# Altivar™ 61/71 Field Drive

## Adjustable Speed Drives for Oil and Gas Pumping and Irrigation

Instruction Bulletin

30072-454-01
1/2012

**Retain for future use.**

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 the lightning bolt or ANSI man symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exist which, as indicated below, can or will result in personal injury if the instructions are not followed.

The exclamation point symbol is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

| Symbol | Name |
|---|---|
|  | Lightning Bolt |
|  | ANSI Man |
|  | Exclamation Point |

**⚠ 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.

## Product Support

For support and assistance, contact the Product Support Group. The Product Support Group is staffed from Monday through Friday, 8:00 am until 6:00 pm Eastern time, to assist with product selection, start-up, and diagnosis of product or application problems. Emergency phone support is available 24 hours a day, 365 days a year.

Toll free: 1-888-778-2733

E-Mail: drive.products.support@us.schneider-electric.com

Fax: 919-217-6508

# Section 1—Introduction and Technical Characteristics

## Introduction

The Schneider Electric field drive is tailored for outdoor applications such as irrigation, oil, and gas pumping. The Type 3R enclosure isolates critical internal electronic components from harsh environments. The design eliminates the need for air filters and separate cooling devices such as air conditioning units or heat exchangers.

- The Altivar 61 version is rated 1–125 hp @ 230 V and 1–700 hp @ 460 V.
- The Altivar 71 version is rated 1–100 hp @ 230 V and 1–600 hp @ 460 V.

This instruction bulletin covers receiving, installation, start-up, configuration, and troubleshooting of the field drive.

## Related Documentation

For further information, refer to the latest revision of the following instruction bulletins which ship with the drive when the corresponding option is selected and are available from the Technical Library at www.Schneider-Electric.us.

**Table 1: Instruction Bulletins**

| Bulletin No. | Title |
|---|---|
| 1760643 | *Altivar® 61 Installation Manual 0.5 to 100 HP* |
| 30072-452-63 | *Supplementary Instructions to ATV61 Variable Speed Drives Installation Manual–Low Horsepower* |
| 1760655 | *Altivar® 61 Installation Manual 75 to 900 HP* |
| 30072-452-49 | *Supplementary Instructions to ATV61 Variable Speed Drives Installation Manual–High Horsepower and ATV61 Programming Manual* |
| W817574030111 | *Altivar® 61 CD-ROM* |
| 1755843 | *Altivar® 71 Installation Manual 0.5 to 100 HP* |
| 1755849 | *Altivar® 71 Installation Manual 75 to 700 HP* |
| 30072-452-25 | *Altivar® 71 Drive Controllers Errata to Bulletin atv71e_installation_manual_en_v3,* |
| 1755855 | *ATV71 Programming Manual* |
| W817555430117A07 | *Altivar® 71 CD-ROM* |
| 1760649 | *ATV61 Programming Manual* |
| 30072-200-50 | *Handling, Installation, Operation, and Maintenance of Electrical Control Equipment* |

## Terminology

The following terminology is used in this instruction bulletin to distinguish between the ATV61/71 field drive and the ATV61/71 drive component:

When used as a component of' the field drive, devices with part numbers beginning in ATV61 or ATV71 are referred to as *power converters*.

The combination of the power converter, the enclosure, and the power and control circuits that constitute the field drive is referred to as the *drive,* the *controller*, or the *adjustable frequency controller (AFC).*

## Before You Begin

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Read and understand this bulletin in its entirety before installing or operating the field drive. Installation, adjustment, repair, and maintenance of the drives must be performed by qualified personnel.
- The user is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Before servicing the drive:
  - — Disconnect all power including external control power that may be present before servicing the drive.
  - — Place a “DO NOT TURN ON” label on the drive disconnect.
  - — Lock disconnect in the open position.
  - — WAIT 15 MINUTES for the DC bus capacitors to discharge. Then follow the DC Bus Voltage Measurement Procedure on page 37 to verify that the DC voltage is less than 42 V. The drive LEDs are not indicators of the absence of DC bus voltage.
- Install and close all covers before applying power or starting and stopping the drive.

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

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Follow manufacturer’s instructions for selecting and setting branch circuit protective devices and overloads (when present) to maintain overcurrent, short circuit and ground fault protection.
- The opening of the branch-circuit-protective device may be an indication that a fault has been interrupted. To provide continued protection against risk of fire or shock hazard, current carrying parts and other components of the circuit should be examined and replaced if damaged. If burnout of thermal unit of an overload relay occurs, the entire overload relay unit must be replaced.

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

**⚠ 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 the equipment.
- Always use a properly rated voltage sensing device to confirm 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.**

## ⚠ DANGER

**UNINTENDED EQUIPMENT OPERATION**

Before turning on the drive or upon exiting the configuration menus, ensure that the inputs assigned to the Run command are in a state that will not cause the drive to run. Otherwise, the motor can start immediately.

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

## ⚠ WARNING

**LOSS OF CONTROL**

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of anticipated transmission delays or failures of the link[1].
- Each implementation of a field drive must be individually and thoroughly tested for proper operation before being placed into service.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems."

## ⚠ CAUTION

**INCOMPATIBLE LINE VOLTAGE**

Before turning on and configuring the drive, ensure that the line voltage is compatible with the line voltage range specified on the drive nameplate. The drive can be damaged if the line voltage is not compatible.

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

Follow these precautions before installing the field drive:

- The Type 3R controller is suitable for installation in a Pollution Degree 2 environment as defined in NEMA ICS1 and IEC 90664-1. The expected environment must be compatible with this rating.
- When attaching wall-mountable controllers to their mounting surfaces, use fasteners rated for the weight of the apparatus, the expected shock and vibration of the installation, and the expected environment.

# Catalog Numbers

The controller catalog number, located on the nameplate on the inside of the door, is coded to describe the configuration and options present. Use the following grid to translate the catalog number into a description of the drive.

| Class | Type | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8930 | IFD | • | H | • | • | • | • | • |
| | | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ |

## ① Product

| Code | Drive Type |
|---|---|
| IFD | Field Drive |

## ② Horsepower

| Code | HP Rating |
|---|---|
| C | 1 |
| D | 2 |
| E | 3 |
| F | 5 |
| G | 7.5 |
| H | 10 |
| J | 15 |
| K | 20 |
| L | 25 |
| M | 30 |
| N | 40 |
| P | 50 |
| Q | 60 |

| Code | HP Rating |
|---|---|
| R | 75 |
| S | 100 |
| T | 125 |
| U | 150 |
| W | 200 |
| X | 250 |
| Y | 300 |
| Z | 350 |
| 4 | 400 |
| 5 | 450 |
| 6 | 500 |
| 7 | 600 |
| 8 | 700 (ATV61 only) |

## ③ Enclosure Type

| Code | Environment Rating |
|---|---|
| H | Type 3R |

## ④ Voltage Rating

| Code | Voltage |
|---|---|
| 1 | 230/240 V, single-phase |
| 3 | 230/240 V, three-phase |
| 4 | 460/460 V, three-phase |

## ⑤ Application Type

| Code | Applied Rating |
|---|---|
| V | Variable Torque (ATV61) |
| C | Constant Torque (ATV71) |

## ⑥ Power Circuit

| Code | Power Circuit |
|---|---|
| W | Variable Frequency Drive (VFD) Without Bypass |
| Y | Full Voltage Non-Reversing (FVNR) With Bypass[1] |

[1] FVNR (2 contactor) bypass option up to 75 hp @ 230 V and 150 hp @ 460 V.

## ⑦ Line Reactor

| Code | Feature |
|---|---|
| A09 | Line Reactor, 5%[1] |

[1] 3% line reactor is standard, with DC choke. With the optional 5% line reactor a DC Choke is not provided above 230 V / 60 hp and 460 V / 100 hp.

## ⑧ Surge Protection

| Code | Feature |
|---|---|
| H09 | HWA Surge[1] |

[1] SDSA standard with optional upgrade to HWA type.

Notes:

- No dry contacts for remote monitoring.
- Load reactor, if required, must be supplied by the customer and installed external to the drive panel.
- Specials include:
  - — Bypass for drives 200 hp and above.
  - — Soft-start bypass.

# Nameplate Identification

The nameplate for the field drive is on the inside of the door. See Figure 1. The nameplate identifies the device by the bill of materials (BOM) number. When identifying or describing the field drive, use the data from this nameplate.

**Figure 1: Nameplate Example**

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**Irrigation Field Drive Data Sheet**

| | | | | | |
|---|---|---|---|---|---|
| Customer | XYZ Corp. | PO# | 1234567 | SO # | SYIFD5 |
| BOM # | 8930IFDSH4VYH | | | | |
| Job # | JNF12345 | Wiring Drawing | 213199 | Assembly Drawing | N/A |
| | | | rev A | | N/A |

| INCOMING POWER | | MOTOR DATA | |
|---|---|---|---|
| VOLTS: | 460 | HP: | 100 |
| HZ: | 60 | FLA: | 124 |

JOB SPECIFIC DATA

| | | |
|---|---|---|
| FU1,2 | 5A | Class CC Time Delay |
| FU3 | 10A | Class CC Time Delay |
| T1 | 750VA | 460:120V |

SO# WO#

DWG#

CONTROL DIVISION

PART#

TYPE VOLTS HZ PH

LARGEST: HP FLA DATE CODE

TOTAL: HP FLA WITHSTAND

INSTALL THIS EQUIPMENT IN ACCORDANCE WITH NEC REQUIREMENTS. CHECK ALL TERMINATIONS FOR TIGHTNESS PRIOR TO ENERGIZING THIS EQUIPMENT.
FIELD INSTALLED CONDUCTORS SHOULD BE RATED 60°C MINIMUM ON CIRCUITS SUPPLYING 100 AMPS OR LESS, AND 75°C MINIMUM ABOVE 100 AMPS.
USE COPPER CONDUCTORS ONLY.

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# Technical Characteristics

## Drive Ratings

**Table 2: 230 V, Single Phase**

| hp | Output Current (A) | Enclosure Frame Size | Short Circuit Protection Means | Short-Circuit Current Rating (SCCR) (kA) |
|---|---|---|---|---|
| 1 | 4.8 | 1 | Circuit Breaker | 5 |
| 2 | 8 | 1 | Circuit Breaker | 5 |
| 3 | 11 | 1 | Circuit Breaker | 5 |
| 5 | 17.5 | 1 | Circuit Breaker | 22 |
| 7.5 | 27.5 | 1 | Circuit Breaker | 22 |
| 10 | 33 | 2 | Circuit Breaker | 22 |
| 15 | 54 | 2 | Circuit Breaker | 22 |
| 20 | 66 | 3 | Circuit Breaker | 22 |
| 25 | 75 | 3 | Circuit Breaker | 22 |
| 30 | 88 | 3 | Fuses | 22 |

**Table 3: 230 V, Three-Phase**

| hp | Output Current (A) | Enclosure Frame Size | Short Circuit Protection Means | SCCR (kA) | |
|---|---|---|---|---|---|
| | | | | w/out Bypass | with Bypass |
| 1 | 4.2 | 1 | Circuit Breaker | 100 | 100 |
| 2 | 6.8 | 1 | Circuit Breaker | 100 | 100 |
| 3 | 9.6 | 1 | Circuit Breaker | 100 | 100 |
| 5 | 15.2 | 1 | Circuit Breaker | 100 | 100 |
| 7.5 | 22 | 1 | Circuit Breaker | 100 | 100 |
| 10 | 28 | 1 | Circuit Breaker | 100 | 100 |
| 15 | 42 | 2 | Circuit Breaker | 100 | 100 |
| 20 | 54 | 2 | Circuit Breaker | 100 | 100 |
| 25 | 68 | 2 | Circuit Breaker | 100 | 100 |
| 30 | 80 | 2 | Circuit Breaker | 100 | 100 |
| 40 | 104 | 3 | Circuit Breaker | 100 | 100 |
| 50 | 130 | 3 | Circuit Breaker | 100 | 100 |
| 60 | 176 | 3 | Fuses | 10 | 10 |
| 75 | 221 | 3 | Fuses | 10 | 10 |
| 100 | 285 | 3 | Fuses | 10 | Special |
| 125 | 359 | 4 (ATV61 only) | Fuses | 10 | Special |

**Table 4: 460 V, Three-Phase**

| hp | Output Current (A) | Enclosure Frame Size | | Short Circuit Protection Means | SCCR (kA) | |
|---|---|---|---|---|---|---|
| | | ATV61 | ATV71 | | w/out Bypass | with Bypass |
| 1 | 2.1 | 1 | 1 | Circuit Breaker | 100 | 100 |
| 2 | 3.4 | 1 | 1 | Circuit Breaker | 100 | 100 |
| 3 | 4.8 | 1 | 1 | Circuit Breaker | 100 | 100 |
| 5 | 7.6 | 1 | 1 | Circuit Breaker | 100 | 100 |
| 7.5 | 11 | 1 | 1 | Circuit Breaker | 100 | 100 |
| 10 | 14 | 1 | 1 | Circuit Breaker | 100 | 100 |
| 15 | 21 | 1 | 1 | Circuit Breaker | 100 | 100 |
| 20 | 27 | 2 | 2 | Circuit Breaker | 100 | 100 |
| 25 | 34 | 2 | 2 | Circuit Breaker | 100 | 100 |
| 30 | 40 | 2 | 2 | Circuit Breaker | 100 | 100 |
| 40 | 52 | 2 | 2 | Circuit Breaker | 100 | 100 |
| 50 | 65 | 2 | 2 | Circuit Breaker | 100 | 100 |
| 60 | 77 | 3 | 3 | Circuit Breaker | 100 | 100 |
| 75 | 96 | 3 | 3 | Circuit Breaker | 100 | 100 |
| 100 | 124 | 3 | 3 | Circuit Breaker | 100 | 100 |
| 125 | 156 | 3 | 3 | Fuses | 100 | 100 |
| 150 | 180 | 3 | 4 | Fuses | 100 | 35 |
| 200 | 240 | 4 | 4 | Fuses | 100 | |
| 250 | 302 | 4 | 4 | Fuses | 100 | |
| 300 | 361 | 4 | 5 | Fuses | 100 | |
| 350 | 414 | 4 | 5 | Fuses | 100 | |
| 400 | 477 | 5 | 5 | Fuses | 100 | Special |
| 450 | 515 | 5 | 5 | Fuses | 100 | |
| 500 | 590 | 5 | 6 | Fuses | 100[1] | |
| 600 | 720 | 6 | 6 | Fuses | 30 | |
| 700 | 840 | 6 | N/A | Fuses | 30 | |

[1] 500 hp VT is rated 100 kA, 500 hp CT is rated 30 kA.

## Enclosure Dimensions

**Table 5: Enclosure Dimensions (inches)**

| Frame Size | H | W | D |
|---|---|---|---|
| **1** | 37.8 | 32.0 | 15.9 |
| **2** | 45.9 | 37.0 | 19.9 |
| **3** | 74.2[1] | 45.85 | 24.0 |
| **4** | 90.0[1] | 44.3 | 28.0 |
| **5** | 90.0 | 78.5 | 33.0 |
| **6** | 90.0 | 86.5 | 33.0 |

[1] Includes 12 inch legs.

## Input Current Ratings

All branch circuit components and equipment such as feeder cables, disconnect devices, and protective devices must be rated for the higher of the following two currents: the input current of the drive, or the motor full load current (MFLC). The MFLC is printed on the nameplate (see Figure 1 on page 11). The branch circuit feeder protection must be sized according to the NEC.

AC line reactors are used to add reactance to the branch circuit, minimize drive input line current, reduce controller nuisance tripping due to transient overvoltage, reduce harmonic distortion, and help improve controller immunity to voltage imbalance. Impedance may be internal or external to the power converter or a combination of internal and external impedance. A 5% line reactor is available as Mod A09.

In systems that use bypass contactors, the line reactor must only be connected between the breaker load terminals in the controller and the power converter. A line reactor in a bypass motor-starting circuit will reduce the motor's ability to produce starting torque.

**Table 6: Input Line Currents for Selection of Branch Circuit Feeders, 460 V, VT[1]**

| Drive Catalog Number [2] | Motor Power 460 V 60Hz | Input Current Ratings | | | | | |
|---|---|---|---|---|---|---|---|
| | | 3% Line Reactor | | | Factory Mounted 5% Line Reactor[3] | | |
| | | 5 kA | 22 kA | 100 kA | 5 kA | 22 kA | 100 kA |
| | (hp) | (A) | (A) | (A) | (A) | (A) | (A) |
| IFDCH4V_ | 1 | 1.5 | 1.5 | 1.5 | 1.5 | 1.4 | 1.4 |
| IFDDH4V_ | 2 | 2.9 | 2.9 | 2.9 | 2.7 | 2.7 | 2.7 |
| IFDEH4V_ | 3 | 4.0 | 4.0 | 4.0 | 3.8 | 3.8 | 3.8 |
| IFDFH4V_ | 5 | 6.9 | 6.9 | 6.9 | 6.6 | 6.6 | 6.6 |
| IFDGH4V_ | 7.5 | 9.2 | 9.2 | 9.2 | 8.8 | 8.8 | 8.8 |
| IFDHH4V_ | 10 | 12.5 | 12.5 | 12.5 | 11.8 | 11.8 | 11.8 |
| IFDJH4V_ | 15 | 17.5 | 17.6 | 17.6 | 16.8 | 16.8 | 16.8 |
| IFDKH4V_ | 20 | 23.5 | 23.6 | 23.7 | 22.4 | 22.4 | 22.4 |
| IFDLH4V_ | 25 | 28.8 | 29.0 | 29.1 | 27.9 | 27.9 | 27.8 |
| IFDMH4V_ | 30 | 33.5 | 33.7 | 33.7 | 33.1 | 33.1 | 33.1 |
| IFDNH4V_ | 40 | 45.1 | 45.3 | 45.3 | 44.7 | 44.7 | 44.6 |
| IFDPH4V_ | 50 | 55.5 | 55.6 | 55.7 | 54.7 | 54.7 | 54.6 |
| IFDQH4V_ | 60 | 67.4[4] | 67.4 | 67.4 | 66.9[4] | 66.9 | 66.8 |
| IFDRH4V_ | 75 | 82.3[4] | 82.4 | 82.6 | 81.5[4] | 81.5 | 81.4 |
| IFDSH4V_ | 100 | 111.1[4] | 111.2 | 111.3 | 109.9[4] | 109.9 | 109.8 |

1 Select the conductor based on the input line current or motor FLA, whichever is greater.

2 "_" indicates that the catalog number continues. See page 10 for a detailed description of catalog numbers.

3 Factory modification A09 is an optional 5% line reactor available for drives of all hp ratings.

4 10 kA.

**Table 7: Input Line Currents for Selection of Branch Circuit Feeders for 125–700 hp, 460 V, VT[1]**

| Drive Catalog Number[2] | Motor Power 460 V 60 Hz (hp) | Rated Output Current | Short-Circuit Current Rating | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 30,000 A | | 65,000 A | | 100,000 A | |
| | | | 3% line reactor | 5% line reactor | 3% reactor standard | 5% reactor option | 3% reactor standard | 5% reactor option |
| IFDTH4V_ | 125 | 156 | – | – | 134.2 | 132.5 | 134.2 | 132.4 |
| IFDUH4V_ | 150 | 180 | – | – | 160.4 | 160.4 | 160.3 | 160.3 |
| IFDWH4V_ | 200 | 240 | – | – | 192.1 | 192.1 | 192.1 | 192.1 |
| IFDXH4V_ | 250 | 302 | – | – | 231.9 | 231.9 | 231.7 | 231.7 |
| IFDYH4V_ | 300 | 361 | – | – | 309.3 | 309.3 | 309.0 | 309.0 |
| IFDZH4V_ | 350 | 414 | – | – | 316.7 | 316.7 | 317.1 | 317.1 |
| IFD4H4V_ | 400 | 477 | – | – | 359.2 | 359.2 | 358.6 | 358.6 |
| IFD5H4V_ | 450 | 515 | – | – | 402.2 | 402.2 | 401.6 | 401.6 |
| IFD6H4V_ | 500 | 590 | – | – | 451.1 | 451.1 | 450.5 | 450.5 |
| IFD7H4V_ | 600 | 720 | 644 | 644 | – | – | – | – |
| IFD8H4V_ | 700 | 840 | 760 | 760 | – | – | – | – |

1 Input line currents are based on the source impedance capable of providing the listed amperage levels.

2 "_" indicates that the catalog number continues. See page 10 for a detailed description of catalog numbers.

**Table 8: Input Line Currents for Selection of Branch Circuit Feeders for 1–75 hp, 460 V, CT[1]**

| Drive Catalog Number[2] | Motor Power 460 V 60 Hz (hp) | Rated Output Current | Short-Circuit Current Rating | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5,000 A | | 10,000 A | | 22,000 A | | 100,000 A | |
| | | | 3% reactor standard | 5% reactor option | 3% reactor standard | 5% reactor option | 3% reactor standard | 5% reactor option | 3% reactor standard | 5% reactor option |
| IFDCH4C_ | 1 | 2.1 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| IFDDH4C_ | 2 | 3.4 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 |
| IFDEH4C_ | 3 | 4.8 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 |
| IFDFH4C_ | 5 | 7.6 | 6.8 | 6.9 | 6.8 | 6.8 | 6.9 | 6.9 | 6.9 | 6.9 |
| IFDGH4C_ | 7.5 | 11 | 9.2 | 9.2 | 9.2 | 9.2 | 9.2 | 9.2 | 9.2 | 9.2 |
| IFDHH4C_ | 10 | 14 | 12.5 | 12.5 | 12.5 | 12.4 | 12.5 | 12.4 | 12.5 | 12.4 |
| IFDJH4C_ | 15 | 21 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.6 | 17.5 |
| IFDKH4C_ | 20 | 27 | 23.6 | 23.5 | 23.6 | 23.5 | 23.6 | 23.5 | 23.6 | 23.4 |
| IFDLH4C_ | 25 | 34 | 28.5 | 28.4 | 28.4 | 28.4 | 28.5 | 28.4 | 28.5 | 28.4 |
| IFDMH4C_ | 30 | 40 | 33.5 | 33.4 | 33.4 | 33.4 | 33.4 | 33.4 | 33.4 | 33.4 |
| IFDNH4C_ | 40 | 52 | 45.5 | 45.4 | 45.4 | 45.4 | 45.4 | 45.3 | 45.4 | 45.2 |
| IFDPH4C_ | 50 | 65 | 55.7 | 55.7 | 55.8 | 55.7 | 55.8 | 55.7 | 55.9 | 55.7 |
| IFDQH4C_ | 60 | 77 | 67.5 | 67.5 | 67.6 | 67.5 | 67.6 | 67.5 | 67.6 | 67.4 |
| IFDRH4C_ | 75 | 96 | 82.1 | 82.1 | 82.2 | 82.1 | 82.2 | 82.1 | 82.3 | 82.1 |

1 Input line currents are based on the source impedance capable of providing the listed amperage levels.

2 "_" indicates that the catalog number continues. See page 10 for a detailed description of catalog numbers.

**Table 9: Input Line Currents for Selection of Branch Circuit Feeders for 100–600 hp, 460 V, CT[1]**

| Drive Catalog Number[2] | Motor Power 460 V 60 Hz (hp) | Rated Output Current | Short-Circuit Current Rating | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 30,000 A | | 65,000 A | | 100,000 A | |
| | | | 3% line reactor | 5% line reactor | 3% reactor standard | 5% reactor option | 3% reactor standard | 5% reactor option |
| IFDSH4C_ | 100 | 124 | – | – | 111.8 | 111.7 | 111.9 | 111.8 |
| IFDTH4C_ | 125 | 156 | – | – | 131.9 | 131.7 | 132.0 | 131.8 |
| IFDUH4C_ | 150 | 180 | – | – | 161.3 | 161.1 | 161.4 | 161.2 |
| IFDWH4C_ | 200 | 240 | – | – | 192.7 | 192.6 | 192.8 | 192.7 |
| IFDXH4C_ | 250 | 302 | – | – | 233.5 | 233.5 | 232.8 | 233.7 |
| IFDYH4C_ | 300 | 361 | – | – | 288.9 | 288.7 | 289.1 | 288.9 |
| IFDZH4C_ | 350 | 414 | – | – | 317.2 | 317.1 | 317.2 | 317.1 |
| IFD4H4C_ | 400 | 477 | – | – | 360.6 | 360.5 | 360.6 | 360.5 |
| IFD5H4C_ | 450 | 515 | – | – | 402.7 | 402.6 | 403.1 | 402.8 |
| IFD6H4C_ | 500 | 590 | 547 | 547 | – | – | – | – |
| IFD7H4C_ | 600 | 720 | 660 | 660 | – | – | – | – |

1 Input line currents are based on the source impedance capable of providing the listed amperage levels.

2 "_" indicates that the catalog number continues. See page 10 for a detailed description of catalog numbers.

**Table 10: Input Line Currents for Selection of Branch Circuit Feeders, 230 V, VT[1]**

| Drive Catalog Number[2] | Motor Power 230 V 60Hz (hp) | Rated Output Current | Input Current Ratings | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Standard 3% Line Reactor | | | | | Factory Mounted 5% Line Reactor[3] MOD A09 | | | | |
| | | | 5 kA (A) | 10 kA (A) | 18 kA (A) | 22 kA (A) | 100 kA (A) | 5 kA (A) | 10 kA (A) | 18 kA (A) | 22 kA (A) | 100 kA (A) |
| IFDCH3V_ | 1 | – | 3.2 | – | – | 3.2 | 3.2 | 3.0 | – | – | 3.0 | 3.0 |
| IFDDH3V_ | 2 | – | 6.0 | – | – | 6.0 | 6.0 | 5.6 | – | – | 5.6 | 5.6 |
| IFDEH3V_ | 3 | – | 8.3 | – | – | 8.4 | 8.4 | 8.0 | – | – | 8.0 | 8.0 |
| IFDFH3V_ | 5 | – | 14.3 | – | – | 14.3 | 14.3 | 13.7 | – | – | 13.8 | 13.8 |
| IFDGH3V_ | 7.5 | – | 19.5 | – | – | 19.5 | 19.5 | 18.4 | – | – | 18.4 | 18.4 |
| IFDHH3V_ | 10 | – | 25.6 | – | – | 25.8 | 25.8 | 24.4 | – | – | 24.6 | 24.6 |
| IFDJH3V_ | 15 | – | 36.4 | – | – | 36.5 | 36.6 | 35.0 | – | – | 35.0 | 35.0 |
| IFDKH3V_ | 20 | – | 47.4 | – | – | 47.5 | 47.6 | 46.2 | – | – | 46.4 | 46.3 |
| IFDLH3V_ | 25 | – | 59.6 | – | – | 59.7 | 59.7 | 58.0 | – | – | 58.0 | 57.9 |
| IFDMH3V_ | 30 | – | 69.7 | – | – | 69.7 | 69.7 | 68.8 | – | – | 68.9 | 68.9 |
| IFDNH3V_ | 40 | – | 94.2 | – | – | 94.2 | 93.9 | 93.5 | – | – | 93.6 | 93.4 |
| IFDPH3V_ | 50 | – | 116.4 | – | – | 116.5 | 116.2 | 116.0 | – | – | 116.0 | 115.8 |
| IFDQH3V_ | 60 | 176 | – | 147 | – | – | – | – | 147 | – | – | – |
| IFDRH3V_ | 75 | 221 | – | 173 | – | – | – | – | 173 | – | – | – |
| IFDSH3V_ | 100 | 285 | – | 232 | – | – | – | – | 232 | – | – | – |
| IFDTH3V_ | 125 | 359 | – | 288 | 288 | – | – | – | 288 | 288 | – | – |

1 Select the conductor based on the input line current or motor FLA, whichever is greater.

2 "_" indicates that the catalog number continues. See page 10 for a detailed description of catalog numbers.

3 Factory modification A09 is an optional 5% line reactor available for drives of all hp ratings.

**Table 11: Input Line Currents for Selection of Branch Circuit Feeders for 230 V, CT[1]**

| Drive Catalog Number[2] | Motor Power 230 V 60 Hz (hp) | Rated Output Current | Short-Circuit Current Rating | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 5,000 A | | 10,000 A | | 22,000 A | | 100,000 A | |
| | | | 3% reactor standard | 5% reactor option | 3% reactor standard | 5% reactor option | 3% reactor standard | 5% reactor option | 3% reactor standard | 5% reactor option |
| IFDCH3C_ | 1 | 4.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 |
| IFDDH3C_ | 2 | 6.8 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |
| IFDEH3C_ | 3 | 9.6 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 | 8.3 |
| IFDFH3C_ | 5 | 15.2 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 | 14.3 |
| IFDGH3C_ | 7.5 | 22 | 19.5 | 19.4 | 19.5 | 19.4 | 19.4 | 19.4 | 19.5 | 19.5 |
| IFDHH3C_ | 10 | 28 | 25.6 | 25.5 | 25.6 | 25.5 | 25.7 | 25.5 | 25.8 | 25.6 |
| IFDJH3C_ | 15 | 42 | 35.4 | 35.2 | 35.4 | 35.2 | 35.8 | 35.5 | 35.9 | 35.7 |
| IFDKH3C_ | 20 | 54 | 47.4 | 47.3 | 47.4 | 47.3 | 47.8 | 47.6 | 47.8 | 47.7 |
| IFDLH3C_ | 25 | 68 | 58.6 | 58.4 | 58.6 | 58.4 | 58.9 | 58.8 | 59.0 | 58.9 |
| IFDMH3C_ | 30 | 80 | 69.4 | 69.2 | 69.4 | 69.2 | 69.5 | 69.4 | 69.5 | 69.5 |
| IFDNH3C_ | 40 | 104 | 94.5 | 94.2 | 94.5 | 94.2 | 94.6 | 94.6 | 94.6 | 94.6 |
| IFDPH3C_ | 50 | 144 | 127 | 127 | 127 | 127 | 127 | 127 | 127 | 127 |
| IFDQH3C_ | 60 | 176 | 147 | 147 | 147 | 147 | – | – | – | – |
| IFDRH3C_ | 75 | 221 | 180 | 180 | 180 | 180 | – | – | – | – |
| IFDSH3C_ | 100 | 285 | 237 | 237 | 237 | 237 | – | – | – | – |

1 Input line currents are based on the source impedance capable of providing the listed amperage levels.

2 "_" indicates that the catalog number continues. See page 10 for a detailed description of catalog numbers.

