DOL STARTER MAINTENANCE CHECKLIST

Complete Preventive Maintenance Guide for Direct-On-Line Motor Starters

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EQUIPMENT INFORMATION

Field	Details
Facility/Location:	_____
Equipment ID/Tag:	_____
Motor Rating (HP):	_____
Voltage (V):	_____
Full Load Current (A):	_____
Date of Maintenance:	_____
Technician Name:	_____
Technician Signature:	_____
Next Maintenance Due:	_____

SAFETY PRECAUTIONS

⚠️ COMPLETE ALL ITEMS BEFORE STARTING MAINTENANCE

- [ ] Lockout/Tagout (LOTO) procedure completed
- [ ] Circuit breaker locked in OFF position with warning tag attached
- [ ] De-energization verified using multimeter/voltage tester

- [ ] **Personal Protective Equipment (PPE) worn:**
  - [ ] Safety glasses or face shield
  - [ ] Insulated gloves (rated for system voltage)
  - [ ] Safety shoes with non-conductive soles
  - [ ] Hard hat (if in industrial setting)
- [ ] **Insulated tools prepared and ready**
- [ ] **Work area cleared and properly illuminated**
- [ ] **Equipment cooled down (wait 10-15 minutes after motor run)**

Technician Confirmation: _____ **Date/Time:** _____

MONTHLY MAINTENANCE CHECKLIST

Perform Every Month or Every 160-170 Operating Hours

1. VISUAL INSPECTION (15 minutes)

- [ ] **Panel exterior condition** - No cracks, damage, or unauthorized modifications
- [ ] **Burning or scorching marks** - Check for signs of overheating
- [ ] **Loose wires or terminals** - All connections appear secure
- [ ] **Rust or corrosion** - Check metal parts and enclosure
- [ ] **Unusual discoloration** - Components show normal color
- [ ] **Enclosure condition** - No cracks in plastic housing
- [ ] **Warning labels present** - Safety labels intact and readable

Notes: _____

2. DUST AND DEBRIS REMOVAL (10 minutes)

- [ ] **Cooling vents cleaned** - Using compressed air (≤30 psi)
- [ ] **Component surfaces cleaned** - Dust removed from all surfaces
- [ ] **Panel interior cleaned** - Interior free of debris
- [ ] **Stubborn dirt removed** - Used soft brush with compressed air if needed

Notes: _____

3. CONNECTION TIGHTNESS CHECK (15 minutes)

- [ ] **Input terminals (from main supply)** - Properly tightened

- [ ] **Output terminals (to motor)** - Properly tightened
- [ ] **Contactor terminals (L1, L2, L3)** - Properly tightened
- [ ] **Contactor terminals (T1, T2, T3)** - Properly tightened
- [ ] **Control circuit connections** - All terminals secure
- [ ] **Ground/Earth connection** - Securely fastened

Torque Wrench Used: Yes [ ] No [ ] **Specified Torque:** _____ N·m

Notes: _____

4. OPERATING TEST (5 minutes)

- [ ] **Start-stop cycle performed** - Motor operates normally
- [ ] **No unusual noises** - No clicking, humming, or grinding
- [ ] **Contactor coil temperature** - Warm but not hot (touch test)
- [ ] **Motor starts smoothly** - No jerking or hesitation
- [ ] **Indicator lights functioning** - All lights work properly

Notes: _____

Monthly Maintenance Completed By: _____ **Date:** _____

QUARTERLY MAINTENANCE CHECKLIST

Perform Every 3 Months or Every 500 Operating Hours

1. DETAILED CONTACT INSPECTION AND CLEANING (30 minutes)

Main Contactor Contacts

- [ ] **Power shutdown and LOTO verified**
- [ ] **Contactor removed (if design allows)**
- [ ] **L1, L2, L3 contacts inspected** - Condition: ☐ Good ☐ Minor pitting ☐ Needs replacement
- [ ] **T1, T2, T3 contacts inspected** - Condition: ☐ Good ☐ Minor pitting ☐ Needs replacement
- [ ] **Carbon buildup present:** Yes [ ] No [ ]
- [ ] **Contacts cleaned using:**
  - [ ] Pencil eraser (light corrosion)
  - [ ] Fine emery paper 220-400 grit (moderate oxidation)

    - [ ] Electrical contact cleaner (stubborn contamination)
- [ ] **Contacts dried completely after cleaning**
- [ ] **Heavy pitting/welding detected:** Yes [ ] No [ ] - *If yes, schedule replacement*

Contact Condition Rating: ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Notes: _____

