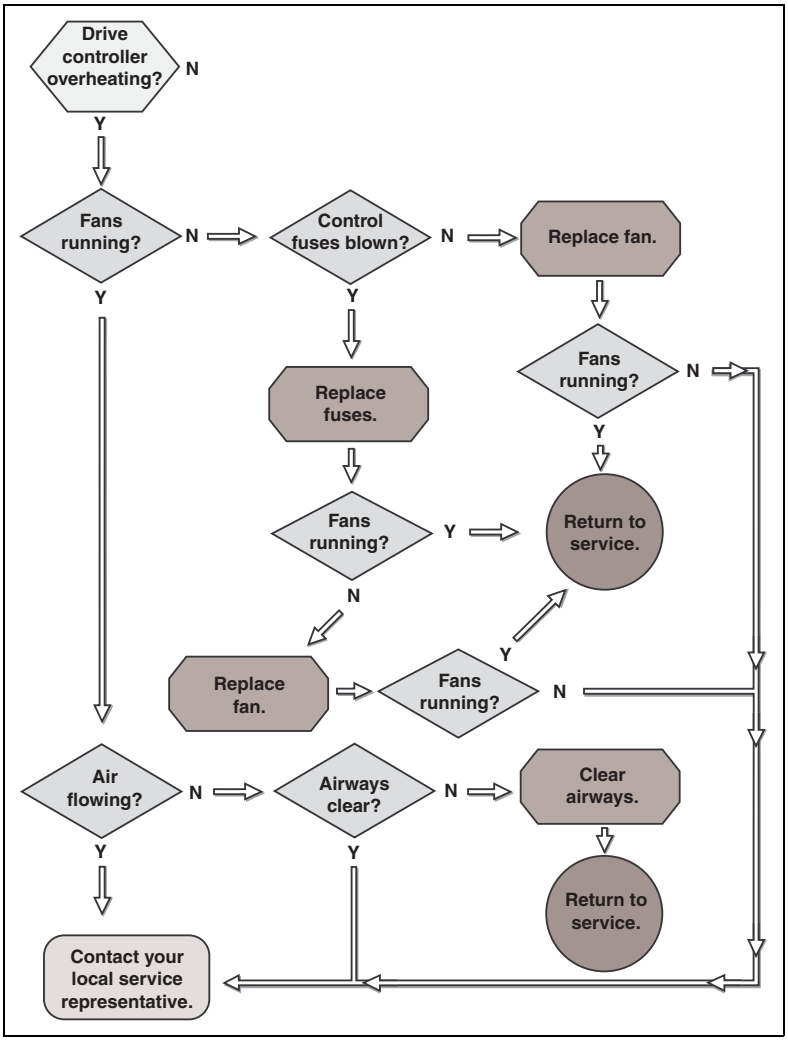
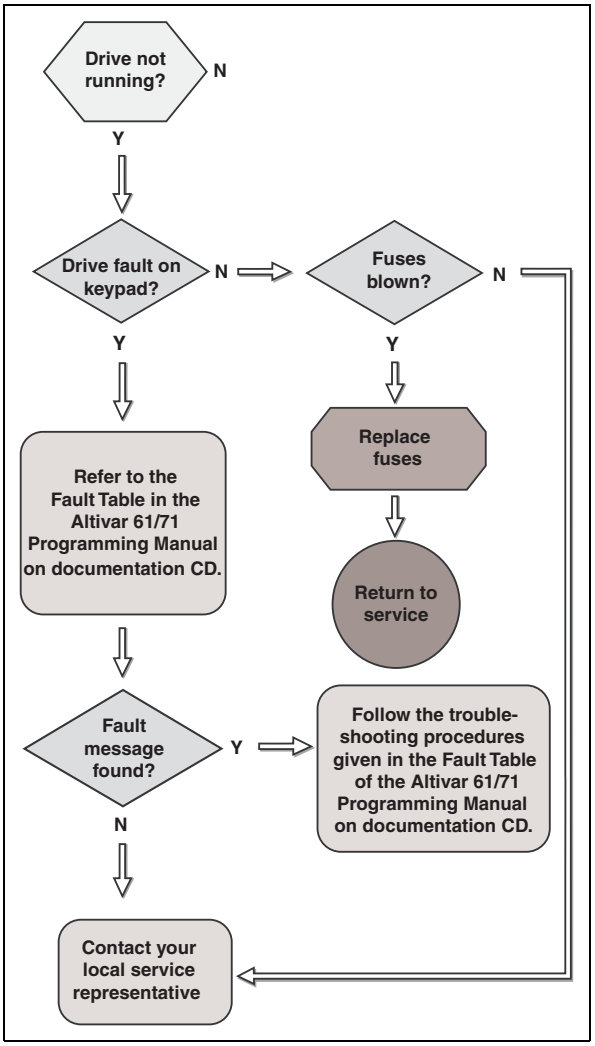


Figure 39: Drive Controller Will Not Run



Drive Controller Replacement

If troubleshooting steps indicate the Altivar 61/71 drive controller should be replaced in the MCC unit, follow the procedure listed below. To obtain a replacement Altivar 61/71 drive controller, contact your local field sales representative. To maintain adequate cooling system performance, replace the drive controller with an Altivar 61/71 drive controller of the same rating.

For drive replacement catalog numbers, see Table 1 on page 9 and Table 2 on page 10.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE

- Replace the drive controller with an Altivar 61/71 drive controller of the same rating.
- Follow the procedure below to properly remove all parts of the Altivar 61/71 drive controller. Do not leave any parts installed that the procedure instructs to remove.
- Tighten the mounting bolts to the torque levels indicated in the following steps.

Failure to follow these instructions can result in injury or equipment damage.

1. Turn OFF all power supplying this equipment and follow lockout/tagout procedures before working on or inside it.
2. For plug-on units, remove the Altivar 61/71 drive controller unit from the MCC structure following the procedures in “Plug-On Unit Removal (Frame Sizes 2–7A)” beginning on page 40.
3. Remove the power, control and keypad wiring connected to the Altivar 61/71 drive controller in the MCC unit. Tag all wires for reinstallation.
4. Remove and retain the mounting bolts attaching the drive controller to the MCC unit. For NEMA 1 or 1A units, see Figure 40 for the mounting bolt location. For NEMA 12 units, see Figure 41 or Figure 42 on page 51.
5. Remove the drive controller from the unit.

Figure 40: Typical Location of the Drive Controller Mounting Bolts on NEMA1/1A Units

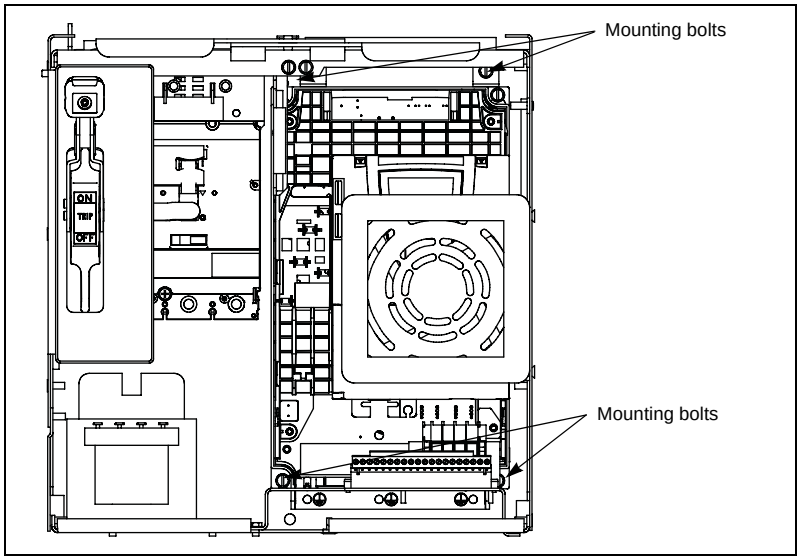


Figure 41: Location of the Drive Controller Mounting Bolts on NEMA 12 (Typical for Frame Sizes 2–5B)

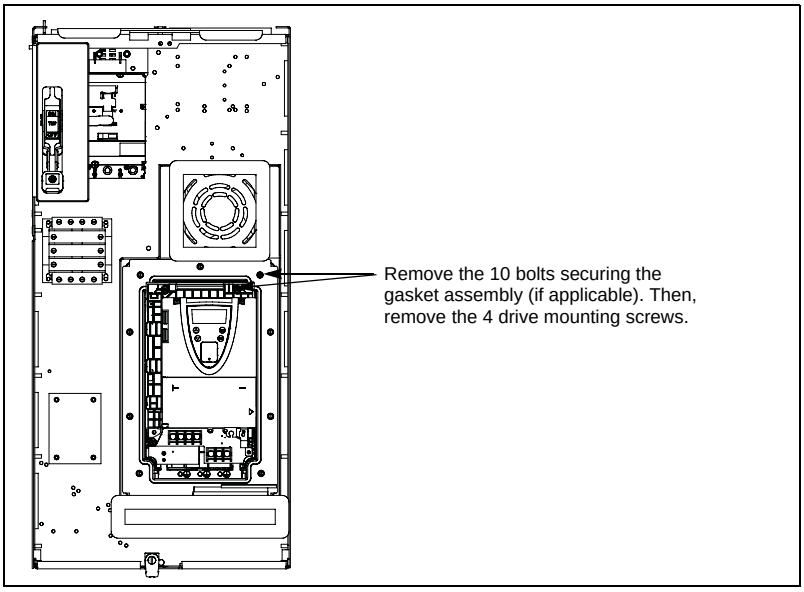
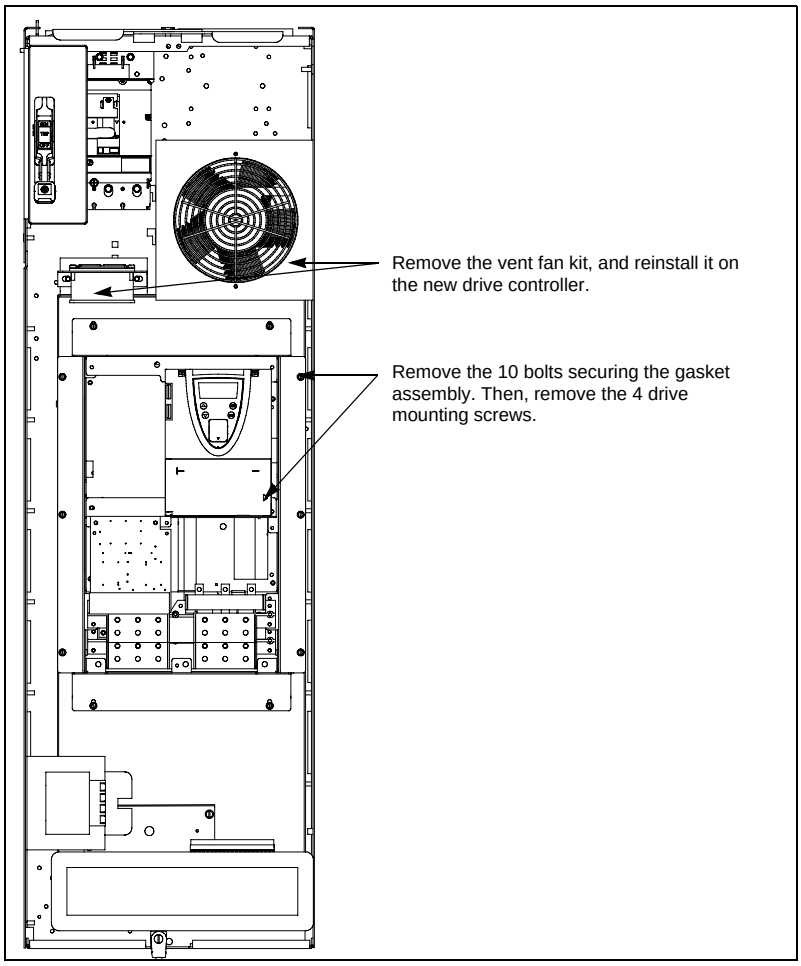


Figure 42: Location of the Drive Controller Mounting Bolts on NEMA 12 Units (Typical for Frame Sizes 6–8)

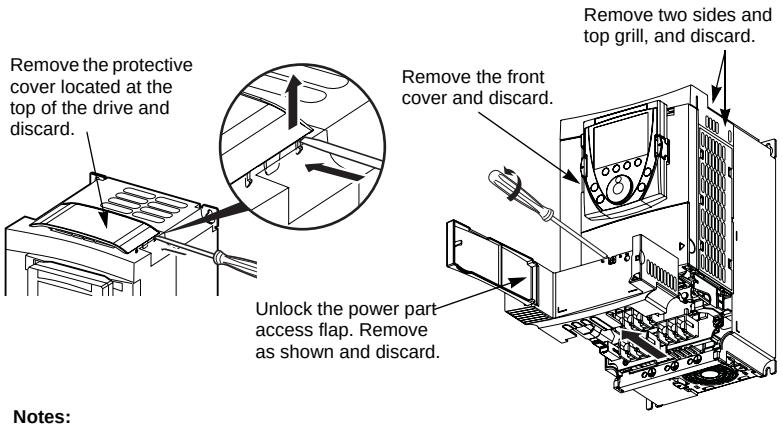


6. Remove the replacement Altivar 61/71 drive controller from its packaging, and confirm the rating is identical to the drive controller being replaced. If not, contact your local sales representative to obtain a unit with the same rating.