**Table 12: Input Line Currents for Selection of Branch Circuit Feeders for 1–30 hp, 230 V, Single-Phase Input, VT/CT**

| Drive Catalog Number | Motor Power 460 V 60 Hz (hp) | Rated Output Current | Short-Circuit Current Rating | | | |
|---|---|---|---|---|---|---|
| | | | 5,000 A | | 22,000 A | |
| | | | 3% reactor standard | 5% reactor option | 3% reactor standard | 5% reactor option |
| IFDCH1V_ / IFDCH1C_ | 1 | 4.8 | 9.9 | 9.9 | – | – |
| IFDDH1V_ / IFDDH1C_ | 2 | 8 | 15.7 | 15.7 | – | – |
| IFDEH1V_ / IFDEH1C_ | 3 | 11 | 22.1 | 22.1 | – | – |
| IFDFH1V_ / IFDFH1C_ | 5 | 17.5 | 29.9 | 29.9 | – | – |
| IFDDG1V_ / IFDDG1C_ | 7.5 | 27.5 | 40.1 | 40.1 | 40.1 | 40.1 |
| IFDHH1V_ / IFDHH1C_ | 10 | 33 | 54 | 54 | 54 | 54 |
| IFDJH1V_ / IFDJH1C_ | 15 | 54 | 78.3 | 78.3 | 78.3 | 78.3 |
| IFDKH1V_ / IFDKH1C_ | 20 | 66 | 101.5 | 101.5 | 101.5 | 101.5 |
| IFDLH1V_ / IFDLH1C_ | 25 | 75 | 131 | 131 | 131 | 131 |
| IFDMH1V_ / IFDMH1C_ | 30 | 88 | 145.9 | 145.9 | 145.9 | 145.9 |

# Specifications

### Table 13: Specifications

| | |
|---|---|
| Input voltage | 460 V ±10%, 230 V ±10% |
| Displacement power factor | 98% through speed range |
| Input frequency | 60 Hz ± 5% |
| Output voltage | Three-phase output<br>Maximum voltage equal to input voltage |
| Galvanic isolation | Galvanic isolation between power and control<br>(inputs, outputs, and power supplies) |
| Frequency range of power converter | 0.1 to 500 Hz (factory setting of 60 Hz) |
| Torque/overtorque | **VT:** 110% of nominal motor torque for 60 s / **CT:** 170% of nominal motor torque for 60 s |
| Current (transient) | **VT:** 110% of controller rated current for 60 s / **CT:** 150% of controller rated current |
| Switching frequency | Selectable from 0.5 up to 16 kHz depending on hp rating[1]. Factory settings:<br>VT: 4 kHz for 230 V, single phase, 1–10 hp and 230 V, 3 phase, 1–20 hp and 1–40 hp @ 460V<br>2.5 kHz for 230 V, single phase, 15–30 hp and 230 V, 3 phase, 25–125 hp and 50–700 hp @ 460 V<br>CT: 4 kHz for 230 V, single phase, 1–10 hp and 230 V, 3 phase, 1–20 hp and 1–40 hp @ 460 V<br>2.5 kHz for 230 V, single phase, 15–30 hp and 230 V, 3 phase, 25–125 hp and 50–700 hp @ 460 V<br>The drive reduces the switching frequency automatically in the event of excessive heatsink temperature. |
| Speed reference | **AI1:** 0 to +10 V, Impedance = 30 kΩ. Can be used for speed potentiometer, 1–10 kΩ.<br>**AI2:** Factory setting: 4 to 20 mA. Impedance = 242 Ω (reassignable, X–Y range with graphic display terminal).<br>Factory modification J10 allows 0–10 Vdc reference signal to AI2,<br>Z= 30 kΩ. |
| Frequency resolution in analog reference | 0.1 for 100 Hz (11 bits) |
| Speed regulation | V/f control: equal to the motor's rated slip.<br>SFVC: 10% of the motor's rate slip from 20% to 100% of nominal motor torque. |
| Reference sample time | 2 ms ±0.5 ms |
| Acceleration and deceleration ramps | 0.1 to 999.9 s (definition in 0.1 s increments) |
| Drive protection | • Thermal protection of power converter<br>• Phase loss of AC mains<br>• Circuit breaker or fuses |
| Motor protection | Class 10 electronic overload protection<br>Class 10 electromechanical overload protection with bypass |
| Graphic display terminal | Self diagnostics with messages in three languages; also refer to the *Altivar® 61 Programming Manual,* supplied with the power converter on CD-ROM W817574030111 or the *Altivar® 71 Programming Manual*, supplied with the power conveter on CD-ROM W817555430117A07.[2] |
| Temperature | **Storage**: -13 to +149 °F (-25 to +65 °C).<br>**Operation**: +14 to +104 °F (-10 to 40 °C). |
| Humidity (power converter) | 95% with no condensation or dripping water, conforming to IEC 60068-2-3. |
| Altitude (power converter) | 3,300 ft (1000 m) maximum without derating; derating of the current by 1% for each additional 330 ft (100 m) |
| Enclosure | Type 3R: all controllers, white color. |
| Pollution degree | Type 3R: Pollution degree 2 per NEMA ICS-1 Annex A and IEC 60664-1 |
| Operational test vibration (Power Converter) | 1–100 hp 460 V, 1–60 hp 230 V<br>Conforming to IEC/EN 60068-2-6<br>1.5 mm peak to peak from 3 to 13 Hz<br>1 g from 13 to 200 Hz<br><br>125–700 hp 460 V, 75–125 hp 230 V<br>Conforming to IEC/EN 60068-2-6<br>1.5 mm peak to peak from 3 to 10 Hz<br>1 g from 10 to 200 Hz |
| Transit test to shock | Conforming to National Safe Transit Association and International Safe Transit Association test for packages. |
| Operational shock (power converter) | 15 g, 11 ms |
| Codes and standards | UL Listed per UL 508A. Service entrance rating.<br>Conforms to applicable NEMA ICS, NFPA, and IEC standards.<br>Manufactured under ISO 9001 standards. |

1 Derating may be required above these switching frequencies.

2 Refer to Table 1 for the instruction bulletin number.

## Short Circuit Ratings

All field drives include a circuit breaker or fuses as the overcurrent protective protective device (OCPD). For short-circuit current ratings, see Tables 2–4 on pages 12–13.

- 460 V, 1–700 hp
- 230 V, 1–125 hp

## Features

The field drive includes the following features:

- ATV61 drive: 1–125 hp @ 230 V and 1–700 hp @ 460 V
- ATV71 drive: 1–100 hp @ 230 V and 1–600 hp @ 460 V
- UL 508A Listed
- Service Entrance rated
- Variable torque (ATV61) or constant torque (ATV71)
- 120 V control power transformer
- Three-position Hand-Off-Auto selector switch
- Speed potentiometer
- 22 mm pilot lights
  - — VFD Run (green)
  - — VFD Detected Fault (yellow)
  - — Power On (red)
  - — Optional Bypass Pilot Light (Green)
- AFC-Off-Bypass selector switch
- White enclosure with door-mounted keypad
- 3% line reactor
- TVSS surge protection
- 120 V interlock for remote system shutdown
- Cabinet heater
- Optional FVNR bypass
- Single-phase ratings available

**Figure 2: Features - Outside View**

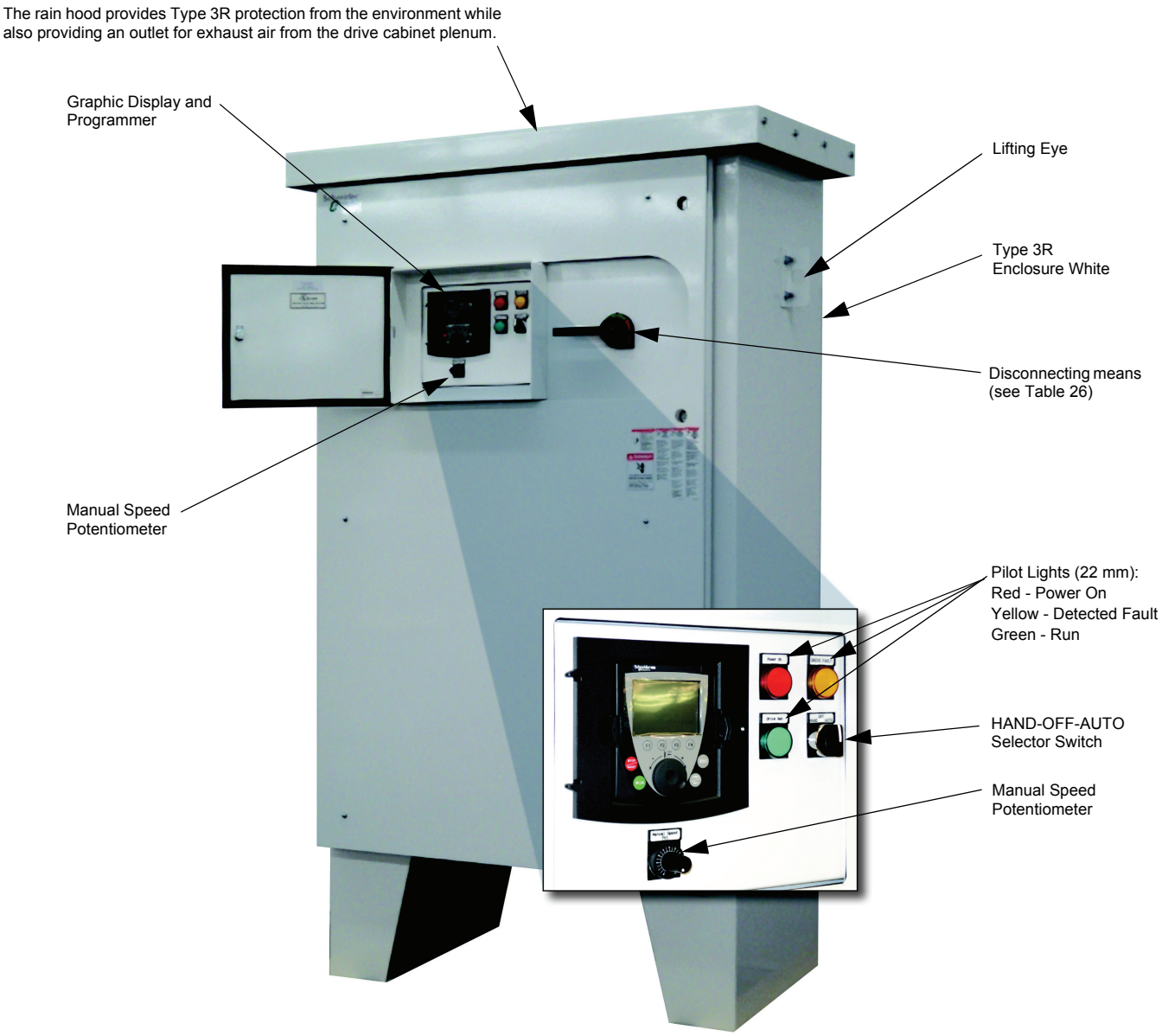
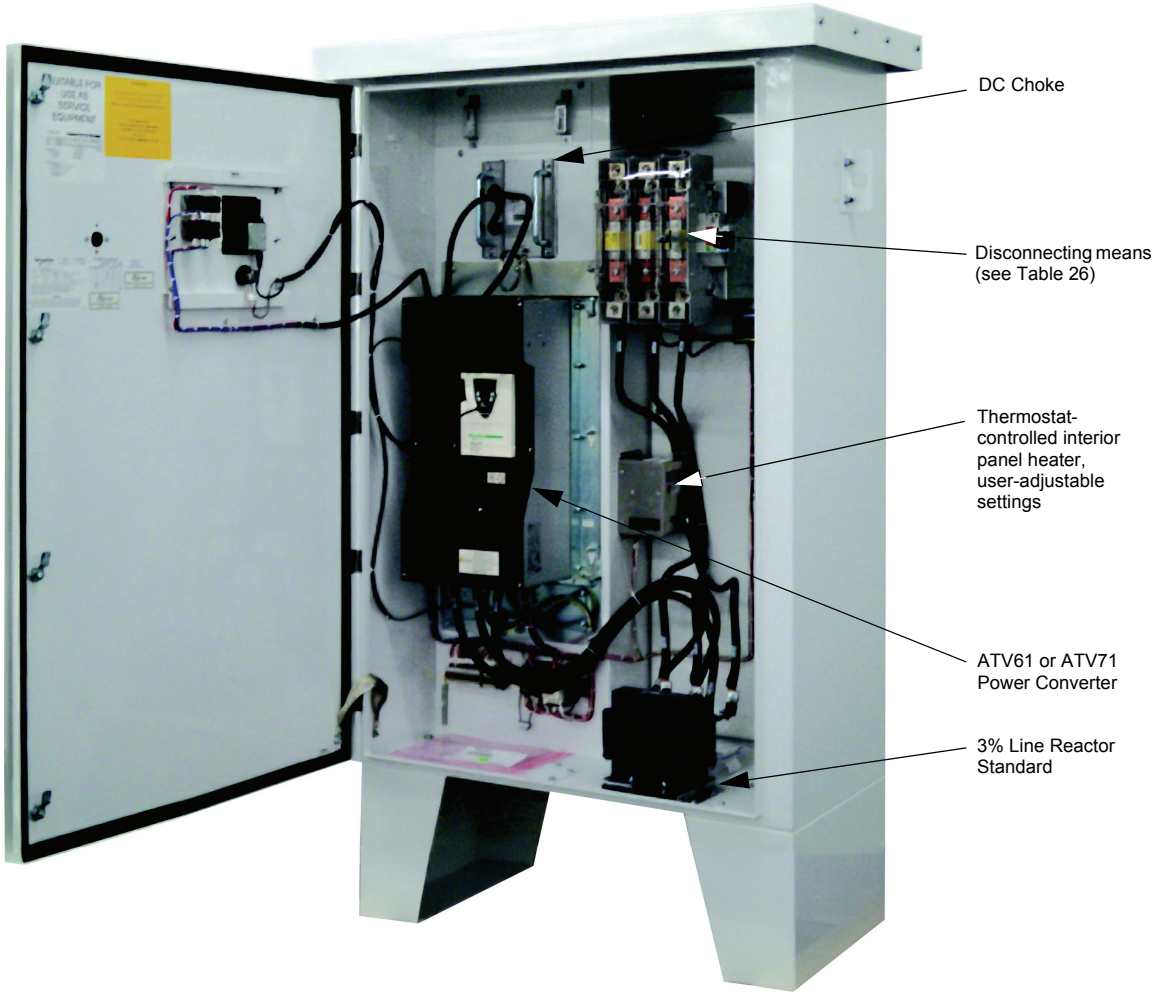


**Figure 3: Features - Inside View**



# Factory Modifications

## Control Options

**Table 14: Control Options (Required Selection)**

| Control Option | Description | Parts List |
|---|---|---|
| Standard | Hand-Off-Auto Selector Switch | XB4BD33 Three-position selector switch (2 N.O.)<br>(2) ZBE102 Additional contact block (1 N.C.)<br>ZBE101 Additional contact block (1 N.O.)<br>ZBZ32 Legend plate holder |
| | Speed Potentiometer | ATVPOT25K Speed potentiometer assembly |
| Bypass option | Hand-Off-Auto Selector Switch | XB4BD33 Three-position selector switch (2 N.O.)<br>(2) ZBE102 Additional contact block (1 N.C.)<br>ZBE101 Additional contact block (1 N.O.)<br>ZBZ32 Legend plate holder |
| | AFC-Off-Bypass | XB4BD33 Three-position selector switch (2 N.O.)<br>(2) ZBZ32 Legend plate holder |
| | Speed Potentiometer | ATVPOT25K Speed potentiometer assembly |

## Light Options

**Table 15: Light Options**

| Light Option | Description | Parts List |
|---|---|---|
| Standard | Red<br>Power On | XB4BVG4 Red pilot light head<br>ZBZ32 Legend plate holder |
| | Green<br>AFC Run | XB4BVG3 Green pilot light head<br>ZBZ32 Legend plate holder |
| | Yellow<br>Detected Fault | XB4BVG5 Yellow pilot light head<br>ZBZ32 Legend plate holder |
| Bypass option | Red<br>Power On | XB4BVG4 Red pilot light head<br>ZBZ32 Legend plate holder |
| | Green<br>AFC Run | XB4BVG3 Green pilot light head<br>ZBZ32 Legend plate holder |
| | Yellow<br>Detected Fault | XB4BVG5 Yellow pilot light head<br>ZBZ32 Legend plate holder |
| | Green<br>Bypass | XB4BVG3 Green pilot light head<br>ZBZ32 Legend plate holder |

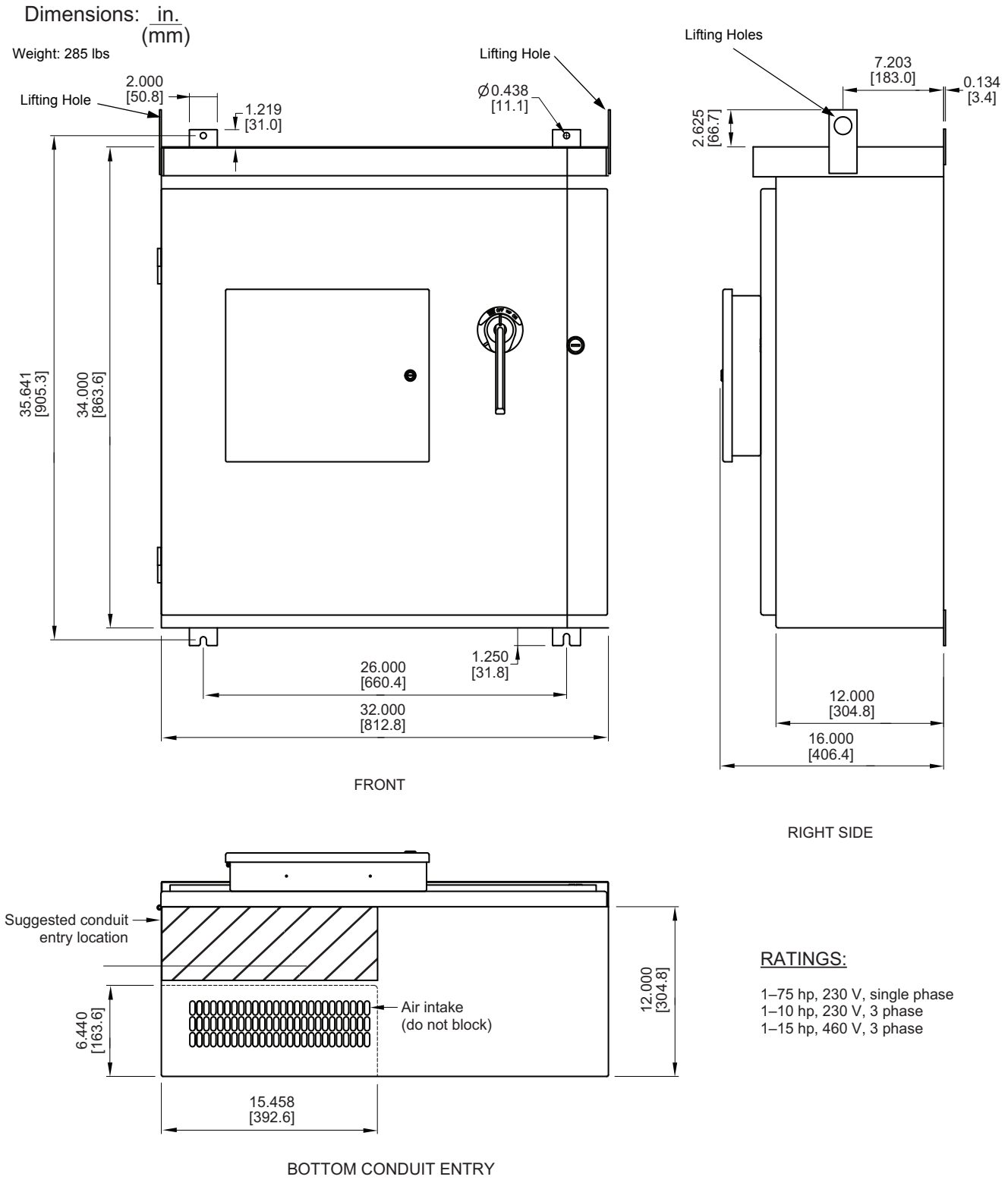
## Misc. Options

**Table 16: Miscellaneous Options (Optional Selection)**

| Misc. Option | Name | Description |
|---|---|---|
| A09 | Line Reactor | Line reactor factory-mounted in enclosure.<br>Standard = 3% line reactor<br>Mod A09 = 5% line reactor |

# Dimensions and Weights

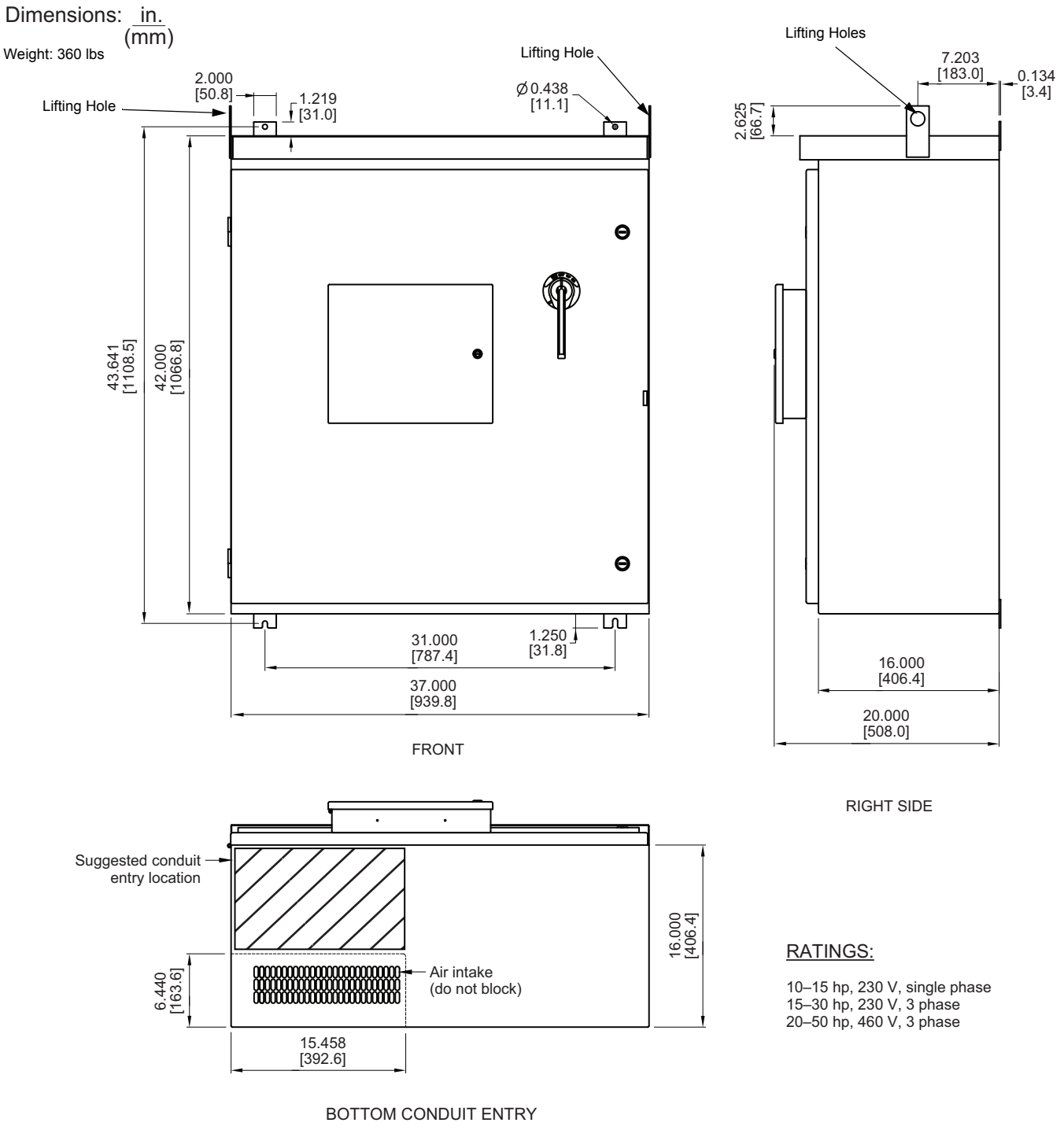
**Figure 4: Frame Size 1 Enclosures**




RATINGS:

1–75 hp, 230 V, single phase
1–10 hp, 230 V, 3 phase
1–15 hp, 460 V, 3 phase

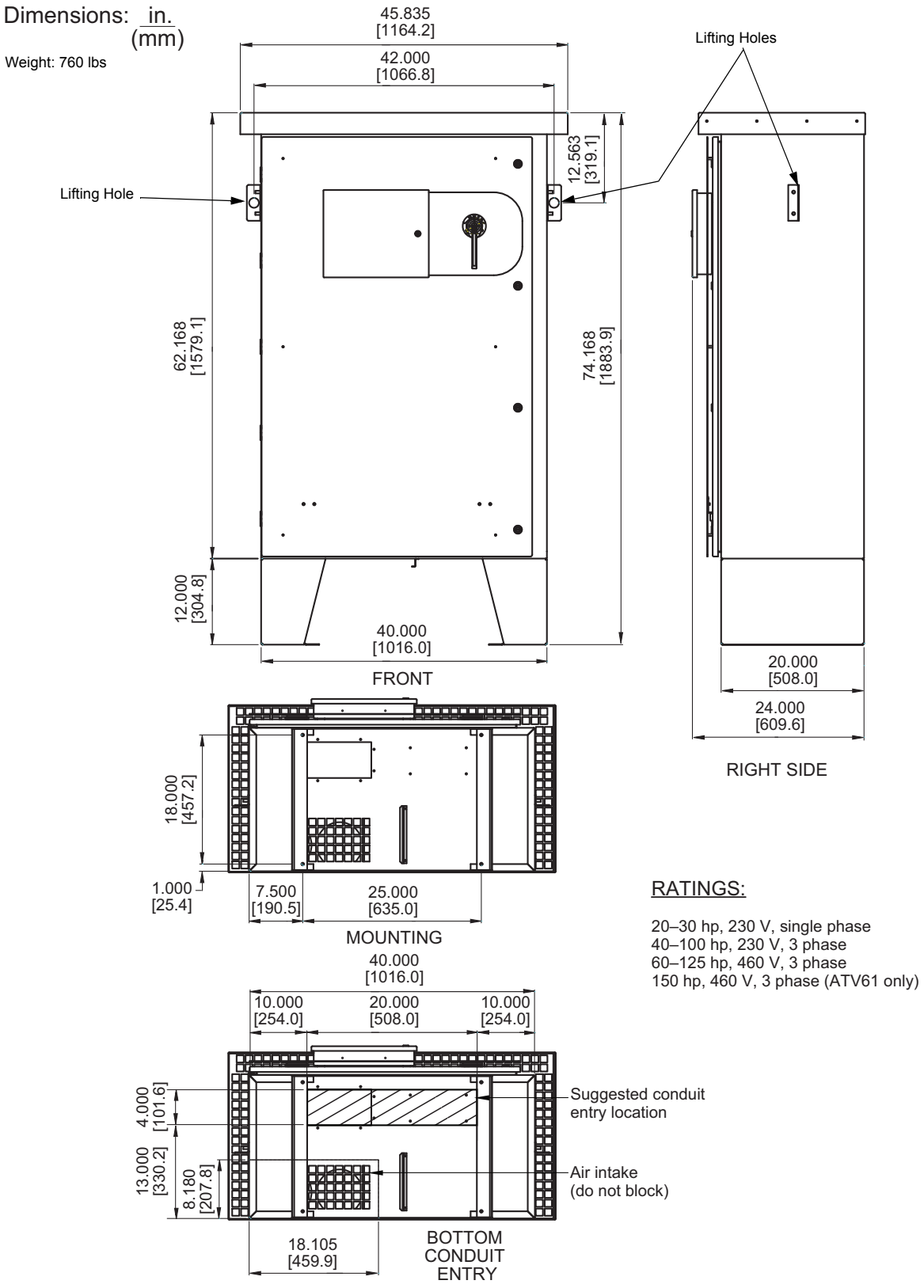
**Figure 5: Frame Size 2 Enclosures**




RATINGS:

10–15 hp, 230 V, single phase
15–30 hp, 230 V, 3 phase
20–50 hp, 460 V, 3 phase

**Figure 6: Frame Size 3 Enclosures**




RATINGS:

20–30 hp, 230 V, single phase
40–100 hp, 230 V, 3 phase
60–125 hp, 460 V, 3 phase
150 hp, 460 V, 3 phase (ATV61 only)

