Start-Up and Service Instructions

SAFETY CONSIDERATIONS

Centrifugal and screw compressor liquid chillers are designed to provide safe and reliable service when operated within design specifications. When operating this equipment, use good judgment and safety precautions to avoid damage to equipment and property or injury to personnel.

Be sure you understand and follow the procedures and safety precautions contained in the chiller instructions as well as those listed in this guide.

DANGER

Failure to follow these procedures will result in severe personal injury or death.

ONLY QUALIFIED electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment.

READ AND UNDERSTAND this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

DO NOT install modification kits with power applied to the drive. Disconnect and lock out incoming power before attempting such installation or removal. Failure to observe this precaution could result in severe bodily injury or loss of life.

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

DO NOT VENT refrigerant relief valves within a building. Outlet from rupture disc or relief valve must be vented outdoors in accordance with the latest edition of ANSI/ASHRAE 15 (American National Standards Institute/American Society of Heating, Refrigerating, and Air-Conditioning Engineers). The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation.

PROVIDE adequate ventilation in accordance with ANSI/ASHRAE 15, especially for enclosed and low overhead spaces. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Misuse can be fatal. Vapor is heavier than air and reduces the amount of oxygen available for breathing. Product causes eye and skin irritation. Decomposition products are hazardous.

DO NOT USE OXYGEN to purge lines or to pressurize a chiller for any purpose. Oxygen gas reacts violently with oil, grease, and other common substances.

(Warnings continued on next page.)
**WARNING**

DO NOT ATTEMPT TO REMOVE fittings, covers, etc., while chiller is under pressure or while chiller is running. Be sure pressure is at 0 psig (0 kPa) before breaking any refrigerant connection.

**CAUTION**

Failure to follow these procedures may result in personal injury or damage to equipment.

TO AVOID an electric shock hazard, verify that the voltage on the bus capacitors has discharged completely before servicing. Check the DC bus voltage at the power terminal block by measuring between the +DC and -DC terminals, between the +DC terminal and the chassis, and between the -DC terminal and the chassis. The voltage must be zero for all 3 measurements.

THE USER is responsible to conform with all applicable local, national, and international codes. Failure to observe this precaution could result in damage to or destruction of the equipment.

THIS DRIVE contains ESD (electrostatic discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. For static control procedures, reference Rockwell publication Guarding Against Electrostatic Damage, or any other applicable ESD protection handbook.

DO NOT alter the setting of any jumper. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

USE OF power correction capacitors on the output of the drive can result in erratic operation of the motor, nuisance tripping, and/or permanent damage to the drive. Remove power correction capacitors before proceeding. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

MOST CODES require that upstream branch circuit protection be provided to protect input power wiring. If fuses are chosen as the protection method, refer to the PowerFlex 750 user manual. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

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

DISTRIBUTION SYSTEM short circuit capacity shall not exceed the rating of the drive. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

DO NOT STEP on refrigerant lines. Broken lines can whip about and release refrigerant, causing personal injury.

DO NOT climb over a chiller. Use platform, catwalk, or staging. Follow safe practices when using ladders.

USE MECHANICAL EQUIPMENT (crane, hoist, etc.) to lift or move inspection covers or other heavy components. Even if components are light, use mechanical equipment when there is a risk of slipping or losing your balance.

BE AWARE that certain automatic start arrangements CAN ENGAGE THE VFD, TOWER FAN, OR PUMPS. Open the disconnect ahead of the VFD, tower fans, or pumps.

(Cautions continued in next column.)

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**INTRODUCTION**

The Carrier VFD option Start-Up and Service Manual is intended for trained and qualified service personnel and is to be used during start-up, operation, and maintenance of Rockwell/Allen-Bradley PF755L drive.
ABBREVIATIONS AND EXPLANATIONS

Frequently used abbreviations in this manual include:

CCM — Chiller Control Module
DC — Direct Current
DPI — Drive Peripheral Interface
ENET — Ethernet
ICVC — International Chiller Visual Controller
IGBT — Insulated Gate Bipolar Transistor
I/O — Inputs/Outputs
IP — Internet Protocol
MCB — Main Control Board
MOV — Metal Oxide Varistor
PE — Protective Earthing Conductor
PIC — Product Integrated Control
PWM — Pulse Width Modulation
SIO — Sensor Input/Output
STS — Status
VFD — Variable Frequency Drive

Required Publications — The Carrier VFD option Start-Up and Service Manual must be used with the following manuals:

- Latest version of the PowerFlex 755 AC Drives manuals
- Latest revision of the Start-Up, Operation, and Maintenance Instructions for the 19XRV or 23XRV with PIC III Controls

Getting Assistance from Rockwell Automation — Contact the local Rockwell Automation sales office with any questions or problems relating to the products described in this manual. For technical support on drives, call the HVAC Hotline at 1-888-926-6786, Option 1.

Before calling, have the following information available from the Allen-Bradley data nameplate located inside the enclosure on the right wall. See Fig. 1.

- Allen-Bradley ID or CAT. NO.
- Carrier VFD Code (Carrier Part Number)
- Allen-Bradley serial number

IDENTIFYING DRIVE COMPONENTS

Chiller control schematics and VFD schematics are included in Appendix A.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter rated for the DC bus voltage to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life. An isolated multimeter will be needed to measure DC bus voltage and to make resistance checks. The drive’s DC bus capacitors retain hazardous voltages after input power has been disconnected.</td>
</tr>
</tbody>
</table>

Opening the VFD Access Door

Before removing the drive enclosure, open access door and verify that the DC bus voltage has dropped to zero by checking the terminals behind the access door. Failure to observe this precaution could result in severe bodily injury or loss of life.

1. Using recommended screwdriver (6.4 mm [0.25 in.] flat or T20 star), open access door. See Fig. 2.
2. Check to be sure that the voltage between DC+ and DC- from each DC terminal to the chassis is zero before proceeding. See Fig. 3.