If the drive controller is received with the cover parts from Figures 43 or 44 already removed, skip Step 7 and go directly to Step 8 on page 53.

7. On frame sizes 2–5B, remove the parts of the replacement drive controller shown in Figure 43. On frame sizes 6–8, remove the parts of the drive controller shown in Figure 44.

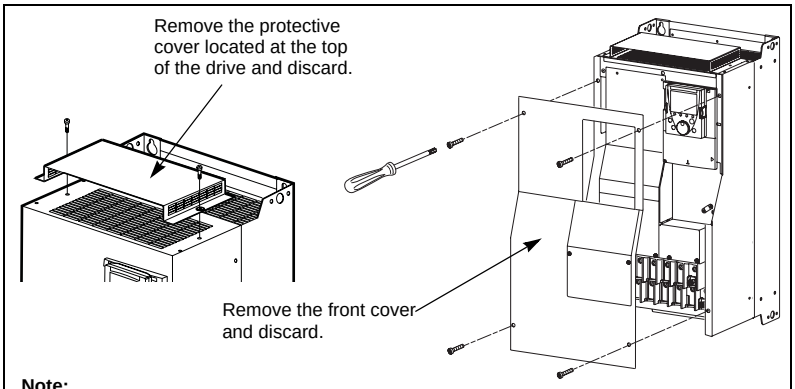
Figure 43: Cover Removal for Frame Sizes 2–5B



Notes:

1. The polycarbonate barrier supplied on frame size 5B must remain installed in the MCC controller unit.
2. Only remove the link between the PO and PA/+ if a dc choke has been added. The screws on the PO and PA/+ terminals must always be fully tightened as there is a high current flowing in the link.

Figure 44: Cover Removal for Frame Sizes 6–8



Note:

Only remove the link between PO and PA/+ if a dc choke has been added. The screws on the PO and PA/+ terminals must always be fully tightened as there is a high current flowing in the link.

8. Install the replacement Altivar 61/71 drive controller into the MCC unit using the mounting bolts removed in Step 4.
9. Reconnect the power, control and keypad wiring.
10. Reinstall the MCC drive unit into the MCC, following the “Plug-On Unit Reinstallation” procedure starting on page 45.
11. The keypad can store the program parameters from the previous drive. If the keypad display from the previous drive controller cannot be re-used on the replacement drive, install the new keypad shipped with the replacement drive. Reload the MCC factory parameters shown on the MCC unit wiring diagram. Any start-up parameters adjusted for the specific installation should also be reloaded. For information on adjusting parameters, refer to the Altivar 61/71 Programming Manual on the Documentation CD supplied with the equipment.

Appendix A—Field Wiring Termination Drawings

Table 6: Field Wire Termination Chart for Basic Frame Sizes 2–5B Altivar® 61/71 Drive Controllers in Square D® brand, NEMA Type 1/1A/3R Motor Control Centers (see Figure 45 on page 55)

Termination Designation	Device	Torque lb-in (N•m)	Maximum Wire Size AWG (mm2)	Conductor Temperature Rating	Noise Class	Voltage Class	Applicable HP Ratings
U/T1, V/T2, W/T3	Power Converter	12 (1.4)	10 (4)	75 °C CU	SW2	600 V	ATV71 480 V: 1–5 hp 208/240 V: 1–5 hp
U/T1, V/T2, W/T3	Power Converter	12 (1.4)	10 (4)	75 °C CU	SW2	600 V	ATV61 480 V: 1–7.5 hp 208 V: 1–5 hp 240 V: 1–7.5 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	8 (6)	75 °C CU	SW2	600 V	ATV71 480 V: 7.5–10 hp 208/240 V: 7.5 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	8 (6)	75 °C CU	SW2	600 V	ATV61 480V: 10–15 hp 208V: 7.5 hp 240V: 10 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV71 480 V: 15 hp 208/240 V: 10 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV61 480 V: 20 hp
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV71 480 V: 20 hp
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV61 480 V: 25 hp
U, V,W	Terminal Block (PTB)	25 (2.8)	8 (6)	75 °C CU	PW1	600 V	All
R/L1, S/L2, T/L3	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	SW2	600 V	All
PO, PA/+, PB, PC/-	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	PW1	1000 V	All
R1A, R1B, R1C, R2A, R2C	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	SW2	250 Vac / 30 Vdc	All
LI1 - LI6, +24V, LO, LO+	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW2	30 Vdc	All
COM, AI1 - AI3 +10V, AO	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW1	30 Vdc	All
X1, X2, S1, S2, 1, 2, 3, through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	SW1	150 V	All
C1, C2, C3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW1	30 V	All
D1, D2, D3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW2	30 V	All

Figure 45: Field Wire Termination Diagram for Basic Frame Sizes 2–5B Altivar® 61/71 Drive Controllers in Square D® brand, NEMA Type 1/1A/3R Motor Control Centers

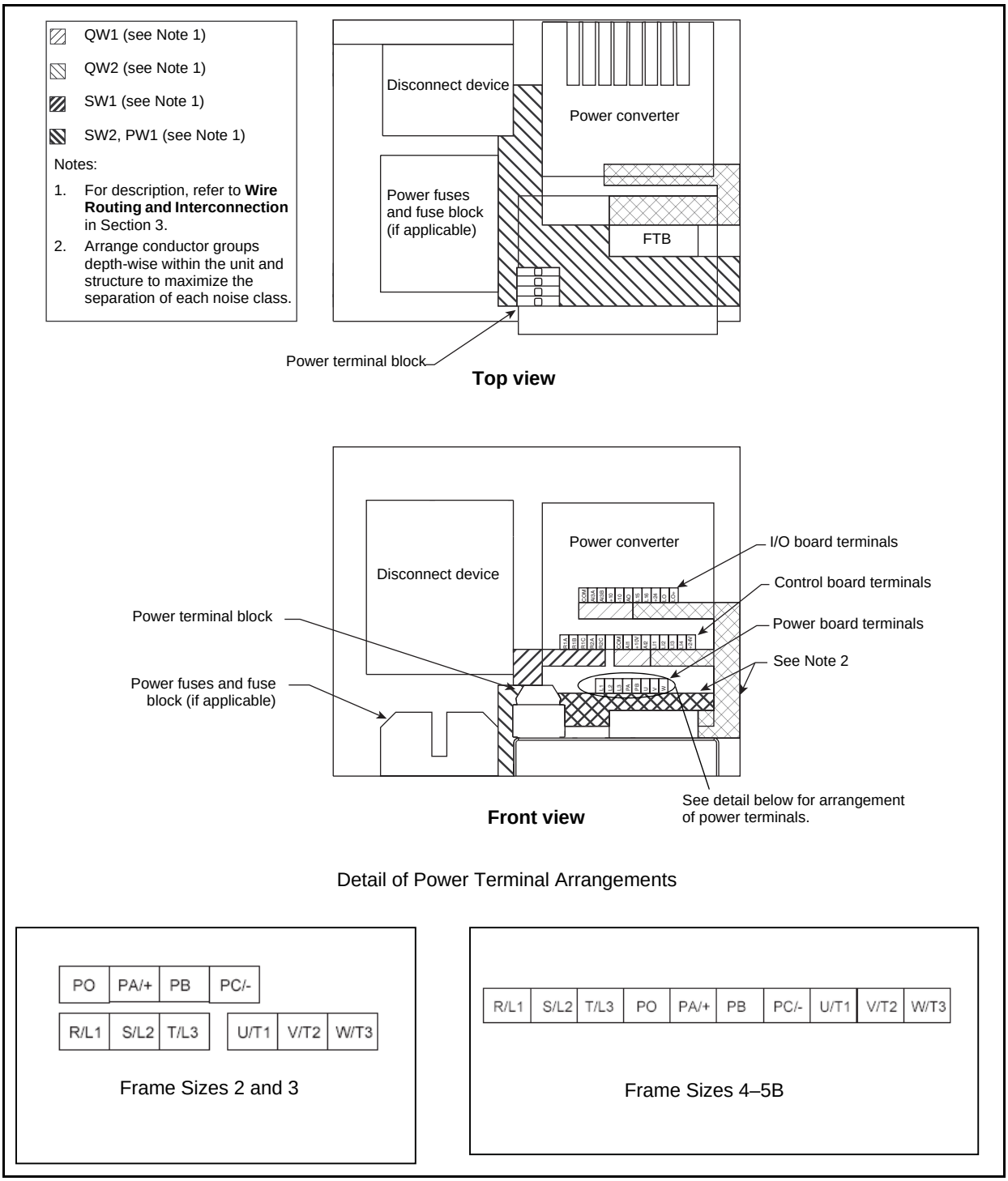


Table 7: Field Wire Termination Chart for Basic Frame Sizes 2–5B Altivar® 61/71 Drive Controllers with Extended Options in Square D® brand, NEMA Type 1/1A/3R Motor Control Centers (see Figure 46 on page 57)

Termination Designation	Device	Torque lb-in (N•m)	Maximum Wire Size AWG (mm2)	Conductor Temperature Rating	Noise Class	Voltage Class	Applicable HP Ratings
U/T1, V/T2, W/T3	Power Converter	12 (1.4)	10 (4)	75 °C CU	SW2	600 V	ATV71 480 V: 1–5 hp 208/240V: 1–5 hp
U/T1, V/T2, W/T3	Power Converter	12 (1.4)	10 (4)	75 °C CU	SW2	600 V	ATV61 480V: 1-7.5 hp 208V: 1-5 hp 240V: 1-7.5 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	8 (6)	75 °C CU	SW2	600 V	ATV71 480 V: 7.5–10 hp 208/240V: 7.5 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	8 (6)	75 °C CU	SW2	600 V	ATV61 480V: 10-15 hp 208V: 7.5 hp 240V: 10 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV71 480 V: 15 hp 208/240 V: 10 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV61 480 V: 20 hp
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV71 480 V: 20 hp
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV61 480 V: 25 hp
R/L1, S/L2, T/L3	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	SW2	600 V	All
PO, PA/+, PB, PC/-	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	PW1	1000 V	All
T1, T2, T3	Iso/Bypass Starter or Isolation Contactor (if applicable	15 (1.7)	8 (6)	75 °C CU	PW1	600 V	480 V: 1–7.5 hp 208/240 V: 1–5 hp
		LR2D18: 15 (1.7)	8 (6)	75 °C CU	PW1	600 V	480V: 10 hp
		LR2D25: 15 (1.7)	8 (6)	75 °C CU	PW1	600 V	480 V: 15 hp 208/240 V: 7.5 hp
		LR2D32: 20 (2.3)	6 (10)	75 °C CU	PW1	600 V	208/240 V: 10 hp
		LR2D40: 45 (5.1)	3 (27)	75 °C CU	PW1	600 V	480V: 20 hp 480 V: 25 hp (ATV61)
L1, L2, L3	Line Contactor (if applicable)	11 (1.2)	14 (2.5)	75 °C CU	SW2	600 V	480 V: 1–7.5 hp 208/240 V: 1–5 hp
		LR2D25: 15 (1.7)	8 (6)	75 °C CU	SW2	600 V	480V: 10 hp
		LR2D40: 45 (5.1)	6 (10)	75 °C CU	SW2	600 V	480 V: 15 hp 208/240 V: 7.5 hp
		LR2D50: 45 (5.1)	3 (27)	75 °C CU	SW2	600 V	480V: 20 hp 480V:25hp(ATV61) 208/240 V: 10 hp
R1A, R1B, R1C, R2A, R2C	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	SW2	250 Vac / 30 Vdc	All
LI1 - LI6, +24V, LO, LO+	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW2	30 Vdc	All
COM, AI1 - AI3 +10V, AO	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW1	30 Vdc	All
X1, X2, S1, S2, 1, 2, 3, through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	SW1	150 V	All
C1, C2, C3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW1	30 V	All
D1, D2, D3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW2	30 V	All

