

Pre-Energization Installation Checklist

FORM 1 OF 3 | PRE-COMMISSIONING | 42 ITEMS | ABOUT 20 MINUTES



This is the field version of the checklist developed in Chapter 13. Walk the installation in the order shown. Fill it out from the panel, not from memory. If an item cannot be verified, mark it and stop. Do not apply power to a drive that has an unverified item on this checklist.

Each item carries a chapter reference so you can look up the reasoning behind anything that is unclear. The items line up with the major drive manufacturers' own checklists. This checklist does not replace the drive manufacturer's installation manual.

Each item takes one disposition. *P (Pass): verified, acceptable, documented where required. F (Fail): verified, not acceptable; correct before proceeding. NA: not applicable to this installation. Do not mark an item Pass if it has not actually been verified.*

B.2 INSTALLATION IDENTIFICATION

Fill out this header before starting.

Site name and location		Facility / building / area	
Drive designation (tag)		Drive manufacturer	
Drive model		Drive serial number	
Drive HP / kW rating		Drive voltage class	
Drive continuous current rating (A)		Motor designation	
Motor manufacturer		Motor HP / kW	
Motor voltage (as connected)		Motor FLA at installed voltage (A)	
Motor nameplate RPM		Motor frame	
Motor service factor		Motor insulation class	
Date of pre-energization check		Technician performing check	
Technician registration / license no.		Commissioning lead (if different)	

B.3 PHASE 1: ENVIRONMENTAL ASSESSMENT

Overheating causes 50 to 60 percent of VFD failures (Chapter 7), and most of those start with an environmental condition that was never assessed.

☐ P
 ☐ F
 ☐ NA

1.1 Ambient temperature at the drive.
 Measured at the drive air intake with the enclosure closed and ventilation running. At or below the drive rated ambient (typically 104 °F, listed as 40 °C on most data sheets), or derating applied for the actual temperature. (Ch. 7)

Measured ambient °F Drive rated ambient °F

Derating applied: ☐ Yes ☐ No ☐ N/A

☐ P
 ☐ F
 ☐ NA

1.2 Altitude.
 Documented. Above 3,300 ft (1000 m), derating applied at about 1 percent per 330 ft above 3,300 ft. (Ch. 7)

Site altitude ft

Derating applied: ☐ Yes ☐ No ☐ N/A

☐ P
 ☐ F
 ☐ NA

1.3 Humidity.
 Within the drive rated range (typically 5 to 95 percent, non-condensing). No risk of condensation from temperature swings crossing the dew point. (Ch. 7)

Humidity range observed %

☐ P
 ☐ F
 ☐ NA

1.4 Contamination and enclosure rating.
 Airborne contaminants at the site identified. Enclosure rating (IP or NEMA) appropriate for the contaminants present. (Ch. 7, Ch. 8)

Contaminants identified

Enclosure rating

B.4 PHASE 2: MECHANICAL CHECKS

With the environment confirmed, verify the physical installation of the drive and its associated components.

P ☐	F ☐	NA ☐	2.1 Mounting surface and orientation. Drive mounted vertically (unless the manufacturer permits another orientation) on a flat, rigid surface that carries the drive weight without flexing. Vibration at the mounting location within manufacturer specification. (Ch. 8)
P ☐	F ☐	NA ☐	2.2 Spacing between drives. Minimum clearances per manufacturer specification met above, below, and between adjacent drives. Cooling airflow path not restricted. (Ch. 8)
P ☐	F ☐	NA ☐	2.3 Flange-mount requirements. If flange-mounted, cooling requirements satisfied on both the enclosure side and the heatsink side. (Ch. 8) Flange-mounted: ☐ Yes ☐ No ☐ N/A
P ☐	F ☐	NA ☐	2.4 Mechanical fasteners. All drive mounting bolts, cable glands, conduit fittings, sub-plate hardware, and accessory brackets torqued to specification. (Ch. 8)
P ☐	F ☐	NA ☐	2.5 Motor feedback devices. Encoder, resolver, or other feedback device securely attached per the device manufacturer's mechanical precautions. (Ch. 12) Feedback device installed: ☐ Yes ☐ No ☐ N/A
P ☐	F ☐	NA ☐	2.6 Motor coupling state documented. Coupling state for the ID Run recorded: decoupled for a Normal ID Run, or coupled for a Reduced ID Run if decoupling is not practical. (Ch. 14) State: ☐ Decoupled ☐ Coupled

B.5 PHASE 3: ELECTRICAL CHECKS

The most detailed phase. Twenty-three items in four parts. Work through them in order.