Auxiliary Contacts

- [ ] **Auxiliary contacts inspected** - Condition: ☐ Good ☐ Needs cleaning ☐ Replace
- [ ] **Holding contact function verified**
- [ ] **Contact cleaner applied and dried**

Notes: _____

2. OVERLOAD RELAY FUNCTIONAL TEST (20 minutes)

- [ ] **Manual trip button pressed** - Relay tripped successfully: Yes [ ] No [ ]
- [ ] **Contactor released when relay tripped** - Verified: Yes [ ] No [ ]
- [ ] **Relay manually reset** - Reset successful: Yes [ ] No [ ]
- [ ] **Relay re-engaged properly** - Verified: Yes [ ] No [ ]
- [ ] **Current setting verified:** Set at _____ A (should be 100% of motor FLC)
- [ ] **Bimetallic element inspected** - No cracks or distortion: Yes [ ] No [ ]

Relay needs recalibration/replacement: Yes [ ] No [ ]

Notes: _____

3. CONTROL CIRCUIT TESTING (20 minutes)

- [ ] **Start button tested** - Smooth pressing, clean contacts: Yes [ ] No [ ]
- [ ] **Stop button tested** - Immediate response verified: Yes [ ] No [ ]
- [ ] **Holding function verified:**
    - [ ] Pressed start, released quickly
    - [ ] Motor continued running (holding works)
    - [ ] Stop button immediately de-energized circuit
- [ ] **Indicator lamps tested** - All lamps illuminate properly: Yes [ ] No [ ]
- [ ] **Control wiring inspected** - No loose or damaged wires: Yes [ ] No [ ]

Notes: _____

4. LUBRICATION OF MOVING PARTS (15 minutes)

- [ ] **Contactor armature pivot points lubricated**
- [ ] **Mechanical interlock mechanism lubricated (if present)**
- [ ] **Auxiliary contact pivot points lubricated**
- [ ] **Sliding surfaces lubricated**
- [ ] **Excess lubricant wiped away with clean cloth**

Lubricant Type Used: _____

Important: Do not over-lubricate - excess oil attracts dust

Notes: _____

Quarterly Maintenance Completed By: _____ **Date:** _____

HALF-YEARLY MAINTENANCE CHECKLIST

Perform Every 6 Months or Every 1000 Operating Hours

1. INSULATION RESISTANCE MEASUREMENT (25 minutes)

Equipment Used: Megohmmeter/Insulation Tester

Test Point	Reading (MΩ)	Status
L1 to Ground	_____ MΩ	☐ Pass (≥1 MΩ) ☐ Fail
L2 to Ground	_____ MΩ	☐ Pass (≥1 MΩ) ☐ Fail
L3 to Ground	_____ MΩ	☐ Pass (≥1 MΩ) ☐ Fail
Control Circuit to Ground	_____ MΩ	☐ Pass (≥1 MΩ) ☐ Fail
L1 to L2	_____ MΩ	☐ Pass (≥1 MΩ) ☐ Fail
L2 to L3	_____ MΩ	☐ Pass (≥1 MΩ) ☐ Fail

Acceptable Values:

- Minimum: 1 MΩ at room temperature
- Good: 10-50 MΩ
- Excellent: >50 MΩ

Action Required if <1 MΩ: Dry out starter in warm environment and retest

Notes: _____

2. ELECTRICAL CONTINUITY TEST (15 minutes)

Equipment Used: Multimeter (continuity function)

- [ ] **L1 to T1 continuity verified** - Resistance: _____ Ω
- [ ] **L2 to T2 continuity verified** - Resistance: _____ Ω
- [ ] **L3 to T3 continuity verified** - Resistance: _____ Ω
- [ ] **Current balance checked (using clamp meter):**
  - Phase R: _____ A
  - Phase Y: _____ A
  - Phase B: _____ A
  - All phases within 5% of each other: Yes [ ] No [ ]

Notes: _____

3. EARTH CONNECTION VERIFICATION (10 minutes)

- [ ] **Earth wire securely connected to panel body** - Verified: Yes [ ] No [ ]
- [ ] **Continuity test: Earth terminal to panel frame** - Resistance: _____ Ω (should be near 0)
- [ ] **No corrosion at earth connection point** - Clean: Yes [ ] No [ ]
- [ ] **Earth connection cleaned if necessary** - Done: Yes [ ] No [ ] N/A [ ]

Notes: _____

4. COMPONENT CONDITION ASSESSMENT (30 minutes)

Circuit Breaker (MCCB)

- [ ] **Visual inspection for wear** - Condition: ☐ Good ☐ Fair ☐ Replace
- [ ] **Signs of burning or discoloration** - Present: Yes [ ] No [ ]
- [ ] **Terminals show corrosion** - Present: Yes [ ] No [ ]
- [ ] **Mechanical operation smooth** - Verified: Yes [ ] No [ ]