Figure 46: Field Wire Termination Diagram for Frame Sizes 2–5B Altivar® 61/71 Drive Controllers with Extended Options in Square D® brand, NEMA Type 1/1A/3R Motor Control Centers

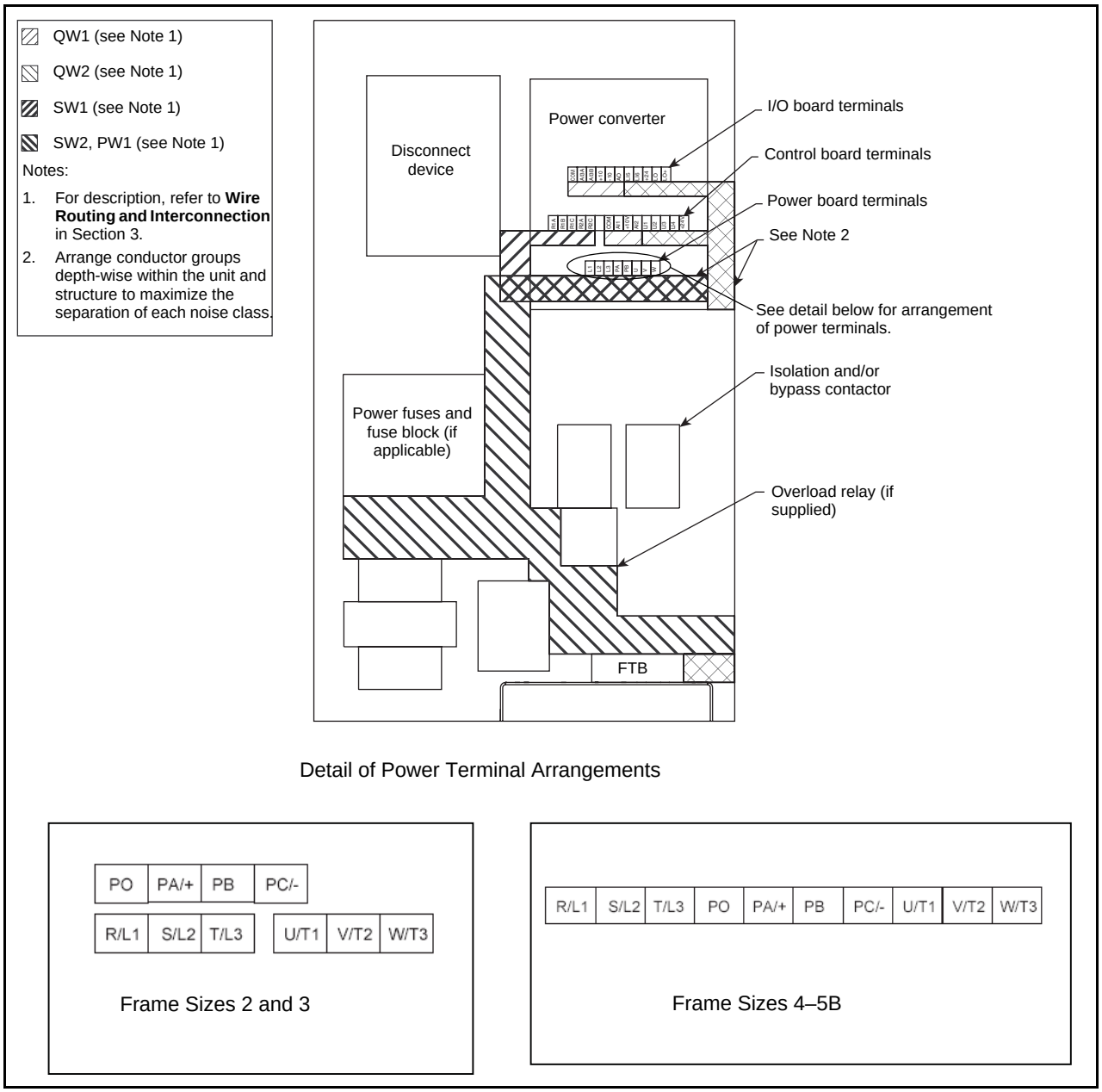


Table 8: Field Wire Termination Chart for Basic Frame Sizes 2–5B Altivar® 61/71 Drive Controllers in Square D® brand, NEMA Type 12 Motor Control Centers (see Figure 47 on page 59)

Termination Designation	Device	Torque lb-in (N•m)	Maximum Wire Size AWG (mm2)	Conductor Temperature Rating	Noise Class	Voltage Class	Applicable HP Ratings
U/T1, V/T2, W/T3	Power Converter	12 (1.4)	10 (4)	75 °C CU	SW2	600 V	ATV71 480 V: 1–5 hp 208/240 V: 1–5 hp
U/T1, V/T2, W/T3	Power Converter	12 (1.4)	10 (4)	75 °C CU	SW2	600 V	ATV61 480V: 1-7.5 hp 208V: 1-5 hp 240V: 1-7.5 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	8 (6)	75 °C CU	SW2	600 V	ATV71 480 V: 7.5–10 hp 208/240V: 7.5 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	8 (6)	75 °C CU	SW2	600 V	ATV61 480V: 10-15 hp 208V: 7.5 hp 240V: 10 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV71 480 V: 15 hp 208/240 V: 10 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV61 480 V: 20 hp
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV71 480 V: 20 hp
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV61 480 V: 25 hp
R/L1, S/L2, T/L3	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	SW2	600 V	All
PO, PA/+, PB, PC/-	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	PW1	1000 V	All
R1A, R1B, R1C, R2A, R2C	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	SW2	250 Vac / 30 Vdc	All
LI1 - LI6, +24V, LO, LO+	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW2	30 Vdc	All
COM, AI1 - AI3 +10V, AO	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW1	30 Vdc	All
X1, X2, S1, S2, 1, 2, 3, through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	SW1	150 V	All
C1, C2, C3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW1	30 V	All
D1, D2, D3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW2	30 V	All

Figure 47: Field Wire Termination Diagram for Basic Frame Sizes 2–5B Altivar® 61/71 Drive Controllers in Square D® brand, NEMA Type 12 Motor Control Centers

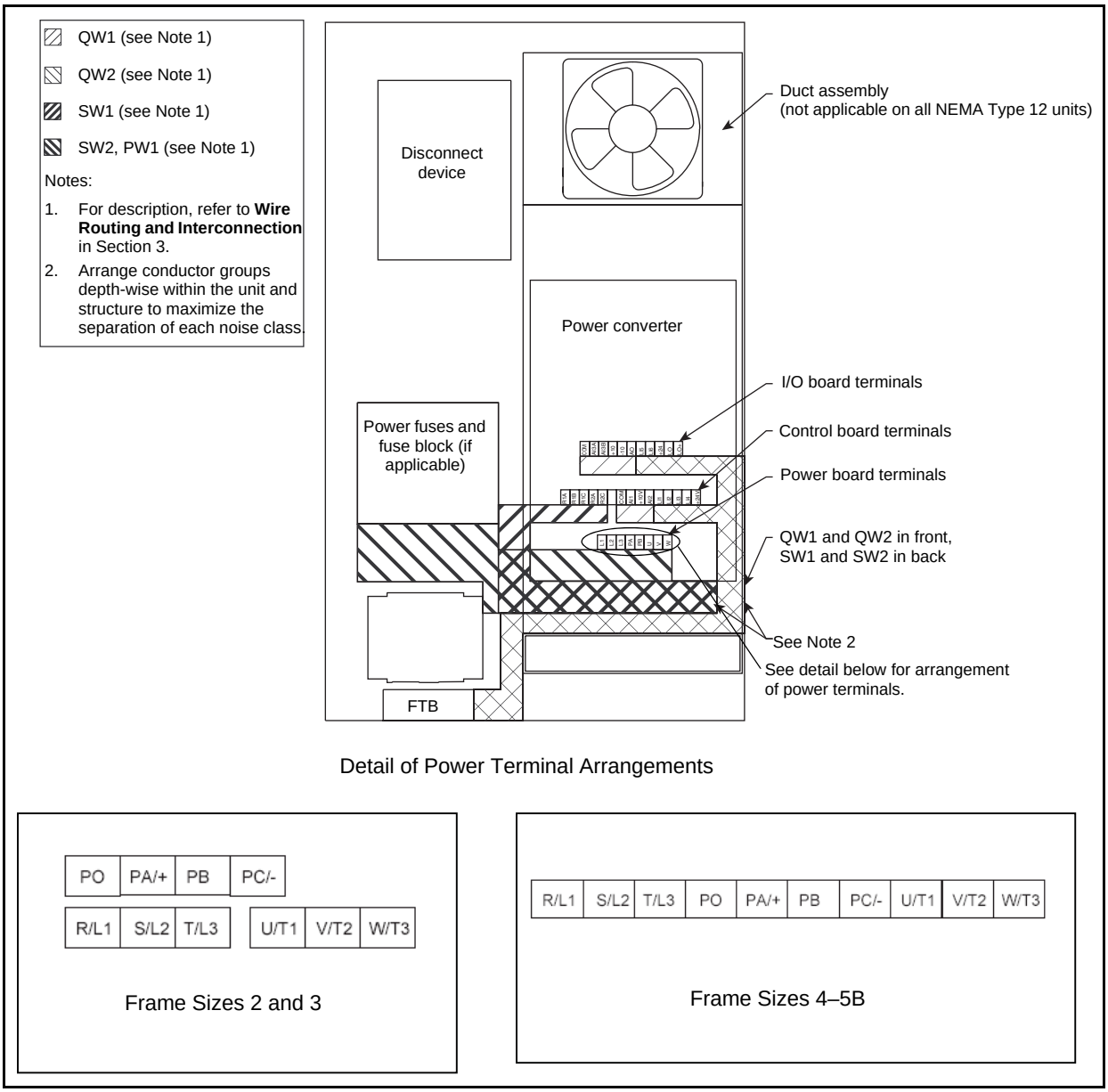


Table 9: Field Wire Termination Chart for Basic Frame Sizes 2–5B Altivar® 61/71 Drive Controllers with Extended Options in Square D® brand, NEMA Type 12 Motor Control Centers (see Figure 48 on page 61)