B.5.1 AC Supply Source and Input Power Conditioning

P ☐	F ☐	NA ☐	3.1 Transformer configuration identified. Distribution transformer grounding configuration documented (Delta/Wye grounded, ungrounded, resistance grounded, corner grounded Delta). (Ch. 9) Configuration
P ☐	F ☐	NA ☐	3.2 Power jumper configuration confirmed. Drive internal power jumpers match the transformer grounding system. Grounded systems: jumpers closed. Ungrounded or resistance-grounded systems: jumpers open AND MOVs and common-mode capacitors removed or disconnected per manufacturer procedure. (Ch. 9)
P ☐	F ☐	NA ☐	3.3 Transformer kVA ratio verified. Transformer kVA does not exceed 10 times drive kVA (no DC link choke) or 20 times drive kVA (with DC link choke). If exceeded, line reactor installed. Transformer also large enough to meet the drive full-load kVA. (Ch. 9) Transformer kVA Drive kVA Ratio Line reactor installed: ☐ Yes ☐ No ☐ N/A
P ☐	F ☐	NA ☐	3.4 Isolation transformer grounding or line reactor confirmed. If an isolation transformer feeds the drive, its XO terminal is solidly grounded (below 1 ohm to earth). If not, a line reactor is present with no device wired between the reactor secondary and the drive input. (Ch. 9) Isolation transformer XO to earth ohms Or line reactor installed
P ☐	F ☐	NA ☐	3.5 Supplemental equipment validated. Other equipment on the same bus identified (power factor capacitors, switching devices, passive harmonic filters) and isolated as needed. Power factor capacitors, if present, are on the line side of the drive, never between drive and motor. (Ch. 9)

B.5.2 Grounding and Bonding

P ☐	F ☐	NA ☐	3.6 Paint removed at all ground connections. Every bolt, lug, and mounting point where a ground conductor or bonding strap meets the panel has bare metal contact. (Ch. 11)
P ☐	F ☐	NA ☐	3.7 Drive PE to ground bar. Dedicated ground conductor from the drive PE terminal directly to the enclosure ground bar, sized to match the power conductors per manufacturer specification. (Ch. 11)
P ☐	F ☐	NA ☐	3.8 Motor to drive ground. Dedicated ground conductor from the motor directly to the drive, not routed through the panel ground bar as an intermediate point. (Ch. 11)
P ☐	F ☐	NA ☐	3.9 Sub-plate bonding. Multiple sub-plates bonded together with braided metal straps at low-impedance connections. (Ch. 11) Multiple sub-plates present: ☐ Yes ☐ No ☐ N/A
P ☐	F ☐	NA ☐	3.10 PE terminal placement. Input power ground on the terminal closer to the input wiring. Motor cable ground on the terminal closer to the output wiring. (Ch. 11)
P ☐	F ☐	NA ☐	3.11 Ground resistance measured. Drive PE to panel ground bar, and panel ground bar to facility ground electrode, measured with a milliohm meter. Readings below 0.1 ohm. (Ch. 11) Drive PE to ground bar ohms Ground bar to facility ground ohms