Allen-Bradley

ID No.: 21P-104773-40
Input Rating: 480VAC 454A 60Hz 3PH
Output Rating: 0-460VAC 477A 0-325Hz 3PH
Short Circuit Rating: 65kA, 480V Max. Max. Ambient Temperature: 40°C
Interrupt Capacity Rating: 100kAIC
Enclosure Type: TYPE 1
Coolant Type: Refrigerant R134a
Design Pressure: 185 PSIG
Carrier Part Number: 19XVR0445335A1F
VFD Serial Number: XXXXXXXX
Carrier Dwg. Number: 19XV04021001
Mfd. On: 08-13-10
ORDER NO: 0001772838-00001
FAC.LOC.: 1100

Fig. 1 — Allen Bradley Data Nameplate

Fig. 2 — Opening Access Door
Drive Assembly Catalog Number — See Fig. 4 and 5 for examples of the Rockwell Automation Drive Assembly Catalog Number.

Components and Physical Data — The 19XRV chillers use the Allen-Bradley PF755 Frame 6 drive for the 230-amp rated application (Carrier Part No. 19XVR0230...). See Fig. 6.

The Allen-Bradley PF755 Frame 7 drive is used for the 335-amp and 445-amp rated application (Carrier Part No. 19XVR0335... and 19XVR0445...). See Fig. 7.

See Fig. 8 for the dimensions of Frames 6 and 7 for 19XRV chillers.

The 23XRV chiller uses the Frame 7 drive for 335-amp and 455-amp rated applications (Carrier Part No. 23XVR0335... and 23XVR0445...). Frame 6 is not used.

See Fig. 9 for the dimensions of Frame 7 for 23XRV chillers.

---

**Fig. 3 — Check DC Bus Terminals**

**Fig. 4 — Rockwell Automation Drive Assembly Catalog Number Nomenclature: 19XRV Units**

- **21P - 19XRV Std Tier**
  - **Voltage Code**
    1. 480 vac, 60 Hz
    2. 380 vac, 50 Hz
    3. 380 vac, 60 Hz
    4. 400 vac, 50 Hz
    5. 400 vac, 60 Hz
    6. 415 vac, 50 Hz
    7. 415 vac, 60 Hz
  - **Full Load Amp Rating (Maximum Continuous Amps)**
    0248 – 248
    0361 – 361
    0477 – 477

- **Meter Option**
  0 – No Meters
  2 – Digital Meter

- **Input Device**
  3 – 65 KAIC Capacity Breaker
  4 – 100 KAIC Capacity Breaker

- **Enclosure**
  4 – Unit Mount Type 1/IP2 Liquid Cooled
  5 – Unit Mount Type 1/IP2 Liquid Cooled/Air Filter

* For Carrier applications, maximum continuous amp ratings are 230, 269, 335, and 445.

---

**Fig. 5 — Rockwell Automation Drive Assembly Catalog Number Nomenclature: 23XRV Units**

- **21PB - 23XRV Std Tier**
  - **Voltage Code**
    1. 480 vac, 60 Hz
    2. 380 vac, 50 Hz
    3. 380 vac, 60 Hz
    4. 400 vac, 50 Hz
    5. 400 vac, 60 Hz
    6. 415 vac, 50 Hz
    7. 415 vac, 60 Hz
    8. 600 vac, 60 Hz
  - **Full Load Amp Rating (Maximum Continuous Amps)**
    0248 – 248
    0289 – 289
    0361 – 361
    0477 – 477

- **CE (Conformité Européenne)**
  0 – No
  1 – Yes

- **Control Power**
  0 – Standard
  1 – High

- **Meter Option**
  0 – No Meters
  2 – Digital Meter

- **Input Device**
  3 – 65 KAIC Capacity Breaker
  4 – 100 KAIC Capacity Breaker

- **Enclosure**
  1 – Unit Mount Type 1/IP2 Air Cooled/Filter
  4 – Unit Mount Type 1/IP2 Liquid Cooled

* For Carrier applications, maximum continuous amp ratings are 230, 269, 335, and 445.
† For 600 v applications, CB1 = 65 KAIC and CB2 = 42 KAIC rating (575 v).
**Fig. 6 — Frame 6 Drive Components**

<table>
<thead>
<tr>
<th>NO.</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Terminals</td>
<td>R/L1, S/L2, T/L3, U/T1, V/T2, W/T3</td>
</tr>
<tr>
<td>2</td>
<td>PE Grounding Studs</td>
<td>Terminating point to chassis ground for incoming motor shield</td>
</tr>
<tr>
<td>3</td>
<td>DC Bus and Brake</td>
<td>+DC, -DC, BR1, BR2</td>
</tr>
<tr>
<td>4</td>
<td>PE-A and PE-B</td>
<td>MOV and CMC Jumper Wires</td>
</tr>
<tr>
<td>5</td>
<td>DC+ and DC-</td>
<td>Bus Voltage Test Points</td>
</tr>
</tbody>
</table>

**Fig. 7 — Frame 7 Drive Components**

<table>
<thead>
<tr>
<th>NO.</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Power Terminals</td>
<td>R/L1, S/L2, T/L3, U/T1, V/T2, W/T3</td>
</tr>
<tr>
<td>2</td>
<td>PE Grounding Studs</td>
<td>Terminating point to chassis ground for incoming motor shield</td>
</tr>
<tr>
<td>3</td>
<td>DC Bus and Brake</td>
<td>+DC, -DC, BR1, BR2</td>
</tr>
<tr>
<td>4</td>
<td>PE-A and PE-B</td>
<td>MOV and CMC Jumper Wires</td>
</tr>
<tr>
<td>5</td>
<td>DC+ and DC-</td>
<td>Bus Voltage Test Points</td>
</tr>
</tbody>
</table>
Fig. 8 — 19XRV Enclosure Dimensions — Frames 6 and 7

Fig. 9 — 23XRV Enclosure Dimensions — Frame 7

NOTE: Dimensions shown in inches.
**START-UP**

### DANGER

Internal components and circuit boards of the drive are live when the drive is connected to incoming power. Coming into contact with this voltage is extremely dangerous and will result in severe personal injury or death.

The motor terminals U, V, W and the DC-link/brake resistor terminals B+/R+, R- are live when the drive is connected to incoming power, even if the motor is not running. Do not make any connections when the drive is connected to the incoming power.

After having disconnected the drive, wait until the indicators on the keypad go out (if no keypad is attached see the indicator through the keypad base). Wait 5 more minutes before doing any work on drive connections. Do not even open the cover before this time has expired.

Before connecting the drive to the incoming power, make sure that the switchgear enclosure door is closed.

### WARNING

The control I/O-terminals are isolated from the mains potential. However, the relay outputs and other I/O terminals may have a dangerous control voltage present even when the drive is disconnected from incoming power. Coming into contact with this voltage could result in severe personal injury.