Termination Designation	Device	Torque lb-in (N•m)	Maximum Wire Size AWG (mm2)	Conductor Temperature Rating	Noise Class	Voltage Class	Applicable HP Ratings
U/T1, V/T2, W/T3	Power Converter	12 (1.4)	10 (4)	75 °C CU	SW2	600 V	ATV71 480 V: 1–5 hp 208/240 V: 1–5 hp
U/T1, V/T2, W/T3	Power Converter	12 (1.4)	10 (4)	75 °C CU	SW2	600 V	ATV61 480V: 1-7.5 hp 208V: 1-5 hp 240V: 1-7.5 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	8 (6)	75 °C CU	SW2	600 V	ATV71 480 V: 7.5–10 hp 208/240 V: 7.5 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	8 (6)	75 °C CU	SW2	600 V	ATV61 480V: 10-15 hp 208V: 7.5 hp 240V: 10 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV71 480 V: 15 hp 208/240 V: 10 hp
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV61 480 V: 20 hp
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV71 480 V: 20 hp
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV61 480 V: 25 hp
U, V,W	Power Converter	25 (2.8)	8 (6)	75 °C CU	PW1	600 V	All
R/L1, S/L2, T/L3	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	SW2	600 V	All
PO, PA/+, PB, PC/-	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	PW1	1000 V	All
T1, T2, T3	Iso/Bypass Starter or Isolation Contactor (if applicable	15 (1.7)	8 (6)	75 °C CU	PW1	600 V	480 V: 1–7.5 hp 208/240 V: 1–5 hp
		LR2D18: 15 (1.7)	8 (6)	75 °C CU	PW1	600 V	480 V: 10 hp
		LR2D25: 15 (1.7)	8 (6)	75 °C CU	PW1	600 V	480 V: 15 hp 208/240 V: 7.5 hp
		LR2D32: 20 (2.3)	6 (10)	75°C CU	PW1	600 V	208/240 V: 10 hp
		LR2D40: 45 (5.1)	3 (27)	75 °C CU	PW1	600 V	480 V: 20 hp 480 V: 25 hp (ATV61)
L1, L2, L3	Line Contactor (if applicable)	11 (1.2)	14 (2.5)	75 °C CU	SW2	600 V	480 V: 1–7.5 hp 208/240 V: 1–5 hp
		LR2D25: 15 (1.7)	8 (6)	75 °C CU	SW2	600 V	480 V: 10 hp
		LR2D40: 45 (5.1)	6 (10)	75 °C CU	SW2	600 V	480 V: 15 hp 208/240 V: 7.5 hp
		LR2D50: 45 (5.1)	3 (27)	75 °C CU	SW2	600 V	480 V: 20 hp 480V: 25hp (ATV61) 208/240 V: 10 hp
R1A, R1B, R1C, R2A, R2C	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	SW2	250 Vac / 30 Vdc	All
LI1 - LI6, +24V, LO, LO+	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW2	30 Vdc	All
COM, AI1 - AI3 +10V, AO	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW1	30 Vdc	All
X1, X2, S1, S2, 1, 2, 3, through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	SW1	150 V	All
C1, C2, C3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW1	30 V	All
D1, D2, D3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW2	30 V	All

Figure 48: Field Wire Termination Diagram for Frame Sizes 2–5B Altivar® 61/71 Drive Controllers with Extended Options in Square D® brand, NEMA Type 12 Motor Control Centers

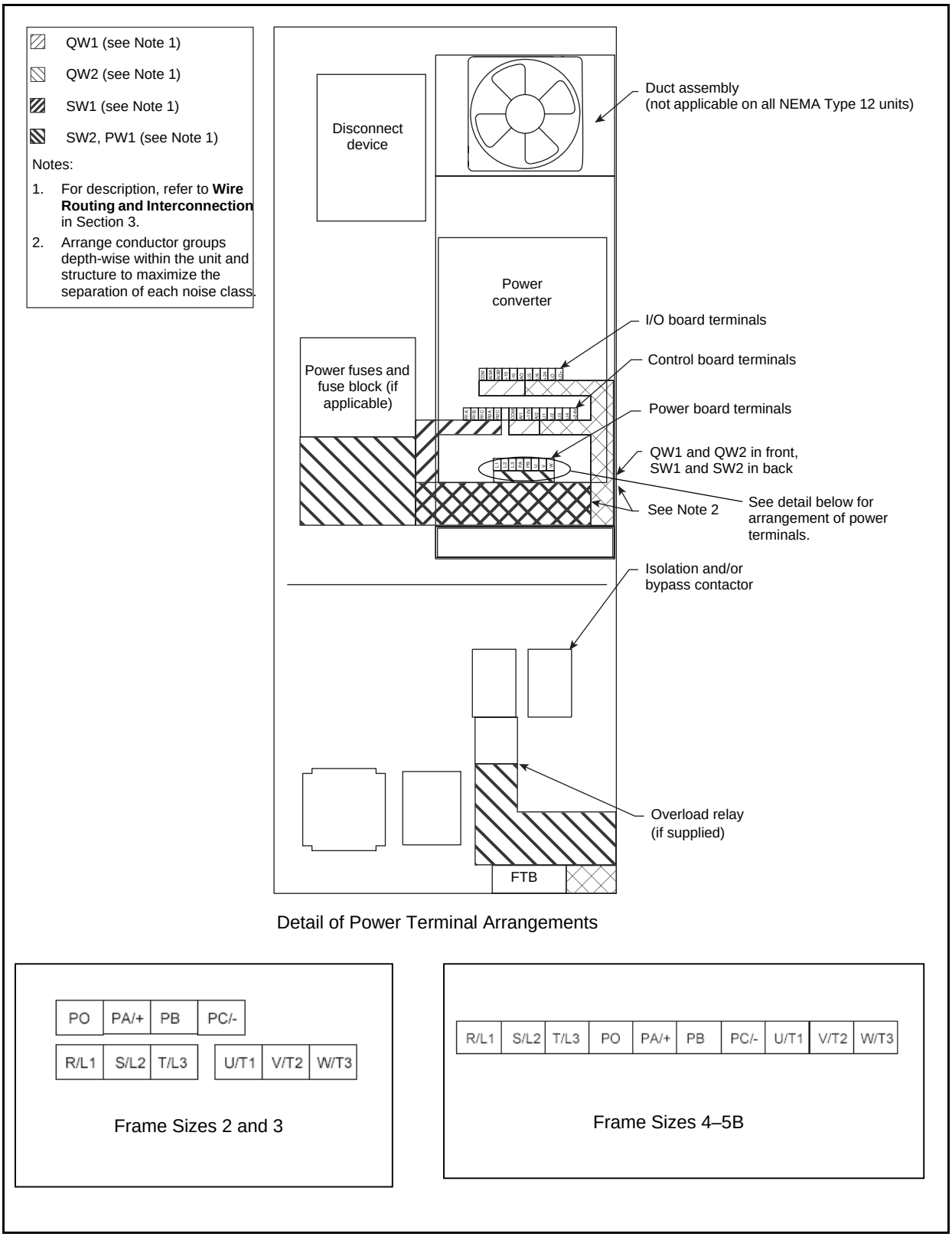


Table 10: Field Wire Termination Chart for Basic Frame Sizes 5A–8 Altivar® 61/71 Drive Controllers in Square D® brand Motor Control Centers

Termination Designation	Device	Torque lb-in (N•m)	Maximum Wire Size AWG (mm2)	Conductor Temp. Rating	Noise Class	Voltage Class	Applicable HP Ratings	Figure
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV61 208V: 10 hp 240V: 15 hp	Figure 49 on page 63
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV71 480 V: 25 hp 208/240 V: 15–20 hp	Figure 49 on page 63
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV61 480V: 30 hp 208V: 15-20 hp 240V: 20-25 hp	Figure 49 on page 63
U/T1, V/T2, W/T3	Power Converter	106 (12)	1/0 (50)	75 °C CU	SW2	600 V	ATV71 480 V: 30–50 hp	30 and 40 hp: Figure 49 on page 63 50 hp: Figure 51 on page 67
U/T1, V/T2, W/T3	Power Converter	106 (12)	1/0 (50)	75 °C CU	SW2	600 V	ATV71 208/240 V: 25–30 hp	Figure 51 on page 67
U/T1, V/T2, W/T3	Power Converter	106 (12)	1/0 (50)	75 °C CU	SW2	600 V	ATV61 480 V: 40–60 hp	40 and 50 hp: Figure 49 on page 63 60 hp: Figure 51 on page 67
U/T1, V/T2, W/T3	Power Converter	106 (12)	1/0 (50)	75 °C CU	SW2	600 V	ATV61 208V: 25-30 hp 240V: 30-40 hp	Figure 51 on page 67
U/T1, V/T2, W/T3	Power Converter	360 (41)	300 kcmil (150)	75 °C CU	SW2	600 V	ATV71 480 V: 60–75 hp 208/240 V: 40 hp	Figure 51 on page 67
U/T1, V/T2, W/T3	Power Converter	360 (41)	300 kcmil (150)	75 °C CU	SW2	600 V	ATV61 480V: 75-100 hp 208V: 40 hp 240V: 50 hp	Figure 51 on page 67
R/L1, S/L2, T/L3	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	SW2	600 V	All	Figure 49 on page 63 and Figure 51 on page 67
PO, PA/+, PB, PC/-	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	PW1	1000 V	All	Figure 49 on page 63 and Figure 51 on page 67
R1A, R1B, R1C, R2A, R2C	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	SW2	250 Vac / 30 Vdc	All	Figure 49 on page 63 and Figure 51 on page 67
LI1 - LI6, +24V, LO, LO+	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW2	30 Vdc	All	Figure 49 on page 63 and Figure 51 on page 67
COM, AI1 - AI3 +10V, AO	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW1	30 Vdc	All	Figure 49 on page 63 and Figure 51 on page 67
X1, X2, S1, S2, 1, 2, 3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	SW1	150 V	All	Figure 49 on page 63 and Figure 51 on page 67
C1, C2, C3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW1	30 V	All	Figure 49 on page 63 and Figure 51 on page 67
D1, D2, D3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW2	30 V	All	Figure 49 on page 63 and Figure 51 on page 67

Figure 49: Field Wire Termination Diagram for Basic Frame Sizes 5A–8 Altivar® 61/71 Drive Controllers in Square D® brand Motor Control Centers

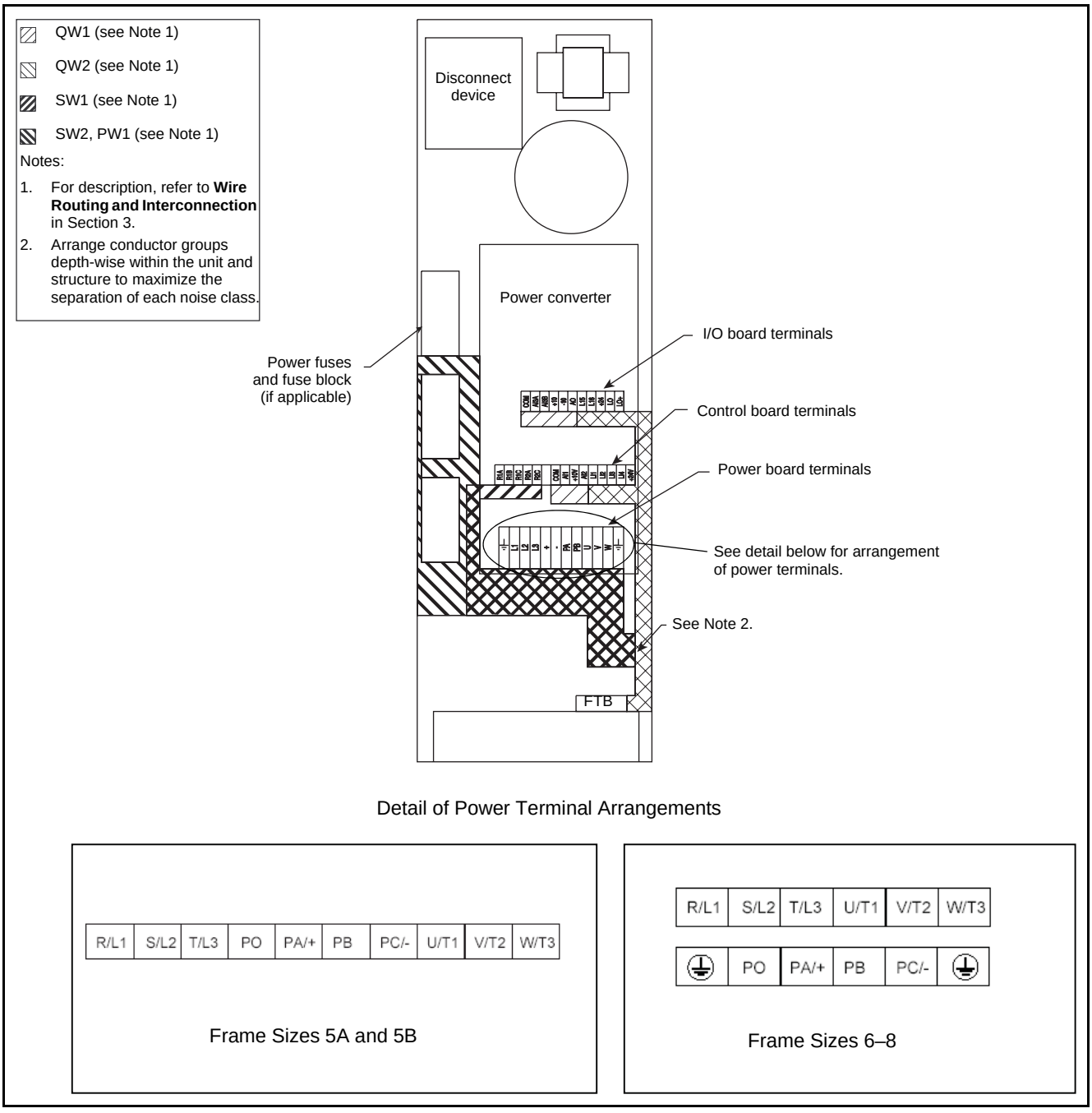


Table 11: Field Wire Termination Chart for Basic Frame Sizes 5A–8 Altivar® 61/71 Drive Controllers with Extended Options in Square D® brand Motor Control Centers