B.5.3 Cable and Shield Verification

P ☐	F ☐	NA ☐	3.12 Motor cable type and shield. Motor cable is VFD cable per ANSI/ICEA S-138-738-2024 (or equivalent construction). Shield terminated 360 degrees at both drive and motor ends. Length within the drive's specified maximum for the motor insulation class. (Ch. 5, Ch. 10) Cable length (one-way) ft Cable type
P ☐	F ☐	NA ☐	3.13 Brake cable shield. If a mechanical motor brake is installed, its cable shield is terminated to the enclosure ground bar, NOT to the drive. (Ch. 12) Mechanical brake present: ☐ Yes ☐ No ☐ N/A
P ☐	F ☐	NA ☐	3.14 Encoder cable type and routing. Correct cable type (double-shielded per ABB and Rockwell). Encoder wiring kept at least 12 in from motor power and brake wiring inside the enclosure; separate raceway with dividers or separate conduit outside it. (Ch. 12) Encoder installed: ☐ Yes ☐ No ☐ N/A
P ☐	F ☐	NA ☐	3.15 Encoder cable shield direction. Shield terminated at the drive end only. Continuous run from device to drive with no breaks, couplers, or intermediate terminals. (Ch. 12)
P ☐	F ☐	NA ☐	3.16 Dynamic brake cable and routing. Twisted pair wired to BR+ and BR-. Length within manufacturer specification for the frame. Routed in the power zone, not with control wiring. (Ch. 5, Ch. 9) Dynamic brake installed: ☐ Yes ☐ No ☐ N/A
P ☐	F ☐	NA ☐	3.17 Wire routing separation. High-voltage and low-voltage wiring separated per the Chapter 8 zone principles. Control and power cables cross at 90 degrees where they must cross. (Ch. 8, Ch. 12)
P ☐	F ☐	NA ☐	3.18 All terminations torqued. Every power, ground, and control terminal torqued to manufacturer specification with a torque screwdriver or wrench. Not feel-tested. (Ch. 9, Ch. 12) Torque specification reference

B.5.4 Surge Suppression and Control Wiring

P ☐ F ☐ NA ☐

3.19 Surge suppressors on all coils.

RC snubbers, MOVs, or flyback diodes (as appropriate for AC or DC coils) across every contactor, relay, solenoid, and brake coil on the same power system as the drive. (Ch. 9)

P ☐ F ☐ NA ☐

3.20 Input fuses sized and installed.

Fuse type and rating match the manufacturer requirement for the specific drive model, sized per NEC and the drive's UL certification. (Ch. 5, Ch. 9)

Fuse type Rating A Interrupting capacity kA

P ☐ F ☐ NA ☐

3.21 Control cable shields.

Analog signal cables are shielded twisted pair, shields at the drive end only. Digital and communication shields terminated per protocol specification. (Ch. 12)

P ☐ F ☐ NA ☐

3.22 Communication cables.

Cables match the protocol specification (shielded Ethernet in VFD environments, not unshielded). Connector termination verified. (Ch. 12)

Protocol

P ☐ F ☐ NA ☐

3.23 Wire run length documented.

Actual one-way length from the motor junction box to the drive output terminals measured and recorded. An ABB warranty registration requirement and the reference for future modifications. (Ch. 10, Ch. 13)

Wire run length ft

B.6 PHASE 4: MOTOR INSULATION TESTING

Megger with the drive DISCONNECTED from the motor. Applying megger voltage through the drive will destroy its output power semiconductors.

P ☐ F ☐ NA ☐

4.1 Drive disconnected from motor.

Motor cable lifted at the drive T1, T2, T3 terminals and left connected at the motor junction box so the test covers cable and windings. (Ch. 13)

P ☐ F ☐ NA ☐

4.2 Megger readings recorded.

Test voltage applied between each phase conductor and PE. Three readings with the test voltage documented. (Ch. 13)

Test voltage VDC

T1 to PE megohms T2 to PE megohms T3 to PE megohms

P ☐ F ☐ NA ☐

4.3 All readings above 1 megohm and reasonably similar.

Above 10 megohms generally healthy. 1 to 10 megohms: investigate for moisture or degraded insulation. Below 1 megohm: correct before connecting the motor. One phase much lower than the others: investigate as a localized insulation problem. (Ch. 13)