**Figure 7: Frame Size 4 Enclosures**

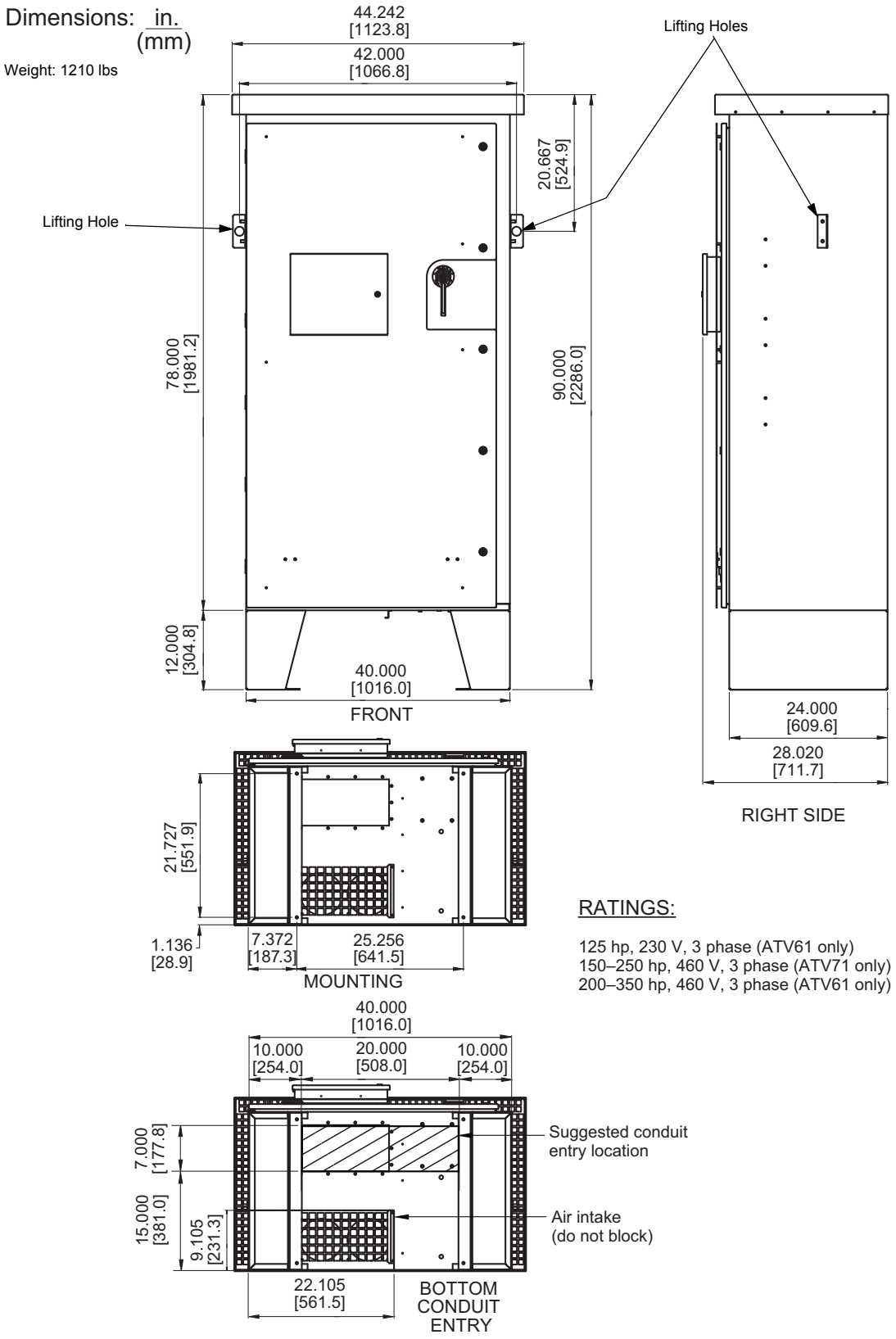


**Figure 8: Frame Size 5 Enclosures**

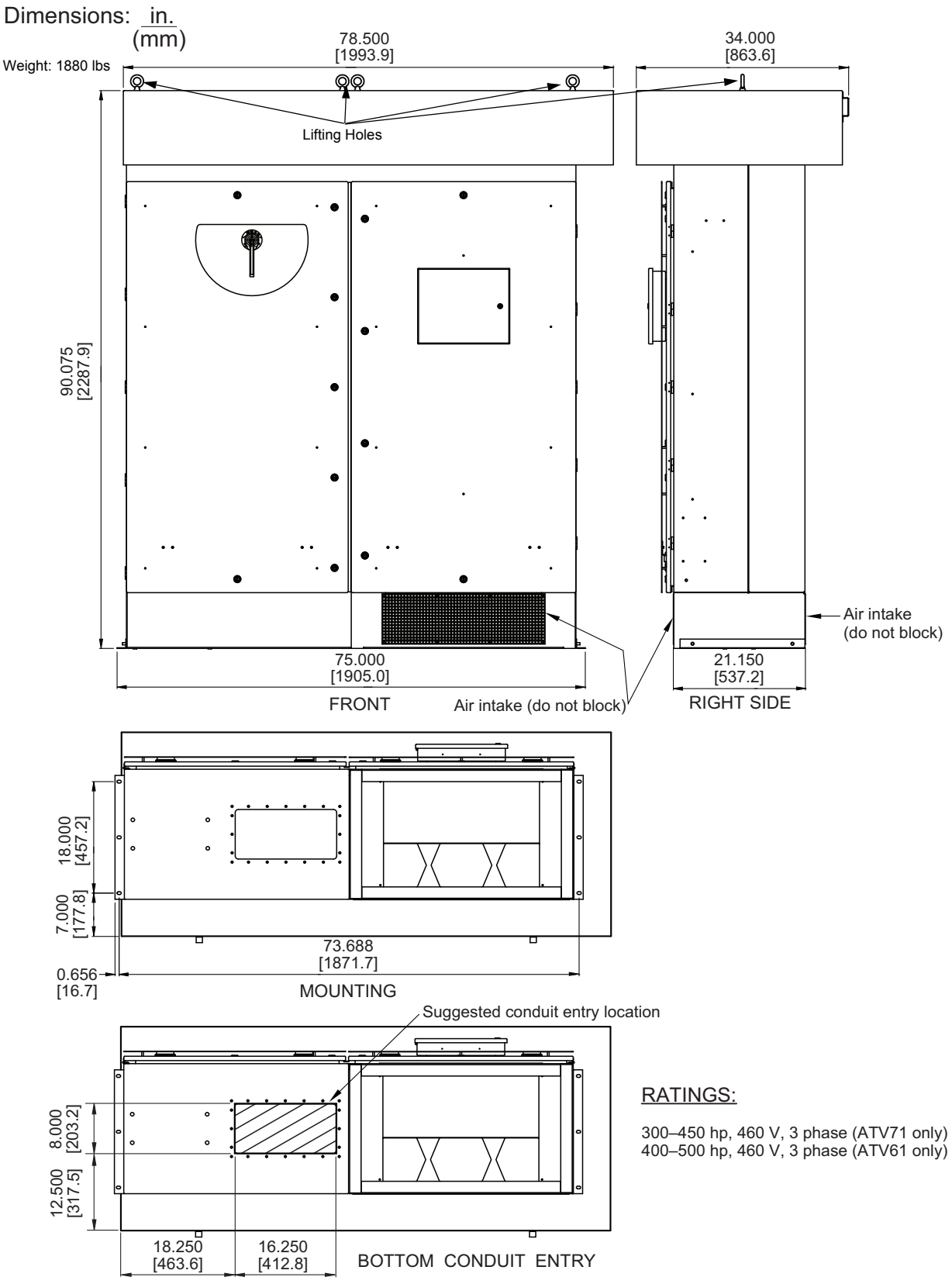
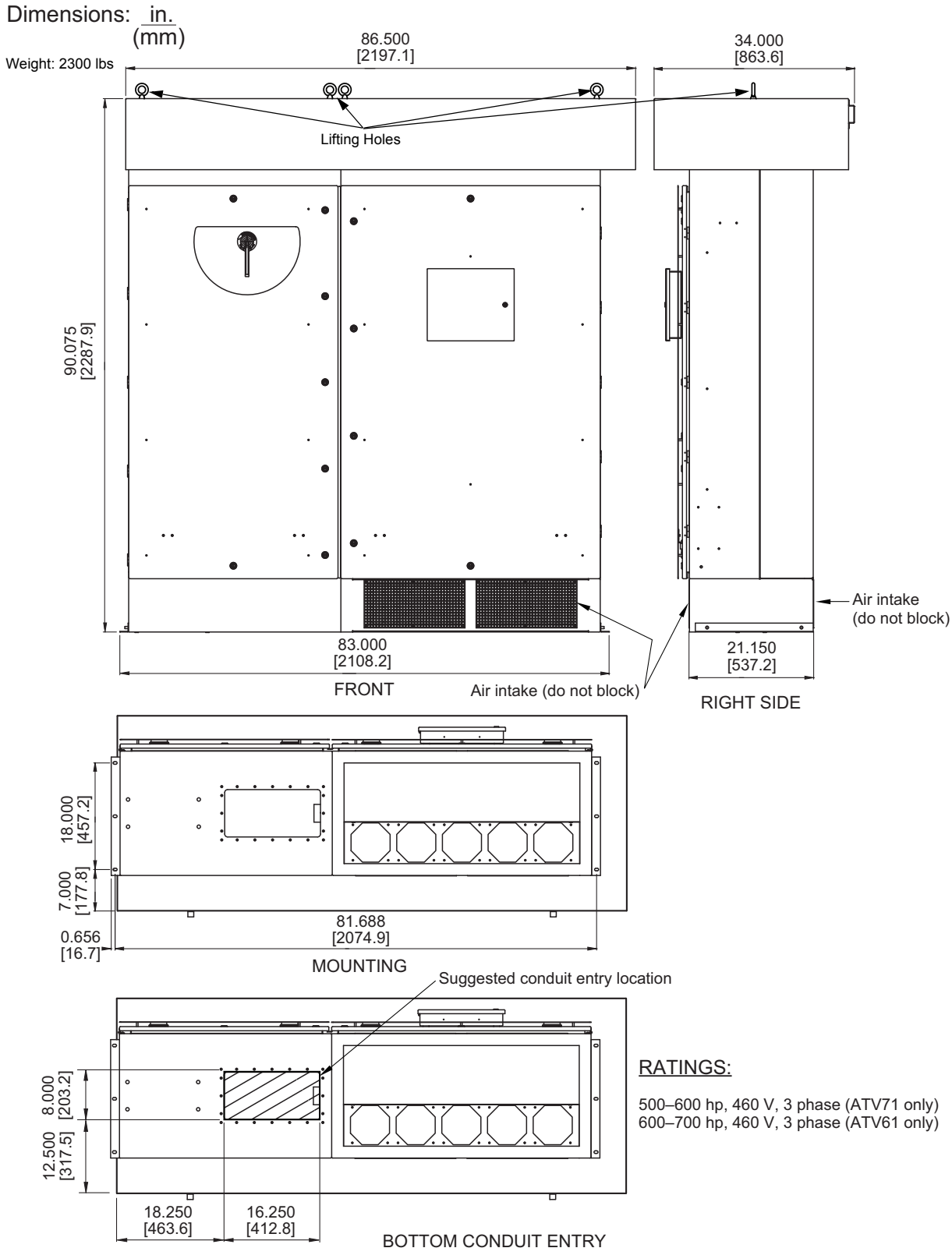


**Figure 9: Frame Size 6 Enclosures**



# Section 2—Receiving, Installation, and Start-Up

## Preliminary Inspection

**⚠ CAUTION**

**DAMAGED CONTROLLER EQUIPMENT**

- Do not operate any drive that appears damaged.

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

Thoroughly inspect the drive before storing or installing it. Upon receipt:

A. Remove the drive from its packaging and visually inspect the exterior for shipping damage.
B. Ensure that the catalog number on the drive nameplate matches the catalog number on the packing slip and corresponding purchase order. See Figure 1 on page 11.
C. If you find any shipping damage, notify the carrier and your Schneider Electric sales representative.

Before installation:

1. Open the door of the drive. To open the door, turn the circuit breaker or disconnect handle assembly to the Off position.
2. Visually verify that all internal mounting and terminal connection hardware is properly seated, securely fastened, and undamaged.
3. Visually verify that the control board on the power converter is properly seated, securely fastened, and undamaged. Verify that the internal wiring connections are tight. Inspect all connections for damage.
4. Close and secure the drive door.

## Storing the Equipment

**⚠ WARNING**

**TOPPLE AND CRUSHING HAZARD**

- Do not stack drives on top of each other.
- Do not place any material on top of the drive.
- Store or ship the drive in the original packaging.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Storing the drive in its original packaging until it reaches its final installation site helps protect the equipment and helps prevent damage to the exterior.

- If you plan to store the drive after receipt, replace it in its original packaging and store it in a clean, dry area where the ambient temperature is between -13 to +149 °F (-25 to +65 °C).
- If the drive must be shipped to another location,use the original shipping material and carton to help protect the drive.

## Unpacking the Drive

**⚠ WARNING**

**HEAVY EQUIPMENT**

- Lifting the drive requires the use of a lifting apparatus.
- Always use safe lifting practices.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

- Handle the drive carefully to avoid damage to the internal components, frame, or exterior.
- Lift the drive out of its shipping carton with a suitable lifting apparatus and place it on a flat surface.

## Lifting the Drive

**⚠ WARNING**

**HANDLING AND LIFTING HAZARD**

- Keep the area below any equipment being lifted clear of all personnel and property.
- Lifting the drive requires the use of a lifting apparatus. Use the lifting method shown in Figure 10 on page 31.
- Before lifting the controller:
  - — Inspect the lifting plates, holes, slots, and eyebolts for any damage.
  - — Attach a spreader bar.
  - — Keep the lifting force vertical.
  - — Limit the sling angle to less than 45º.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

**⚠ WARNING**

**TO ENSURE A RAINPROOF SEAL (FRAME SIZES 5 AND 6):**

- 1/2-13 bolts or eyebolts must be securely tightened in four (4) places on top of this unit, and
- Gasketed washers must be placed under the 1/2-13 bolts or eyebolts.
- Use only the gasketed washers supplied with this unit.
- Inspect gasketed washers before use to ensure gasketing is not damaged.
- When top-lifting this unit:
  - — Use only four (4) 1/2-13 eyebolts supplied with this unit.
  - — A spreader bar is required.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## ⚠ WARNING

**IMPROPER MOUNTING**

For wall-mounted units, before removing the lifting mechanism:

- Ensure that all hardware is of sufficient size and type for the controller weight.
- Secure and tighten all hardware.

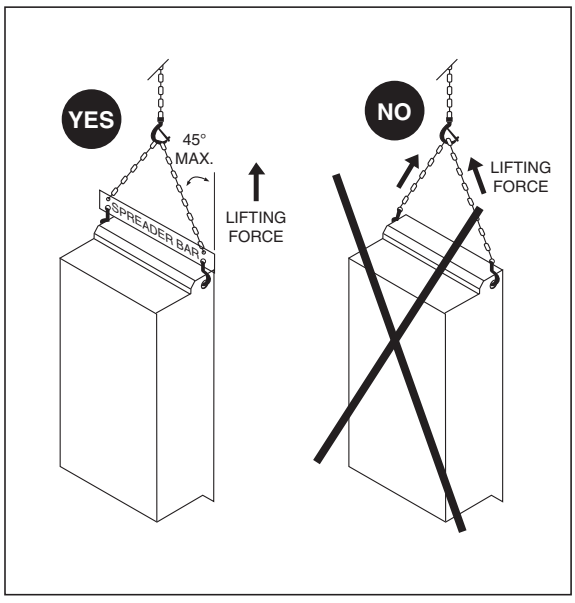
**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

When lifting drives:

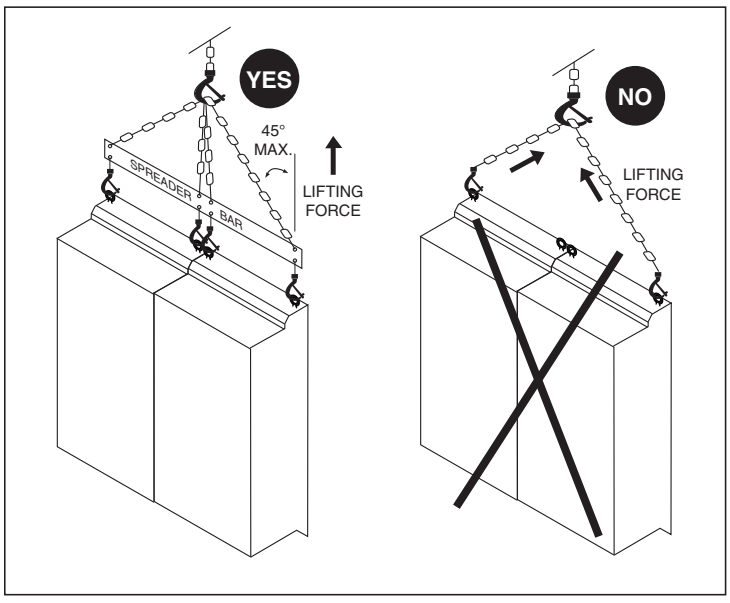
- Always work with another person. The weight, size, and shape of the drive is such that two people are required to handle it.
- Use cut-resistant gloves.
- Attach a spreader bar to the top lifting eyebolts (see Figures 4–9 on pages 23–28 for location of lifting holes) and hoist the drive with chains or straps. See Figure 10 on page 31 for the proper hoisting method.
- Raise the drive from a horizontal position (the back of the controller resting on a pallet) to the verical, upright position.
- The bottom of the drive has a mounting flange which prevents the drive from standing in a vertical position. If the drive is rested on the mounting flange, it may tip over.
- Mount the wall-mounted drives on a flat, solid, noncombustible vertical surface, capable of supporting the controller weight.
- Mount the floor-mounted drives on a flat, solid surface capable of supporting the drive's weight.

**Figure 10: Lifting Field Drives**

FRAME SIZES 1–4:




FRAME SIZES 5–6:



## Physical Installation

Observe these requirements when mounting the drive:

- Install the drive in a pollution degree 2 (Type 3R) environment, as defined in NEMA ICS1 and IEC 60664-1.
- Mount the wall-mounted drive on a flat, rigid, noncombustible vertical surface, capable of supporting the drive weight.
- Mount the floor-mounted drive on a flat, solid surface capable of supporting the controller weight.
- If drilling for conduit entry, take care to prevent metal chips from falling on parts and electronic printed wiring boards.
- Do not mount the drive in direct sunlight or on hot surfaces.
- When attaching wall-mountable drives to their mounting surfaces, use fasteners rated for the weight of the driver, the expected shock and vibration of the installation, and the expected environment. See Figures 4–9 on pages 23–28 for controller weights.
- Use water-tight rated conduit hubs to make connections between the conduit and the UL Type 3R enclosures.
- Do not obstruct air intake on units.

## Electrical Installation

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Turn off all power (main and remote) before installing the equipment.
- Read and understand the precautions in "Before you Begin" starting on page 8 before performing the procedures in this section.

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

## General Wiring Practices

Before wiring the drive, perform the DC Bus Voltage Measurement Procedure on page 37. Good wiring practice requires the separation of control circuit wiring from all power wiring. Power wiring to the motor must have the maximum possible separation from all other power wiring, whether from the same drive or other drives. **Do not run power and/or control or multiple power wiring in the same conduit**. This separation reduces the possibility of coupling electrical transients from power circuits into control circuits or from motor power wiring into other power circuits.

**⚠ CAUTION**

**IMPROPER WIRING HAZARD**

Follow the wiring practices described in this document in addition to those already required by the National Electrical Code and local codes.

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

When wiring the field drive:

- Before applying power ensure that the wiring termination points have been checked for proper torque. See Tables 21–22 on pages 47–48 for torque values.
- Use metallic conduit for all drive wiring. Do not run control and power wiring in the same conduit.
- Separate metallic conduits carrying power wiring or low-level control wiring by at least 3 inches (76 mm).
- Separate existing, non-metallic conduits or cable trays used to carry power wiring from metallic conduit carrying low-level control wiring by at least 12 inches (305 mm).
- Whenever power and control wiring cross, the metallic conduits and non-metallic conduits or trays must cross at right angles.
- Equip all inductive circuits near the controller (relays, contactors, solenoid valves) with noise suppressors.

## Input Power

The field drive operates from a three-phase, 460 Vac +/-10% or 230 Vac +/-10% supply connected to the disconnecting means. Refer to Tables 2, 3, and 4 for drive input voltages and ratings.

## Branch Circuit Connections

All branch circuit components and equipment (such as feeder cables, disconnect devices, and protective devices) must be rated for the maximum input current of the field drive, or the FLA of the motor, whichever is greater. The drive input current and motor full load current is stamped on the nameplate. Refer to Tables 6 and 10 on pages 14 and 16 for drive input currents.

Connect input power leads L1, L2, and L3 to the input of the circuit breaker or disconnect. Refer to Figures 12–17 (pages 40–45) for location. Refer to Tables 21 and 22 (pages 47–48) for lug data and wire size range for drive input terminals L1, L2, and L3.

**⚠ WARNING**

**IMPROPER OVERCURRENT COORDINATION**

- Protective devices must be properly coordinated.
- Do not connect the drive to a power feeder whose short circuit capacity exceeds the short circuit rating listed on the drive nameplate.

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

**⚠ CAUTION**

**EQUIPMENT DAMAGE FROM IMPROPER WIRING**

- Do not connect input power leads to the drive output terminals (T1, T2, T3 or U, V, W). This damages the controller and voids the warranty.
- Check the power connections before energizing the controller.

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

## Input Wiring

The ampacity of the input power conductors should be sized according to the National Electrical Code, and applicable local codes, based on:

A. Drive input current when controller has no bypass.

B. Drive input current or motor full load current (whichever is greater) when controller has a bypass circuit.

## Grounding

Ground the drive according to the National Electrical Code and all local codes. To ground the drive:

- Connect a copper wire from the ground bar terminal to the power system ground.
- Verify that the resistance to ground is 1 Ω or less. Improper grounding causes intermittent and unreliable operation.

**⚠ DANGER**

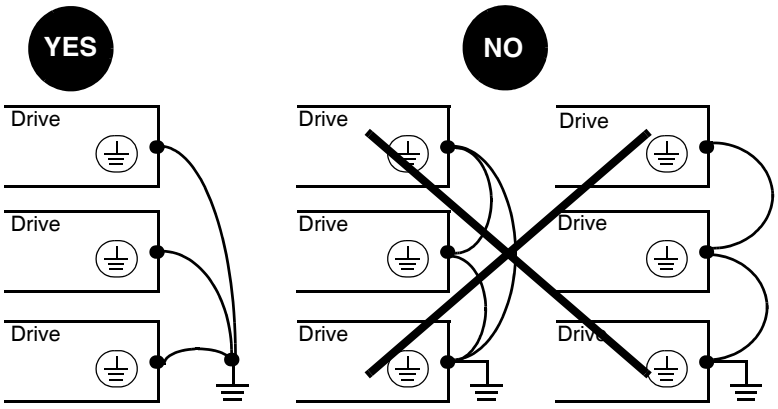
**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Ground equipment using the provided ground connection point as shown in Figures 12–17 starting on page 40. The drive panel must be properly grounded before power is applied.
- Do not use metallic conduit as a ground conductor.

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

Ground multiple drives as shown in Figure 11. Use one grounding conductor per device. Do not loop ground conductors or install them in series.

**Figure 11: Grounding Multiple Drives**



## Wiring and Electromagnetic Compatibility

**⚠ WARNING**

**LOSS OF CONTROL**

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and over travel stop.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of anticipated transmission delays or failures of the link[1].
- Each implementation of a field drive must be individually and thoroughly tested for proper operation before being placed into service.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

[1] For additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems."

The high frequency equipotential ground connection between the drive, motor, and cable shielding does not eliminate the need to connect the ground (PE) conductors (green-yellow) to the appropriate terminals on each unit. To help accomplish this, follow these guidelines:

- To avoid communication interference, grounds between the drive, motor and cable shields must have high frequency equipotentiality.
- When using shielded cable for the motor, use a 4-conductor cable so that one wire will be the ground connection between the motor and the drive. Size of the ground conductor must be selected in compliance with local and national codes. The shield can then be grounded at both ends. Metal ducting or conduit can be used for part or all of the shielding length, provided there is no break in continuity.
- When using shielded cable for control signals, if the cable is connecting equipment that is close together and the grounds are bonded together, then both ends of the shield can be grounded. If the cable is connected to equipment that may have a different ground potential, then ground the shield at one end only to prevent large currents from flowing in the shield. The shield on the ungrounded end may be tied to ground with a capacitor (for example: 10 nF, 100V or higher) in order to provide a path for the electromagnetic interference.
- Ensure maximum separation between the power supply cable (line supply) and the motor cable and also ensure maximum separation between the control cables and any power cables.

## Output Wiring

The ampacity of motor power conductors should be sized according to the motor full load current, National Electrical Code, and applicable local codes.

Connect motor conductors to the lugs provided and connect the motor ground to the ground bar provided. Connect motor conductors to T1, T2, and T3 on the overload relay when the controller is supplied with a bypass circuit. Connect motor conductors to T1/U, T2/V, and T3/W on the power converter, or T1, T2, and T3 on the distribution block (if supplied) when the controller is supplied without a bypass circuit. See Figures 12–17 starting on

page 40 for location. See Tables 21 and 22 (pages 47–48) for lug data and wire size range. Refer to the nameplate for torque requirements.

The drive is sensitive to the amount of capacitance (either phase-to-phase or phase-to-ground) present on the output power conductors. If excessive capacitance is present, the drive may trip on overcurrent.

## Output Cable

Follow the guidelines below when selecting output cable:

- Cable type: the cable selected must have a low capacitance phase-to-phase and to ground. Do not use mineral-impregnated cable because it has a very high capacitance. Immersion of cables in water increases capacitance.
- Cable length: the longer the cable, the greater the capacitance. Cable lengths greater than 150 ft (50 m) may cause ground faults. For installation where cable capacitances may be a problem, a reactor or motor protection filter can be installed between the drive and the motor.

The following guidelines are designed to address maximum cable length for typical drive/motor applications:

These limits are based on the maximum recommended peak voltage that can be allowed at the motor terminals, which is due to the reflected wave phenomenon. This increase in voltage is primarily determined by the degree of impedance mismatch between the power conductor and the motor in combination of the dV/dt of the specific semiconductors used in the inverter section of the drive feeding the motor, both of which vary depending on the horsepower involved. Many variables can affect the performance of the drive, the motor, and the cables in long lead applications. Motor protection filters can provide substantial benefits when you are using:

- 460 V or higher rated AC drives
- Existing non-inverter duty motors subject to retrofit to an AC drive
- Shielded cables

NEMA MG-1 Part 31 compliant motors are recommended but not required. However, it is prudent to consult the motor manufacturer or vendor literature to address any specific limitations governing the application.

- Proximity to other output cables: because of high frequency switching and increased capacitance, the drive may trip under some conditions.
- **Do not use lightning arrestors or power factor correction capacitors on the output of the drive.**

For proper drive short circuit protection, certain values of inductance may be required in the output power wiring. Inductance can be supplied by the power wiring or auxiliary inductors.

**⚠ CAUTION**

**INSUFFICIENT OUTPUT INDUCTANCE**

A minimum inductance is needed to protect the drive output from short circuits. Provide at least 20 in. (500 mm) of cable at the drive outputs, T1/U, T2/V, and T3/W, and on distribution block terminals T1, T2, and T3 (for a controller without bypass) or overload relay terminals T1, T2, and T3 (for a controller with bypass).

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

**Table 17: Maximum Cable Length for Inverter Duty Motors**

| Drive Rating hp @ 460 V | Type of cable | Approximate length of motor cables | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 20 in. to 164 ft. (0.5 to 50 m) | 164 to 328 ft. (50–100 m) | 328 to 492 ft. (100–150 m) | 492 to 656 ft. (150–200 m) | 656 to 984 ft. (200–300 m) | 984 to 1,312 ft. (300–400 m) | 1,312 to 1,968 ft. (400–600 m) | 1,968 to 3,280 ft. (600–1000 m) |
| 1 to 20 hp CT<br>1 to 25 hp VT | Shielded | | 3% Load Reactor | | Motor Protection Filter | | | | Consult your Schneider Electric sales representative. |
| | Unshielded | | | 3% Load Reactor | | | Motor Protection Filter | | |
| 25 to 100 hp CT<br>30 to 125 hp VT | Shielded | | | 3% Load Reactor | Motor Protection Filter | | | | |
| | Unshielded | | | | 3% Load Reactor | | Motor Protection Filter | | |
| 125 to 600 hp CT<br>150 to 700 hp VT | Shielded | | | 3% Load Reactor | | Motor Protection Filter | | | |
| | Unshielded | | | 3% Load Reactor | | | Motor Protection Filter | | |

## DC Bus Voltage Measurement Procedure

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- Read and understand the DC Bus Voltage Measurement Procedure before performing the procedure. Measurement of bus capacitor voltage must be performed by qualified personnel.
- DO NOT short across capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Many parts in this drive, 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/– terminals. The location of these terminals varies by power converter model number. Read the model number of the power converter from the nameplate, and identify the corresponding PA/+ and PC/– terminals. The power converter model number is listed on the nameplate. Refer to ATV61/71 installation manual for location of drive terminals.

To measure the DC bus capacitor voltage:

1. Observe the lockout/tagout procedures.
2. Be sure to remove all external control power that may be present such as on the control board and the option board terminals.
3. Wait fifteen minutes for the DC bus capacitors to discharge.
4. Open the door of the drive.
5. Set the voltmeter to the 1000 Vdc scale. Measure the voltage between the PA/+ and PC/– terminals.
6. Verify that the DC bus voltage has discharged below 42 V before servicing the drive. If the DC bus capacitors will not discharge below 42 V, contact your local Schneider Electric representative. **Do not operate the drive.**
7. After servicing the drive, close and secure door.

## Wire Routing and Interconnection

### Wire Class

The Wire Class describes the compatibility of the field wiring terminal with the conductor material and insulation system. When used in conjunction with the required conductor current rating and controller ambient temperature rating, the Wire Class forms the basis for selecting a conductor size that limits the temperature on the conductor insulation at the field wiring terminal to acceptable limits. Although it is permissible to use conductors with operating temperatures exceeding those given by the Wire Class, conductor **size** must fall within the Wire Class limits.

### EMI Class

The EMI Class categorizes the electromagnetic properties of the voltages and currents present. The EMI Class comprises of the six categories shown in Table 18.

**Table 18: EMI Class Categories**

| EMI Class | Definition |
|---|---|
| Quiet Wiring 1 (QW1) | High susceptibility analog and digital control signals. Signals falling under this classification include digital communication/network circuits, controller analog I/O and analog process signals. |
| Quiet Wiring 2 (QW2) | Medium susceptibility, analog and digital control signals. Signals falling under this classification include 24 Vdc and 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 falling under 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 falling under this classification include motor and dynamic braking circuits fed from pulse width modulated (PWM) power converters. |

### Voltage Class

The Voltage Class categorizes the voltages present into recognized conductor insulation categories (30, 150, 300, and 600 V) for selection of the conductor voltage rating and physical segregation purposes.

## Wiring Methods

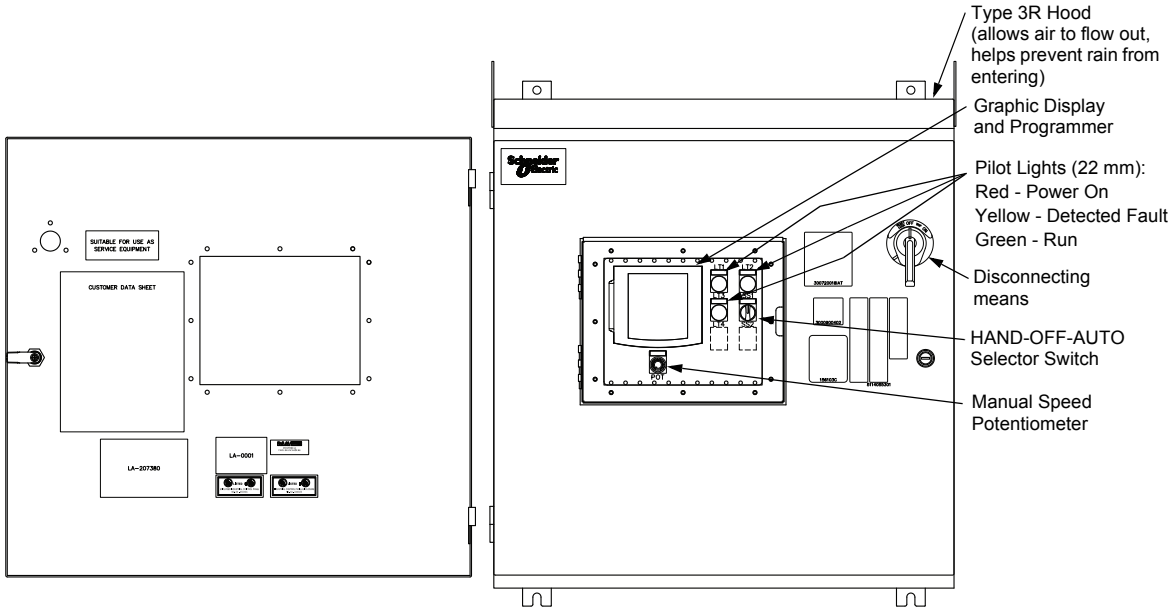
Based upon the EMI Class and Voltage Class of the conductors, apply the wiring methods in Table 19 to the drive system.