### CAUTION

If other than refrigerant cooling is used, before connecting the drive to the incoming power, make sure that the coolant is circulating and has no leaks.

### CAUTION

When working with the Drive Explorer, never use the Rotate function as the motor will immediately start and severe compressor damage could result.

**Alternate Wire Lugs** — If the incoming power wire size does not fit the standard lug, alternate lugs may be used. See Table 1. Note that lugs rated for a higher current than the circuit breaker may be used.

### Verify Installation

Record the following job information:

1. Job Name
2. Job Number
3. City
4. State
5. Zip Code

Record the following nameplate information:

1. From the Allen-Bradley nameplate (Fig. 1) located inside the VFD enclosure:
   a. Allen-Bradley ID or CAT NO.
   b. Allen-Bradley Serial Number
   c. Carrier Part Number
2. From the machine nameplate (Fig. 10) located inside the VFD enclosure:
   a. Chiller Serial Number
   b. Chiller Model
   c. Motor rated load amps
   d. Motor nameplate rpm
   e. Motor nameplate kW
   f. Motor nameplate voltage
   g. Inverter PWM (pulse width modulation) frequency
   h. Voltage
3. From the drive module label (Fig. 11) located on the drive module:
   a. Model or Cat. Number
   b. Serial Number
4. From the ICVC control panel screen:
   a. Carrier Part Number and Revision
   b. ICVC Software Number

Rockwell PowerFlex 755 drive start-up must be registered on the Rockwell website:


<table>
<thead>
<tr>
<th>CARRIER VFD MAX INPUT AMPS</th>
<th>VOLTAGE</th>
<th>STANDARD ABB LUG</th>
<th>STANDARD LUG CABLE RANGE</th>
<th>ALTERNATE ABB LUG</th>
<th>ALTERNATE LUG CABLE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>230</td>
<td>480</td>
<td>KT5400</td>
<td>(2) 3/0 - 250 MCM</td>
<td>KT5300</td>
<td>(1) 250 - 500 MCM</td>
</tr>
<tr>
<td>335</td>
<td>480</td>
<td>K6TJ</td>
<td>(3) 2/0 - 400 MCM</td>
<td>K6TH</td>
<td>(2) 250 - 500 MCM</td>
</tr>
<tr>
<td>445</td>
<td>480</td>
<td>K6TJ</td>
<td>(3) 2/0 - 400 MCM</td>
<td>K6TH</td>
<td>(2) 250 - 500 MCM</td>
</tr>
<tr>
<td>230</td>
<td>380/400/415</td>
<td>KT5400</td>
<td>(2) 3/0 - 250 MCM</td>
<td>KT5300</td>
<td>(1) 250 - 500 MCM</td>
</tr>
<tr>
<td>335</td>
<td>380/400/415</td>
<td>K6TJ</td>
<td>(3) 2/0 - 400 MCM</td>
<td>K6TH</td>
<td>(2) 250 - 500 MCM</td>
</tr>
<tr>
<td>445</td>
<td>380/400/415</td>
<td>K6TJ</td>
<td>(3) 2/0 - 400 MCM</td>
<td>K6TH</td>
<td>(2) 250 - 500 MCM</td>
</tr>
<tr>
<td>269</td>
<td>600</td>
<td>KT5400</td>
<td>(2) 3/0 - 250 MCM</td>
<td>KT5300</td>
<td>(1) 250 - 500 MCM</td>
</tr>
</tbody>
</table>
Configure the VFD — All configurations required by the VFD are supplied by the ICVC through the VFD Gateway. The 19XRV, 23XRV Std Tier VFD can operate with PIC III ICVC and above. Any configuration changes necessary and possible are made on the ICVC screens. A complete set of configurations is transmitted to the VFD each time the controls are powered up.

Table 2 lists parameters displayed on the 19XRV, 23XRV PIC ICVC screen. Parameters in italics are to be entered or confirmed at start-up. Parameters in bold are to be changed only after consulting with Carrier service engineering.

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>DEFAULT VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTOR NAMEPLATE VOLTAGE</td>
<td>460</td>
</tr>
<tr>
<td>COMPRESSOR 100% SPEED</td>
<td>YES</td>
</tr>
<tr>
<td>LINE FREQ=60 HZ? (NO=50)</td>
<td></td>
</tr>
<tr>
<td>RATED LINE VOLTAGE* †</td>
<td>460</td>
</tr>
<tr>
<td>RATED LINE AMPS* †</td>
<td>200</td>
</tr>
<tr>
<td>RATED LINE KILOWATTS* †</td>
<td>100</td>
</tr>
<tr>
<td>MOTOR RATED LOAD KW*</td>
<td>100</td>
</tr>
<tr>
<td>MOTOR RATED LOAD AMPS</td>
<td>100</td>
</tr>
<tr>
<td>MOTOR NAMEPLATE RPM</td>
<td>3456</td>
</tr>
<tr>
<td>MOTOR NAMEPLATE KW</td>
<td>100</td>
</tr>
<tr>
<td>INVERTER PWM FREQUENCY (0 = 4 KHZ, 1 = 2 KHZ)</td>
<td>1</td>
</tr>
<tr>
<td>SKIP FREQUENCY 1 (HZ)</td>
<td>20.0</td>
</tr>
<tr>
<td>SKIP FREQUENCY 2 (HZ)</td>
<td>20.0</td>
</tr>
<tr>
<td>SKIP FREQUENCY 3 (HZ)</td>
<td>20.0</td>
</tr>
<tr>
<td>SKIP FREQUENCY BAND LINE (HZ)</td>
<td>0.0</td>
</tr>
<tr>
<td>VOLTAGE % IMBALANCE</td>
<td>10</td>
</tr>
<tr>
<td>LINE VOLT IMBALANCE TIME (SEC)†</td>
<td>10</td>
</tr>
<tr>
<td>LINE CURRENT % IMBALANCE†</td>
<td>10</td>
</tr>
<tr>
<td>MOTOR CURRENT % IMBALANCE</td>
<td>10</td>
</tr>
<tr>
<td>MOTOR CURRENT IMBAL TIME</td>
<td>10</td>
</tr>
<tr>
<td>INCREASE RAMP TIME (SEC)</td>
<td>30</td>
</tr>
<tr>
<td>DECREASE RAMP TIME (SEC)</td>
<td>30</td>
</tr>
<tr>
<td>SINGLE CYCLE DROP OUT (DISABLE/ENABLE)</td>
<td>DISABLE</td>
</tr>
</tbody>
</table>

* Parameters marked with an * are not downloadable to the VFD but are used in other calculations and algorithms in the ICVC.
† Parameters marked with a † may not be available with PIC-IV ICVC.