Termination Designation	Device	Torque lb-in (N•m)	Maximum Wire Size AWG (mm2)	Conductor Temp. Rating	Noise Class	Voltage Class	Applicable HP Ratings	Figure
U/T1, V/T2, W/T3	Power Converter	27 (3)	4 (16)	75 °C CU	SW2	600 V	ATV61 208V: 10 hp 240V: 15 hp	Figure 50 on page 66
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV71 480 V: 25 hp 208/240 V: 15–20 hp	Figure 50 on page 66
U/T1, V/T2, W/T3	Power Converter	48 (5.4)	2 (35)	75 °C CU	SW2	600 V	ATV61 480V: 30 hp 208V: 15-20 hp 240V: 20-25 hp	Figure 50 on page 66
U/T1, V/T2, W/T3	Power Converter	106 (12)	1/0 (50)	75 °C CU	SW2	600 V	ATV71 480 V: 30–50 hp	30 and 40 hp: Figure 50 on page 66 50 hp: Figure 52 on page 68
U/T1, V/T2, W/T3	Power Converter	106 (12)	1/0 (50)	75 °C CU	SW2	600 V	ATV71 208/240 V: 25–30 hp	Figure 52 on page 68
U/T1, V/T2, W/T3	Power Converter	106 (12)	1/0 (50)	75 °C CU	SW2	600 V	ATV61 480 V: 40–60 hp	40 and 50 hp: Figure 50 on page 66 60 hp: Figure 52 on page 68
U/T1, V/T2, W/T3	Power Converter	106 (12)	1/0 (50)	75 °C CU	SW2	600 V	ATV61 208V: 25-30 hp 240V: 30-40 hp	Figure 52 on page 68
U/T1, V/T2, W/T3	Power Converter	360 (41)	300 kcmil (150)	75 °C CU	SW2	600 V	ATV71 480 V: 60–75 hp 208/240 V: 40 hp	Figure 52 on page 68
U/T1, V/T2, W/T3	Power Converter	360 (41)	300 kcmil (150)	75 °C CU	SW2	600 V	ATV61 480V: 75-100 hp 208V: 40 hp 240V: 50 hp	Figure 52 on page 68
R/L1, S/L2, T/L3	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	SW2	600 V	All	Figure 51 on page 67 and Figure 52 on page 68
PO, PA/+, PB, PC/-	Power Converter	11 (1.2)	14 (2.5)	75 °C CU	PW1	1000 V	All	Figure 51 on page 67 and Figure 52 on page 68
T1, T2, T3	Iso/Bypass Starter or Isolation Contactor (if applicable	45 (5)	1/0 (50)	75 °C CU	PW1	600 V	ATV 71 480 V: 25–40 hp 208/240 V: 15–20 hp ATV 61 480 V: 30–50 hp 208/240 V: 15–25 hp	Figure 49 on page 63
		LR2D33: 45 (5)	1/0 (50)	75 °C CU	PW1	600 V	ATV 71 480 V: 50 hp 208/240 V: 25 hp ATV 61 480 V: 60 hp 208/240 V: 30 hp	Figure 52 on page 68
		LR2D43: 45 (5)	4/0 (95)	75 °C CU	SW2	600 V	ATV 71 480 V: 60–75 hp 208/240 V: 30–40 hp ATV 61 480 V: 75 and 100(@96.1-120A) hp 208/240 V: 40 and 50 (@117-120A) hp	Figure 52 on page 68
		LR9F53: 160 (18)	M8 clamping screw (1in/25mm wide terminal lug)	75 °C CU	SW2	600 V	ATV 61 480 V: 100 (@121–124 A) hp 208/240 V: 50 (@121-143A) hp	Figure 52 on page 68

Table 11: Field Wire Termination Chart for Basic Frame Sizes 5A–8 Altivar® 61/71 Drive Controllers with Extended Options in Square D® brand Motor Control Centers *(continued)*

Termination Designation	Device	Torque lb-in (N•m)	Maximum Wire Size AWG (mm2)	Conductor Temp. Rating	Noise Class	Voltage Class	Applicable HP Ratings	Figure
L1, L2, L3	Line Contactor (if applicable)	LC1D40: 45 (5)	3 (35)	75 °C CU	SW2	600 V	ATV71 480 V: 25 hp ATV61 480 V: 30 hp	Figure 49 on page 63
		LC1D50: 45 (5)	3 (35)	75 °C CU	SW2	600 V	ATV71 480 V: 30 hp 208/240 V: 15 hp ATV61 480 V: 40 hp 208/240 V: 15 hp	Figure 49 on page 63
		LC1D65: 45 (5)	3 (35)	75 °C CU	SW2	600 V	208/240 V: 20 hp	Figure 49 on page 63
		LC1D80: 100 (11)	2 (35)	75 °C CU	SW2	600 V	ATV71 480 V: 40–50 hp 208/240 V: 25 hp ATV61 480 V: 50 hp 208/240 V: 25–30 hp	ATV71 480 V, 40 hp: Figure 49 on page 63 ATV61 480V, 50 hp; 208/240V, 25 hp: Figure 49 on page 63 All others: Figure 52 on page 68
		LC1D150: 100 (11)	250 kcmil (120)	75 °C CU	SW2	600 V	ATV71 480 V: 60–75 hp 208/240 V: 30–40 hp ATV61 480 V: 60–100 hp 208/240 V: 40–50 hp	Figure 52 on page 68
R1A, R1B, R1C, R2A, R2C	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	SW2	250 Vac / 30 Vdc	All	Figure 51 on page 67 and Figure 52 on page 68
LI1 - LI6, +24V, LO, LO+	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW2	30 Vdc	All	Figure 51 on page 67 and Figure 52 on page 68
COM, AI1 - AI3 +10V, AO	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW1	30 Vdc	All	Figure 51 on page 67 and Figure 52 on page 68
X1, X2, S1, S2, 1, 2, 3, through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	SW1	150 V	All	Figure 51 on page 67 and Figure 52 on page 68
C1, C2, C3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW1	30 V	All	Figure 51 on page 67 and Figure 52 on page 68
D1, D2, D3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW2	30 V	All	Figure 51 on page 67 and Figure 52 on page 68

Figure 50: Field Wire Termination Diagram for Basic Frame Sizes 5A–8 Altivar® 61/71 Drive Controllers with Extended Options in Square D® brand Motor Control Centers

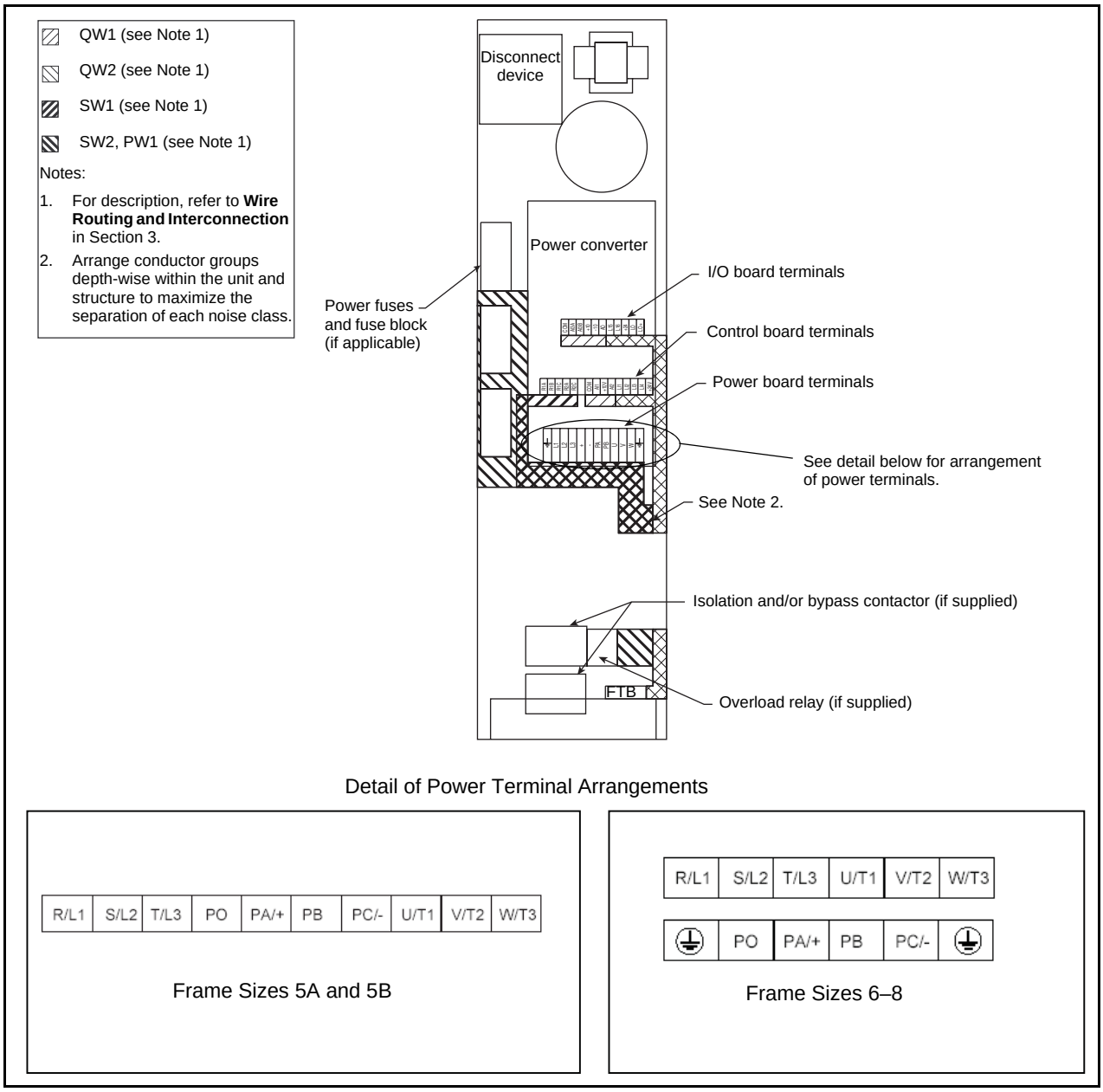


Figure 51: Field Wire Termination Diagram for Basic Frame Sizes 6–8 Altivar® 61/71 Drive Controllers in Square D® brand Motor Control Centers