**Table 19: Wire Routing and Interconnection**

| Wiring Methods and Considerations | EMI Class of Conductors | | | | |
|---|---|---|---|---|---|
| | QW1 | QW2 | SW1 | SW2 | PW1 |
| **Conductor Grouping in Wireways/Conduits** | | | | | |
| 1. All conductors of 1 or 3 phase AC power circuits 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 parallel conductors must be run in separate wireways or conduit, bundle conductors into groups that minimize stray magnetic fields. | | | | X | X |
| 4. Maintain conductor runs as short and direct as practical. | X | X | X | X | X |
| **Separation of Circuits** | | | | | |
| 1. DO NOT run different EMI 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 the maximum Voltage Class present. | X | X | X | X | X |
| 3. All pulse wiring (PW) conductor groups must be individually segregated using metallic conduit. | | | | | X |
| 4. Segregate all conductors by EMI Class. Use the following circuit separation when conductors can run parallel for more than 12 in. | | | | | |
| • Metallic conduit: 3 in. between quiet wiring (QW) to standard wiring (SW) / pulse wiring (PW) | X | X | X | X | X |
| • Metallic tray: 3 in. between SW to PW | | | X | X | X |
| • Metallic tray: 6 in. between QW to SW/PW | X | X | X | X | X |
| • Against continuous metal surface: 3 in. between SW to PW | | | X | X | X |
| • Against continuous metal surface: 6 in. between QW to SW/PW | X | X | X | X | X |
| • Metallic conduit housing QW: 12 in. to non-metallic conduit SW/PW | X | X | X | X | X |
| • Non-metallic conduit: 3 in. between SW to 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 EMI 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 only at the 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 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 power 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 |

# Component Identification and Terminal Strip Locations

**Figure 12: Typical Component Identification and Terminal Strip Locations for 1–10 hp @ 230 V and 1–15 hp @ 460 V**



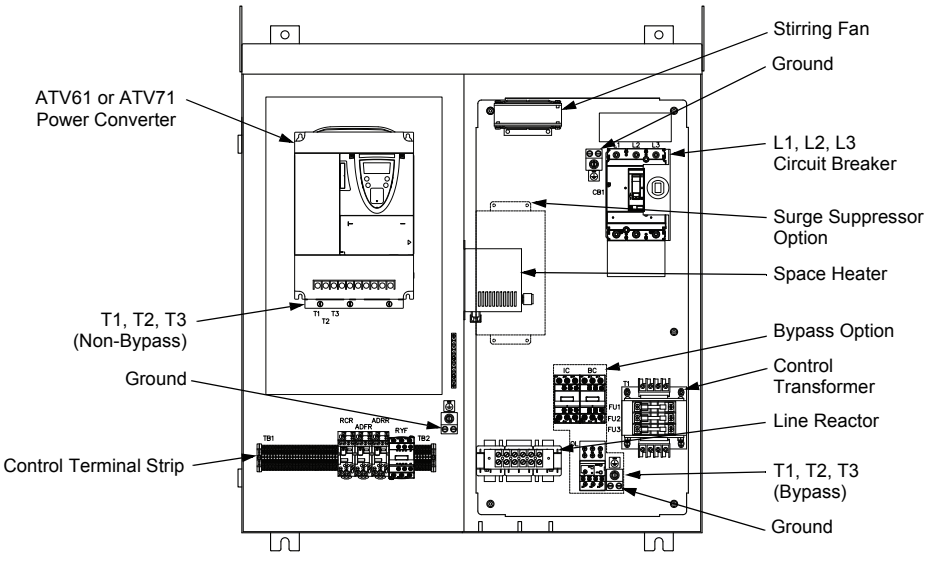
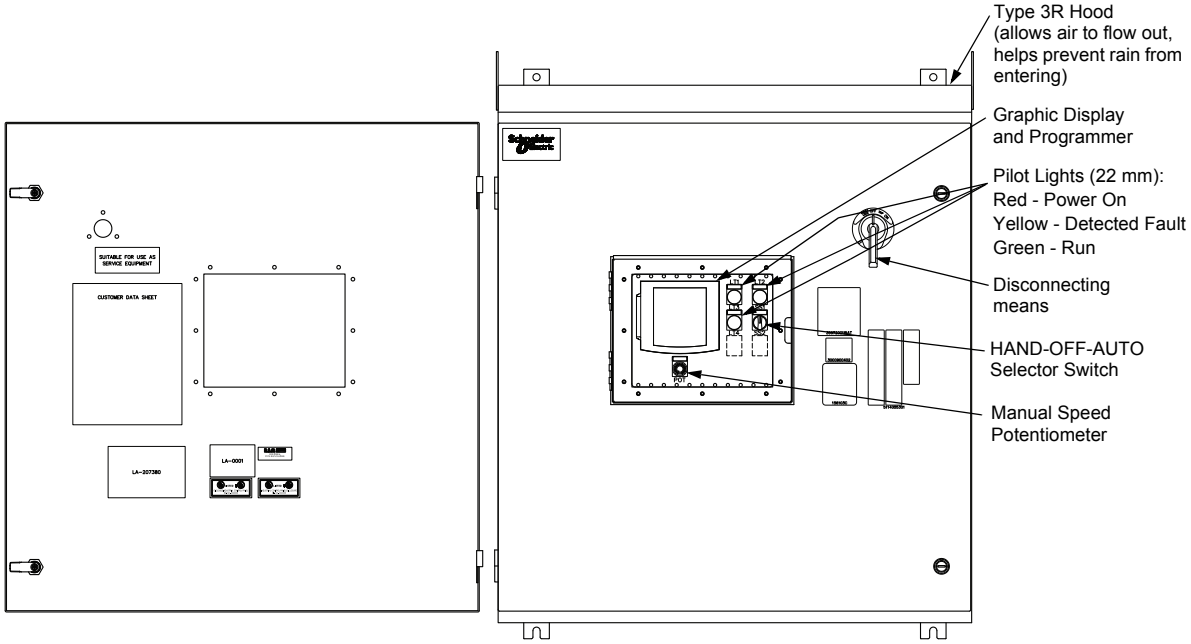



**Figure 13: Typical Component Identification and Terminal Strip Locations for 10–30 hp @ 230 V and 20–50 hp @ 460 V**



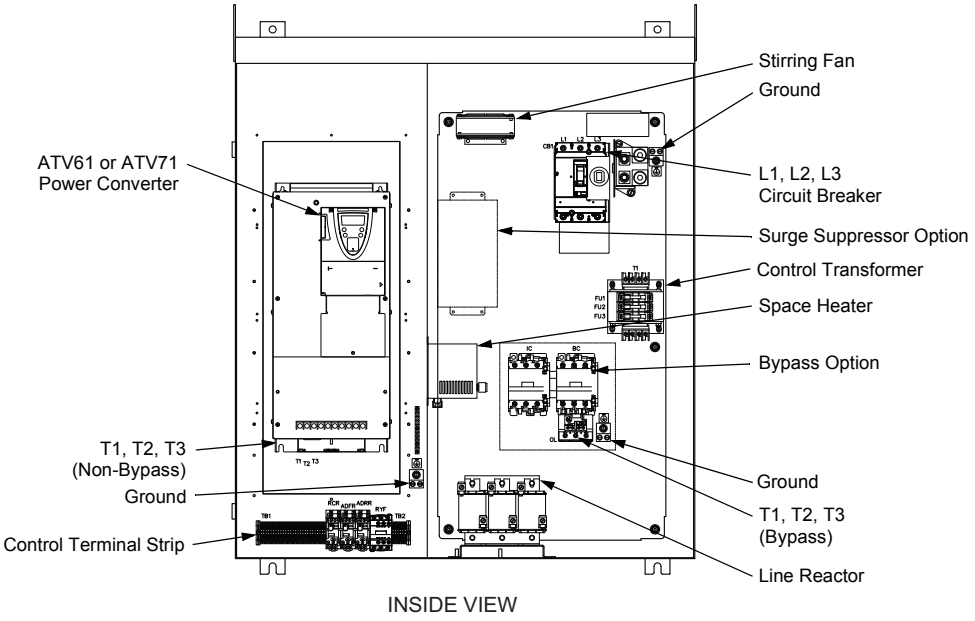
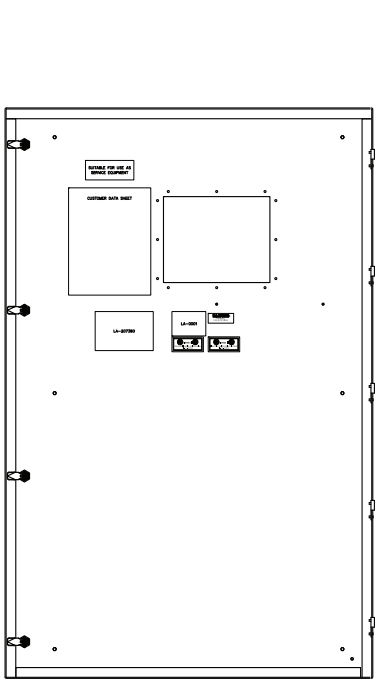
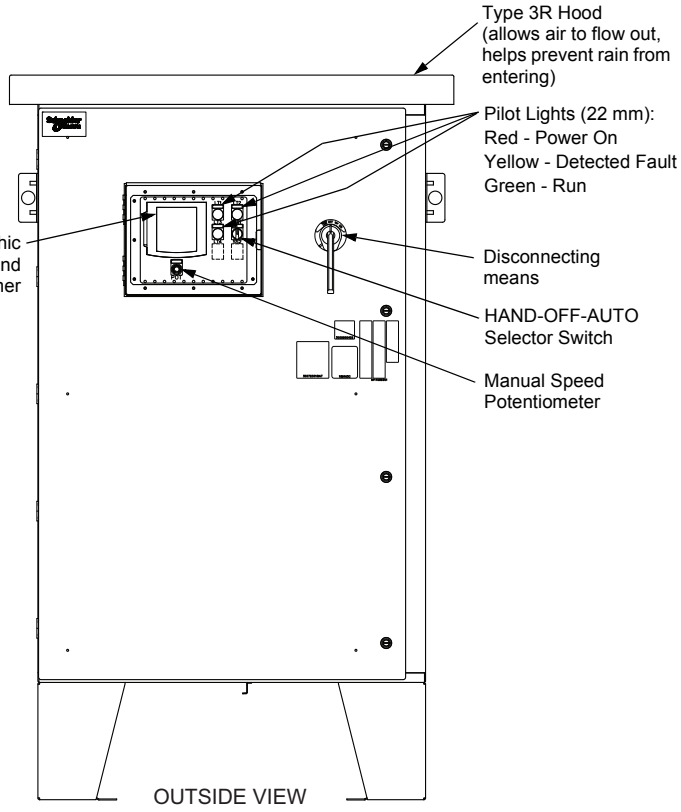



**Figure 14: Typical Component Identification and Terminal Strip Locations for 20–100 hp @ 230 V and 60–150 hp @ 460 V**

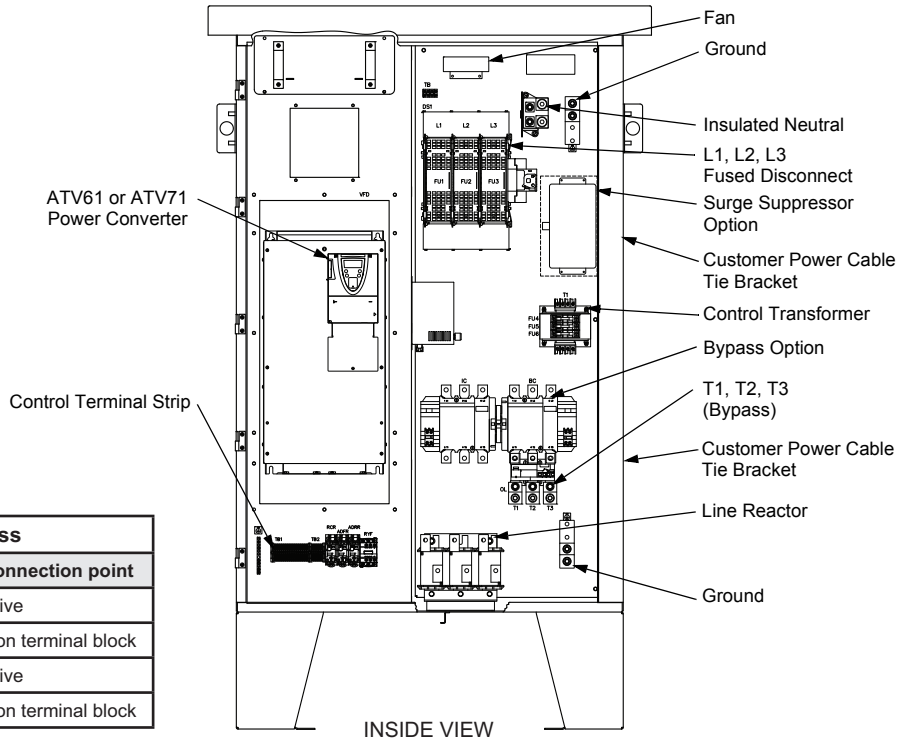


BACK OF MAIN DOOR

– INDICATES OPTIONAL DEVICES




OUTSIDE VIEW




INSIDE VIEW

| T1, T2, T3 Non-Bypass | | |
|---|---|---|
| **voltage** | **hp** | **motor cable connection point** |
| 230 V | 20–60 | drive |
| 230 V | 75–100 | power distribution terminal block |
| 460 V | 60–100 | drive |
| 460 V | 125–150 | power distribution terminal block |

**Figure 15: Typical Component Identification and Terminal Strip Locations for 125 hp @ 230 V and 150–350 hp @ 460 V (No Bypass Available)**

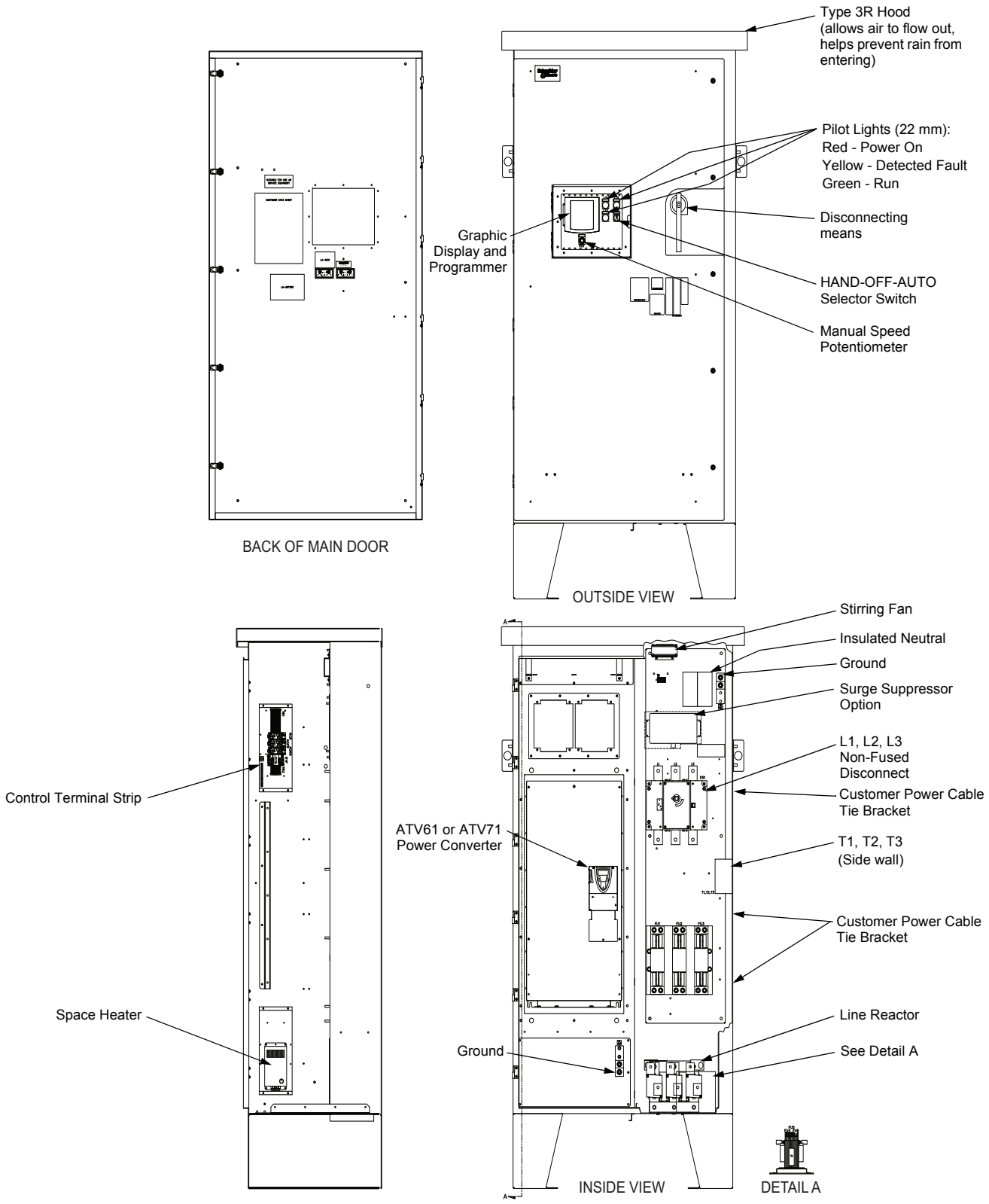


**Figure 16: Typical Component Identification and Terminal Strip Locations for 300–500 hp @ 460 V (No Bypass Available)**

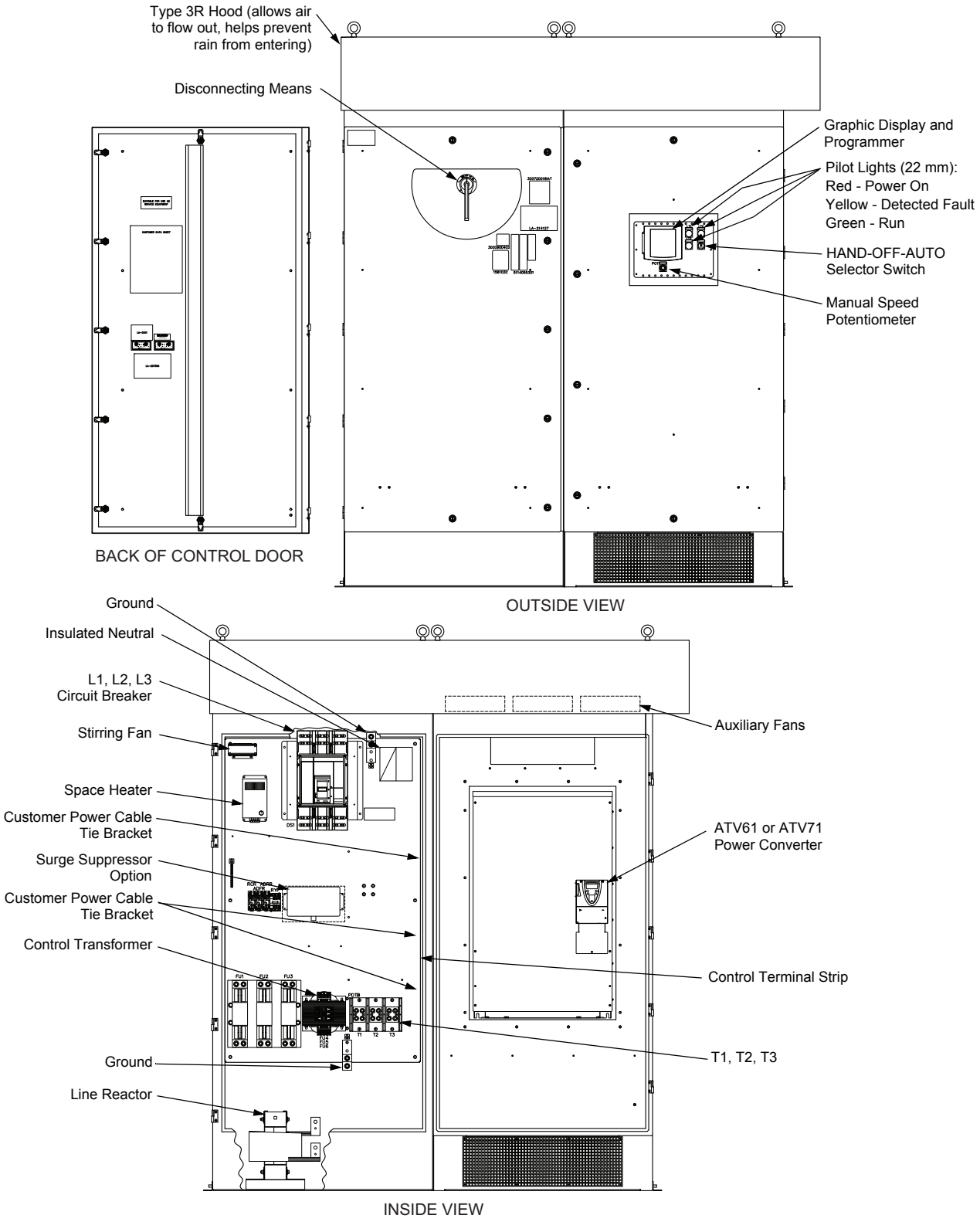
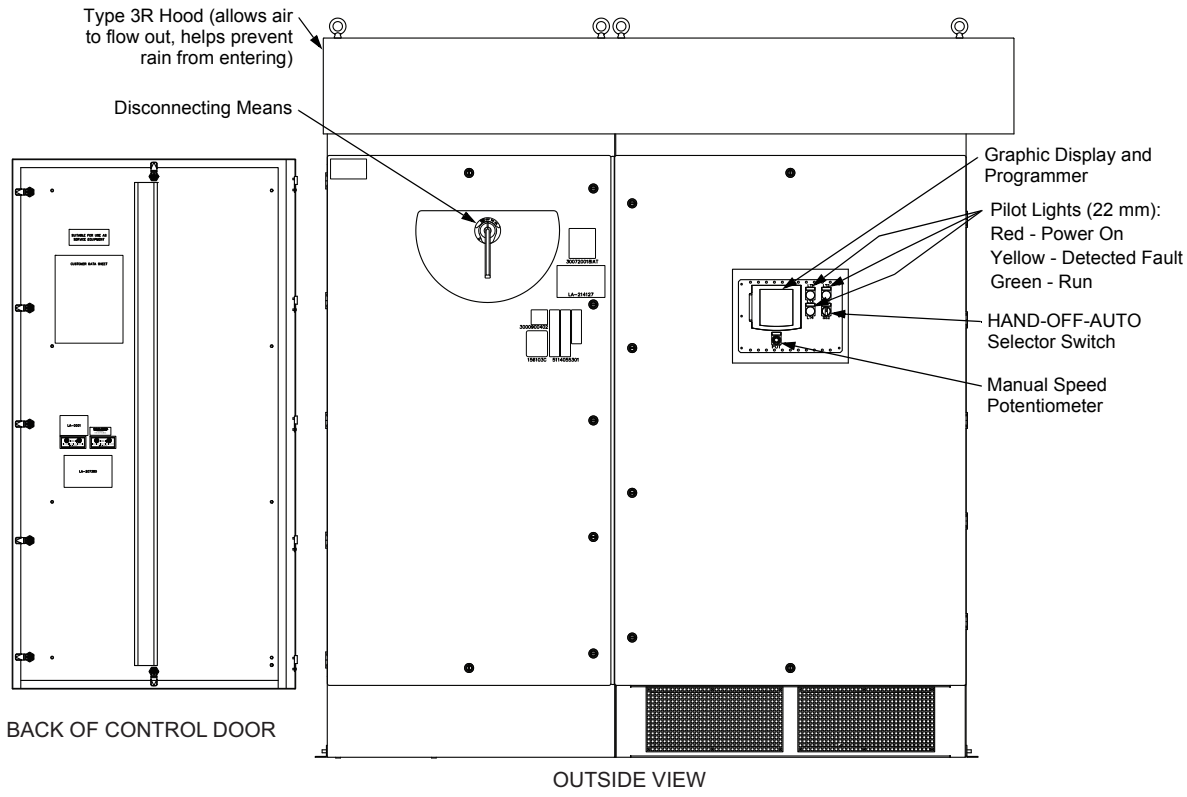
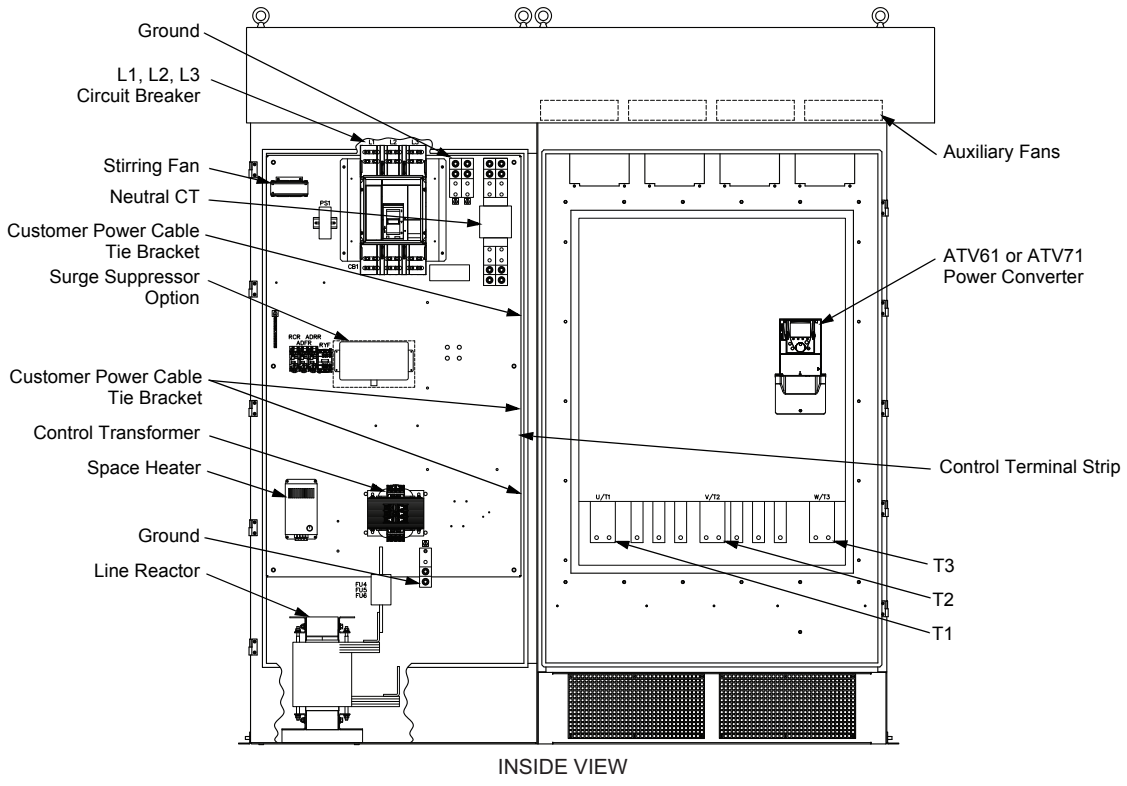


**Figure 17: Typical Component Identification and Terminal Strip Locations for 500–700 hp @ 460 V (No Bypass Available)**



## Power Wiring

**Table 20: Power Terminal Functions**

| Terminal | Function |
|---|---|
| GND | Grounding Bar |
| L1<br>L2<br>L3 | 3-phase input power supply (at top of circuit breaker or fuses) |
| T1<br>T2<br>T3 | Output connections to motor for controller with bypass (at bottom of overload relay), or distribution block for controller without bypass |
| T1/U<br>T2/V<br>T3/W | Output connections to motor for controller without bypass (power converter output terminal) |

**Table 21: Power Terminal Wire Range, 460 V (copper wire only)**

| VT | Terminals | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Maximum Wire Size | | Terminal Torque | Maximum Wire Size | | Terminal Torque | Maximum Wire Size | | Terminal Torque | Maximum Wire Size | Terminal Torque |
| | Qty. | AWG ($mm^2$) | lb-in (N•m) | Qty. | AWG ($mm^2$) | lb-in (N•m) | Qty. | AWG ($mm^2$) | lb-in (N•m) | AWG ($mm^2$) | lb-in (N•m) |
| hp | L1, L2, L3 (Line) | | | Output Terminals (Non-Bypass) T1/U, T2/V, T3/W (Load) | | | Overload Relay Output Terminals (Bypass) T1, T2, T3 (Load) | | | Line/Motor GND | |
| 1 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 14 (2.5) | 12.3 (1.4) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 2 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 14 (2.5) | 12.3 (1.4) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 3 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 14 (2.5) | 12.3 (1.4) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 5 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 8 (8.4) | 12.3 (1.4) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 7.5 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 8 (6) | 26.5 (3) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 10 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 8 (6) | 26.5 (3) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 15 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 4 (16) | 26.5 (3) | 1 | 6 (13.3) | 20 (2.5) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 20 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 2 (35) | 47.7 (5.4) | 1 | 6 (13.3) | 20 (2.5) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 25 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 2 (35) | 47.7 (5.4) | 1 | 1/0 (53.5) | 75 (9.0) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 30 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 1/0 (50) | 102 (12) | 1 | 1/0 (53.5) | 75 (9.0) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 40 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 1/0 (50) | 102 (12) | 1 | 1/0 (53.5) | 75 (9.0) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 50 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 1/0 (50) | 102 (12) | 1 | 1/0 (53.5) | 75 (9.0) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 60 | 1 | 3/0–350 (120–85) | 225 (26) | 1 | 300 (150) | 360 (41) | 1 | 1/0 (53.5) | 75 (9.0) | 14–1/0 (2.5–54) | 180 (20.3) |
| 75 | 1 | 3/0–350 (120–85) | 225 (26) | 1 | 300 (150) | 360 (41) | 1 | 6–300 (150) | 325 (36.7) | 6–250 (13.3–127) | 325 (36.7) |
| 100 | 1 | 3/0–350 (120–85) | 225 (26) | 1 | 300 (150) | 360 (41) | 1 | 6–300 (150) | 325 (36.7) | 6–250 (13.3–127) | 325 (36.7) |
| 125 | 2 | 2–600 (34–304) | 500 (56.6) | 1 | 4–600 (21–304) | 500 (56.5) | 1 | 4–500 (21–250) | 375 (42.4) | 6–250 (13.3–127) | 325 (36.7) |
| 150 | 2 | 2–600 (34–304) | 500 (56.6) | 1 | 4–600 (21–304) | 500 (56.5) | 1 | 4–500 (21–250) | 375 (42.4) | 6–250 (13.3–127) | 325 (36.7) |
| 200 | 2 | 2–600 (34–304) | 500 (56.6) | 2 | 4–500 (21–250) | 375 (42.4) | Special | | | 6–250 (13.3–127) | 325 (36.7) |
| 250 | 2 | 2–600 (34–304) | 500 (56.6) | 2 | 4–500 (21–250) | 375 (42.4) | | | | 2–600 (34–304) | 375 (42.4) |
| 300 | 2 | 2–600 (34–304) | 500 (56.6) | 2 | 4-500 (21–250) | 375 (42.4) | | | | 2–600 (34–304) | 375 (42.4) |
| 350 | 2 | 2–600 (34–304) | 500 (56.6) | 2 | 4-500 (21–250) | 375 (42.4) | | | | 2–600 (34–304) | 375 (42.4) |
| 400 | 3 | 3/0–500 (95–250) | 443 (50) | 2 | 4–500 (21–250) | 375 (42.4) | | | | 2–600 (34–304) | 375 (42.4) |
| 450 | 3 | 3/0–500 (95–250) | 443 (50) | 2 | 4–500 (21–250) | 375 (42.4) | | | | 2–600 (34–304) | 375 (42.4) |
| 500 | 3 | 3/0–500 (95–250) | 443 (50) | 2 | 4–500 (21–250) | 375 (42.4) | | | | 2–600 (34–304) | 375 (42.4) |
| 600 | 3 | 3/0–500 (95–250) | 443 (50) | Consult ATV61/71 Manuals[1] | | | | | | 2–600 (34–304) | 375 (42.4) |
| 700 | 4 | 3/0–500 (95–250) | 443 (50) | Consult ATV61/71 Manuals[1] | | | | | | 2–600 (34–304) | 375 (42.4) |