All readings above 1 megohm: ☐ Yes ☐ No

Within about 50 percent of each other: ☐ Yes ☐ No

B.7 PHASE 5: MOTOR PREPARATION FOR COMMISSIONING

P ☐ F ☐ NA ☐

5.1 Motor coupling state confirmed and documented.

Decoupled and documented as ready for a Normal ID Run, or coupled and documented as requiring a Reduced ID Run. (Ch. 14)

Coupling state: ☐ Decoupled (Normal ID Run) ☐ Coupled (Reduced ID Run)

P F NA
☐ ☐ ☐

5.2 Rotation direction identified and marked.

For rotation-sensitive equipment (pump, compressor, handed fan wheel, positive displacement machine), correct direction identified and marked at the motor and at the drive output terminals. Otherwise, verified at first rotation. (Ch. 15)

Rotation-sensitive: ☐ Yes ☐ No

Correct direction marked: ☐ Yes ☐ N/A

B.8 PHASE 6: FINAL REVIEW BEFORE POWER-UP

A deliberate pause. Step back from the individual items and consider the installation as a whole.

P F NA
☐ ☐ ☐

6.1 Installation walkthrough performed.

Walked the full path from transformer through the panel to the motor and driven equipment. Cable runs clean, wire ducts closed, no debris, clippings, or loose hardware in the enclosure. (Ch. 13)

P F NA
☐ ☐ ☐

6.2 Panel clean and closable.

Doors and covers close without pinching cables. Warning labels in place. Feeding disconnect or breaker operational and accessible. (Ch. 13)

P F NA
☐ ☐ ☐

6.3 Safe-to-operate confirmation from all stakeholders.

Electrical lead confirms electrical work complete. Mechanical lead confirms motor and driven equipment ready. Operations confirms it is safe to start. LOTO removed by the authorized person and all personnel clear. (Ch. 13)

Electrical lead

Mechanical lead

Operations

P F NA
☐ ☐ ☐

6.4 Checklist signed and dated.

Name, registration or license number, date, and signature recorded in B.9. (Ch. 13)

B.9 CERTIFICATION AND SIGN-OFF

By signing, the verifying technician states that every item has been personally verified to the best of their ability, all required measurements are recorded accurately, and the installation is ready for first power-up per Chapters 14 and 15.

Verifying technician (printed name)

Registration / license number

Signature

Date

Time check completed

Total elapsed time

Disposition of deficiencies. List every item marked F or not verified, the corrective action, and initial when resolved. Do not proceed to first power-up until all deficiencies are resolved.

Item #	Deficiency	Corrective action	Date resolved	Initial

B.10 CONSOLIDATED MEASUREMENT RECORD

The baseline for every future inspection, annual test, and condition assessment on this drive. Values fill in automatically from the items above in Acrobat and most desktop PDF readers; type them in if your viewer does not.

Measurement	Value	Units	Reference
Ambient temperature at drive		°F	Item 1.1
Site altitude		ft	Item 1.2
Ambient humidity range		%	Item 1.3
Transformer kVA		kVA	Item 3.3
Transformer / drive kVA ratio		ratio	Item 3.3
Isolation transformer XO to earth		ohms	Item 3.4
Drive PE to ground bar resistance		ohms	Item 3.11
Ground bar to facility ground resistance		ohms	Item 3.11
Motor cable length (one-way)		ft	Item 3.12
Input fuse rating		A	Item 3.20
Input fuse interrupting capacity		kA	Item 3.20
Wire run length (motor to drive)		ft	Item 3.23
Megger T1 to PE		megohms	Item 4.2
Megger T2 to PE		megohms	Item 4.2
Megger T3 to PE		megohms	Item 4.2
Megger test voltage		VDC	Item 4.2

B.11 DISTRIBUTION OF THE COMPLETED CHECKLIST

- ☐ Drive documentation binder (panel or motor control room)
- ☐ Facility CMMS, attached to the drive asset record
- ☐ Manufacturer warranty registration, if applicable (ABB Certified Start-Up: within 10 days of start-up)
- ☐ Project commissioning package with Forms 2 and 3