NOTES:
1. Parameters in italics are to be entered or confirmed at start-up.
2. Parameters in bold are to be changed only after consultation with service engineering.

Commissioning the Unit — The commission procedure is as follows:

1. If the chiller has been stored outdoors, allow at least 24 hours room temperature stabilization prior to commissioning. Ensure any condensation that occurs as a result of the ambient temperature is allowed to evaporate.
2. Enter parameters in the VFD_CONF screen.
3. Install surge suppression devices if required.
4. Review the power wiring and grounding to ensure that it has been properly connected.
5. Visually examine the inside of the drive enclosure to:
   a. Look for signs of corrosion or moisture residue.
   b. Remove any dirt or debris.
   c. Make sure all vents are clear.
6. Apply power to the drive and take thermal measurements of the capacitor bank and power connections. Do this again before start-up.
7. Measure and record the incoming line voltage. Line-to-line voltages should be balanced within 3% as calculated by Rockwell’s procedure below:

\[
V_{\text{max}} = \text{Maximum measured phase-to-phase voltage (A to B, B to C, C to A)} \\
V_{\text{min}} = \text{Minimum measured phase-to-phase voltage}
\]
8. Take a final thermal measurement of the capacitor bank and power after finalizing the installation to ensure all connections are good.

9. If a ground fault occurs, then do the following:
   a. Check for a ground in the motor or motor wiring.
   b. Check for damage to wiring insulation and that wiring is dry.
   c. Verify the motor wiring is separated from ground and there is no connection between phases.
   d. Check for failed IGBTs.

10. If an overcurrent fault occurs, then do the following:
   a. Check for excessive load and verify load limit settings on the ICVC.
   b. Check motor and wiring insulation.
   c. Check parameter settings on VFD_CONF screen in the ICVC.

**Check Internal Jumpers** — On the Main VFD Control board there are 2 jumpers labeled J1 HARDWARE ENABLE and J2 SAFETY ENABLE. J1 should be removed and J2 should be in place. See Fig. 12.

Two jumper wires connect a particular terminal to chassis ground. The MOV and AC EMI jumper should be connected to the PE-A terminal. The COMMON MODE CAPACITORS to GROUND jumper should be connected to a standoff rather than the PE-B terminal.

Use the recommended tools as follows when connecting jumper wires in Frame 6 and in Frame 7:
- Recommended torque (screws and nuts) = 1.36 N·m (120.0 lb-in.)
- Recommended hex socket = 7 mm
- Recommended screwdriver = T20 star type

See Fig. 13 and Fig. 14 for the correct positions of the jumpers.

---

**Imbalance Calculation Formula**

\[
V_{avg} = \frac{(V_{AB} + V_{BC} + V_{CA})}{3}
\]

\[
\text{Imbalance \%} = \frac{(V_{max} - V_{min}) \times 100}{V_{avg}}
\]

---

**TB1 I/O TERMINAL DESIGNATIONS**

<table>
<thead>
<tr>
<th>FIXED I/O</th>
<th>TERMINAL</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Di 0ac</td>
<td>Digital Input 120V AC</td>
<td>Connections for AC power supply.</td>
<td></td>
</tr>
<tr>
<td>Di C</td>
<td>Digital Input Common</td>
<td>Digital input common</td>
<td></td>
</tr>
<tr>
<td>Di 0dc</td>
<td>Digital Input 24V DC</td>
<td>Connections for DC power supply.</td>
<td></td>
</tr>
<tr>
<td>+24V</td>
<td>+24 Volt Power</td>
<td>Connections for drive supplied 24V power.</td>
<td></td>
</tr>
<tr>
<td>24VC</td>
<td>24 Volt Common</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**LEGEND**

<table>
<thead>
<tr>
<th>NO.</th>
<th>NAME</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HIM (Human Interface Module) Connector</td>
<td>DPI Port 1 (HIM Cradle) connection.</td>
</tr>
<tr>
<td>2</td>
<td>Fan Connector</td>
<td>Power supply for internal cooling fan (Frames 2 and 3).</td>
</tr>
<tr>
<td>3</td>
<td>Battery Receptacle</td>
<td>User-installed CR1220 lithium coin cell battery provides power to the real-time clock (Optional, not supplied).</td>
</tr>
<tr>
<td>4</td>
<td>DPI Port 2</td>
<td>Cable connection for handheld and remote HIM options.</td>
</tr>
<tr>
<td>5</td>
<td>Embedded Ethernet/IP Address Selectors</td>
<td>Rotary switches for setting lowest octet of Ethernet address (forces address to 192.168.1.xxx).</td>
</tr>
<tr>
<td>6</td>
<td>Embedded Ethernet/IP Connector</td>
<td>Network cable connection.</td>
</tr>
<tr>
<td>7</td>
<td>Jumper J2 SAFETY ENABLE</td>
<td>Safety enable jumper. Removed when safety option is installed. For additional information, refer to the Check Internal Jumpers section on page 9.</td>
</tr>
<tr>
<td>8</td>
<td>Jumper J1 HARDWARE ENABLE</td>
<td>Hardware enable jumper. Removed when a hardware enable configuration is utilized. For additional information, refer to the Check Internal Jumpers section on page 9.</td>
</tr>
<tr>
<td>9</td>
<td>TB1 I/O terminal block.</td>
<td></td>
</tr>
</tbody>
</table>

**IMPORTANT:** Wiring to pluggable terminal block connectors should be supported by wire ties or other means to help prevent unintentional disconnection.

---

Fig. 12 — PF755 Main Control Board
Troubleshooting the Drive — The drive can display 2 kinds of error codes on the ICVC called Alert and Alarm codes. These codes signal a problem detected during self-tuning or drive operation. Note the following differences between Carrier and Allen-Bradley terminology:

- A warning message on the ICVC is an ALERT.
- The same warning viewed with Rockwell Drive Explorer is a VFD ALARM.
- A failure resulting in a shutdown is seen as an ALARM on the ICVC and as a VFD FAULT when viewed with Drive Explorer.