1 ATV61: Bulletin No.1760655, *Altivar® 61 Installation Manual 75 to 900 HP*, Rev. 10/2009
ATV71: Bulletin No.1755849, *Altivar® 71 Installation Manual 75 to 900 HP*, Rev. 11/2009

**Table 22: Power Terminal Wire Range, 230 V, 3 Phase (copper wire only)**

| | Terminals | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| VT | Maximum Wire Size | | Terminal Torque | Maximum Wire Size | | Terminal Torque | Maximum Wire Size | | Terminal Torque | Maximum Wire Size | Terminal Torque |
| | Qty. | AWG ($mm^2$) | lb-in (N•m) | Qty. | AWG ($mm^2$) | lb-in (N•m) | Qty. | AWG ($mm^2$) | lb-in (N•m) | AWG ($mm^2$) | lb-in (N•m) |
| hp | L1, L2, L3 (Line) | | | Output Terminals (Non-Bypass) T1/U, T2/V, T3/W (Load) | | | Overload Relay Output Terminals (Bypass) T1, T2, T3 (Load) | | | Line/Motor GND | |
| 1 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 10 (4) | 12.3 (1.4) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 2 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 10 (4) | 12.3 (1.4) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 3 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 10 (4) | 12.3 (1.4) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 5 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 10 (4) | 12.3 (1.4) | 1 | 10 (5.26) | 15 (1.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 7.5 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 8 (6) | 26.5 (3) | 1 | 6 (13.3) | 20 (2.5) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 10 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 4 (16) | 26.5 (3) | 1 | 6 (13.3) | 20 (2.5) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 15 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 2 (35) | 47.7 (5.4) | 1 | 1/0 (53.5) | 75 (9.0) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | | | | |
| 20 | 1 | 4–4/0 (20–95) | 225 (26) | 1 | 2 (35) | 47.7 (5.4) | 1 | 1/0 (53.5) | 75 (9.0) | 14–1/0 (2.5–54) | 180 (20.3) |
| 25 | 1 | 3/0–350 (120–85) | 225 (26) | 1 | 1/0 (50) | 102 (12) | 1 | 1/0 (53.5) | 75 (9.0) | 14–1/0 (2.5–54) | 180 (20.3) |
| 30 | 1 | 3/0–350 (120–185) | 225 (26) | 1 | 1/0 (50) | 102 (12) | 1 | 6–300 (150) | 325 (36.7) | 14–1/0 (2.5–54) | 180 (20.3) |
| 40 | 1 | 3/0–350 (120–185) | 225 (26) | 1 | 300 (150) | 360 (41) | 1 | 6–300 (150) | 325 (36.7) | 6–250 (13.3–127) | 325 (36.7) |
| 50 | 1 | 3/0–350 (120–185) | 225 (26) | 1 | 300 (150) | 360 (41) | 1 | 6–300 (150) | 325 (36.7) | 6–250 (13.3–127) | 325 (36.7) |
| 60 | 2 | 2–600 (34–304) | 500 (56.5) | 1 | 300 (150) | 360 (41) | 1 | 4–500 (21–250) | 375 (42.4) | 6–250 (13.3–127) | 325 (36.7) |
| 75 | 2 | 2–600 (34–304) | 500 (56.5) | 1 | 4–600 (21–304) | 500 (56.5) | 1 | 4–500 (21–250) | 375 (42.4) | 6–250 (13.3–127) | 325 (36.7) |
| 100 | 2 | 2–600 (34–304) | 500 (56.5) | 1 | 4–600 (21–304) | 500 (56.5) | Special | | | 6–250 (13.3–127) | 325 (36.7) |
| 125 | 2 | 2–600 (34–304) | 500 (56.5) | 1 | 4–600 (21–304) | 500 (56.5) | | | | 2–600 (34–304) | 375 (42.4) |

**Table 23: Power Terminal Wire Range, 230 V, Single Phase (copper wire only)**

| | Terminals | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| VT | Maximum Wire Size | | Terminal Torque | Maximum Wire Size | | Terminal Torque | Maximum Wire Size | Terminal Torque |
| | Qty. | AWG ($mm^2$) | lb-in (N•m) | Qty. | AWG ($mm^2$) | lb-in (N•m) | AWG ($mm^2$) | lb-in (N•m) |
| hp | L1, L2, L3 (Line) | | | Output Terminals (Non-Bypass) T1/U, T2/V, T3/W (Load) | | | Line/Motor GND | |
| 1 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 10 (4) | 12.3 (1.4) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | |
| 2 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 10 (4) | 12.3 (1.4) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | |
| 3 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 10 (4) | 12.3 (1.4) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | |
| 5 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 8 (6) | 26.5 (3) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | |
| 7.5 | 1 | 14–10 (2.5–6) | 50 (5) | 1 | 8 (6) | 26.5 (3) | 14–1/0 (2.5–54) | 180 (20.3) |
| | 1 | 8–3/0 (10–95) | 120 (14) | | | | | |
| 10 | 1 | 4–4/0 (20–95) | 225 (26) | 1 | 2 (35) | 47.7 (5.4) | 14–1/0 (2.5–54) | 180 (20.3) |
| 15 | 1 | 3/0–350 (120–185) | 225 (26) | 1 | 1/0 (50) | 102 (12) | 14–1/0 (2.5–54) | 180 (20.3) |
| 20 | 1 | 3/0–350 (120–185) | 225 (26) | 1 | 300 (150) | 360 (41) | 6–250 (13.3–127) | 325 (36.7) |
| 25 | 1 | 3/0–350 (120–185) | 225 (26) | 1 | 300 (150) | 360 (41) | 6–250 (13.3–127) | 325 (36.7) |
| 30 | 2 | 2–600 (34–304) | 500 (56.5) | 1 | 300 (150) | 360 (41) | 6–250 (13.3–127) | 325 (36.7) |

**Table 24: Service Entrance Ground Wire Range (copper wire only)**

| | Terminals | | | | | |
|---|---|---|---|---|---|---|
| | 460 V | | 230 V, 3 Phase | | 230 V, Single Phase | |
| VT | Maximum Wire Size AWG ($mm^2$) | Terminal Torque lb-in (N•m) | Maximum Wire Size AWG ($mm^2$) | Terminal Torque lb-in (N•m) | Maximum Wire Size AWG ($mm^2$) | Terminal Torque lb-in (N•m) |
| hp | Service Entrance Ground Lug | | | | | |
| 1 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) |
| 2 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) |
| 3 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) |
| 5 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) |
| 7.5 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) |
| 10 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) |
| 15 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) |
| 20 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) |
| 25 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 6–250 (13.3–127) | 325 (36.7) |
| 30 | 14–1/0 (2.5–54) | 180 (20.3) | 14–1/0 (2.5–54) | 180 (20.3) | 6–250 (13.3–127) | 325 (36.7) |
| 40 | 14–1/0 (2.5–54) | 180 (20.3) | 6–250 (13.3–127) | 325 (36.7) | | |
| 50 | 14–1/0 (2.5–54) | 180 (20.3) | 6–250 (13.3–127) | 325 (36.7) | | |
| 60 | 14–1/0 (2.5–54) | 180 (20.3) | 6–250 (13.3–127) | 325 (36.7) | | |
| 75 | 6–250 (13.3–127) | 325 (36.7) | 6–250 (13.3–127) | 325 (36.7) | | |
| 100 | 6–250 (13.3–127) | 325 (36.7) | 6–250 (13.3–127) | 325 (36.7) | | |
| 125 | 6–250 (13.3–127) | 325 (36.7) | 2–600 (34–304) | 375 (42.4) | | |
| 150 | 6–250 (13.3–127) | 325 (36.7) | | | | |
| 200 | 6–250 (13.3–127) | 325 (36.7) | | | | |
| 250 | 2–600 (34–304) | 375 (42.4) | | | | |
| 300 | 2–600 (34–304) | 375 (42.4) | | | | |
| 350 | 2–600 (34–304) | 375 (42.4) | | | | |
| 400 | 2–600 (34–304) | 375 (42.4) | | | | |
| 450 | 2–600 (34–304) | 375 (42.4) | | | | |
| 500 | 2–600 (34–304) | 375 (42.4) | | | | |
| 600 | 2–600 (34–304) | 375 (42.4) | | | | |
| 700 | 2–600 (34–304) | 375 (42.4) | | | | |

# Control Wiring

### Table 25: Terminal Block Characteristics

| Terminal[1] | Function | Characteristics |
|---|---|---|
| +24 V | +24 V Control Supply | Minimum: 21 V; Maximum: 27 V;<br>I = 200 mA maximum[4] |
| LI1 | Logic Input 1 (programmed for Run Forward) | 24 Vdc, 10 mA<br>State 0: V<5 V; State 1: V>11 V; Z = 3.5 kΩ |
| LI3 | Logic Input 3 (programmed for Reference Switching Auto/Manual) | 24 Vdc, 10 mA<br>State 0: V<5 V; State 1: V>11 V; Z = 3.5 kΩ |
| LI4 | Logic Input 4 (programmed for Detected Fault Reset.) | 24 Vdc, 10 mA<br>State 0: V<5 V; State 1: V>11 V; Z = 3.5 kΩ |
| TB1-1, TB1-3 | Remote Interlock | Provision for user-supplied N.C. contact |
| TB1-1, TB1-4 | Remote Interlock | Provision for user-supplied N.C. contact[2] |
| TB1-6, TB1-7 | Auto Start | User-supplied auto start contact. |
| +10 | +10 V Reference Supply | 10 V, I = 10 mA maximum[3] |
| AI1+ | AI1 (Analog Input 1) programmed for Speed Reference Voltage | 0-10 V, Z = 30 kΩ (bipolar differential)[3] |
| COM | Speed Reference Common | 0 V[3] |
| TB2-40 | AO1 Analog Output configurable for voltage or current (programmed for Frequency Feedback) | 0-10 V, min., Z = 470 Ω<br>0-20 mA, max., Z = 500 Ω |
| TB2-41 | COM, Analog I/O Common | 0 V |
| TB2-S1 | Shield, AO1 | |
| TB2-53 | AI2 (Analog Input 2) programmed for Remote Speed Reference | 0-20 mA, Z = 250 Ω, 0-10 V, 30 Ω |
| TB2-54 | COM, Analog I/O Common | 0 V |
| TB2-S2 | Shield, AI2 | |
| TB1-3, TB1-7 | Hand (Local) mode selected; Control from speed potentiometer | |
| TB1-3, TB1-6 | Auto (Remote) mode selected; Control from 0-20 mA Speed Reference | |
| TB1-8 | Internal wiring connection | No user connection |
| TB1-9 | Internal wiring connection | No user connection |
| TB1-4, TB1-15 | AFC Select | Supplied with bypass circuit[5] |
| TB1-16 | Internal wiring connection | No user connection[5] |
| TB1-17 | Internal wiring connection | No user connection[5] |
| TB1-4, TB1-19 | Bypass Select | Supplied with bypass circuit[5] |
| TB1-20 | Internal wiring connection | No user connection[5] |
| TB1-1, TB1-2 | LT1; Power On Light | |
| TB1-10, TB1-2 | LT2; Detected Fault Light | |
| TB1-11, TB1-2 | LT3; Drive Run Light | |
| TB1-21, TB1-18 | LT4; Bypass Run Light[5] | |
| TB1-30 | Internal wiring connection | No user connection |
| TB1-31 | Internal wiring connection | No user connection |
| TB1-32 | Internal wiring connection | No user connection |
| ADRR-11<br>ADRR-12<br>ADRR-14 | AFC Run Contacts<br>Auxiliary N.C. Contact (AFC Run)<br>COM<br>Auxiliary N.O. Contact (AFC Run) | • Switching capacity (minimum): 10 mA @ 17 V<br>• Switching Capacity (maximum): 1500 VA<br>• Nominal load (resistive): 6 A @ 250 Vac, 6 A @ 28 Vdc<br>• Horsepower rating: 1/3 hp @ 120 Vac, 1/2 hp @ 250 Vac pilot duty |
| ADFR-11<br>ADFR-12<br>ADFR-14 | Drive Detected Fault Contacts<br>Auxiliary N.C. Contact (Drive Detected Fault)<br>COM<br>Auxiliary N.O. Contact (Drive Detected Fault) | • Switching capacity (minimum): 10 mA @ 17 V<br>• Switching Capacity (maximum): 1500 VA<br>• Nominal load (resistive): 6 A @ 250 Vac, 6 A @ 28 Vdc<br>• Horsepower rating: 1/3 hp @ 120 Vac, 1/2 hp @ 250 Vac pilot duty |

Notes to Table 25:

1 See the Control Circuit Elementary Diagrams in Section 5 beginning on page 73.

2 Only available when bypass option is installed.

3 Terminal located on power converter.

4 Total current of +24 V internal supply is 200 mA. If more current is required, an external supply must be used.

5 Available only when bypass option is provided.

# Initial Start-up Procedure

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Read and understand the precautions in Before You Begin starting on page 8 before you perform the procedures in this section.
- Before working on this equipment, turn off all power supplying it and perform the DC Bus Voltage Measurement Procedure on page 37.

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

**⚠ DANGER**

**UNQUALIFIED PERSONNEL**

- This equipment must be installed and serviced only by qualified personnel.
- Qualified personnel performing diagnostics or troubleshooting requiring electrical conductors to be energized must comply with NFPA 70 E - Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards–29 CFR Part 1910 Subpart S Electrical.

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

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK**

- Properly ground the controller panel before applying power.
- Close and secure the enclosure door before applying power.
- Certain adjustments and test procedures require that power be applied to this controller. Extreme caution must be exercised as hazardous voltages exist. The enclosure door must be closed and secured while turning on power or starting and stopping this controller.

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

The field drive has been configured for the installed options and tested at the factory. Depending on the application requirements, minor adjustments may be required to complete the field installation. Follow this initial start-up procedure step by step. In case of difficulty, refer to Section 4, Troubleshooting and Maintenance, beginning on page 61.

The door-mounted graphic display must be used to perform the initial start-up procedure.

To perform any programming:

1. Ensure that the enclosure door is closed and secured.
2. Close the equipment disconnect means.
3. Perform programming on keypad.

After replacing the power converter or installing any plug-in option card, the programming parameters must be set as listed in the elementary diagrams. See pages 74–78.

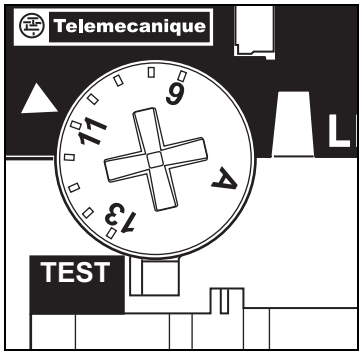
In addition, after installing any plug-in option card for the first time, previously-saved parameters downloaded from the graphic display terminal or PC software will not be correct because they do not include the additional

parameters available with the card. The I/O extension card parameters must be set as listed in the elementary diagram that corresponds to the options ordered. See pages 74–78.

With all incoming power removed, make the following equipment checks:

1. Verify that all equipment disconnects are open.
2. Set the Hand-Off-Auto switch to Off and the AFC-Off-Bypass switch (if used) to Off.
3. Set the speed potentiometer (drive mounted or remotely mounted) to its minimum setting (full counterclockwise position).
4. Open the enclosure door. To open the door, turn the circuit breaker or disconnect and handle assembly to the Off position.
5. Check the wiring of the input power ground, motor ground, speed potentiometer (if remotely mounted), and Hand-Off-Auto switch. See the control circuit elementary diagrams in Section 5 beginning on page 74 for the remote control operator wiring.

**Figure 18: Overload Relay Dial**
**NOTE:** The LR2D1516 overload relay is shown. Your dial setting range may be different.




6. When using the bypass circuit, ensure that the motor conductors are wired to the T1, T2, and T3 terminals of the overload relay. When using the power circuit without bypass, ensure that the motor conductors are wired to the drive T1/U, T2/V, and T3/W of the controller, or the distribution block T1, T2, and T3 terminals.
7. If the drive includes a bypass option for running the motor across the line, set the overload relay dial (on the load side of the bypass contactor) to the full load ampere rating on the nameplate of the connected motor. See the example at left.
8. Using a voltmeter set at the 1000 Vac scale, verify that the incoming line voltage at the line side of the disconnecting means is within ± 10% of the input voltage rating on the drive nameplate.
9. Close and secure the enclosure door. Close the equipment disconnect means. The Power On pilot light illuminates.

   This drive does not provide direct thermal protection for the motor. Consult the motor manufacturer for the thermal capability of the motor when operated over the desired speed range.

## ⚠ CAUTION

**MOTOR OVERHEATING HAZARD**

Use a thermal sensor in the motor as required by the motor manufacturer to facilitate motor overheating protection at all speeds and load conditions.

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

10. Press the ESC key on the graphic keypad until “MAIN MENU” is displayed and “DRIVE MENU” is highlighted. Press the keypad knob (ENT) twice. The “SIMPLY START” menu is displayed. Rotate the keypad knob clockwise until “Mot. therm. current” is highlighted. Press ENT. Rotate the keypad knob until the display indicates the correct motor nameplate full load amperes. Press ENT. The controller is now calibrated to provide motor overload protection. Press ESC three times to return to the monitor screen.

**NOTE:** The settings listed in this procedure are suitable for most applications. If your application requires different operating characteristics, refer to the *Altivar® 61 Programming Manual* on CD-ROM W817574030111,

or the *Altivar® 71 Programming Manual* on CD-ROM W817555430117A07 for more information.

## ⚠ WARNING

**HAZARDOUS MOVING PARTS**

Before starting the drive, ensure that the motor and its connected load are clear of personnel and are ready to run.

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

11. Set the AFC-Off-Bypass selector switch (if used) to AFC and the Hand-Off-Auto to Hand. Slowly turn the manual speed potentiometer clockwise to accelerate the motor. Check the direction of motor rotation. If correct, proceed to step 19. If incorrect, stop the drive. **Remove all power!**

## ⚠ DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Turn off all power supplying this equipment and perform the DC Bus Voltage Measurement Procedure on page 37 before proceeding.

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

12. Correct the direction of motor rotation by reversing any two motor leads connected to the drive output (see Step 6, page 52).
13. Reset the speed potentiometer to minimum speed.
14. Slowly turn the manual speed potentiometer clockwise to accelerate the motor. Check the direction of motor rotation. If correct, this completes the controller mode, motor rotation check.

## CAUTION

**RISK OF CONTROLLER DAMAGE**

- Move the Hand-Off-Auto switch to the Off position before moving the AFC-Off-Bypass switch from AFC to the Off position.
- Avoid repeated opening of the drive output contactor while under load.

**Failure to follow these instructions can result in equipment damage.**

15. Set the AFC-Off-Bypass selector switch (if used) to Off, leaving the Hand-Off-Auto switch in the Hand position.
16. Momentarily set the AFC-Off-Bypass selector switch to Bypass to check the direction of motor rotation, then return it immediately to the Off position. If the direction of motor rotation is correct, proceed to Step 19. If incorrect, stop the drive. **Remove all power!**

## ⚠ DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Turn off all power supplying this equipment and perform the DC Bus Voltage Measurement Procedure on page 37 before proceeding.

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

17. Correct the direction of motor rotation by reversing any two incoming leads to the disconnect means marked L1, L2, or L3.
18. Momentarily set the AFC-Off-Bypass selector switch to Bypass to check the direction of motor rotation, then return it immediately to the Off position. If correct, this completes the bypass mode motor rotation check.
19. Check the High Speed (HSP) setting (maximum motor speed setting). Press the ESC key on the graphic keypad until “MAIN MENU” is displayed and “DRIVE MENU” is highlighted. Press the keypad knob (ENT) twice. The “SIMPLY START” menu is displayed. Rotate the keypad knob clockwise until “High Speed” is highlighted. Press ENT. Rotate the keypad knob until the display indicates the maximum output frequency required for the application (factory default is 60 Hz), then press ENT. The controller HSP setting is now complete.

    Refer to the *Altivar® 61 Programming Manual* on CD-ROM W817574030111 [1] or the *Altivar® 71 Programming Manual* on CD-ROM W817555430117A07 [2].
20. Check the Low Speed (LSP) setting (minimum motor speed setting). Continuing from Step 19 above, rotate the keypad knob counter-clockwise until “Low Speed” is highlighted. Press ENT. Rotate the keypad knob until the display indicates the minimum output frequency required for the application (preset value is 3 Hz; factory default is 0 Hz), then press ENT. The controller LSP setting is now complete. Press ESC three times to return to the monitor screen.

    Refer to the *Altivar® 61 Programming Manual* on CD-ROM W817574030111 [1] or the *Altivar® 71 Programming Manual* on CD-ROM W817555430117A07 [2].
21. The application may require changing the setting of acceleration (ACC) and deceleration (dEC) times. The factory default value is preset to 3 seconds. To change the setting, press the ESC key on the graphic keypad until “MAIN MENU” is displayed and “DRIVE MENU” is highlighted. Press the keypad knob (ENT) twice. The “SIMPLY START” menu is displayed. Rotate the keypad knob clockwise until “Acceleration” is highlighted. Press ENT. Rotate the keypad knob until the display indicates the acceleration time required for the application, then press ENT. Rotate the keypad knob counter-clockwise until “Deceleration” is highlighted. Press ENT. Rotate the keypad knob until the display indicates the deceleration time required for the application, then press ENT. The controller acceleration and deceleration time setting is now complete. Press ESC three times to return to the monitor screen.

[1] See the *Altivar® 61 Installation Manual* and the *ATV61 Programming Manual*. These manuals are available from the Technical Library at www.Schneider-electric.us.

[2] See the *Altivar® 71 Installation Manual* and the *ATV71 Programming Manual*. These manuals are available from the Technical Library at www.Schneider-electric.us.

## Circuit Breaker Trip Adjustment Procedure

For circuit breakers with an “H” or “J” prefix, see manual 30072-453-26 Rev. 01, 01/2011; pages 57-EN to 59-EN. For circuit breakers with a “P” prefix, see manual 48049-136-05 for an explanation of Micrologic Electronic Trip units.

**Table 26: Circuit Breaker Trip Adjustment**

| hp-VT | 460 V | 230 V, 3 Phase | 230 V, Single Phase |
|---|---|---|---|
| 1 | HLL36015 | HLL36015 | HLL26025 |
| 2 | HLL36015 | HJL36025 | HJL26040 |
| 3 | HLL36015 | HJL36040 | HJL26040 |
| 5 | HLL36020 | HJL36040 | HJL26070 |
| 7.5 | HLL36030 | HJL36070 | HJL26110 |
| 10 | HLL36040 | HJL36110 | JJL26175 |
| 15 | HLL36060 | HJL36125 | JJL26250 |
| 20 | HLL36070 | JJL36175 | JJL26250 |
| 25 | HLL36070 | JJL36200 | JJL26250 |
| 30 | HLL36100 | JJL36250 | Fused Disconnect |
| 40 | HLL36125 | JJL36250 | |
| 50 | HLL36150 | JJL36250 | |
| 60 | JLL36200 | Fused Disconnect | |
| 75 | JLL36225 | | |
| 100 | JLL36250 | | |
| 125 | Fused Disconnect | | |
| 150 | | | |
| 200 | Non-Fused Disconnect in Series with Fuses | | |
| 250 | | | |
| 300 | | | |
| 350 | | | |
| 400 | PLL34080CU33A | | |
| 450 | | | |
| 500 | | | |
| 600 | PJL36080CU44A | | |
| 700 | PJL36100CU44A | | |

**Table 27: PowerPact™ Circuit Breaker Derating for Temperature and Altitude[1], 460 V / 100 kA and 240 V / 125 kA**

| Circuit Breaker | Circuit Breaker (A) | | | Altitude Current Derating Value | | |
|---|---|---|---|---|---|---|
| | ≤ 40° C (≤ 104° F) | ≤ 50° C (≤ 122° F) | ≤ 60° C (≤ 140° F) | ≤ 2000 m (≤ 6600 ft) | 2600 m (8500 ft) | 3900 m (13000 ft) |
| HLL36015 | 15 | 12 | 9 | 1 | 0.99 | 0.96 |
| HLL36020 | 20 | 17 | 14 | 1 | 0.99 | 0.96 |
| HLL36025 | 25 | 21 | 17 | 1 | 0.99 | 0.96 |
| HLL36030 | 30 | 25 | 20 | 1 | 0.99 | 0.96 |
| HLL36035 | 35 | 30 | 24 | 1 | 0.99 | 0.96 |
| HLL36040 | 40 | 34 | 28 | 1 | 0.99 | 0.96 |
| HLL36045 | 45 | 38 | 31 | 1 | 0.99 | 0.96 |
| HLL36050 | 50 | 43 | 35 | 1 | 0.99 | 0.96 |
| HLL36060 | 60 | 53 | 46 | 1 | 0.99 | 0.96 |
| HLL36070 | 70 | 62 | 53 | 1 | 0.99 | 0.96 |
| HLL36080 | 80 | 72 | 63 | 1 | 0.99 | 0.96 |
| HLL36090 | 90 | 80 | 70 | 1 | 0.99 | 0.96 |
| HLL36100 | 100 | 86 | 72 | 1 | 0.99 | 0.96 |
| HLL36110 | 110 | 95 | 80 | 1 | 0.99 | 0.96 |
| HLL36125 | 125 | 109 | 93 | 1 | 0.99 | 0.96 |
| HLL36150 | 150 | 131 | 111 | 1 | 0.99 | 0.96 |
| JLL36150 | 150 | 131 | 111 | 1 | 0.99 | 0.96 |
| JLL36175 | 175 | 150 | 124 | 1 | 0.99 | 0.96 |
| JLL36200 | 200 | 176 | 151 | 1 | 0.99 | 0.96 |
| JLL36250 | 225 | 193 | 160 | 1 | 0.99 | 0.96 |
| JLL36250 | 250 | 214 | 177 | 1 | 0.99 | 0.96 |
| PLL34080CU33A | 800 | 736 | 664 | 1 | 0.99 | 0.96 |
| PJL36080CU44A | 800 | 736 | 664 | 1 | 0.99 | 0.96 |
| PJL36100CU44A | 1000 | 920 | 830 | 1 | 0.99 | 0.96 |

[1] Derating applies to the thermal magnetic circuit breaker, not the overall drive.

# Section 3—Circuit Descriptions and Options

## Introduction

This section describes basic sequences of operation for the two pre-engineered power circuit configurations and available options. The options are:

- Power Circuit W: Without Bypass (see page 58)
- Power Circuit Y: With Bypass (see page 59)

## Terminal Versus Keypad Command Operation

Do not change the factory settings of the power converter logic inputs or the factory and user-supplied pilot devices and controls may not be recognized. See Figures 21–25 on pages 74–78.

Changing certain factory settings will affect the performance of the field drive.

**⚠ WARNING**

**UNINTENDED EQUIPMENT OPERATION**

- The controller has been factory-programmed. Alteration of factory programming may create incompatibilities with the supplied controller configuration.
- Read and understand the *Altivar® 61 Programming Manual* on CD-ROM W817574030111, or the *Altivar® 71 Programming Manual* on CD-ROM W817555430117A07, supplied with the power converter, as well as the programming information found in the applicable control circuit elementary diagrams provided with each controller.
- If the power converter unit or the main control board of the power converter is replaced, or if any option cards are field installed, the power converter must be re-programmed according to the programming instructions found in the applicable control circuit elementary diagrams provided with each controller.

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

**NOTE:** The factory program can be saved in the graphic display terminal. Refer to the *Altivar® 61 Programming Manual* or the *Altivar® 71 Programming Manual* for saving and retrieving factory settings.[1]

## Graphic Display Terminal Operation

The graphic display terminal is for programming and display. The FWD/REV, Run, and Stop/Reset buttons are not for drive primary operation. Use the 22 mm operators on the front of the drive door to command the AFC and Bypass modes of operation.

## Type 3R Operation

To help prevent condensation on the inside of the cabinet, leave the mains energized when the motor is not running.

[1] See the *Altivar® 61 Installation Manual* and the *Altivar® 61 Programming Manual*. These manuals are available from the Technical Library at www.Schneider-electric.us.

## Reset After Clearing a Detected Fault

Turn the Hand-Off-Auto selector switch to the Off position to reset the drive after a detected fault has been cleared.

## Power Circuit W (Without Bypass)

This power circuit consists of a fused control transformer, disconnect with means for locking in the open position, power converter, and optional equipment as specified.

### Operator Controls–General Arrangement and Operation

The operator controls are located on the front door of the drive.

### Controller Operation

To operate the controller, the disconnect located on the front of the drive must be in the closed position.

Two-wire control functionality: Hand-Off-Auto selector switch. The controller will automatically restart when power is restored after a power loss or upon clearing a detected fault condition, if the Auto contact is closed.

### Hand-Off-Auto Selector and Manual Speed Potentiometer

This control option provides a door-mounted Hand-Off-Auto selector switch and manual speed potentiometer to operate the power converter.

The speed potentiometer is used to control the speed of the drive.

Off mode commands the power converter to stop the motor by either following the programmed deceleration ramp (factory setting) or by a freewheel stop.

Set the Hand-Off-Auto switch to Off to reset the drive.

In Auto mode, the power converter starts the motor when the user-supplied run contact is closed between controller terminals 6 and 7. Motor speed is varied by adjusting the user-supplied auto speed reference signal (0–20 mA) supplied to terminals TB2-53 and TB2-54 in the drive.

### MOD A09 5% Line Reactor

This option includes an integrally-mounted 5% AC line reactor factory installed and mounted before the power converter for harmonic mitigation. It replaces the standard 3% input line reactor on all drives and also replaces the DC choke for any drive larger than 230 V / 60 hp and 460 V / 100 hp.

**Table 28: Hard-Wired Secondary Surge Arresters**

| Description | Part No. |
|---|---|
| Secondary Surge Arrester<br>For single-phase, 3-wire systems.<br>150 Vac phase-to-ground maximum. | SDSA1175 |
| Secondary Surge Arrester and Surge Protective Device<br>For 3-phase systems.<br>600 Vac phase-to-ground maximum.[1] | SDSA3650 |

[1] Do not use on underground systems. Systems must be solidly grounded.

# Power Circuit Y (With Bypass)

This power circuit operates the motor from the power converter or from full voltage line power (bypass mode). The motor can be run in the bypass mode in the unlikely event that the power converter becomes inoperative. The Bypass Package consists of:

- Drive output and bypass contactors (electrically interlocked) with Class 10 overloads
- Control transformer
- Disconnect with means for locking in the open position
- AFC-Off-Bypass switch
- Power converter
- Optional equipment as specified

## Operator Controls–General Arrangement and Operation

**CAUTION**

**RISK OF CONTROLLER DAMAGE**

- Move the Hand-Off-Auto switch to the Off position before moving the AFC-Off-Bypass switch from AFC to the Off position.
- Avoid repeated opening of the drive output contactor while under load.
- Check motor for desired rotation in both VFD and bypass mode.

**Failure to follow these instructions can result in equipment damage.**

Drive output contactors are rated to carry full load motor current; however, these contactors are not intended to break motor current except in the event of an emergency. Always ensure that the motor has come to a complete stop and that the drive is stopped and its output frequency is zero before turning the drive off. Failure to follow these guidelines can reduce the life of the device.