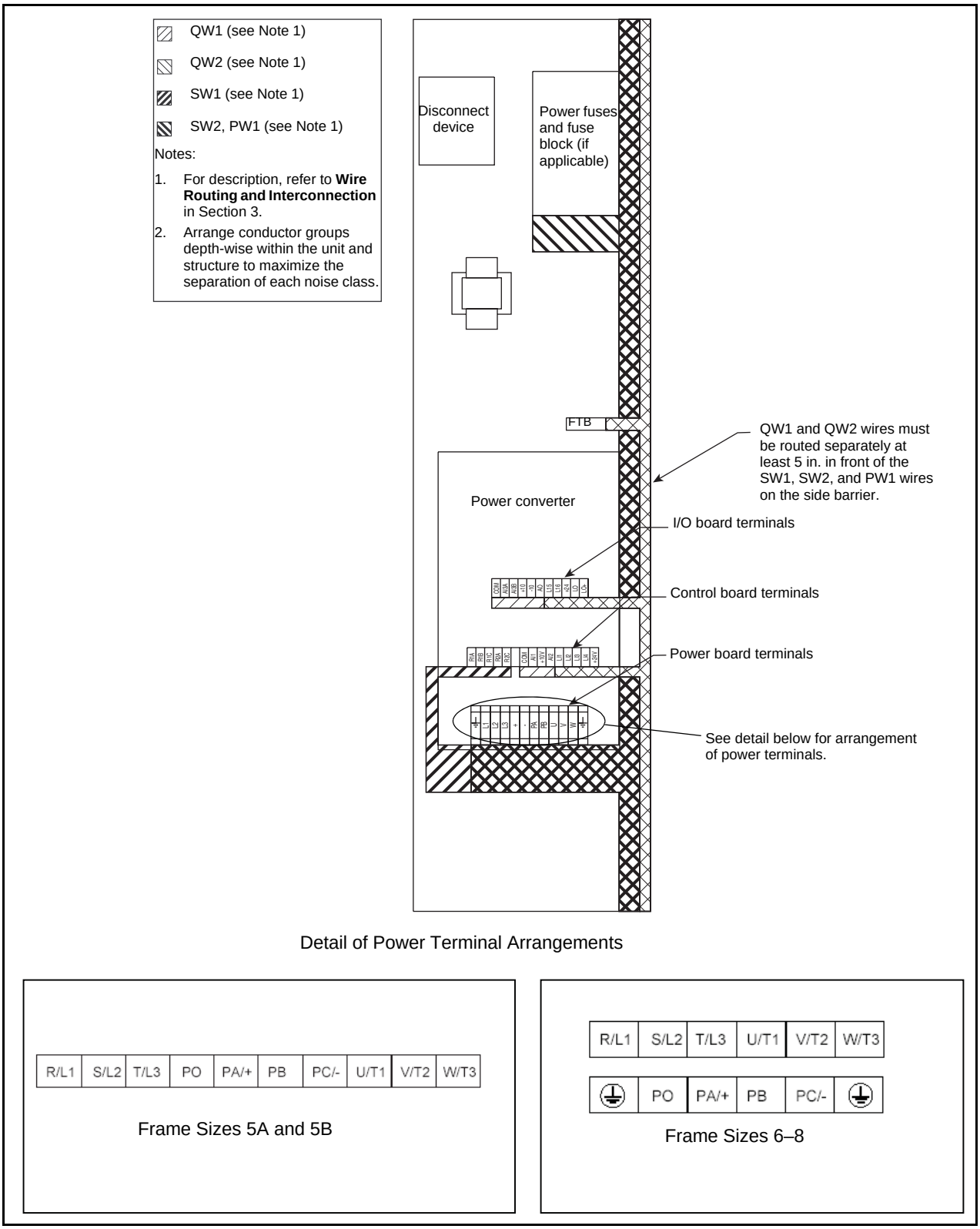


Figure 52: Field Wire Termination Diagram for Basic Frame Sizes 6–8 Altivar® 61/71 Drive Controllers with Extended Options in Square D® brand Motor Control Centers

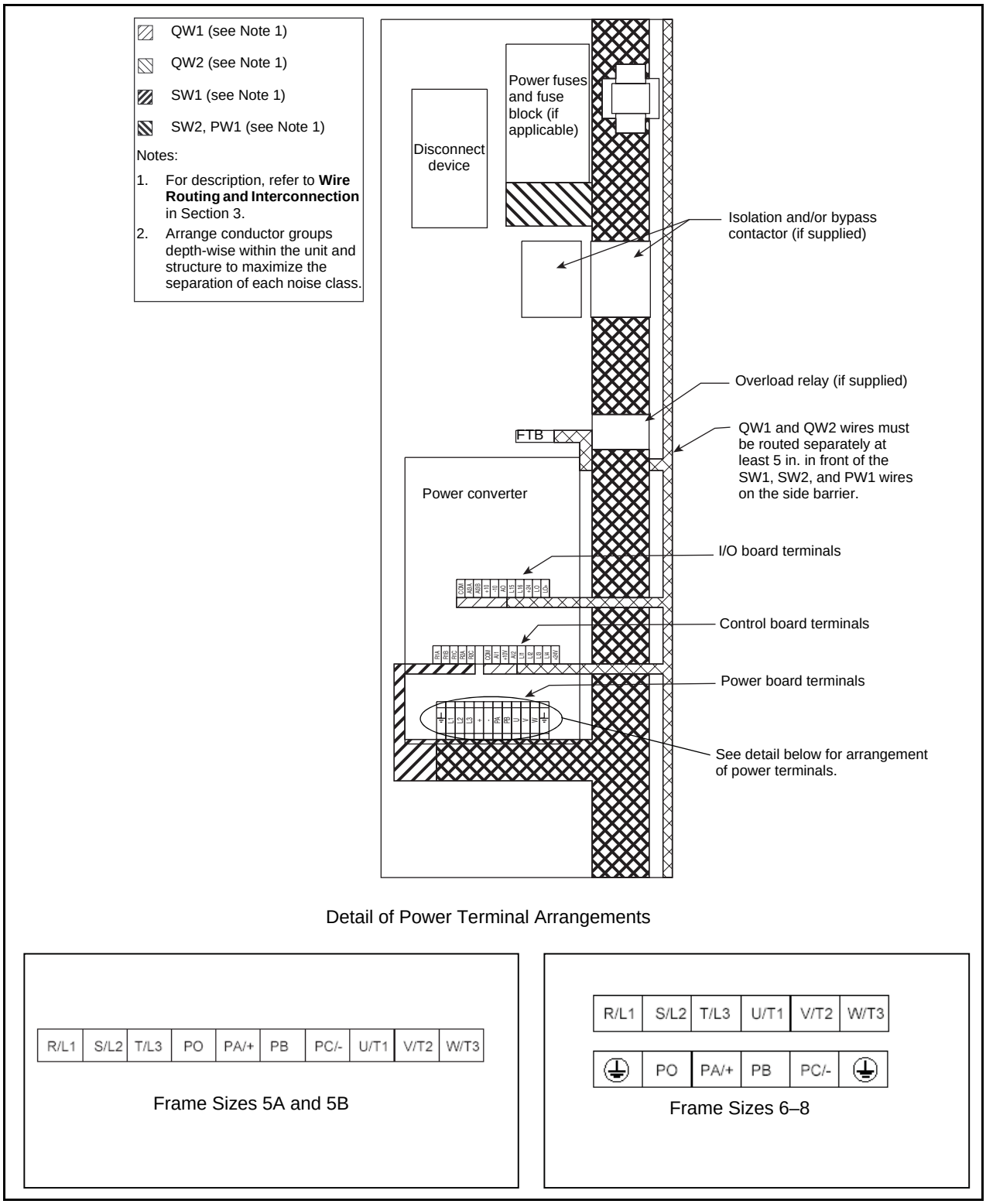


Table 12: Field Wire Termination Chart for Basic Frame Sizes 8–13 Altivar® 61/71 Drive Controllers in Square D® brand Motor Control Centers

Termination Designation	Device	Torque lb-in (N•m)	Maximum Wire Size AWG (mm2)	Conductor Temp. Rating	Noise Class	Voltage Class	Applicable HP Ratings	Figure
U/T1, V/T2, W/T3	Power Converter	216 (24)	350 kcmil (177)	75 °C CU	SW2	600 V	ATV71 480 V: 125–150 hp	125 hp: Figure 24 on page 30 150 hp: Figure 25 on page 31
U/T1, V/T2, W/T3	Power Converter	216 (24)	350 kcmil (177)	75 °C CU	SW2	600 V	ATV61 480 V: 150–200 hp	150 hp: Figure 24 on page 30 200 hp: Figure 25 on page 31
U/T1, V/T2,W/T3	Power Converter	360 (41)	500 kcmil (253)	75 °C CU	SW2	600 V	ATV71 480 V: 200–450 hp	200 hp: Figure 26 on page 31 250 hp: Figure 27 on page 32 300–450 hp: Figure 28 on page 32
U/T1, V/T2,W/T3	Power Converter	360 (41)	500 kcmil (253)	75 °C CU	SW2	600 V	ATV61 480 V: 250–500 hp	300–350 hp: Figure 27 on page 32 400–500 hp: Figure 28 on page 32
U/T1, V/T2, W/T3	Integrated Bypass Overload Relay- LR9F5371 LR9F7375	200 (22.4)	3/0	75 °C CU	PW1	600 V	480 V: 100–150 hp	Figure 54 on page 71
U/T1, V/T2, W/T3		375 (42.4)	300 kcmil	75 °C CU	PW1	600 V	480 V: 200 hp	Figure 54 on page 71
U/T1, V/T2, W/T3	Barriered Bypass Overload Relay	375 (42.4)	500 kcmil	75 °C CU	PW1	600 V	480 V: 125–200 hp	Figure 55 on page 72
PC/-, PO, PA/+	Power Converter	360 (41)	2x250 (100)	75 °C CU	SW2	600 V	ATV71 480 V: 125 hp	Figure 24 on page 30
PC/-, PO, PA/+	Power Converter	360 (41)	2x250 (100)	75 °C CU	SW2	600 V	ATV61 480 V: 150 hp	Figure 24 on page 30
PC/-, PO, PA/+	Power Converter	360 (41)	2x250 (150)	75 °C CU	SW2	600 V	ATV71 480 V: 150 hp	Figure 25 on page 31
PC/-, PO, PA/+	Power Converter	360 (41)	2x250 (150)	75 °C CU	SW2	600 V	ATV61 480 V: 200 hp	Figure 25 on page 31
PC/-, PO, PA/+	Power Converter	360 (41)	2x250 (120)	75 °C CU	SW2	600 V	ATV71 480 V: 200 hp	Figure 26 on page 31
PC/-, PO, PA/+	Power Converter	360 (41)	2x250 (120)	75 °C CU	SW2	600 V	ATV61 480 V: 250 hp	Figure 26 on page 31
PC/-, PO, PA/+	Power Converter	360 (41)	2x350 (150)	75 °C CU	SW2	600 V	ATV71 480 V: 250 hp	Figure 27 on page 32
PC/-, PO, PA/+	Power Converter	360 (41)	2x350 (150)	75 °C CU	SW2	600 V	ATV61 480 V: 300–350 hp	Figure 27 on page 32
PC/-, PO, PA/+	Power Converter	360 (41)	3x350 (4x185)	75 °C CU	SW2	600 V	ATV71 480 V: 300–450 hp	Figure 28 on page 32
PC/-, PO, PA/+	Power Converter	360 (41)	3x350 (4x185)	75 °C CU	SW2	600 V	ATV61 480 V: 400–500 hp	Figure 28 on page 32
PA, PB	Power Converter	106 (12)	250 (60)	75 °C CU	SW2	600 V	ATV61 480 V: 150 hp	Figure 24 on page 30
PA, PB	Power Converter	106 (12)	250 (60)	75 °C CU	SW2	600 V	ATV71 480 V: 150 hp	Figure 24 on page 30
PA, PB	Power Converter	106 (12)	250 (60)	75 °C CU	SW2	600 V	ATV61 480 V: 200 hp	Figure 25 on page 31
PA, PB	Power Converter	212 (24)	250 (120)	75 °C CU	SW2	600 V	ATV71 480 V: 200 hp	Figure 25 on page 31
PA, PB	Power Converter	212 (24)	250 (120)	75 °C CU	SW2	600 V	ATV61 480 V: 250 hp	Figure 26 on page 31
PA, PB	Power Converter	212 (24)	250 (120)	75 °C CU	SW2	600 V	ATV71 480 V: 250 hp	Figure 27 on page 32
PA, PB	Power Converter	212 (24)	250 (120)	75 °C CU	SW2	600 V	ATV61 480 V: 300–350 hp	Figure 27 on page 32
R1A, R1B, R1C, R2A, R2C	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	SW2	250 Vac/ 30 Vdc	All	Figure 53 on page 70
P24, 0V, LI1 - LI6, +24, PWR	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW2	30 Vdc	All	Figure 53 on page 70
+10, AI+, AI1-, COM, AI2, COM, AI2, COM, AO1	Power Converter	5 (0.6)	14 (2.5)	75 °C CU	QW1	30 Vdc	All	Figure 53 on page 70
X1, X2, S1, S2, 1, 2, 3, through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	SW1	150 V	All	Figure 53 on page 70, Figure 54 on page 71, Figure 55 on page 72