CONDITION CODES

<table>
<thead>
<tr>
<th>ICVC ALERT</th>
<th>VFD ALARM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICVC ALARM</td>
<td>VFD FAULT</td>
</tr>
</tbody>
</table>

See Tables 3-4 and Fig. 15.

ICVC ALERT CODES — An alert condition is indicated by a message at the top of the ICVC default screen. In addition, an exclamation point (!) will appear next to any affected point on an ICVC display screen. The drive will continue to operate during the alert condition. Investigate the cause of the alert to ensure it does not lead to a fault condition. The alert code will automatically be cleared from the ICVC when the condition causing the alert no longer exists. See the 19XRV or 23XRV Start-Up, Operation and Maintenance Instructions for ICVC alert codes.

ICVC ALARM CODES — An alarm condition is also indicated by a message at the top of the ICVC default screen. If an alarm occurs, the drive coasts to stop. The STS (status) light on the drive will turn from green to red or yellow (see Table 3). The detected fault message is maintained on the display until it is cleared by pressing the RESET softkey. See the 19XRV or 23XRV Start-Up, Operation and Maintenance Instructions for ICVC alarm codes.

TEST EQUIPMENT NEEDED TO TROUBLESHOOT — An isolated multimeter adequately rated for the DC bus voltage will be needed to measure DC bus voltage and to make resistance checks. Note that dedicated troubleshooting test points are not provided.

DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.
### Table 3 — Drive Status Indicator Descriptions

<table>
<thead>
<tr>
<th>NAME</th>
<th>COLOR</th>
<th>STATE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STS (Status)</strong></td>
<td>Green</td>
<td>Flashing</td>
<td>Drive ready but not running, and no faults are present.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady</td>
<td>Drive running, no faults are present.</td>
</tr>
<tr>
<td></td>
<td>Yellow</td>
<td>Flashing</td>
<td>Drive is not running. A type 2 (non-configurable) alarm condition exists, and the drive cannot be started.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady</td>
<td>Drive is not running, a type 1 alarm condition exists. The drive can be started.</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>Flashing</td>
<td>A major fault has occurred. Drive cannot be started until fault condition is cleared.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady</td>
<td>A non-resettable fault has occurred.</td>
</tr>
<tr>
<td></td>
<td>Red/Yellow</td>
<td>Flashing Alternately</td>
<td>A minor fault has occurred. When running, the drive continues to run. System is brought to a stop under system control. Fault must be cleared to continue. Use parameter 950 [Minor Flt Config] to enable. If not enabled, acts like a major fault.</td>
</tr>
<tr>
<td></td>
<td>Green/Red</td>
<td>Flashing Alternately</td>
<td>Drive is flash updating.</td>
</tr>
<tr>
<td><strong>ENET</strong></td>
<td>None (Unlit)</td>
<td>Off</td>
<td>Adapter and/or network is not powered, adapter is not properly connected to the network, or adapter needs an IP address.</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>Flashing</td>
<td>An Ethernet/IP connection has timed out.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady</td>
<td>Adapter failed the duplicate IP address detection test.</td>
</tr>
<tr>
<td></td>
<td>Red/Green</td>
<td>Flashing Alternately</td>
<td>Adapter is performing a self-test.</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Flashing</td>
<td>Adapter is properly connected but is not communicating with any devices on the network.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady</td>
<td>Adapter is properly connected and communicating on the network.</td>
</tr>
<tr>
<td><strong>LINK</strong></td>
<td>None (Unlit)</td>
<td>Off</td>
<td>Adapter is not powered or is not transmitting on the network.</td>
</tr>
<tr>
<td></td>
<td>Green</td>
<td>Flashing</td>
<td>Adapter is properly connected and transmitting data packets on the network.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady</td>
<td>Adapter is properly connected but is not transmitting on the network.</td>
</tr>
</tbody>
</table>

**NOTES:**
1. A Type 1 alarm indicates that a condition exists. Type 1 alarms are user configurable.
2. A Type 2 alarm indicates that a configuration error exists and the drive cannot be started. Type 2 alarms are not configurable.

**VERIFYING THAT DC BUS CAPACITORS ARE DISCHARGED** — The drive’s DC bus capacitors retain hazardous voltages after input power has been disconnected. Perform the following steps before touching any internal components:

1. Turn off and lock out input power. Wait 5 minutes.
2. Verify that there is no voltage at the drive’s input power terminals.
3. Measure the DC bus potential with a voltmeter while standing on a non-conductive surface and wearing insulated gloves (1000 v). Measure the DC bus potential. See Fig. 6 for the 248-amp drive and Fig. 7 for the 289, 361, and 477-amp drives. The voltage between DC+ and DC-, and from each DC terminal to the chassis must be zero before proceeding.
4. Once the drive has been serviced, reapply input power.

**HIGH TEMPERATURE ALARMS** — Coolant flow through the cold plate is controlled by an orifice in the refrigerant line leaving the cold plate. The orifice looks like one of the O-ring face seal connectors and in fact is used as one of the connections on the coolant tubing. If the orifice is present and condenser liquid flow is present, the liquid will flash to cooler temperature at the orifice. This temperature difference is great enough to be easily felt.

**MAIN CONTROL BOARD (MCB) COMPONENTS** — Figure 16 shows the drive module with the cover removed. To access the control boards, loosen the screw on the face of the keypad mount and swing the keypad mount upward.

The components on the main control board (MCB) are shown in Fig. 17. Note the location of the terminals labeled MCB I/O. The high-pressure switch is wired to these terminals as shown in Fig. 18. In the event of a high condenser pressure alarm, the connections at these terminals should be checked and tightened if necessary.

Typical wiring schematics are shown in Appendix A.
Fig. 17 — MCB (Main Control Board) Components

*Located outside of starter; connected by field wiring.