Operator controls are located on the front door of the drive. The drive is factory configured to operate in terminal command mode.

The AFC-Off-Bypass switch allows selection of either adjustable speed operation of the motor through the power converter (AFC position) or line power operation of the motor (Bypass position). Both the AFC and Bypass operation can be started in the Hand mode for immediate start, or in the Auto mode for remote operation.

## Bypass Operation

To control the operation of the motor with line power, the disconnect located on the front of the drive must be in the closed position and the AFC-Off-Bypass switch must be in the Bypass position. When the AFC-Off-Bypass selector switch is set to Bypass, motor operation is transferred to line power. In Hand mode the motor will immediately start. In Auto mode, the motor will start when the user-supplied contact is closed. When the selector switch is moved to the Off position, the bypass contactor opens and the motor stops. If terminals 6 and 7 are connected, then the motor will run immediately.

## MOD A09
## Line Reactor

This option includes an integrally-mounted 5% AC line reactor, factory-installed and wired between the circuit breaker disconnect means and the power converter, for harmonic mitigation. It replaces the standard 3% DC choke.

## MOD H09
## HWA Series Surge Protection

This option provides a suppression path for each mode, line-to-neutral (L-N), line-to-line (L-L), line-to-ground (L-G), and neutral-to-ground (N-G). Each mode is individually fused and uses circuitry with thermal cutouts. An audible alarm and dry contacts are provided for status of the suppression device. It replaces the SDSA series surge suppressor that is supplied as standard on all units.

**Table 29: Hard-Wired Secondary Surge Arresters**

| Description | Part No. |
|---|---|
| Secondary Surge Arrester<br>For single-phase, 3-wire systems.<br>150 Vac phase-to-ground maximum. | SDSA1175 |
| Secondary Surge Arrester and Surge Protective Device<br>For 3-phase systems.<br>600 Vac phase-to-ground maximum.[1] | SDSA3650 |

[1] Do not use on underground systems. Systems must be solidly grounded.

**Table 30: HWA Series Non-Modular, Nipple-Mounted Surge Protective Device**

| Service Voltage | Peak Surge Current Rating per Phase (kA) | NEMA 3R, 4X, 12 Part No. |
|---|---|---|
| 120/240 V,<br>single-phase, 3-wire<br>+ground | 80 | TVS1HWA80X |
| 208Y/120 V,<br>3-phase, 4-wire<br>+ground[1] | 80 | TVS2HWA80X |
| 120/240 V,<br>3-phase, 4-wire +ground<br>High-leg Delta | 80 | TVS3HWA80X |
| 480Y/277 V,<br>3-phase, 4-wire<br>+ground[1 2] | 80 | TVS4HWA80X |

[1] Can be used on 4-wire or 3-wire grounded neutral system.

[2] 480Y/277 series applies to the following voltages: 380Y/220, 400Y/230, and 415Y/240.

# Section 4—Troubleshooting and Maintenance

## ⚠ DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Read and understand this bulletin in its entirety before installing or operating the field drive. Installation, adjustment, repair, and maintenance of the drives must be performed by qualified personnel.
- The user is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Before servicing the drive:
  - — Disconnect all power including external control power that may be present before servicing the drive.
  - — Place a “DO NOT TURN ON” label on the drive disconnect.
  - — Lock disconnect in the open position.
  - — WAIT 15 MINUTES for the DC bus capacitors to discharge. Then follow the DC Bus Voltage Measurement Procedure on page 37 to verify that the DC voltage is less than 42 V. The drive LEDs are not indicators of the absence of DC bus voltage.
- Install and close all covers before applying power or starting and stopping the drive.

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

## ⚠ 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 the equipment.
- Always use a properly rated voltage sensing device to confirm 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.**

## Introduction

A number of diagnostic and status codes are included on the power converter. The graphic display terminal provides visual indication of controller operating and protective circuit functions and indicator lights to assist in maintenance and troubleshooting. If the controller trips while operating, the codes must be viewed before power is removed because removing power resets the detected fault code.

## External Signs of Damage

The following are examples of external signs of damage:

- Cracked, charred, or damaged covers or enclosure parts
- Damage to the graphic display terminal such as scratches, punctures, burn marks, chemical burns, or moisture in the screen
- Oil or electrolyte on the bottom of the drive which might have leaked from the capacitors inside
- Excessive surface temperatures of enclosures and conduits
- Damage to power or control conductors
- Unusual noise or odors from any of the equipment
- Abnormal temperature, humidity, or vibration

If any of the above signs are found while the equipment is powered up, immediately inform operating personnel and assess the risk of leaving the drive system powered up. Before removing power from the equipment, always consult with the operating personnel responsible for the machinery and process.

If troubleshooting indicates the need for component replacement, refer to “Field Replacement of the Power Converter” on page 65.

## Preventive Maintenance

Type 3R controllers use ventilation cooling. Inspect the interior fans and exterior fans of the controller for blockage and impeded rotation.

To maintain the environmental rating of Type 3R enclosures, periodically inspect the enclosure gaskets for damage.

To maintain proper air flow, periodically check air intake plenum for blockage or debris.

Inspect ground fault protection on units with ground fault current transformers (see Appendix B on page 85).

## Product Support

When troubleshooting the field drive, discuss with operating personnel the symptoms of the reported problems. Ask them to describe the problem, when they first observed the problem, and where the problem was seen. Observe directly the drive system and process.

For more information, call, fax, or write:

Drives Product Support Group
P.O. Box 27446
Raleigh, NC 27611-7446

The Product Support Group is staffed from 8 am to 6 pm Eastern time for product selection, start-up assistance, or diagnosis of product problems and advice for the correct course of action. **Emergency phone support** is available 24 hours a day, 365 days a year.

| | |
|---|---|
| Toll Free | 1-888-778-2733 |
| E-mail | drive.products.support@us.schneider-electric.com |
| Fax | 919-217-6508 |

## Service (On-Site)

The Services division is committed to providing quality on-site service that consistently meets customer expectations. Services responds to your requests, seven days a week, 24 hours a day.

| | |
|---|---|
| Toll Free | 1-888-778-2733 |

## Customer Training

Schneider Electric offers a variety of instructor-led, skill enhancing and technical product training programs for customers. For a complete list of drives/soft start training with dates, locations, and pricing, please call:

| | |
|---|---|
| Phone | 978-975-9306 |
| Fax | 978-975-2821 |

## FIELD DRIVE TROUBLESHOOTING SHEET

When requesting after-sales service, it is important to disclose all conditions under which the Schneider Electric equipment currently operates. This will help in diagnosing the system quickly. Call the Product Support Group at 1-888–778–2733.

DATE: _____
CONTACT NAME: _____
COMPANY: _____
ADDRESS: _____
CITY: _____
STATE: _____
PHONE: _____
FAX: _____

## DRIVE CONFIGURATION

CATALOG NUMBER: CLASS **8930 TYPE IFD** _____
APPLICATION/EQUIPMENT DESIGNATION:

## MOTOR NAMEPLATE DATA

HORSEPOWER:_____VOLTAGE (3 PHASE):_____FREQUENCY:_____POLES:_____FLA:_____
SERVICE FACTOR:_____MOTOR INSULATION: ☐ NEW OR ☐ EXISTING
MOTOR CABLE TYPE:_____LENGTH IN FEET:_____
IS MOTOR DESIGNED TO COMPLY WITH NEMA MG-1 PART 31 GUIDELINES? ☐ YES ☐ NO

## POWER SOURCE AND ENVIRONMENT

VOLTAGE BETWEEN:L1 AND L2:_____L2 AND L3:_____L3 AND L1:_____
SERVICE TRANSFORMER RATING: _____KVA_____% Z FREQUENCY: ☐ 60 HZ OR ☐ 50 HZ
AMBIENT TEMPERATURES:MIN °C (°F)_____MAX °C (°F)_____HUMIDITY:_____
ALTITUDE IF GREATER THAN 3300 FEET ABOVE SEA LEVEL, SPECIFY:_____FT

## DRIVE DETECTED FAULT CODES

Refer to the *Altivar® 61 Programming Manual* on CD-ROM W817574030111, or the *Altivar® 71 Programming Manual* on CD-ROM W817555430117A07, for possible causes and corrective action.

| | | | | |
|---|---|---|---|---|
| ☐ **AI2F** AI2 input | ☐ **FCF1** Output contactor stuck | ☐ **InFb** Internal-thermal sensor | ☐ **OPF2** 3 motor phase loss | ☐ **SCF4** IGBT short circuit |
| ☐ **APF** Application fault | ☐ **FCF2** Output contactor open | ☐ **InFC** Internal-time measurement | ☐ **OSF** Mains overvoltage | ☐ **SCF5** Motor short circuit |
| ☐ **bOF** DB resistor overload | ☐ **HCF** Cards pairing | ☐ **InFE** Internal-CPU | ☐ **OtF1** PTC1 overheat | ☐ **SLF1** Modbus comm. |
| ☐ **bUF** DB unit short circuit | ☐ **HdF** IGBT desaturation | ☐ **LCF** Input contactor | ☐ **OtF2** PTC2 overheat | ☐ **SLF2** Powersuite comm. |
| ☐ **CFF** Incorrect config. | ☐ **ILF** Internal comm. link | ☐ **LFF2** AI2 4-20mA loss | ☐ **OtFL** LI6 = PTC overheat | ☐ **SLF3** HMI communication |
| ☐ **CFI** Invalid configuration | ☐ **InF1** Rating error | ☐ **LFF3** AI3 4-20mA loss | ☐ **PHF** Input phase loss | ☐ **SOF** Overspeed |
| ☐ **CnF** Comm. network | ☐ **InF2** Incompatible power board | ☐ **LFF4** AI4 4-20mA loss | ☐ **PrF** Phase removal | ☐ **SPIF** PI Feedback |
| ☐ **COF** CAN comm. | ☐ **InF3** Internal serial link | ☐ **nFF** External flow sensor | ☐ **PrtF** Power identification | ☐ **SSF** Torque/current limit |
| ☐ **CrF1** Precharge | ☐ **InF4** Internal MFG area | ☐ **ObF** Overbraking | ☐ **PtF1** PTC1 probe | ☐ **tJF** IGBT overheat |
| ☐ **CrF2** Thyristor soft charge | ☐ **InF6** Internal-option | ☐ **OCF** Overcurrent | ☐ **PtF2** PTC2 probe | ☐ **tnF** Auto tuning |
| ☐ **EEF1** Control Eeprom | ☐ **InF7** Internal-hard initialization | ☐ **OHF** Drive overheat | ☐ **PtFL** LI6 = PTC probe | ☐ **ULF** Process underload |
| ☐ **EEF2** Power Eeprom | ☐ **InF8** Internal-control supply | ☐ **OLC** Process overload | ☐ **SCF1** Motor short circuit | ☐ **USF** Undervoltage |
| ☐ **EPF1** External fault via logic input | ☐ **InF9** Internal-current measure | ☐ **OLF** Motor overload | ☐ **SCF2** Impedant short circuit | |
| ☐ **EPF2** External fault via comm. link | ☐ **InFA** Internal-mains circuit | ☐ **OPF1** 1 motor phase loss | ☐ **SCF3** Ground short circuit | |

## DETAILED DESCRIPTION OF PROBLEM

# Field Replacement Procedures

*Refer to Appendix A beginning on page 79 for the part numbers of the equipment required for the following field replacement procedures. For component locations, refer to Figure 12 on page 40.*

*For replacement of any 100–600 hp constant torque or 125–700 hp variable torque, 460 V power converters, contact: AC Drives Technical Support Group. See the Product Support Section on page 63.*

## Field Replacement of the Power Converter

If the power converter becomes inoperable in the field drive, it must be replaced. Refer to Table 31 for power converter weights.

**Table 31: Power Converter Weights**

| 460 V | | 230 V, 3 Phase | 230 V, Single Phase | Converter | | Converter w/ Flange | |
|---|---|---|---|---|---|---|---|
| VT | CT | VT | VT | lb | kg | lb | kg |
| 1–3 | 1–3 | 1–2 | 1 | 6.6 | 3 | 12.54 | 5.7 |
| 5 | 5 | 3–5 | 2–3 | 8.8 | 4 | 15.62 | 7.1 |
| 7.5–10 | 7.5–10 | 7.5 | 5 | 12.1 | 5.5 | 20.24 | 9.2 |
| 15 | 15 | 10 | 7.5 | 15.4 | 7 | 25.52 | 11.6 |
| 20–25 | 20–25 | 15–20 | 10 | 19.8 | 9 | 30.58 | 13.9 |
| 30 | 30 | 25–30 | 15 | 66.1 | 30 | 75.34 | 34.2 |
| 40–50 | 40–50 | 40–60 | 20–30 | 81.5 | 37 | 92.28 | 41.9 |
| 60–100 | 60–100 | – | – | 99.2 | 45 | 110.64 | 50.3 |
| 125 | 125 | 75 | – | 132 | 60 | – | – |
| 150 | 150 | 100 | – | 163 | 74 | – | – |
| 200 | – | 125 | – | 176 | 80 | – | – |
| 250 | – | – | – | 242 | 110 | – | – |
| – | 200 | – | – | 255 | 116 | – | – |
| 300–400 | – | – | – | 309 | 140 | – | – |
| – | 250 | – | – | 358 | 163 | – | – |
| – | 300–450 | – | – | 455 | 207 | – | – |
| 450–500 | – | – | – | 474 | 215 | – | – |
| 600 | – | – | – | 496 | 225 | – | – |
| 700 | – | – | – | 661 | 300 | – | – |
| – | 500 | – | – | 704 | 320 | – | – |
| – | 600 | – | – | 726 | 330 | – | – |

**NOTE:** For replacement of any 100–700 hp VT or 100–600 hp CT power converters, contact AC Drives Technical Support.

## Removing the Power Converter Assembly

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Disconnect all power.
- Place a “Do Not Turn On” label on the drive disconnect.
- Lock the disconnect in the open position.
- Read and understand the DC Bus Voltage Measurement Procedure on page 37 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 connectors with voltage present.
- Many parts in the drive, 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.**

**⚠ CAUTION**

**ELECTROSTATIC DISCHARGE**

Do not subject this device to electrostatic discharge. This drive contains electronic components that are very susceptible to damage from electrostatic discharge.

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

Observe the lockout/tagout procedures.

Observe the following precautions when handling static sensitive components:

- Keep static producing material (plastic, upholstery, carpeting) out of the immediate work area.
- Store the power converter assembly in its protective packaging when it is not installed in the drive.
- When handling the power converter assembly, wear a conductive wrist strap connected to the power converter assembly through a minimum of one megaohm resistance.
- Avoid touching exposed conductors and component leads with skin or clothing.

To replace the power converter, follow these steps:

1. Turn the disconnect handle assembly to the Off position and open the door of the drive.
2. Measure the DC bus voltage as described on page 37 of this instruction bulletin.
3. Disconnect all power and control wiring from the power converter assembly. Identify each wire for ease of re-assembling the new power converter.
4. For units up to 100 hp, remove the heatsink fan assembly before removing the power converter. Refer to the “Field Replacement of Heatsink Fan Assembly” on page 69 for directions.

5. Remove the outside flange screws that secure the power converter to the enclosure back pan. Refer to Figures 12–16 starting on page 40 for screw locations. Refer to Table 32 for the number of screws on your drive. Keep the screws for the new power converter.
6. Remove the power converter assembly from the enclosure.

**Table 32: Number of Flange Screws**

| hp-VT | No. of Screws/Nuts 460 V | No. of Screws/Nuts 230 V, 3 Phase | No. of Screws/Nuts 230 V, Single Phase |
|---|---|---|---|
| 1 | 10 | 10 | 10 |
| 2 | 10 | 10 | 10 |
| 3 | 10 | 10 | 10 |
| 5 | 10 | 10 | 10 |
| 7.5 | 10 | 10 | 10 |
| 10 | 10 | 10 | 10 |
| 15 | 10 | 10 | 12 |
| 20 | 10 | 10 | 12 |
| 25 | 10 | 10 | 14 |
| 30 | 10 | 12 | 14 |
| 40 | 12 | 12 | – |
| 50 | 14 | 14 | – |
| 60 | 14 | 14 | – |
| 75 | 16 | 12 | – |
| 100 | 16 | 12 | – |
| 125 | 12 | 14 | – |
| 150 | 12 | – | – |
| 200 | 14 | – | – |
| 250 | 14 | – | – |
| 300 | 14 | – | – |
| 350 | 14 | – | – |
| 400 | 16 | – | – |
| 450 | 16 | – | – |
| 500 | 16 | – | – |
| 600 | 22 | – | – |
| 700 | 22 | – | – |

## Installing the Power Converter Assembly

To install the new power converter, follow these steps:

1. Install the new power converter assembly in the enclosure.
2. Secure the power converter frame to the enclosure back pan using the screws from the removed power converter. Tighten the screws to 15 ± 2 lb-in. (1.7 ± 0.2 N•m).
3. Install all power and control wiring to the power converter assembly terminal blocks. Install all other removed equipment. Tighten the hardware to the torque values given in Table 33 on page 68. Check all wiring connections for correct terminations and check the power wiring for grounds with an ohmmeter.

*Continued on page 69.*

**Table 33: ATV61/71 Power Terminal Strip Torques**

| | VT | | | | | | | | Torque | | | CT | | | | | | | | Torque | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Catalog Number | | | | | | | hp | lb-in. | N.m | | Catalog Number | | | | | | | hp | lb-in. | N.m |
| 460 V | 8930 | IFD | C | H | 4 | V | __ | 1 | 12.3 | 1.4 | 460 V | 8930 | IFD | C | H | 4 | C | __ | 1 | 12.3 | 1.4 |
| | 8930 | IFD | D | H | 4 | V | __ | 2 | 12.3 | 1.4 | | 8930 | IFD | D | H | 4 | C | __ | 2 | 12.3 | 1.4 |
| | 8930 | IFD | E | H | 4 | V | __ | 3 | 12.3 | 1.4 | | 8930 | IFD | E | H | 4 | C | __ | 3 | 12.3 | 1.4 |
| | 8930 | IFD | F | H | 4 | V | __ | 5 | 12.3 | 1.4 | | 8930 | IFD | F | H | 4 | C | __ | 5 | 12.3 | 1.4 |
| | 8930 | IFD | G | H | 4 | V | __ | 7.5 | 26.5 | 3 | | 8930 | IFD | G | H | 4 | C | __ | 7.5 | 26.5 | 3 |
| | 8930 | IFD | H | H | 4 | V | __ | 10 | 26.5 | 3 | | 8930 | IFD | H | H | 4 | C | __ | 10 | 26.5 | 3 |
| | 8930 | IFD | J | H | 4 | V | __ | 15 | 26.5 | 3 | | 8930 | IFD | J | H | 4 | C | __ | 15 | 26.5 | 3 |
| | 8930 | IFD | K | H | 4 | V | __ | 20 | 47.7 | 5.4 | | 8930 | IFD | K | H | 4 | C | __ | 20 | 47.7 | 5.4 |
| | 8930 | IFD | L | H | 4 | V | __ | 25 | 47.7 | 5.4 | | 8930 | IFD | L | H | 4 | C | __ | 25 | 47.7 | 5.4 |
| | 8930 | IFD | M | H | 4 | V | __ | 30 | 102 | 12 | | 8930 | IFD | M | H | 4 | C | __ | 30 | 102 | 12 |
| | 8930 | IFD | N | H | 4 | V | __ | 40 | 102 | 12 | | 8930 | IFD | N | H | 4 | C | __ | 40 | 102 | 12 |
| | 8930 | IFD | P | H | 4 | V | __ | 50 | 102 | 12 | | 8930 | IFD | P | H | 4 | C | __ | 50 | 102 | 12 |
| | 8930 | IFD | Q | H | 4 | V | __ | 60 | 360 | 41 | | 8930 | IFD | Q | H | 4 | C | __ | 60 | 360 | 41 |
| | 8930 | IFD | R | H | 4 | V | __ | 75 | 360 | 41 | | 8930 | IFD | R | H | 4 | C | __ | 75 | 360 | 41 |
| | 8930 | IFD | S | H | 4 | V | __ | 100 | 360 | 41 | | 8930 | IFD | S | H | 4 | C | __ | 100 | 360 | 41 |
| | 8930 | IFD | T | H | 4 | V | __ | 125 | 212 | 24 | | 8930 | IFD | T | H | 4 | C | __ | 125 | 212 | 24 |
| | 8930 | IFD | U | H | 4 | V | __ | 150 | 212 | 24 | | 8930 | IFD | U | H | 4 | C | __ | 150 | 212 | 24 |
| | 8930 | IFD | W | H | 4 | V | __ | 200 | 212 | 24 | | 8930 | IFD | W | H | 4 | C | __ | 200 | 212 | 24 |
| | 8930 | IFD | X | H | 4 | V | __ | 250 | 212 | 24 | | 8930 | IFD | X | H | 4 | C | __ | 250 | 360 | 41 |
| | 8930 | IFD | Y | H | 4 | V | __ | 300 | 360 | 41 | | 8930 | IFD | Y | H | 4 | C | __ | 300 | 360 | 41 |
| | 8930 | IFD | Z | H | 4 | V | __ | 350 | 360 | 41 | | 8930 | IFD | Z | H | 4 | C | __ | 350 | 360 | 41 |
| | 8930 | IFD | 4 | H | 4 | V | __ | 400 | 360 | 41 | | 8930 | IFD | 4 | H | 4 | C | __ | 400 | 360 | 41 |
| | 8930 | IFD | 5 | H | 4 | V | __ | 450 | 360 | 41 | | 8930 | IFD | 5 | H | 4 | C | __ | 450 | 360 | 41 |
| | 8930 | IFD | 6 | H | 4 | V | __ | 500 | 360 | 41 | | 8930 | IFD | 6 | H | 4 | C | __ | 500 | 360 | 41 |
| | 8930 | IFD | 7 | H | 4 | V | __ | 600 | 360 | 41 | | 8930 | IFD | 7 | H | 4 | C | __ | 600 | 360 | 41 |
| | 8930 | IFD | 8 | H | 4 | V | __ | 700 | 360 | 41 | | | | | | | | | | | |
| 230 V | 8930 | IFD | C | H | 3 | V | __ | 1 | 12.3 | 1.4 | 230 V | | | | | | | | | | |
| | 8930 | IFD | D | H | 3 | V | __ | 2 | 12.3 | 1.4 | | | | | | | | | | | |
| | 8930 | IFD | E | H | 3 | V | __ | 3 | 12.3 | 1.4 | | | | | | | | | | | |
| | 8930 | IFD | F | H | 3 | V | __ | 5 | 12.3 | 1.4 | | | | | | | | | | | |
| | 8930 | IFD | G | H | 3 | V | __ | 7.5 | 26.5 | 3 | | | | | | | | | | | |
| | 8930 | IFD | H | H | 3 | V | __ | 10 | 26.5 | 3 | | | | | | | | | | | |
| | 8930 | IFD | J | H | 3 | V | __ | 15 | 47.7 | 5.4 | | | | | | | | | | | |
| | 8930 | IFD | K | H | 3 | V | __ | 20 | 47.7 | 5.4 | | | | | | | | | | | |
| | 8930 | IFD | L | H | 3 | V | __ | 25 | 102 | 12 | | | | | | | | | | | |
| | 8930 | IFD | M | H | 3 | V | __ | 30 | 102 | 12 | | | | | | | | | | | |
| | 8930 | IFD | N | H | 3 | V | __ | 40 | 360 | 41 | | | | | | | | | | | |
| | 8930 | IFD | P | H | 3 | V | __ | 50 | 360 | 41 | | | | | | | | | | | |
| | 8930 | IFD | Q | H | 3 | V | __ | 60 | 360 | 41 | | | | | | | | | | | |
| | 8930 | IFD | R | H | 3 | V | __ | 75 | 212 | 24 | | | | | | | | | | | |
| | 8930 | IFD | S | H | 3 | V | __ | 100 | 212 | 24 | | | | | | | | | | | |
| | 8930 | IFD | T | H | 3 | V | __ | 125 | 212 | 24 | | | | | | | | | | | |
| 230 V, 1ph | 8930 | IFD | C | H | 1 | V | __ | 1 | 12.3 | 1.4 | 230 V, 1ph | | | | | | | | | | |
| | 8930 | IFD | D | H | 1 | V | __ | 2 | 12.3 | 1.4 | | | | | | | | | | | |
| | 8930 | IFD | E | H | 1 | V | __ | 3 | 12.3 | 1.4 | | | | | | | | | | | |
| | 8930 | IFD | F | H | 1 | V | __ | 5 | 26.5 | 3 | | | | | | | | | | | |
| | 8930 | IFD | G | H | 1 | V | __ | 7.5 | 26.5 | 3 | | | | | | | | | | | |
| | 8930 | IFD | H | H | 1 | V | __ | 10 | 47.7 | 5.4 | | | | | | | | | | | |
| | 8930 | IFD | J | H | 1 | V | __ | 15 | 102 | 12 | | | | | | | | | | | |
| | 8930 | IFD | K | H | 1 | V | __ | 20 | 360 | 41 | | | | | | | | | | | |
| | 8930 | IFD | L | H | 1 | V | __ | 25 | 360 | 41 | | | | | | | | | | | |
| | 8930 | IFD | M | H | 1 | V | __ | 30 | 360 | 41 | | | | | | | | | | | |
| S Shield Connection (power converter) | | | | | | | | | 3.5 | 0.34 | | | | | | | | | | 3.5 | 0.34 |

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- This equipment must be installed and serviced only by qualified personnel.
- Qualified personnel performing diagnostics or troubleshooting requiring electrical conductors to be energized must comply with NFPA 70 E - Standard for Electrical Safety Requirements for Employee Workplaces and OSHA Standards–29 CFR Part 1910 Subpart S Electrical.

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

4. Shut the enclosure door, secure the door with door fasteners, and close the disconnect.
5. Program the drive according to the control circuit elementary diagrams in Section 5 beginning on page 73. Follow the initial start-up procedure on page 51.

The drive is now ready to operate.

*Refer to Appendix A beginning on page 79 for the part numbers of the equipment required for the following field replacement procedures. For component locations, refer to Figure 12 on page 40.*

## Field Replacement of Heatsink Fan Assembly

If a heatsink fan becomes inoperable the fan assembly must be replaced. Observe the lockout / tagout procedures.

### Removing the Heatsink Fan Assembly

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Disconnect all power.
- Place a “Do Not Turn On” label on the drive disconnect.
- Lock the disconnect in the open position.
- Read and understand the DC Bus Voltage Measurement Procedure on page 37 before performing 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 connectors with voltage present.
- Many parts in the drive, 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.**

**⚠ CAUTION**

**ELECTROSTATIC DISCHARGE**

Do not subject this device to electrostatic discharge. This controller contains electronic components that are very susceptible to damage from electrostatic discharge.

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

Observe the following precautions when handling static sensitive components:

- Keep static producing material (plastic, upholstery, carpeting) out of the immediate work area.
- Store the heatsink fan assembly in its protective packaging when it is not installed in the drive.
- When handling the heatsink fan assembly, wear a conductive wrist strap connected to the heatsink fan assembly through a minimum of one megaohm resistance.
- Avoid touching exposed conductors and component leads with skin or clothing.

To replace the heatsink fan assembly, follow these steps:

1. Turn the disconnect handle assembly to the Off position and open the door of the drive.
2. Measure the DC bus voltage as described on page 37.
3. Locate the heatsink fan assembly below the power converter.
4. Remove the four screws securing the heatsink fan assembly. Keep the four screws.
5. Lift the fan assembly above the flange opening.
6. Disconnect the fan cable from the converter.
7. Remove the fan assembly from the enclosure.

### Installing the Heatsink Fan Assembly

To install the new heatsink fan assembly, follow these steps:

1. Place the fan assembly near the flange opening.
2. Connect the fan assembly wiring plug to the converter cable, below the flange.
3. Install the heatsink fan assembly. Secure the assembly with the four screws saved from step 4 above. Torque the screws to 15 lb-in (1.7 N•m).
4. Shut the enclosure door and secure it with door fasteners. Then close the disconnect.
5. Fully test the drive before placing into service.

## Field Replacement of the Stirring Fans

If a stirring fan inside the enclosure becomes inoperable, the fan must be replaced.

Before removing the inoperable stirring fan, mark and note airflow direction to ensure proper installation of the replacement fan.

## Field Replacement of the Auxiliary Fan on Type 3R

**Figure 19: Replacing Auxiliary Fans – Frame Sizes 3 and 4**

Step 1

Step 2

Step 3

Step 4

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Read and understand the precautions in Before You Begin starting on page 8 before you perform the procedures in this section.
- Before working on this equipment, turn off all power supplying it and perform the DC Bus Voltage Measurement Procedure on page 37.

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

If a Type 3R auxiliary fan becomes inoperable, it must be replaced. Before removing the inoperable fan, mark and note airflow direction to ensure proper installation of the replacement fan.

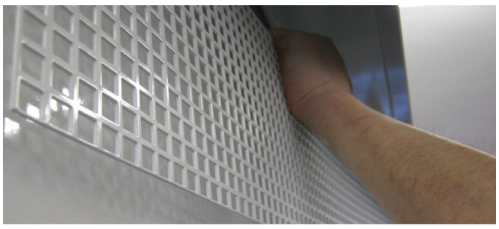
To replace the enclosure auxiliary fan on frame sizes 3 and 4:

1. Remove (4) 1/4-20 Kep-nuts from fan bracket EN-213108 using a 7/16” socket and ratchet. Pull (2) handles EN-212717 straight out, exposing the auxiliary fans.
2. Remove (4) Hex HD cap screws 021-18664-000, (4) per fan, using a 5/32” hex socket and ratchet.
3. Disconnect the wire leads from the inoperable fan by carefully moving the wire connector back and forth on fan pin.
4. Route the fan control wires between the fans. Note the air flow of the fan. The arrow points to the up position.

**Figure 20: Replacing Auxiliary Fans – Frame Sizes 5 and 6**

Step 1

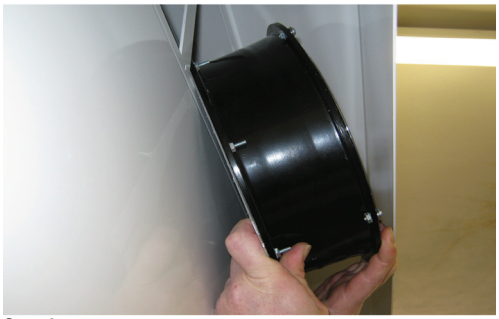
Step 2



Step 3

Step 4

Step 5



Step 6

To replace the enclosure auxiliary fan on frame sizes 5 and 6:

1. Remove the rear top fan grill from the back of the unit for access to fan nuts. Do not remove the rain hood.
2. Remove (8) 10-32 Phillips hex head screws using a short Phillips screwdriver.
3. Remove the fan grill.
4. On the fan plate, there are (2) lock-nuts closest to the grill opening to be removed using a 7/16” socket and ratchet. There are (4) lock- nuts mounting the fan plate, (2) near the grill opening, and (2) toward the front of the enclosure. The (2) lock nuts toward the front of the enclosure are locked in place with space for the fan plate to slide freely for fan service or replacement. There is no need to remove these nuts.
5. Disconnect the power cord from the fan by pulling it straight off. The power is located toward front of the enclosure. When the fan is dismounted from the enclosure, rotate the fan assembly 1/2 turn to gain access to power cord plug.
6. Remove the fan assembly. Reverse this procedure for re-installation.