Table 12: Field Wire Termination Chart for Basic Frame Sizes 8–13 Altivar® 61/71 Drive Controllers in Square D® brand Motor Control Centers *(continued)*

Termination Designation	Device	Torque lb-in (N•m)	Maximum Wire Size AWG (mm2)	Conductor Temp. Rating	Noise Class	Voltage Class	Applicable HP Ratings	Figure
C1, C2, C3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW1	30 V	All	Figure 53 on page 70, Figure 54 on page 71, Figure 55 on page 72
D1, D2, D3 through n	Terminal Block (FTB)	5 (0.6)	12 (2.5)	75 °C CU	QW2	30 V	All	Figure 53 on page 70, Figure 54 on page 71, Figure 55 on page 72

Figure 53: Field Wire Termination Diagram for Basic Frame Sizes 8–13 Altivar® 61/71 Drive Controllers in Square D® brand, NEMA Type 1/1A Motor Control Centers

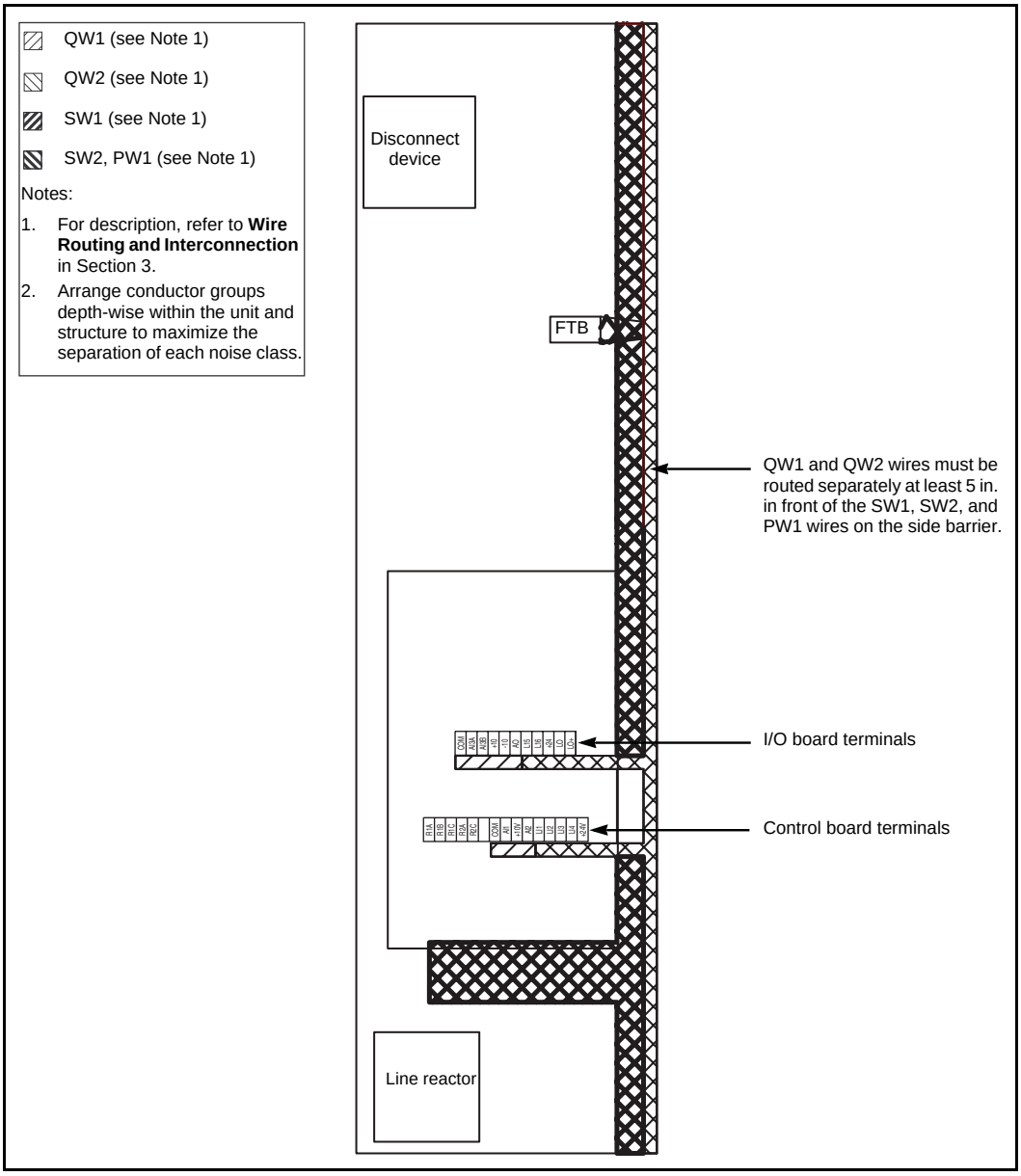


Figure 54: Field Wire Termination Diagram for Basic Frame Sizes 8–13 Altivar® 61/71 Drive Controllers with Integrated Bypass in Square D® brand, NEMA Type 1/1A Motor Control Centers

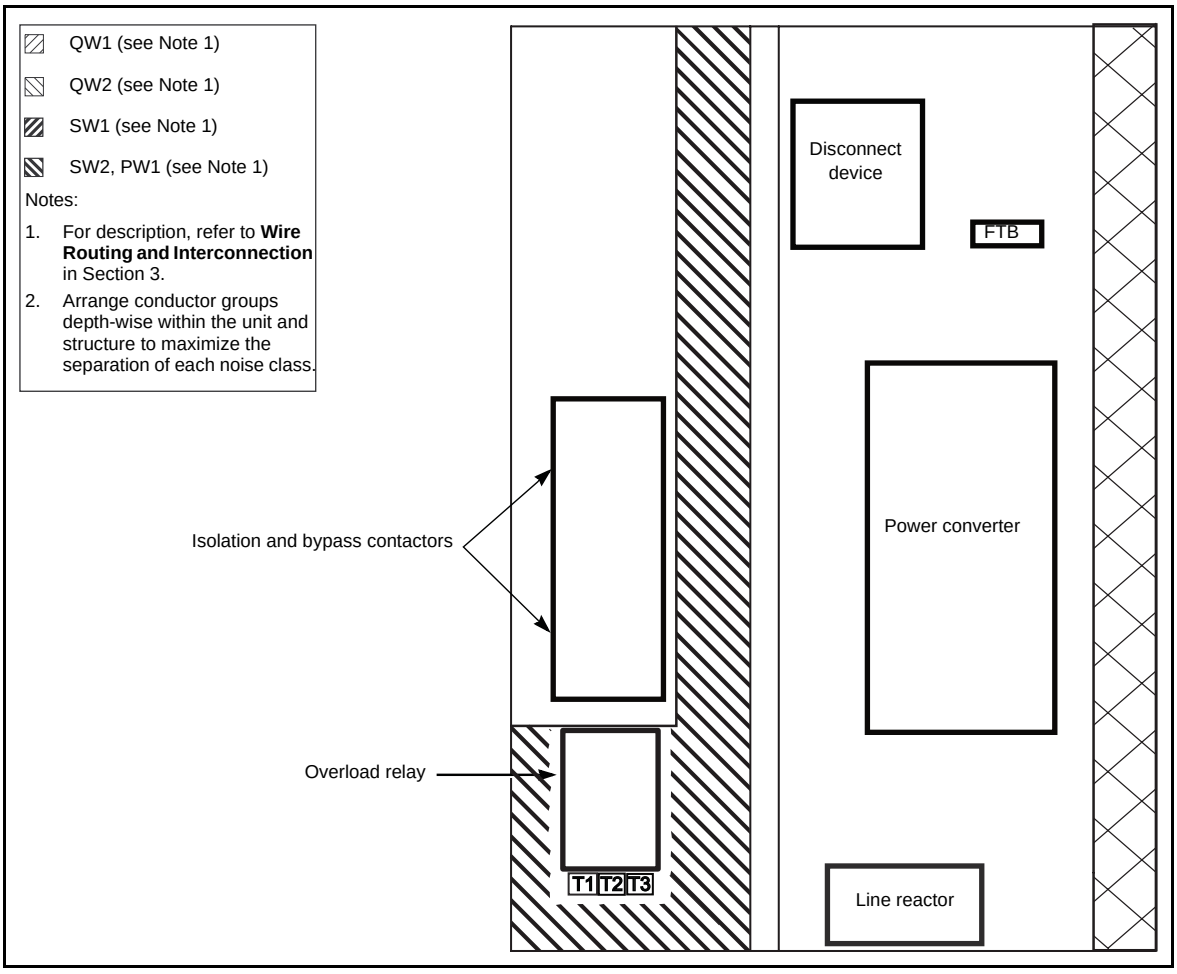
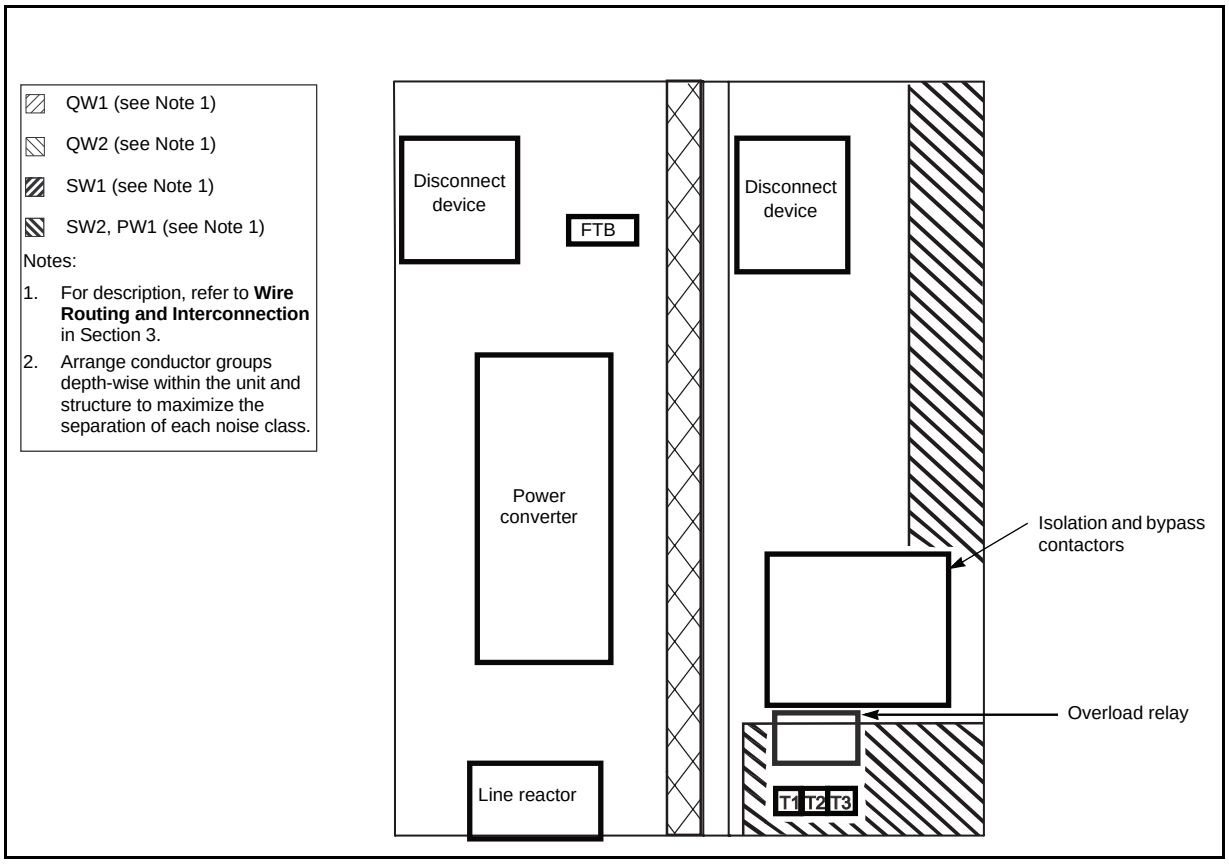


Figure 55: Field Wire Termination Diagram for Basic Frame Sizes 8–13 Altivar® 61/71 Drive Controllers with Barriered Bypass in Square D® brand, NEMA Type 1/1A Motor Control Centers



Appendix B—Field Installation of Inlet Vent Filter Assembly

Overview

This appendix contains installation instructions for a foam filter assembly. The assembly is installed onto the enclosure door over the bottom inlet ventilation louvers of the Altivar® 61/71 adjustable speed drive controller unit. The assembly is available only for 125–500 hp, variable torque Altivar 61/71 drives and 100–450 hp, constant torque Altivar 71 drives.