Fig. 18 — High-Pressure Switch Wiring
<table>
<thead>
<tr>
<th>VFD FAULT CODE ON VFD HIST SCREEN</th>
<th>ICVC FAULT STATE</th>
<th>FAULT TYPE</th>
<th>DESCRIPTION</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>206</td>
<td>Processor memory fault</td>
<td>Consult VFD manual to resolve generic fault.</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td>No Entry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>207</td>
<td>Auxiliary Input</td>
<td>Input is open.</td>
<td>Check Compressor Discharge High Pressure switch wiring and accuracy. Check for high condenser water temperatures, low water flow, fouled tubes. Check for noncondensables in refrigerant.</td>
</tr>
<tr>
<td>4</td>
<td>215</td>
<td>Undervoltage</td>
<td>Low DC bus voltage</td>
<td>Verify phase-to-phase and phase-to-ground line voltage. VFD Circuit Board malfunction. Contact Carrier Service.</td>
</tr>
<tr>
<td>5</td>
<td>166</td>
<td>Overvoltage</td>
<td>High DC bus voltage</td>
<td>Verify phase to phase and ground line voltage. Monitor AC line for high transient voltage conditions.</td>
</tr>
<tr>
<td>7</td>
<td>217</td>
<td>Motor Overload</td>
<td>An internal electronic overload trip has occurred.</td>
<td>Any phase current &gt; 106% RLA. Can result from significant load side current imbalance when running at full load. Check entering condenser water temperature and water flow rate. Check Motor Rated Load Amps in VFD_CONF screen.</td>
</tr>
<tr>
<td>8</td>
<td>219</td>
<td>Heat Sink Overtemp</td>
<td>Heat sink temperature has exceeded maximum operating temperature.</td>
<td>Check that VFD refrigerant isolation valves are open. Check VFD refrigerant cooling orifice and refrigerant strainer. Check for proper VFD cooling fan operation and air flow blockage.</td>
</tr>
<tr>
<td>9</td>
<td>219</td>
<td>Transistor Overtemp</td>
<td>The output transistors have exceeded maximum operating temperature.</td>
<td>Check that VFD refrigerant isolation valves are open. Check VFD refrigerant cooling orifice and refrigerant strainer. Check for proper VFD cooling fan operation and air flow blockage.</td>
</tr>
<tr>
<td>12</td>
<td>286</td>
<td>HW Overcurrent</td>
<td>The drive output current has exceeded hardware current limit.</td>
<td>Check for high entering water temperature or low condenser water flow. Check current settings in VFD_CONF screen.</td>
</tr>
<tr>
<td>13</td>
<td>220</td>
<td>Ground Fault</td>
<td>A current path to earth ground greater than 25% of drive rating has occurred.</td>
<td>Check the motor, motor terminals, and external wiring to the drive output terminals for a grounded condition.</td>
</tr>
<tr>
<td>14</td>
<td>206</td>
<td>Ground Warning</td>
<td>The ground current has exceeded the level set in P467.</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>206</td>
<td>Load Loss</td>
<td>If this fault appears, there may be a problem with software configuration.</td>
<td>To reset the processor, cycle power to chiller, check ICVC VFD_CONF settings and save settings when exiting VFD_CONF screen. Check VFD parameters with Drive Explorer.</td>
</tr>
<tr>
<td>17</td>
<td>216</td>
<td>The DC bus ripple has exceeded a preset level.</td>
<td>Line Voltage imbalance</td>
<td>Check phase-to-phase and phase-to-ground distribution bus voltage. Increase Line Voltage % imbalance in VFD_CONF screen.</td>
</tr>
<tr>
<td>20</td>
<td>206</td>
<td>TorqPrv Spd Band</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>21</td>
<td>225</td>
<td>Output PhaseLoss</td>
<td>The current in one or more phases has been lost or remains below a preset level.</td>
<td>Check Motor Current % Imbalance in VFD_-CONF screen.</td>
</tr>
<tr>
<td>24</td>
<td>204</td>
<td>Decel Inhibit</td>
<td>The drive is not following a commanded deceleration because it is attempting to limit bus voltage.</td>
<td>Verify input voltage is within drive specified limits. Verify system ground impedance follows proper grounding techniques. Disable bus regulation P186 and/or add dynamic brake resistor and/or extend deceleration time P537 and P538.</td>
</tr>
<tr>
<td>33</td>
<td>206</td>
<td>AuRsts Exhausted</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>36</td>
<td>286</td>
<td>SW Overcurrent</td>
<td>The drive output current has exceeded the 1 ms current rating.</td>
<td>Check for excess load, improper DC boost setting, DC brake volts set too high.</td>
</tr>
<tr>
<td>VFD Fault Code</td>
<td>ICVC Fault State</td>
<td>Fault Type</td>
<td>Description</td>
<td>Corrective Action</td>
</tr>
<tr>
<td>----------------</td>
<td>------------------</td>
<td>------------</td>
<td>-------------</td>
<td>------------------</td>
</tr>
<tr>
<td>38</td>
<td>220</td>
<td>Phase U to Gnd</td>
<td>GROUND FAULT</td>
<td>Check wiring between drive and motor. Check motor for grounded phase. Check motor terminals. Replace drive.</td>
</tr>
<tr>
<td>39</td>
<td></td>
<td>Phase V to Gnd</td>
<td>GROUND FAULT</td>
<td>Check wiring between drive and motor. Check motor terminals.</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>Phase W to Gnd</td>
<td>GROUND FAULT</td>
<td>Check wiring between drive and motor. Replace drive.</td>
</tr>
<tr>
<td>41</td>
<td>246</td>
<td>Phase UV Short</td>
<td>GROUND FAULT</td>
<td>Check wiring between drive and motor. Check motor terminals. Replace drive.</td>
</tr>
<tr>
<td>42</td>
<td></td>
<td>Phase VW Short</td>
<td></td>
<td>Check wiring between drive and motor. Replace drive.</td>
</tr>
<tr>
<td>43</td>
<td></td>
<td>Phase WU Short</td>
<td></td>
<td>Check wiring between drive and motor. Replace drive.</td>
</tr>
<tr>
<td>44</td>
<td>206</td>
<td>Phase UNot</td>
<td>GROUND FAULT (no LF2 equivalent)</td>
<td>Check wiring between drive and motor. Check motor terminals. Replace drive.</td>
</tr>
<tr>
<td>45</td>
<td>206</td>
<td>Phase VNot</td>
<td>GROUND FAULT (no LF2 equivalent)</td>
<td>Check wiring between drive and motor. Check motor terminals. Replace drive.</td>
</tr>
<tr>
<td>46</td>
<td>206</td>
<td>Phase WNot</td>
<td></td>
<td>Check wiring between drive and motor. Replace drive.</td>
</tr>
<tr>
<td>55</td>
<td>NONE</td>
<td>Inverter Overtemp</td>
<td>The temperature sensor on the main control board detected excessive heat.</td>
<td>Check that VFD refrigerant isolation valves are open. Check VFD refrigerant strainer.</td>
</tr>
<tr>
<td>61</td>
<td>206</td>
<td>Shear Pin 1</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>62</td>
<td>206</td>
<td>Shear Pin 2</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>64</td>
<td>206</td>
<td>Drive Overload</td>
<td>Drive is overloaded.</td>
<td>Check for high entering water temperature or low condenser water flow. Check current settings in VFD_CONF screen.</td>
</tr>
<tr>
<td>65</td>
<td>206</td>
<td>OW TrqLvltTimeout</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>77</td>
<td>206</td>
<td>IR Volts Range</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>78</td>
<td>206</td>
<td>FluxAmpsRef Rang</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>79</td>
<td>206</td>
<td>Excessive Load</td>
<td>Motor did not come up to speed in the allotted time.</td>
<td>Check that guide vanes are closed completely. Check for high entering water temperature or low condenser flow. Repeat Autotune</td>
</tr>
<tr>
<td>80</td>
<td>206</td>
<td>AutoTune Aborted</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>87</td>
<td>206</td>
<td>Ixo VoltageRange</td>
<td>Ixo voltage calculated from motor nameplate data is too high.</td>
<td>Re-enter motor nameplate data in VFD_CONF screen.</td>
</tr>
<tr>
<td>91</td>
<td>206</td>
<td>Pri VelFdbk Loss</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>93</td>
<td>206</td>
<td>HW Enable Check</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>94</td>
<td>206</td>
<td>Ait VelFdbk Loss</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>95</td>
<td>206</td>
<td>Aux VelFdbk Loss</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>96</td>
<td>206</td>
<td>PositionFdbkLoss</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>97</td>
<td>206</td>
<td>Auto Tach Switch</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>100</td>
<td>206</td>
<td>Parameter Chksum</td>
<td>The checksum read from the board does not match the checksum calculated.</td>
<td>Press ICVC reset. Check VFD_CONF parameters. Cycle power to the drive.</td>
</tr>
<tr>
<td>107</td>
<td>NONE</td>
<td>Replaced MCB-PB</td>
<td>The main control board was moved to a different power structure. Data set to default values.</td>
<td>Press ICVC reset. Check VFD_CONF parameters. Cycle power to the drive.</td>
</tr>
<tr>
<td>113</td>
<td>206</td>
<td>Tracking DataErr</td>
<td>Internal data error</td>
<td>Press ICVC reset. Cycle power to the drive.</td>
</tr>
<tr>
<td>124</td>
<td>206</td>
<td>App ID Changed</td>
<td>Application firmware changed.</td>
<td>Verify application version.</td>
</tr>
<tr>
<td>141</td>
<td>206</td>
<td>Aitm Enc Angle</td>
<td>P78 [Encdriss AngComp] is out of range.</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>142</td>
<td>206</td>
<td>Aitm Spd Rstrct</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>143</td>
<td>206</td>
<td>Autotune CurReg</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>144</td>
<td>206</td>
<td>Autotune Inertia</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
<tr>
<td>145</td>
<td>206</td>
<td>Autotune Travel</td>
<td>See VFD Fault Code 15</td>
<td>See VFD Fault Code 15</td>
</tr>
</tbody>
</table>
Checking Power Modules and Motor Input with Input Power Off — Use the following procedure to check the drive’s power module circuitry with power off:

1. Turn off and lock out input power. Wait 5 minutes.
2. Verify there is no voltage at the drive’s input power terminals.
3. Using a voltmeter, check the DC bus potential as described in the section Verifying That DC Bus Capacitors Are Discharged on page 11 to ensure the DC bus capacitors are discharged.
4. Disconnect the motor from the drive.
5. Check all AC line and DC bus fuses.
6. Use a multimeter to check the input diodes and output IGBTs if a fuse is open. See Table 5.
7. Check motor impedance.
8. Reconnect the motor to the drive.
9. Reapply input power.

DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Confirm that the DC bus has discharged before performing diode checks. Failure to observe this precaution could result in severe bodily injury or loss of life.
Servicing the Drive

**WARNING**

To guard against possible personal injury and/or equipment damage:

1. Inspect all lifting hardware for proper attachment before lifting drive.
2. Do not allow any part of the drive or lifting mechanism to make contact with electrically charged conductors or components.
3. Do not subject the drive to high rates of acceleration or deceleration while transporting to the mounting location or when lifting.

Do not allow personnel or their limbs directly underneath the drive when it is being lifted and mounted.

**WARNING**

DC bus capacitors retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait five (5) minutes for the DC bus capacitors to discharge and then check the voltage with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

1. Using recommended screwdriver (6.4 mm [0.25 in.] flat or T20 star), open access door. See Fig. 19.
2. Check to be sure that the voltage between DC+ and DC- and from each DC terminal to the chassis is zero before proceeding. See Fig. 20.
3. Remove the enclosure. See Fig. 21.

**REMOVING THE DRIVE** — The dimensions and weights specified must be taken into consideration when removing the drive. All lifting equipment and lifting components (hooks, bolts, lifts, slings, chains, etc.) must be properly sized and rated to safely lift and hold the weight of the drive while removing it. For 19XRV chillers, see Fig. 22. For 23XRV chillers, see Fig. 23. The drive weights are as follows:

- Drive weight for Frame 6: 85 lb.
- Drive weight for Frame 7: 160 - 249 lb.

When replacing the drive, reverse the procedures and tighten to the torques for Frames 6 and 7 power terminal block listed in Table 6.

**Table 6 — Frames 6 and 7 Power Terminal Block**

<table>
<thead>
<tr>
<th>FRAME</th>
<th>MAXIMUM LUG WIDTH</th>
<th>RECOMMENDED TORQUE</th>
<th>TERMINAL BOLT SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>34.6 mm (1.36 in.)</td>
<td>11.3 N·m (100 in.-lb)</td>
<td>M8 x 1.25</td>
</tr>
<tr>
<td>7</td>
<td>43.5 mm (1.71 in.)</td>
<td>11.3 N·m (100 in.-lb)</td>
<td>M8 x 1.25</td>
</tr>
</tbody>
</table>

**RIGGING THE ENCLOSURE** — Where overhead room and/or clearance in front of the drive enclosure is insufficient to allow the drive to be safely removed from the enclosure, the entire enclosure may have to be removed from the chiller.