## Field Replacement of the Space Heater on Type 3R

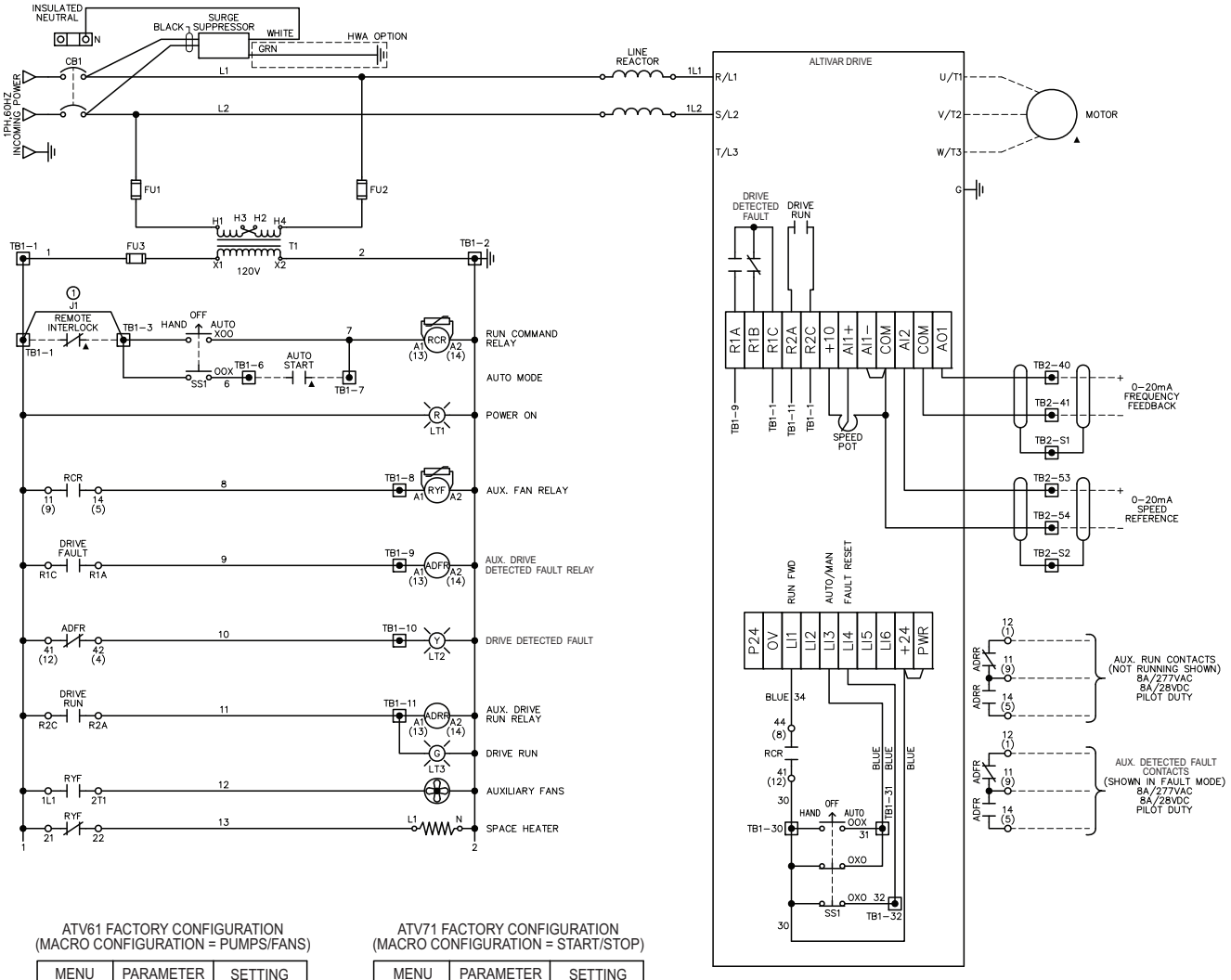
If a Type 3R space heater becomes inoperable, it must be replaced. The thermostat is factory set at 60 °F (15 °C).

# Section 5—Power and Control Circuit Elementary Diagrams

## Introduction

This section contains Power and Control Circuit Elementary Diagrams, beginning on page 74.

## Figure 21: Power Circuit W (without bypass): 230 V, Single Phase, 1–25 HP (Drawing No. 213910)

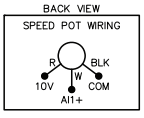



ATV61 FACTORY CONFIGURATION
(MACRO CONFIGURATION = PUMPS/FANS)

| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.6 | F4 KEY ASSIGNMENT | NO |
| 1.7 | REF 1B SWITCHING | CH 1 ACTIVE |
| 1.7 | REF 1B CHANNEL | NO |
| 1.8 | AUTOMATIC RESTART | YES |
| 1.8 | INPUT PHASE LOSS | IGNORE |

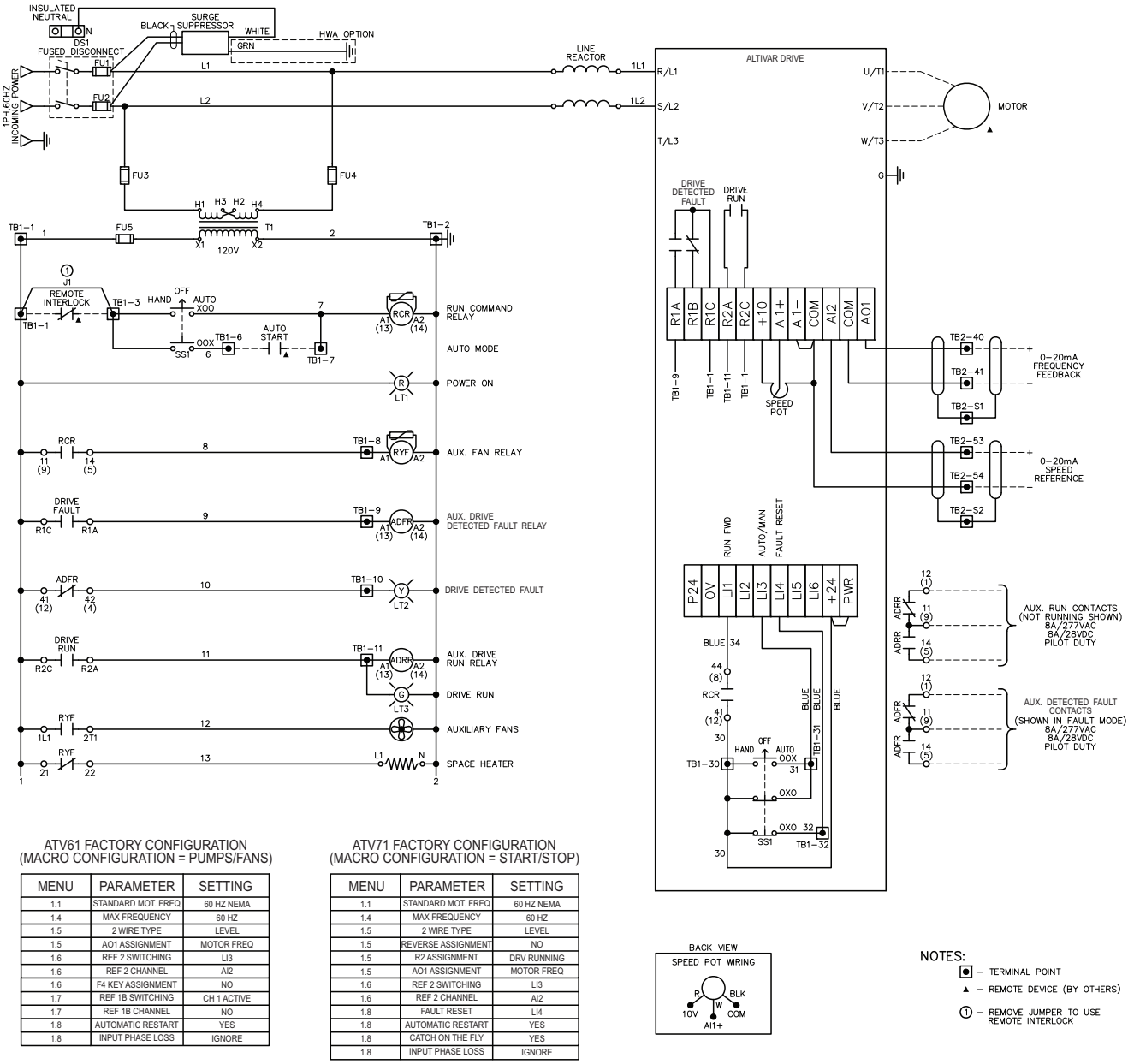
ATV71 FACTORY CONFIGURATION
(MACRO CONFIGURATION = START/STOP)

| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | REVERSE ASSIGNMENT | NO |
| 1.5 | R2 ASSIGNMENT | DRV RUNNING |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.8 | FAULT RESET | LI4 |
| 1.8 | AUTOMATIC RESTART | YES |
| 1.8 | CATCH ON THE FLY | YES |
| 1.8 | INPUT PHASE LOSS | IGNORE |




NOTES:
- ⊙ – TERMINAL POINT
- ▲ – REMOTE DEVICE (BY OTHERS)
- ① – REMOVE JUMPER TO USE REMOTE INTERLOCK

## Figure 22: Power Circuit W (without bypass): 230 V, Single Phase, 30 HP (Drawing No. 214145)



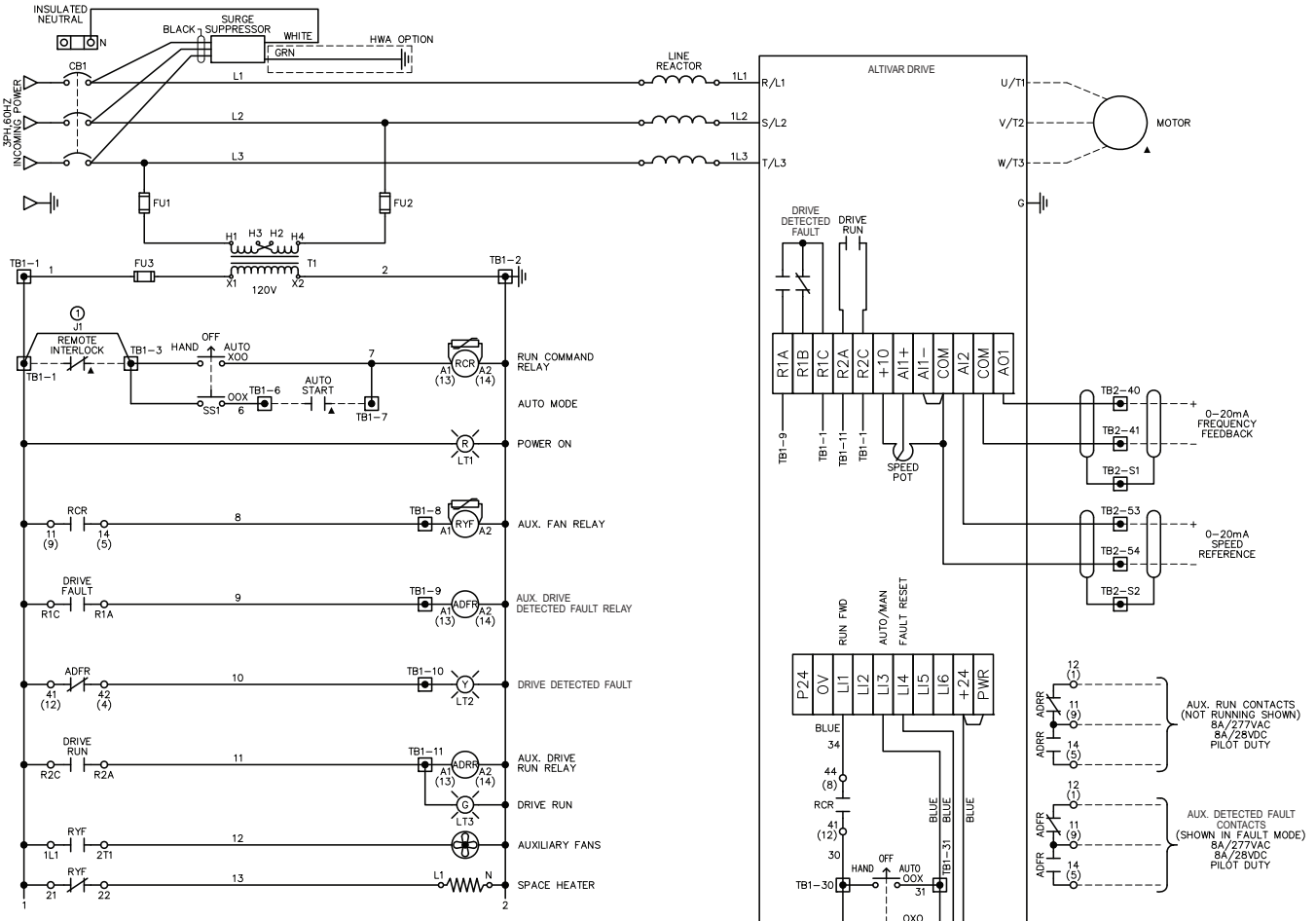

ATV61 FACTORY CONFIGURATION
(MACRO CONFIGURATION = PUMPS/FANS)

| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.6 | F4 KEY ASSIGNMENT | NO |
| 1.7 | REF 1B SWITCHING | CH 1 ACTIVE |
| 1.7 | REF 1B CHANNEL | NO |
| 1.8 | AUTOMATIC RESTART | YES |
| 1.8 | INPUT PHASE LOSS | IGNORE |

ATV71 FACTORY CONFIGURATION
(MACRO CONFIGURATION = START/STOP)

| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | REVERSE ASSIGNMENT | NO |
| 1.5 | R2 ASSIGNMENT | DRV RUNNING |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.8 | FAULT RESET | LI4 |
| 1.8 | AUTOMATIC RESTART | YES |
| 1.8 | CATCH ON THE FLY | YES |
| 1.8 | INPUT PHASE LOSS | IGNORE |

**Figure 23: Power Circuit W (without bypass): 230 V, Three Phase, 1–50 HP; 460 V, Three Phase, 1–100 HP (Drawing No. 213158)**




ATV61 FACTORY CONFIGURATION
(MACRO CONFIGURATION = PUMPS/FANS)

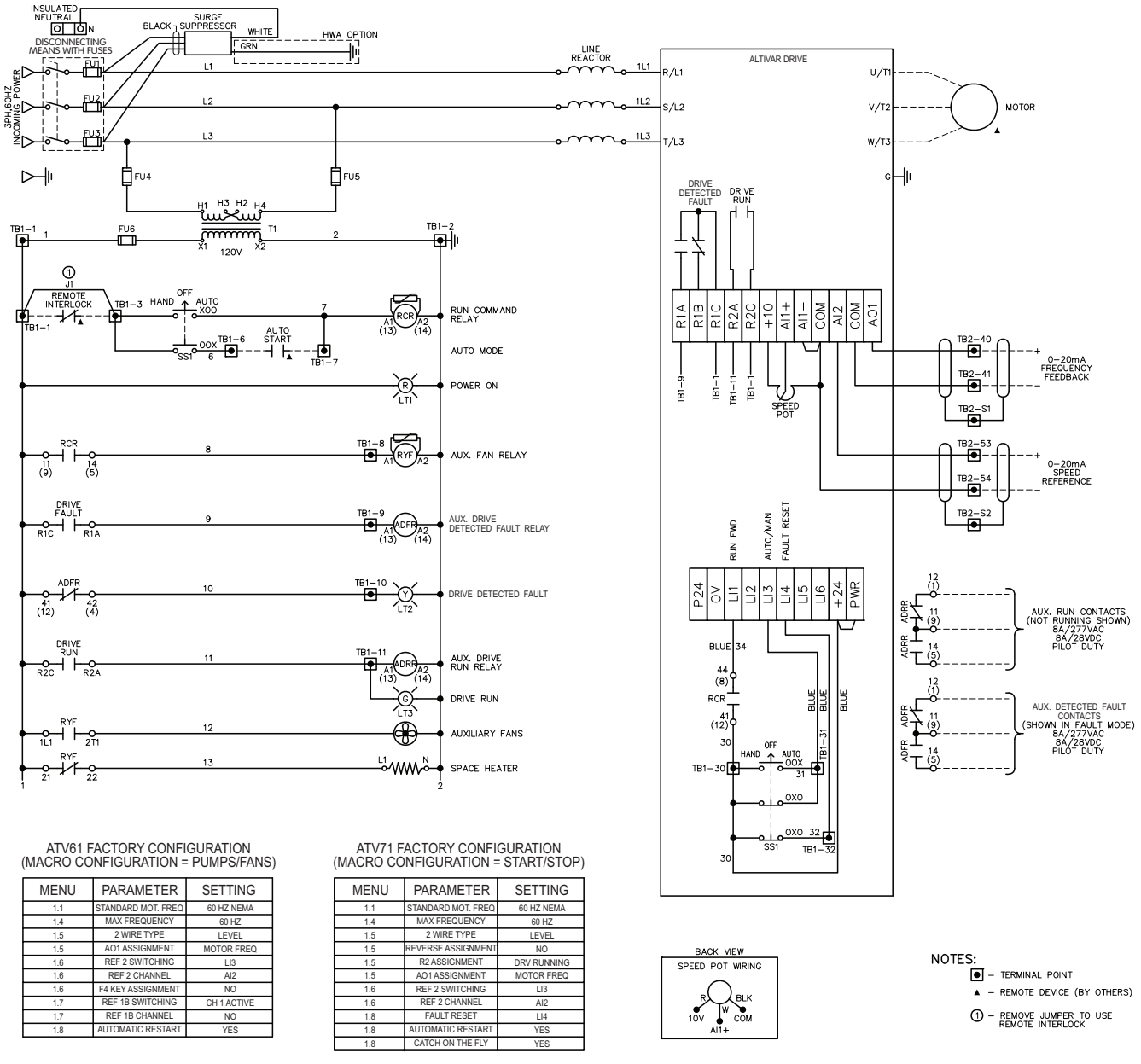
| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.6 | F4 KEY ASSIGNMENT | NO |
| 1.7 | REF 1B SWITCHING | CH 1 ACTIVE |
| 1.7 | REF 1B CHANNEL | NO |
| 1.8 | AUTOMATIC RESTART | YES |

ATV71 FACTORY CONFIGURATION
(MACRO CONFIGURATION = START/STOP)

| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | REVERSE ASSIGNMENT | NO |
| 1.5 | R2 ASSIGNMENT | DRV RUNNING |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.8 | FAULT RESET | LI4 |
| 1.8 | AUTOMATIC RESTART | YES |
| 1.8 | CATCH ON THE FLY | YES |

NOTES:
- ● – TERMINAL POINT
- ▲ – REMOTE DEVICE (BY OTHERS)
- ① – REMOVE JUMPER TO USE REMOTE INTERLOCK

**Figure 24: Power Circuit W (without bypass): 460 V, Three Phase, 125–700 HP (Drawing No. 213288)**



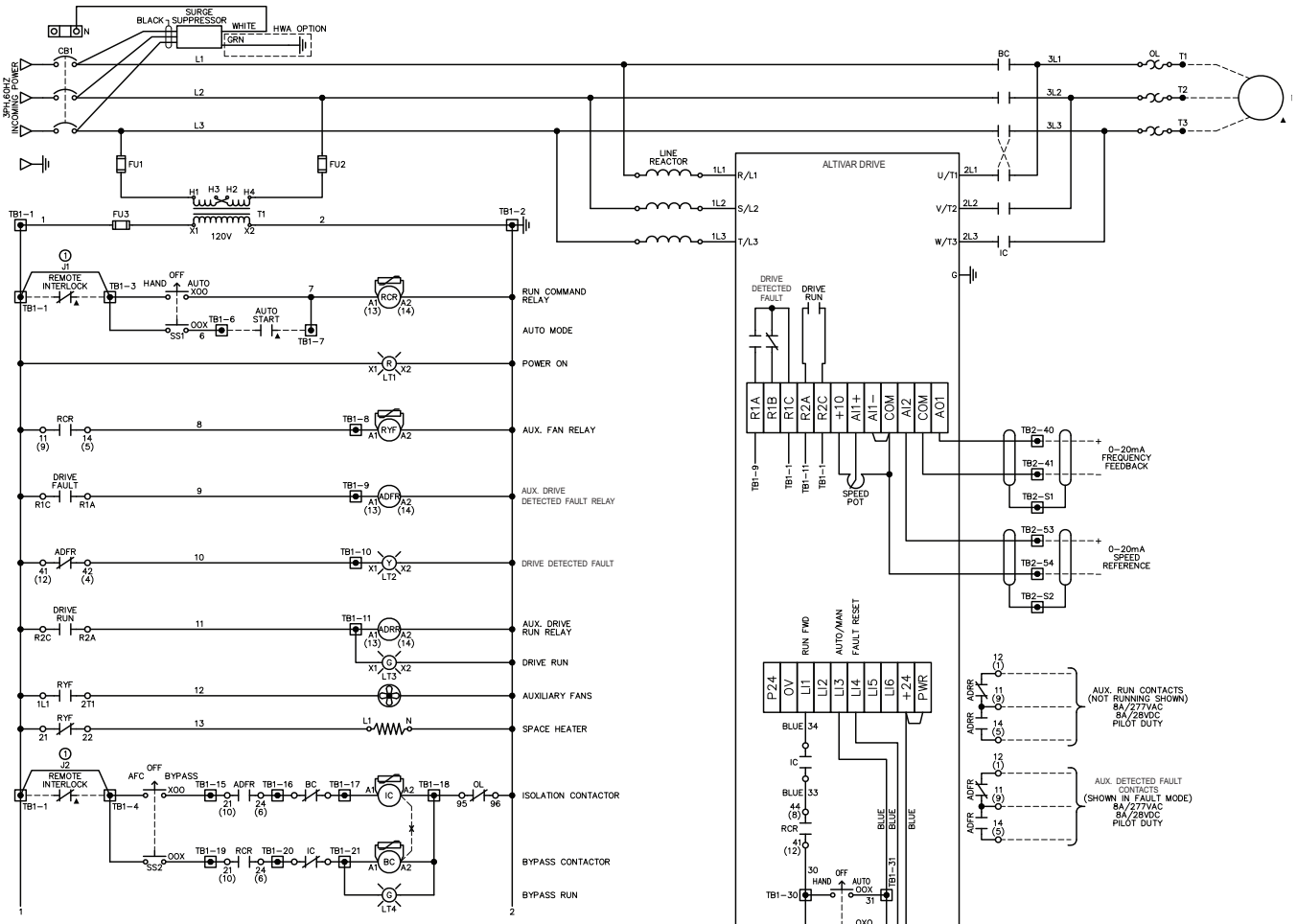

ATV61 FACTORY CONFIGURATION
(MACRO CONFIGURATION = PUMPS/FANS)

| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.6 | F4 KEY ASSIGNMENT | NO |
| 1.7 | REF 1B SWITCHING | CH 1 ACTIVE |
| 1.7 | REF 1B CHANNEL | NO |
| 1.8 | AUTOMATIC RESTART | YES |

ATV71 FACTORY CONFIGURATION
(MACRO CONFIGURATION = START/STOP)

| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | REVERSE ASSIGNMENT | NO |
| 1.5 | R2 ASSIGNMENT | DRV RUNNING |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.8 | FAULT RESET | LI4 |
| 1.8 | AUTOMATIC RESTART | YES |
| 1.8 | CATCH ON THE FLY | YES |

## Figure 25: Power Circuit Y (with bypass): 230 V, Three Phase, 1–50 HP; 460 V, Three Phase, 1–100 HP (Drawing No. 213199)




ATV61 FACTORY CONFIGURATION
(MACRO CONFIGURATION = PUMPS/FANS)

| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.6 | F4 KEY ASSIGNMENT | NO |
| 1.7 | REF 1B SWITCHING | CH 1 ACTIVE |
| 1.7 | REF 1B CHANNEL | NO |
| 1.8 | AUTOMATIC RESTART | YES |

ATV71 FACTORY CONFIGURATION
(MACRO CONFIGURATION = START/STOP)

| MENU | PARAMETER | SETTING |
|---|---|---|
| 1.1 | STANDARD MOT. FREQ | 60 HZ NEMA |
| 1.4 | MAX FREQUENCY | 60 HZ |
| 1.5 | 2 WIRE TYPE | LEVEL |
| 1.5 | REVERSE ASSIGNMENT | NO |
| 1.5 | R2 ASSIGNMENT | DRV RUNNING |
| 1.5 | AO1 ASSIGNMENT | MOTOR FREQ |
| 1.6 | REF 2 SWITCHING | LI3 |
| 1.6 | REF 2 CHANNEL | AI2 |
| 1.8 | FAULT RESET | LI4 |
| 1.8 | AUTOMATIC RESTART | YES |
| 1.8 | CATCH ON THE FLY | YES |

# Appendix A—Renewable Parts

**Table 34: 460 V Renewable Parts**

| Description | Qty. | 1–15 hp | Qty. | 20–50 hp | Qty. | 60–100 hp | Qty. | 125–150 hp |
|---|---|---|---|---|---|---|---|---|
| Power Converter: Variable Torque (VT) | 1 | ATV61H075N4 (1 hp)<br>ATV61HU15N4 (2 hp)<br>ATV61HU22N4 (3 hp)<br>ATV61HU40N4 (5 hp)<br>ATV61HU55N4 (7.5 hp)<br>ATV61HU75N4 (10 hp)<br>ATV61HD11N4 (15 hp) | 1 | ATV61HD15N4 (20 hp)<br>ATV61HD18N4 (25 hp)<br>ATV61HD22N4 (30 hp)<br>ATV61HD30N4 (40 hp)<br>ATV61HD37N4 (50 hp) | 1 | ATV61HD45N4 (60 hp)<br>ATV61HD55N4 (75 hp)<br>ATV61HD75N4 (100 hp) | 1 | ATV61HD90N4 (125 hp)<br>ATV61HC11N4 (150 hp) |
| Power Converter: Constant Torque (CT) | 1 | ATV71H075N4 (1 hp)<br>ATV71HU15N4 (2 hp)<br>ATV71HU22N4 (3 hp)<br>ATV71HU40N4 (5 hp)<br>ATV71HU55N4 (7.5 hp)<br>ATV71HU75N4 (10 hp)<br>ATV71HD11N4 (15 hp) | 1 | ATV71HD15N4 (20 hp)<br>ATV71HD18N4 (25 hp)<br>ATV71HD22N4 (30 hp)<br>ATV71HD30N4 (40 hp)<br>ATV71HD37N4 (50 hp) | 1 | ATV71HD45N4 (60 hp)<br>ATV71HD55N4 (75 hp)<br>ATV71HD75N4 (100 hp) | 1 | ATV71HD90N4 (125 hp) |
| Graphic Display | 1 | VW3A1101 | 1 | VW3A1101 | 1 | VW3A1101 | 1 | VW3A1101 |
| Power Fuses (VT) | | N/A | | N/A | | N/A | 3 | Bussmann LPJ300SP (125 hp)<br>Bussmann LPJ400SP (150 hp) |
| Power Fuses (CT) | | N/A | | N/A | | N/A | 3 | Bussmann LPJ300SP (125 hp) |
| Control Fuses Primary | 2 | Ferraz Shawmut ATQR3-1/2 | 2 | Ferraz Shawmut ATQR3-1/2 | 2 | Ferraz Shawmut ATQR5 | 2 | Ferraz Shawmut ATQR5 |
| Control Fuses Secondary | 1 | Ferraz Shawmut ATQR7 | 1 | Ferraz Shawmut ATQR7 | 1 | Ferraz Shawmut ATQR10 | 1 | Ferraz Shawmut ATQR10 |
| Pilot Light Red | 1 | ZB4BV043 | 1 | ZB4BV043 | 1 | ZB4BV043 | 1 | ZB4BV043 |
| Pilot Light Yellow | 1 | ZB4BV053 | 1 | ZB4BV053 | 1 | ZB4BV053 | 1 | ZB4BV053 |
| Pilot Light Green[1] | 1 | ZB4BV033 | 1 | ZB4BV033 | 1 | ZB4BV033 | 1 | ZB4BV033 |
| Pilot Light Mounting Collar w/ Red Light Module | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 |
| Pilot Light Mounting Collar w/ Yellow Light Module | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 |
| Pilot Light Mounting Collar w/ Green Light Module[1] | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 |
| 3R Space Heater | 1 | Hoffman 200 W, 120 Vac DAH2001A | 1 | Hoffman 200 W, 120 Vac DAH2001A | 1 | Hoffman 400 W, 120 Vac DAH4001B | 1 | Hoffman 400 W, 120 Vac DAH4001B |
| Stirring Fan Assembly | 1 | 31158-065-50 | 1 | 31158-065-50 | 1 | 31158-065-50 | 1 | 31158-065-50 |
| Top Fan Assembly | | N/A | | N/A | 2 | FANKIT1 (60–100 hp) | 2 | FANKIT1(100–125 hp) |
| Heatsink Fans | 1 | VZ3V1203 (1–3 hp)<br>VZ3V1209 (5 hp)<br>VZ3V1204 (7.5–10 hp)<br>VZ3V1210 (15 hp) | 1 | VZ3V1205 (20–25 hp)<br>VZ3V1211 (30 hp)<br>VZ3V1206 (40–50 hp) | 1 | VZ3V1208 (60–100 hp) | 1 | VZ3V1215 (125–150 hp) |
| Heatsink Blowers | | N/A | | N/A | | N/A | | N/A |
| Surge Arrestor (HWA Series)[2] | 1 | TVS4HWA80X | 1 | TVS4HWA80X | 1 | TVS4HWA80X | 1 | TVS4HWA80X |
| Surge Arrestor (SDSA Series)[2] | 1 | SDSA3650 | 1 | SDSA3650 | 1 | SDSA3650 | 1 | SDSA3650 |

[1] Units with bypass have two green lights (150 hp max).

[2] SDSA series is standard unless HWA series is ordered as an option.