The MCC factory installs the foam filter assembly as standard for NEMA 1A Gasketed MCC enclosures; the filter media is rated at 30 pores per inch. The foam filter assembly is available only as a field installed option on NEMA 1 MCC enclosures.

Table 13: Inlet Vent Filter Assembly Parts

Drive HP Rating	Part Description	Part Number (Quantity)
125–250 variable torque and 100–200 constant torque	Outer filter bracket	80444-132-02 (1)
	Inner filter bracket	80444-133-02 (1)
	Foam filter element	80444-134-02 (1)
300–500 variable torque and 250–450 constant torque	Foam filter element	80444-134-02 (2)

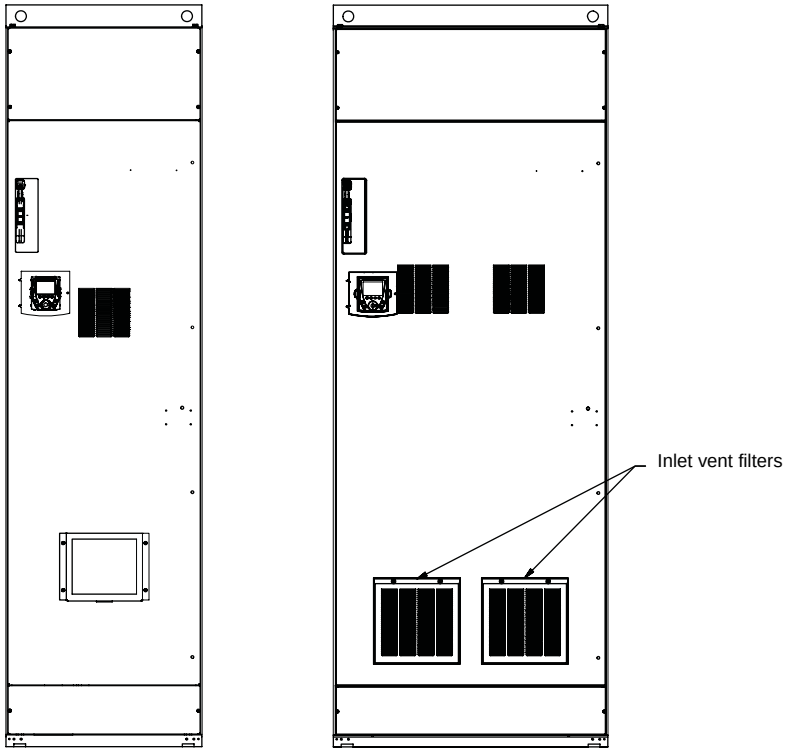
This filter is offered for users who desire a reduction in the amount of contaminants pulled through the cooling vents of the drive controller unit. Filters are not required to maintain the UL Listing of the unit for NEMA 1 integrity.

The assembly requires the following parts (see Table 13):

- Outer filter bracket
- Inner filter bracket
- Foam filter element

Each filter media is pre-cut to fit a particular drive horsepower size inlet vent.

Figure 56: Altivar® 61/71 Drive Controller with Inlet Vent Filter Assembly Installed



100 hp CT–250 hp VT

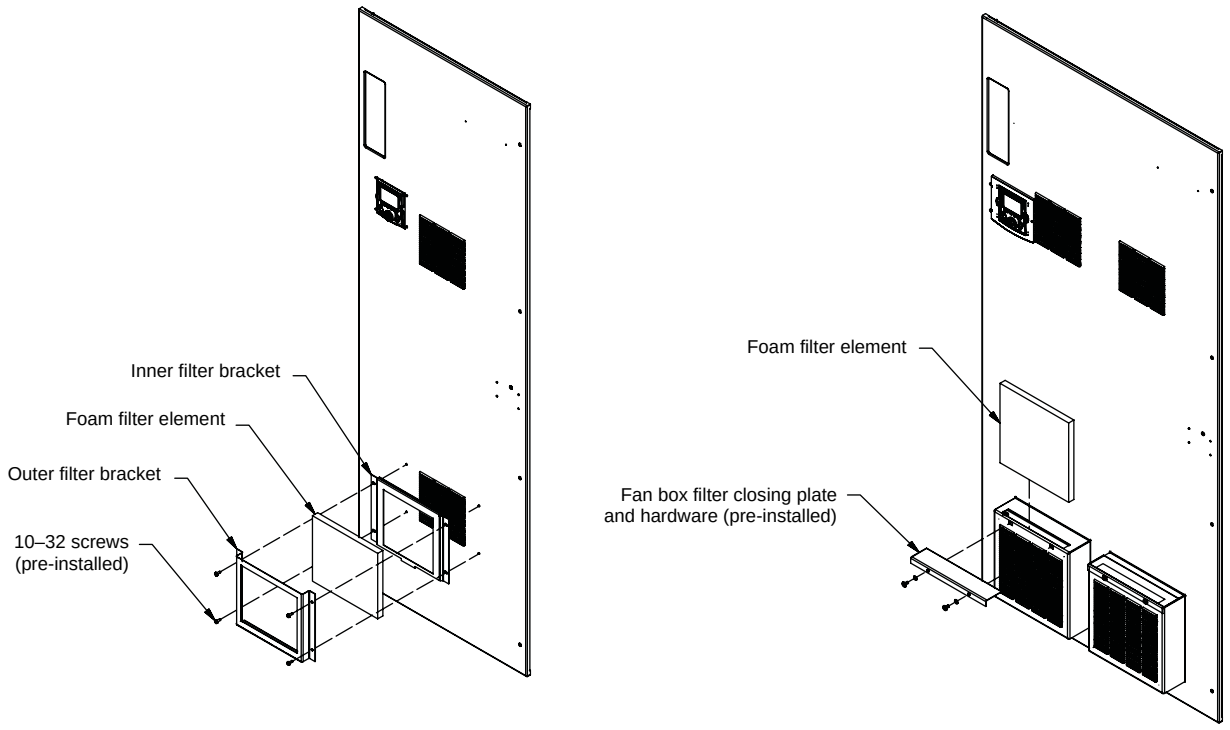
250 hp CT–500 hp VT

Installation

Follow these steps to install the inlet vent filter assembly:

1. With the door closed, install the filter brackets (outer and inner) over the louvers, as shown in Figure 57, using the hardware provided in the pre-drilled holes around the louvers.
2. Insert the foam filter element into the opening at the top of the filter bracket. The element should be completely inside the filter brackets.

Figure 57: Inlet Vent Filter Assembly Hardware Locations



Maintenance

Frame Sizes 9–13 drive controllers in NEMA 1A (Gasketed) MCC enclosures include a filter over the lower door vents. The maintenance procedures for the MCC drive controller require that the filter element be inspected and cleaned every six months, or more frequently if indicated by service conditions and your established maintenance schedule.

To clean the filter element:

1. Remove the filter element from the front door bracket by pushing the filter element up from the bottom of the filter bracket, using the access slots in the bottom of the bracket. Once the filter element is partially above the bracket, remove it by pulling it out of the top of the bracket.
2. Vacuum and wash the filter thoroughly.
3. Dry the filter completely and re-install it.

If the filter element becomes damaged, or when it deteriorates, replace it. See Table 13 on page 73 for a list of replacement filter part numbers.

Appendix C—Field Replacement of Power Fuses

Overview

This appendix contains instructions for replacing the power fuses in drive controllers with the following ratings:

- 250–450 hp CT
- 300–500 hp VT

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must be installed and serviced only by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm that power is off.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

To replace the power fuses, see the instructions below and refer to Figure 58 on page 76.

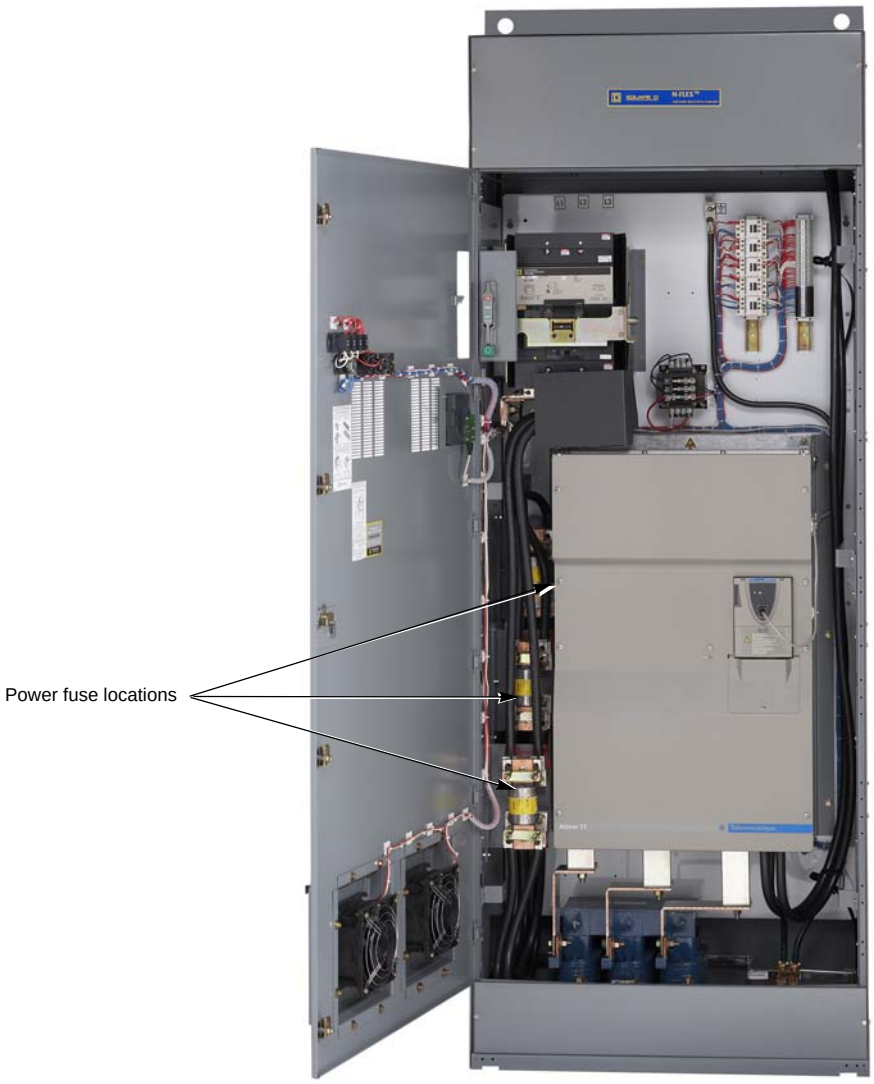
1. Turn off all power supplying this equipment and follow lockout/tagout procedures before working on or inside equipment. Always use a properly rated voltage sensing device to confirm the power is off.
2. Loosen the bolts holding the clamps on each end of the Phase A fuse.
3. Push the fuse down until clear of the top clamp, then pull the fuse toward the front of the enclosure while lifting it clear of the bottom clamp.

   NOTE: If the power wires block fuse removal, loosen the wire-connector lug of the wire in front of the fuse, then pull the wire free from the lug.
4. Using a new fuse of the same class and size as the one removed, repeat Step 3 in reverse order.
5. Using the recommended torque values in Table 14:
   a. Tighten the two bolts of the top clamp holding the fuse.
   b. Tighten the two bolts of the bottom clamp.
6. If you removed the power wire in step 3, reinstall it into the lug. Tighten it to the indicated value in Table 14.
7. Repeat steps 1–6 for Phases B and C.
8. Close and latch the door before turning on the power to the equipment.

Table 14: Recommended Fuse Tightening Torque Values

Wire	25–32 lb-ft (34–43 N•m)
Clamp	11–13 lb-ft (15–17.6 N•m)

Figure 58: Power Fuse Locations



Installation and Maintenance Log

Date	Job Description	Name/Initials

Notes

80444-233-01D **12/2008**
Replaces 80444-233-01C 03/2008

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