The dimensions and weights specified must be taken into consideration when removing the enclosure. For 19XRV chillers, the total weight for Frames 6 and 7, including drive weight and enclosure, is 720 lb. The 23XRV chiller enclosure, including all components, weighs 975 lb. All lifting equipment and lifting components (hooks, bolts, lifts, slings, chains, etc.) must be properly sized and rated to safely lift and hold the weight of the enclosure and drive while removing. See Fig. 24 and Fig. 25.
**Fig. 22 — 19XRV Enclosure Access for Removing Drive**

**Fig. 23 — 23XRV Enclosure Access for Removing Drive**

**Fig. 24 — Rigging the Enclosure, Frame 6**

**Fig. 25 — Rigging the Enclosure, Frame 7**
REPLACING THE GATEWAY (A-B20-750-20COMM OPTION CARD) — Follow these steps for removing and replacing the existing gateway:

1. Disconnect power to the drive. Before removing the enclosure, open the access door on the front of the drive. See Fig. 19.
2. Check to be sure that the voltage between DC+ and DC- and from each DC terminal to the chassis is zero before proceeding. See Fig. 20.
3. Remove the enclosure. See Fig. 21.
4. Remove the 2 screws securing the mounting plate and remove the mounting plate and COMM card. See Fig. 26.
5. Mount the new COMM card and mounting plate and attach with the 2 screws removed in Step 4. See Fig. 27.
6. Use the shorter ribbon cable to connect the plug on the COMM card to the connector on the mounting plate. See Fig. 26.
7. Install the enclosure. See Fig. 21.

CHILL PLATE FAN AND INTERNAL FAN REPLACEMENT — Follow these steps to replace the chill plate fan and internal fan in Frames 6 and 7.

Frame 6 (chill plate fan kit Z1P-FAN-A6-A):

1. Disconnect power to the drive. Before removing the enclosure, open the access door on the front of the drive. See Fig. 19.
2. Check to be sure that the voltage between DC+ and DC- and from each DC terminal to the chassis is zero before proceeding. See Fig. 20.
3. Remove the enclosure. See Fig. 21.
4. Remove and replace the chill plate fan. See Fig. 28.
5. Remove and replace the internal fan. See Fig. 29.
6. Install the enclosure. See Fig. 21.
Frame 7 (chill plate fan kit Z1P-FAN-A7-A):
1. Disconnect power to the drive. Before removing the enclosure, open the access door on the front of the drive. See Fig. 19.
2. Check to be sure that the voltage between DC+ and DC- and from each DC terminal to the chassis is zero before proceeding. See Fig. 20.
3. Remove the enclosure. See Fig. 21.

Part Identification and Location — See Fig. 31-34 for parts descriptions and locations.

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Fig. 29 — Internal Fan, Frame 6

Fig. 30 — Chill Plate and Internal Fans, Removal and Replacement, Frame 7

Fig. 31 — 19XRV Assembly Parts
LEGEND

1 — Input Circuit Breaker
2 — Power Module
3 — Control Relays (CR1 - CR6)
4 — Control Fuses
5 — 120 v Control Transformer
6 — 120 v Vaporizer Heater Transformer
7 — 15 amp Control Circuit Breaker
8 — Cooling Fan

Fig. 32 — 23XRV Assembly Parts
NOTE: When replacing the Main Control Board (Item No. 5) the jumper marked “J1 HARDWARE ENABLE” must be removed and the jumper marked “J2 SAFETY ENABLE” must be left in place.

LEGEND
1 — PF750 Series, Precharge Kit
2 — PF750 Series, Gate Interface
3 — PF750 Series, Power Interface
4 — PowerFlex 750 Series, Flange Gasket
5 — PF755 Main Control Board
6 — PF750 Series, Backplane Interface
7 — PF750 Series, Type 4X/12 Chill Plate (Heatsink) Fan Kit
8 — Chill Plate Fan

Fig. 33 — Frame 6 Parts

LEGEND
1 — Slot for Gateway (Gateway Not Shown)
2 — PF750 Series, Backplane Interface
3 — PF750 Series, Type 4X/12 Heatsink Fan Kit
4 — PF750 Series, Power Interface
5 — PF750 Series, Bus Cap Assembly
6 — PF750 Series, Power Interface Cable
7 — PF750 Series, Current Transducer Kit
8 — PF750 Series, Precharge Kit
9 — Slot for 24 v I/O Module (24 v I/O Module Not Shown)
10 — PF755 Main Control Board

NOTE: When replacing the Main Control Board (Item No. 10) the jumper marked “J1 HARDWARE ENABLE” must be removed and the jumper marked “J2 SAFETY ENABLE” must be left in place.

Fig. 34 — Frame 7 Parts
APPENDIX A — WIRING SCHEMATICS (cont)

23XRV CHILLER CONTROL SCHEMATIC

NOTES:
1. Liquid flow circuit: to install optional flow device, wire as shown (NO) and replace jumper with a 4.3k resistor.
2. For TP compressor, the condenser flow switch must be installed in series with the cooler flow switch. Do not connect condenser flow switch to J3 (Lower) 23 and 24.
3. For TP compressor, remove 4.3k resistor between J3 (Lower) 20 and 21.
APPENDIX A — WIRING SCHEMATICS (cont)
ROCKWELL POWERFLEX 755 WIRING SCHEMATIC (Typical)
19XRV (Typical)

See Legend on page 25.
See Legend on page 27.
APPENDIX A — WIRING SCHEMATICS (cont)
ROCKWELL POWERFLEX 755 WIRING SCHEMATIC (Typical) (cont)
23XRV Typical (cont)

LEGEND

CAP — Capacitor
CB — Circuit Breaker
COM — Common
COMM — Communication
COND — Condenser
CR — Control Relay
DPI/SI — Internal Communication Protocols
Connections
EA — Electrical Assembly
EMI — Electro-Magnetic Interference
EVAP — Evaporator
FU — Fuse
GND — Ground
JMPR — Jumper
M — Motor
NC — Normally Closed
NO — Normally Open
PE — Potential Earth (Ground)
POD — I/O Card Mounting Board Slot
REM — Remote
RO — Relay Output
ROC — Relay Output Common
SHLD — Shield
TB — Terminal Block