**Table 34: 460 V Renewable Parts** *(continued)*

| Description | Qty. | 200–350 hp | Qty. | 400–500 hp | Qty. | 600–700 hp |
|---|---|---|---|---|---|---|
| Power Converter: Variable Torque (VT) | 1 | ATV61HC13N4 (200 hp)<br>ATV61HC16N4 (250 hp)<br>ATV61HC22N4 (300 hp)<br>ATV61HC22N4 (350 hp) | 1 | ATV61HC25N4 (400 hp)<br>ATV61HC31N4 (450 hp)<br>ATV61HC31N4 (500 hp) | 1 | ATV61HC40N4 (600 hp)<br>ATV61HC50N4 (700 hp) |
| Power Converter: Constant Torque (CT) | 1 | ATV71HC11N4 (150 hp)<br>ATV71HC13N4 (200 hp)<br>ATV71HC16N4 (250 hp) | 1 | ATV71HC20N4 (300 hp)<br>ATV71HC25N4 (350 hp)<br>ATV71HC25N4 (400 hp)<br>ATV71HC28N4 (450 hp) | 1 | ATV71HC31N4 (500 hp)<br>ATV71HC40N4 (600 hp) |
| Graphic Display | 1 | VW3A1101 | 1 | VW3A1101 | 1 | VW3A1101 |
| Power Fuses (VT) | 3 | Bussmann LPJ400SP (200 hp)<br>Bussmann LPJ600SP (250 hp)<br>Bussmann LPJ600SP (300–350 hp)[1] | 3 | Bussmann LPJ600SP (400–500 hp)[1] | 3 | Ferraz Shawmut A4BQ1000 (600 hp)<br>Ferraz Shawmut A4BQ1200 (700 hp) |
| Power Fuses (CT) | 3 | Bussmann LPJ300SP (150 hp)<br>Bussmann LPJ400SP (200 hp)<br>Bussmann LPJ400SP (250 hp)[1] | 3 | Bussmann LPJ500SP (300–350 hp)[1]<br>Bussmann LPJ600SP (400–450 hp)[1] | 3 | Bussmann LPJ600SP (500 hp)[1]<br>Ferraz Shawmut A4BQ1000 (600 hp) |
| Control Fuses Primary | 2 | Ferraz Shawmut ATQR5 | 2 | Ferraz Shawmut ATQR3-1/2 | 2 | Ferraz Shawmut ATQR3-1/2 |
| Control Fuses Secondary | 1 | Ferraz Shawmut ATQR10 | 1 | Ferraz Shawmut ATQR10 | 1 | Ferraz Shawmut ATQR10 |
| Pilot Light Red | 1 | ZB4BV043 | 1 | ZB4BV043 | 1 | ZB4BV043 |
| Pilot Light Yellow | 1 | ZB4BV053 | 1 | ZB4BV053 | 1 | ZB4BV053 |
| Pilot Light Green | 1 | ZB4BV033 | 1 | ZB4BV033 | 1 | ZB4BV033 |
| Pilot Light Mounting Collar w/ Red Light Module | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 |
| Pilot Light Mounting Collar w/ Yellow Light Module | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 |
| Pilot Light Mounting Collar w/ Green Light Module | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 |
| 3R Space Heater | 1 | Hoffman 400 W, 120 Vac DAH4001B | 2 | Hoffman 400 W, 120 Vac DAH4001B | 2 | Hoffman 400 W, 120 Vac DAH4001B |
| Stirring Fan Assembly | 1 | 31158-065-50 | 2 | 31158-065-50 | 2 | 31158-065-50 |
| Top Fan Assembly | 3 | FANKIT1 (200–350 hp) | 3 | FANKIT2 (400–500 hp) | 4 | FANKIT2 (600–700 hp) |
| Heatsink Blowers | 1 | VZ3V1212 (200–350 hp) | 2 | VZ3V1212 (400–500 hp) | 3 | VZ3V1212 (600–700 hp) |
| Surge Arrestor (HWA Series)[2] | 1 | TVS4HWA80X | 1 | TVS4HWA80X | 1 | TVS4HWA80X |
| Surge Arrestor (SDSA Series)[2] | 1 | SDSA3650 | 1 | SDSA3650 | 1 | SDSA3650 |

1 Bussmann Class J time delay fuse required.

2 SDSA series is standard unless HWA series is ordered as an option.

**Table 35: 230 V Renewable Parts**

| Description | Qty. | 1–10 hp | Qty. | 15–30 hp | Qty. | 40–50 hp | Qty. | 60–100 hp | Qty. | 125 hp |
|---|---|---|---|---|---|---|---|---|---|---|
| Power Converter: Variable Torque (VT) | 1 | ATV61H075M3 (1 hp)<br>ATV61HU15M3 (2 hp)<br>ATV61HU22M3 (3 hp)<br>ATV61HU40M3 (5 hp)<br>ATV61HU55M3 (7.5 hp)<br>ATV61HU75M3 (10 hp) | 1 | ATV61HD11M3X (15 hp)<br>ATV61HD15M3X (20 hp)<br>ATV61HD18M3X (25 hp)<br>ATV61HD22M3X (30 hp) | 1 | ATV61HD30M3X (40 hp)<br>ATV61HD37M3X (50 hp) | 1 | ATV61HD45M3X (60 hp)<br>ATV61HD55M3X (75 hp)<br>ATV61HD75M3X (100 hp) | 1 | ATV61HD90M3X (125 hp) |
| Graphic Display | 1 | VW3A1101 | 1 | VW3A1101 | 1 | VW3A1101 | 1 | VW3A1101 | 1 | VW3A1101 |
| Power Fuses | | – | | – | | – | 3 | Bussmann LPJ250SP (60 hp)<br>Bussmann LPJ350SP (75–100 hp) | 3 | Bussmann LPJ450SP (125 hp) |
| Control Fuses Primary | 2 | Ferraz Shawmut ATQR3-1/2 | 2 | Ferraz Shawmut ATQR3-1/2 | 2 | Ferraz Shawmut ATQR5 | 2 | Ferraz Shawmut ATQR5 | 2 | Ferraz Shawmut ATQR5 |
| Control Fuses Secondary | 1 | Ferraz Shawmut ATQR7 | 1 | Ferraz Shawmut ATQR7 | 1 | Ferraz Shawmut ATQR10 | 1 | Ferraz Shawmut ATQR10 | 1 | Ferraz Shawmut ATQR10 |
| Pilot Light Red | 1 | ZB4BV043 | 1 | ZB4BV043 | 1 | ZB4BV043 | 1 | ZB4BV043 | 1 | ZB4BV043 |
| Pilot Light Yellow | 1 | ZB4BV053 | 1 | ZB4BV053 | 1 | ZB4BV053 | 1 | ZB4BV053 | 1 | ZB4BV053 |
| Pilot Light Green | 1 | ZB4BV033 | 1 | ZB4BV033 | 1 | ZB4BV033 | 1 | ZB4BV033 | 1 | ZB4BV033 |
| Pilot Light Mounting Collar w/ Red Light Module | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 |
| Pilot Light Mounting Collar w/ Yellow Light Module | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 |
| Pilot Light Mounting Collar w/ Green Light Module | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 |
| 3R Space Heater | 1 | Hoffman 200 W, 120 Vac DAH2001A | 1 | Hoffman 200 W, 120 Vac DAH2001A | 1 | Hoffman 400 W, 120 Vac DAH4001B | 1 | Hoffman 400 W, 120 Vac DAH4001B | 1 | Hoffman 400 W, 120 Vac DAH4001B |
| Stirring Fan Assembly | 1 | 31158-065-50 | 1 | 31158-065-50 | 1 | 31158-065-50 | 1 | 31158-065-50 | 1 | 31158-065-50 |
| Top Fan Assembly | | – | | – | 2 | FANKIT1 (40–50 hp) | 2 | FANKIT1 (60–100 hp) | 3 | FANKIT1 (125 hp) |
| Heatsink Fans | 1 | VZ3V1203 (1–2 hp)<br>VZ3V1209 (3–5 hp)<br>VZ3V1204 (7–5 hp)<br>VZ3V1210 (10 hp) | 1 | VZ3V1205 (15–20 hp)<br>VZ3V1211 (25–30 hp) | 1 | VZ3V1207 (40–50 hp) | 1 | VZ3V1207 (60 hp)<br>VZ3V1215 (75–100 hp) | | – |
| Heatsink Blowers | | – | | – | | – | | – | | VZ3V1216 (125 hp) |
| Surge Arrestor (HWA Series)[1] | 1 | TVS3HWA80X | 1 | TVS3HWA80X | 1 | TVS3HWA80X | 1 | TVS3HWA80X | 1 | TVS3HWA80X |
| Surge Arrestor (SDSA Series) | 1 | SDSA3650 | 1 | SDSA3650 | 1 | SDSA3650 | 1 | SDSA3650 | 1 | SDSA3650 |

[1] SDSA series is standard unless HWA series is ordered as an option.

**Table 36: 230 V, Single Phase Renewable Parts (3-phase motors only)**

| Description | Qty. | 1–7.5 hp | Qty. | 10–15 hp | Qty. | 20–25 hp | Qty. | 30 hp |
|---|---|---|---|---|---|---|---|---|
| Power Converter: Variable Torque (VT) | 1 | ATV61HU15M3 (1 hp)<br>ATV61HU22M3 (2 hp)<br>ATV61HU30M3 (3 hp)<br>ATV61HU55M3 (5 hp)<br>ATV61HU75M3 (7.5 hp) | 1 | ATV61HD15M3X (10 hp)<br>ATV61HD22M3X (15 hp) | 1 | ATV61HD30M3X (20 hp)<br>ATV61HD37M3X (25 hp) | 1 | ATV61HD45M3X (30 hp) |
| Graphic Display | 1 | VW3A1101 | 1 | VW3A1101 | 1 | VW3A1101 | 1 | VW3A1101 |
| Power Fuses | | – | | – | | – | | Bussmann LPJ250SP |
| Control Fuses Primary | 2 | Ferraz Shawmut ATQR3-1/2 | 2 | Ferraz Shawmut ATQR3-1/2 | 2 | Ferraz Shawmut ATQR5 | 2 | Ferraz Shawmut ATQR5 |
| Control Fuses Secondary | 1 | Ferraz Shawmut ATQR7 | 1 | Ferraz Shawmut ATQR7 | 1 | Ferraz Shawmut ATQR10 | 1 | Ferraz Shawmut ATQR10 |
| Pilot Light Red | 1 | ZB4BV043 | 1 | ZB4BV043 | 1 | ZB4BV043 | 1 | ZB4BV043 |
| Pilot Light Yellow | 1 | ZB4BV053 | 1 | ZB4BV053 | 1 | ZB4BV053 | 1 | ZB4BV053 |
| Pilot Light Green | 1 | ZB4BV033 | 1 | ZB4BV033 | 1 | ZB4BV033 | 1 | ZB4BV033 |
| Pilot Light Mounting Collar w/ Red Light Module | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 | 1 | ZB4BVBG4 |
| Pilot Light Mounting Collar w/ Yellow Light Module | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 | 1 | ZB4BVBG5 |
| Pilot Light Mounting Collar w/ Green Light Module | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 | 1 | ZB4BVBG3 |
| 3R Space Heater | 1 | Hoffman 200 W, 120 Vac DAH2001A | 1 | Hoffman 200 W, 120 Vac DAH2001A | 1 | Hoffman 400 W, 120 Vac DAH4001B | 1 | Hoffman 400 W, 120 Vac DAH4001B |
| Stirring Fan Assembly | 1 | 31158-065-50 | 1 | 31158-065-50 | 1 | 31158-065-50 | 1 | 31158-065-50 |
| Heatsink Fans | 1 | VZ3V1203 (1 hp)<br>VZ3V1209 (2–3 hp)<br>VZ3V1204 (5 hp)<br>VZ3V1210 (7.5 hp) | 1 | VZ3V1205 (10 hp)<br>VZ3V1211 (15 hp) | 1 | VZ3V1207 (20–25 hp) | 1 | VZ3V1207 (30 hp) |
| Surge Arrestor (HWA Series)[1] | 1 | TVS1HWA80X | 1 | TVS1HWA80X | 1 | TVS1HWA80X | 1 | TVS1HWA80X |
| Surge Arrestor (SDSA Series)[1] | 1 | SDSA1175 | 1 | SDSA1175 | 1 | SDSA1175 | 1 | SDSA1175 |

[1] SDSA series is standard unless HWA series is ordered as an option.

**Table 37: Overcurrent Protection Devices (Fuses and Circuit Breakers)**

| | VT | | | | | | | | | | | CT | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Catalog Number | | | | | | | hp | Circuit Breaker | Fuse | Fuse Class | | Catalog Number | | | | | | | hp | Circuit Breaker | Fuse | Fuse Class |
| 460 V | 8xxx | IFD | C | H | 4 | V | __ | 1 | HLL36015 | N/A | N/A | 460 V | 8xxx | IFD | C | H | 4 | C | __ | 1 | HLL36015 | N/A | N/A |
| | 8xxx | IFD | D | H | 4 | V | __ | 2 | HLL36015 | N/A | N/A | | 8xxx | IFD | D | H | 4 | C | __ | 2 | HLL36015 | N/A | N/A |
| | 8xxx | IFD | E | H | 4 | V | __ | 3 | HLL36015 | N/A | N/A | | 8xxx | IFD | E | H | 4 | C | __ | 3 | HLL36015 | N/A | N/A |
| | 8xxx | IFD | F | H | 4 | V | __ | 5 | HLL36020 | N/A | N/A | | 8xxx | IFD | F | H | 4 | C | __ | 5 | HLL36020 | N/A | N/A |
| | 8xxx | IFD | G | H | 4 | V | __ | 7.5 | HLL36030 | N/A | N/A | | 8xxx | IFD | G | H | 4 | C | __ | 7.5 | HLL36030 | N/A | N/A |
| | 8xxx | IFD | H | H | 4 | V | __ | 10 | HLL36040 | N/A | N/A | | 8xxx | IFD | H | H | 4 | C | __ | 10 | HLL36040 | N/A | N/A |
| | 8xxx | IFD | J | H | 4 | V | __ | 15 | HLL36060 | N/A | N/A | | 8xxx | IFD | J | H | 4 | C | __ | 15 | HLL36060 | N/A | N/A |
| | 8xxx | IFD | K | H | 4 | V | __ | 20 | HLL36070 | N/A | N/A | | 8xxx | IFD | K | H | 4 | C | __ | 20 | HLL36070 | N/A | N/A |
| | 8xxx | IFD | L | H | 4 | V | __ | 25 | HLL36070 | N/A | N/A | | 8xxx | IFD | L | H | 4 | C | __ | 25 | HLL36070 | N/A | N/A |
| | 8xxx | IFD | M | H | 4 | V | __ | 30 | HLL36100 | N/A | N/A | | 8xxx | IFD | M | H | 4 | C | __ | 30 | HLL36100 | N/A | N/A |
| | 8xxx | IFD | N | H | 4 | V | __ | 40 | HLL36125 | N/A | N/A | | 8xxx | IFD | N | H | 4 | C | __ | 40 | HLL36125 | N/A | N/A |
| | 8xxx | IFD | P | H | 4 | V | __ | 50 | HLL36150 | N/A | N/A | | 8xxx | IFD | P | H | 4 | C | __ | 50 | HLL36150 | N/A | N/A |
| | 8xxx | IFD | Q | H | 4 | V | __ | 60 | JLL36200 | N/A | N/A | | 8xxx | IFD | Q | H | 4 | C | __ | 60 | JLL36200 | N/A | N/A |
| | 8xxx | IFD | R | H | 4 | V | __ | 75 | JLL36225 | N/A | N/A | | 8xxx | IFD | R | H | 4 | C | __ | 75 | JLL36225 | N/A | N/A |
| | 8xxx | IFD | S | H | 4 | V | __ | 100 | JLL36250 | N/A | N/A | | 8xxx | IFD | S | H | 4 | C | __ | 100 | JLL36250 | N/A | N/A |
| | 8xxx | IFD | T | H | 4 | V | __ | 125 | N/A | 300 | J | | 8xxx | IFD | T | H | 4 | C | __ | 125 | N/A | 300 | J |
| | 8xxx | IFD | U | H | 4 | V | __ | 150 | N/A | 400 | J | | 8xxx | IFD | U | H | 4 | C | __ | 150 | N/A | 300 | J |
| | 8xxx | IFD | W | H | 4 | V | __ | 200 | N/A | 400 | J | | 8xxx | IFD | W | H | 4 | C | __ | 200 | N/A | 400 | J |
| | 8xxx | IFD | X | H | 4 | V | __ | 250 | N/A | 600 | J | | 8xxx | IFD | X | H | 4 | C | __ | 250 | N/A | 400[1] | J |
| | 8xxx | IFD | Y | H | 4 | V | __ | 300 | N/A | 600[1] | J | | 8xxx | IFD | Y | H | 4 | C | __ | 300 | N/A | 500[1] | J |
| | 8xxx | IFD | Z | H | 4 | V | __ | 350 | N/A | 600[1] | J | | 8xxx | IFD | Z | H | 4 | C | __ | 350 | N/A | 500[1] | J |
| | 8xxx | IFD | 4 | H | 4 | V | __ | 400 | PLL34080CU33A | 600[1] | J | | 8xxx | IFD | 4 | H | 4 | C | __ | 400 | PLL34080CU33A | 600[1] | J |
| | 8xxx | IFD | 5 | H | 4 | V | __ | 450 | PLL34080CU33A | 600[1] | J | | 8xxx | IFD | 5 | H | 4 | C | __ | 450 | PLL34080CU33A | 600[1] | J |
| | 8xxx | IFD | 6 | H | 4 | V | __ | 500 | PLL34080CU33A | 600[1] | J | | 8xxx | IFD | 6 | H | 4 | C | __ | 500 | PLL34080CU33A | 600[1] | J |
| | 8xxx | IFD | 7 | H | 4 | V | __ | 600 | PJL36080CU44A | 1000 | L | | 8xxx | IFD | 7 | H | 4 | C | __ | 600 | PJL36080CU44A | 1000 | L |
| | 8xxx | IFD | 8 | H | 4 | V | __ | 700 | PJL36100CU44A | 1200 | L | | | | | | | | | | | | |
| 230 V | 8xxx | IFD | C | H | 3 | V | __ | 1 | HLL36015 | N/A | N/A | 230 V | | | | | | | | | | | |
| | 8xxx | IFD | D | H | 3 | V | __ | 2 | HLL36025 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | E | H | 3 | V | __ | 3 | HLL36040 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | F | H | 3 | V | __ | 5 | HLL36040 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | G | H | 3 | V | __ | 7.5 | HLL36070 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | H | H | 3 | V | __ | 10 | HLL36110 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | J | H | 3 | V | __ | 15 | HLL36125 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | K | H | 3 | V | __ | 20 | JLL36175 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | L | H | 3 | V | __ | 25 | JLL36200 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | M | H | 3 | V | __ | 30 | JLL36250 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | N | H | 3 | V | __ | 40 | JLL36250 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | P | H | 3 | V | __ | 50 | JLL36250 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | Q | H | 3 | V | __ | 60 | N/A | 250 | J | | | | | | | | | | | | |
| | 8xxx | IFD | R | H | 3 | V | __ | 75 | N/A | 350 | J | | | | | | | | | | | | |
| | 8xxx | IFD | S | H | 3 | V | __ | 100 | N/A | 350 | J | | | | | | | | | | | | |
| | 8xxx | IFD | T | H | 3 | V | __ | 125 | N/A | 450 | J | | | | | | | | | | | | |
| 230 V, 1ph | 8xxx | IFD | C | H | 1 | V | __ | 1 | HJL26025 | N/A | N/A | 230 V, 1ph | | | | | | | | | | | |
| | 8xxx | IFD | D | H | 1 | V | __ | 2 | HLL26040 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | E | H | 1 | V | __ | 3 | HLL26040 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | F | H | 1 | V | __ | 5 | HLL26070 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | G | H | 1 | V | __ | 7.5 | HLL26110 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | H | H | 1 | V | __ | 10 | HLL26175 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | J | H | 1 | V | __ | 15 | JLL26250 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | K | H | 1 | V | __ | 20 | JLL26250 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | L | H | 1 | V | __ | 25 | JLL26250 | N/A | N/A | | | | | | | | | | | | |
| | 8xxx | IFD | M | H | 1 | V | __ | 30 | N/A | 250 | J | | | | | | | | | | | | |

[1] Bussmann Class J time delay fuse required.

**Table 38: Replacement Power Converter Part Numbers**

| | VT | | | | | | | | | | CT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Catalog Number | | | | | | | hp | Power Converter Part Number | | Catalog Number | | | | | | | hp | Power Converter Part Number |
| 460 V | 8xxx | IFD | C | H | 4 | V | __ | 1 | ATV61H075N4 | 460 V | 8xxx | IFD | C | H | 4 | C | __ | 1 | ATV71H075N4 |
| | 8xxx | IFD | D | H | 4 | V | __ | 2 | ATV61HU15N4 | | 8xxx | IFD | D | H | 4 | C | __ | 2 | ATV71HU15N4 |
| | 8xxx | IFD | E | H | 4 | V | __ | 3 | ATV61HU22N4 | | 8xxx | IFD | E | H | 4 | C | __ | 3 | ATV71HU22N4 |
| | 8xxx | IFD | F | H | 4 | V | __ | 5 | ATV61HU40N4 | | 8xxx | IFD | F | H | 4 | C | __ | 5 | ATV71HU40N4 |
| | 8xxx | IFD | G | H | 4 | V | __ | 7.5 | ATV61HU55N4 | | 8xxx | IFD | G | H | 4 | C | __ | 7.5 | ATV71HU55N4 |
| | 8xxx | IFD | H | H | 4 | V | __ | 10 | ATV61HU75N4 | | 8xxx | IFD | H | H | 4 | C | __ | 10 | ATV71HU75N4 |
| | 8xxx | IFD | J | H | 4 | V | __ | 15 | ATV61HD11N4 | | 8xxx | IFD | J | H | 4 | C | __ | 15 | ATV71HD11N4 |
| | 8xxx | IFD | K | H | 4 | V | __ | 20 | ATV61HD15N4 | | 8xxx | IFD | K | H | 4 | C | __ | 20 | ATV71HD15N4 |
| | 8xxx | IFD | L | H | 4 | V | __ | 25 | ATV61HD18N4 | | 8xxx | IFD | L | H | 4 | C | __ | 25 | ATV71HD18N4 |
| | 8xxx | IFD | M | H | 4 | V | __ | 30 | ATV61HD22N4 | | 8xxx | IFD | M | H | 4 | C | __ | 30 | ATV71HD22N4 |
| | 8xxx | IFD | N | H | 4 | V | __ | 40 | ATV61HD30N4 | | 8xxx | IFD | N | H | 4 | C | __ | 40 | ATV71HD30N4 |
| | 8xxx | IFD | P | H | 4 | V | __ | 50 | ATV61HD37N4 | | 8xxx | IFD | P | H | 4 | C | __ | 50 | ATV71HD37N4 |
| | 8xxx | IFD | Q | H | 4 | V | __ | 60 | ATV61HD45N4 | | 8xxx | IFD | Q | H | 4 | C | __ | 60 | ATV71HD45N4 |
| | 8xxx | IFD | R | H | 4 | V | __ | 75 | ATV61HD55N4 | | 8xxx | IFD | R | H | 4 | C | __ | 75 | ATV71HD55N4 |
| | 8xxx | IFD | S | H | 4 | V | __ | 100 | ATV61HD75N4 | | 8xxx | IFD | S | H | 4 | C | __ | 100 | ATV71HD75N4 |
| | 8xxx | IFD | T | H | 4 | V | __ | 125 | ATV61HD90N4 | | 8xxx | IFD | T | H | 4 | C | __ | 125 | ATV71HD90N4 |
| | 8xxx | IFD | U | H | 4 | V | __ | 150 | ATV61HC11N4 | | 8xxx | IFD | U | H | 4 | C | __ | 150 | ATV71HC11N4 |
| | 8xxx | IFD | W | H | 4 | V | __ | 200 | ATV61HC13N4 | | 8xxx | IFD | W | H | 4 | C | __ | 200 | ATV71HC13N4 |
| | 8xxx | IFD | X | H | 4 | V | __ | 250 | ATV61HC16N4 | | 8xxx | IFD | X | H | 4 | C | __ | 250 | ATV71HC16N4 |
| | 8xxx | IFD | Y | H | 4 | V | __ | 300 | ATV61HC22N4 | | 8xxx | IFD | Y | H | 4 | C | __ | 300 | ATV71HC22N4 |
| | 8xxx | IFD | Z | H | 4 | V | __ | 350 | ATV61HC22N4 | | 8xxx | IFD | Z | H | 4 | C | __ | 350 | ATV71HC25N4 |
| | 8xxx | IFD | 4 | H | 4 | V | __ | 400 | ATV61HC25N4 | | 8xxx | IFD | 4 | H | 4 | C | __ | 400 | ATV71HC25N4 |
| | 8xxx | IFD | 5 | H | 4 | V | __ | 450 | ATV61HC31N4 | | 8xxx | IFD | 5 | H | 4 | C | __ | 450 | ATV71HC28N4 |
| | 8xxx | IFD | 6 | H | 4 | V | __ | 500 | ATV61HC31N4 | | 8xxx | IFD | 6 | H | 4 | C | __ | 500 | ATV71HC31N4 |
| | 8xxx | IFD | 7 | H | 4 | V | __ | 600 | ATV61HC40N4 | | 8xxx | IFD | 7 | H | 4 | C | __ | 600 | ATV71HC40N4 |
| | 8xxx | IFD | 8 | H | 4 | V | __ | 700 | ATV61HC50N4 | | | | | | | | | | |
| 230 V | 8xxx | IFD | C | H | 3 | V | __ | 1 | ATV61H075M3 | 230 V | | | | | | | | | |
| | 8xxx | IFD | D | H | 3 | V | __ | 2 | ATV61HU15M3 | | | | | | | | | | |
| | 8xxx | IFD | E | H | 3 | V | __ | 3 | ATV61HU22M3 | | | | | | | | | | |
| | 8xxx | IFD | F | H | 3 | V | __ | 5 | ATV61HU40M3 | | | | | | | | | | |
| | 8xxx | IFD | G | H | 3 | V | __ | 7.5 | ATV61HU55M3 | | | | | | | | | | |
| | 8xxx | IFD | H | H | 3 | V | __ | 10 | ATV61HU75M3 | | | | | | | | | | |
| | 8xxx | IFD | J | H | 3 | V | __ | 15 | ATV61HD11M3X | | | | | | | | | | |
| | 8xxx | IFD | K | H | 3 | V | __ | 20 | ATV61HD15M3X | | | | | | | | | | |
| | 8xxx | IFD | L | H | 3 | V | __ | 25 | ATV61HD18M3X | | | | | | | | | | |
| | 8xxx | IFD | M | H | 3 | V | __ | 30 | ATV61HD22M3X | | | | | | | | | | |
| | 8xxx | IFD | N | H | 3 | V | __ | 40 | ATV61HD30M3X | | | | | | | | | | |
| | 8xxx | IFD | P | H | 3 | V | __ | 50 | ATV61HD37M3X | | | | | | | | | | |
| | 8xxx | IFD | Q | H | 3 | V | __ | 60 | ATV61HD45M3X | | | | | | | | | | |
| | 8xxx | IFD | R | H | 3 | V | __ | 75 | ATV61HD55M3X | | | | | | | | | | |
| | 8xxx | IFD | S | H | 3 | V | __ | 100 | ATV61HD75M3X | | | | | | | | | | |
| | 8xxx | IFD | T | H | 3 | V | __ | 125 | ATV61HD90M3X | | | | | | | | | | |
| 230 V, 1ph | 8xxx | IFD | C | H | 1 | V | __ | 1 | ATV61HU15M3 | 230 V, 1ph | | | | | | | | | |
| | 8xxx | IFD | D | H | 1 | V | __ | 2 | ATV61HU22M3 | | | | | | | | | | |
| | 8xxx | IFD | E | H | 1 | V | __ | 3 | ATV61HU30M3 | | | | | | | | | | |
| | 8xxx | IFD | F | H | 1 | V | __ | 5 | ATV61HU55M3 | | | | | | | | | | |
| | 8xxx | IFD | G | H | 1 | V | __ | 7.5 | ATV61HU75M3 | | | | | | | | | | |
| | 8xxx | IFD | H | H | 1 | V | __ | 10 | ATV61HD15M3X | | | | | | | | | | |
| | 8xxx | IFD | J | H | 1 | V | __ | 15 | ATV61HD22M3X | | | | | | | | | | |
| | 8xxx | IFD | K | H | 1 | V | __ | 20 | ATV61HD30M3X | | | | | | | | | | |
| | 8xxx | IFD | L | H | 1 | V | __ | 25 | ATV61HD37M3X | | | | | | | | | | |
| | 8xxx | IFD | M | H | 1 | V | __ | 30 | ATV61HD45M3X | | | | | | | | | | |

# Appendix B—Ground Fault Protection and Testing Instructions

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Read and understand this bulletin in its entirety before installing or operating the field drive. Installation, adjustment, repair, and maintenance of the drives must be performed by qualified personnel.
- The user is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Before servicing the drive:
  - — Disconnect all power including external control power that may be present before servicing the drive.
  - — Place a “DO NOT TURN ON” label on the drive disconnect.
  - — Lock disconnect in the open position.
  - — WAIT 15 MINUTES for the DC bus capacitors to discharge. Then follow the DC Bus Voltage Measurement Procedure on page 37 to verify that the DC voltage is less than 42 V. The drive LEDs are not indicators of the absence of DC bus voltage.
- Install and close all covers before applying power or starting and stopping the drive.

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

**⚠ 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 the equipment.
- Always use a properly rated voltage sensing device to confirm 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.**

**⚠ DANGER**

**UNINTENDED EQUIPMENT OPERATION**

Before turning on the drive or upon exiting the configuration menus, ensure that the inputs assigned to the Run command are in a state that will not cause the drive to run. Otherwise, the motor can start immediately.

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

# Ground Fault Testing Procedure

Per the NEC, service entrance rated equipment with a disconnect or fuse rated at 1000 A or more requires ground fault protection. This is limited to solidly grounded wye electric services of more than 150 V to ground but not exceeding 600 V phase-to-phase. The 600 to 700 hp Field Drive units have ground fault protection as a standard.

The ground fault protection consists of a P-Frame Schneider Electric circuit breaker with a Micrologic 6.0 A trip unit, and a neutral current transformer. Ground fault equipment must be tested at least every six months.

Perform circuit breaker ground fault testing as follows, with all power removed from the drive and the circuit breaker primary.

1. This test may be performed by qualified personnel only.
2. Remove all power from the drive and the circuit breaker primary and lock out the equipment.
3. Make sure the circuit breaker is isolated from all upstream and downstream devices.
4. Use the Schneider Electric Circuit Breaker Full Function Test Kit, part number S33595.
5. Perform secondary injection testing as outlined in the installation bulletin included with the full function test kit. Verify that all applicable trip unit functions are operating properly.
6. Repeat step 5 with the circuit breaker in the open position. NOTE: The test kit states that the circuit breaker should be closed when performing the test. DO NOTclose the circuit breaker for this step.
7. If any test fails, do not put the circuit breaker into service. Contact your local sales office for factory authorized service.
8. For more details, refer to Schneider Electric Manual 48049-900-02 “Field Testing and Maintenance Guide,” section 4.
9. Log the test date and results in Table 39 of this manual.

**Table 39: Test Dates for Circuit Breakers with Ground Fault Protection**

**NOTE:** The personnel in charge of the electrical installation must retain this form and keep it available for the authority having jurisdiction. Refer to the "Ground Fault Protection and Testing Instructions" section of this manual.

Use this table to record the ground fault test dates of the Schneider Electric circuit breakers with ground fault trip capability and the test results. Tests must be repeated at least every 6 months. The first line is given as an example only.

| Component Designation | Component Manufacturer's Name | Catalog Designation | Number Used | Panel Identification | Ground Fault Testing Date | Results |
|---|---|---|---|---|---|---|
| Circuit Breaker | Schneider Electric | PJL36100CU44A | 1 | 8930IFD8H4VW | 1/1/89 | Secondary injection test passed with with Schneider Electric Full Function Test Kit p/n S33595. |
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**Altivar™ 61/71 Field Drive**
**Instruction Bulletin**



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