Notes: _____

Main Contactor

- [ ] **Arc damage inside contactor** - Present: Yes [ ] No [ ]
- [ ] **Pole face condition** - ☐ Clean ☐ Dirty ☐ Damaged
- [ ] **Coil condition** - ☐ Good ☐ Overheating signs ☐ Replace

- [ ] **Mechanical operation smooth** - Verified: Yes [ ] No [ ]

Notes: _____

Thermal Overload Relay

- [ ] **Bimetallic element inspected** - Condition: ☐ Good ☐ Cracked ☐ Deformed
- [ ] **Proper positioning within housing** - Verified: Yes [ ] No [ ]
- [ ] **Relay body clean and intact** - Condition: ☐ Good ☐ Needs cleaning ☐ Replace

Notes: _____

Half-Yearly Maintenance Completed By: _____ **Date:** _____

YEARLY MAINTENANCE CHECKLIST

Perform Annually or Every 2000 Operating Hours

1. PROFESSIONAL ELECTRICAL TESTING (1-2 hours)

Qualified Electrician: _____ **License #:** _____

- [ ] **Contact resistance measurement** - Voltage drop across contacts measured
  - L1 to T1: _____ V (should be <0.5V, concern if >1.5V)
  - L2 to T2: _____ V (should be <0.5V, concern if >1.5V)
  - L3 to T3: _____ V (should be <0.5V, concern if >1.5V)
- [ ] **Coil resistance verification** - Measured: _____ Ω (compare to manufacturer spec)
- [ ] **Control circuit voltage measurement** - Voltage: _____ V (within ±10% of rated)
- [ ] **Thermal imaging performed** - Hot spots detected: Yes [ ] No [ ]
  - If yes, location: _____
- [ ] **Comprehensive insulation testing** - All readings within acceptable range: Yes [ ] No [ ]

Notes: _____

2. COMPONENT REPLACEMENT ASSESSMENT

Component Lifespan Tracking

Component	Installation Date	Age (Years)	Expected Life	Condition	Replace?
Main Contactor	_____	_____	5-7 years	☐ Good ☐ Fair ☐ Poor	☐ Yes ☐ No
Overload Relay	_____	_____	3-5 years	☐ Good ☐ Fair ☐ Poor	☐ Yes ☐ No
MCCB	_____	_____	10+ years	☐ Good ☐ Fair ☐ Poor	☐ Yes ☐ No
Start Button	_____	_____	5-10 years	☐ Good ☐ Fair ☐ Poor	☐ Yes ☐ No
Stop Button	_____	_____	5-10 years	☐ Good ☐ Fair ☐ Poor	☐ Yes ☐ No

Components Replaced During This Maintenance:

1. _____ (Part #: _____)
2. _____ (Part #: _____)
3. _____ (Part #: _____)

Total Replacement Cost: $ _____

Notes: _____

3. DOCUMENTATION AND RECORDS (15 minutes)

- **[ ] All test results recorded in maintenance log**
- **[ ] Any repairs or component replacements documented**
- **[ ] Observed issues or anomalies noted**
- **[ ] Next scheduled maintenance date calculated and recorded**
- **[ ] Maintenance history reviewed for patterns**
- **[ ] Digital photos taken of equipment condition** - Count: _____

Patterns or Recurring Issues Identified:

_____

_____

Recommendations for Next Maintenance Cycle:

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4. COMPLETE PANEL CLEANING (30-45 minutes)

- [ ] **All loose dust and dirt removed** - Using compressed air
- [ ] **Exposed surfaces cleaned** - Using clean, dry cloth
- [ ] **All fasteners checked and tightened** - Any loose bolts secured
- [ ] **Cable routing inspected** - No damage or deterioration detected
- [ ] **Panel door hinges and locks lubricated** - Smooth operation verified
- [ ] **Ventilation openings clear** - No blockages present

Notes: _____

Yearly Maintenance Completed By: _____ **Date:** _____

TROUBLESHOOTING LOG

Document Any Issues Found During Maintenance

Date	Issue Description	Cause Identified	Action Taken	Result	Technician
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

COMMON ISSUES QUICK REFERENCE

Motor Fails to Start

Check: Power supply, circuit breaker, start button, contactor coil voltage

Contactor Chatters

Check: Coil voltage (brownout?), pole face condition, mechanical connections

Overload Relay Trips Frequently

Check: Motor load, relay setting vs. FLC, phase voltage balance, bearing condition

Weak Starting

Check: Contact voltage drop, pole face cleanliness, terminal corrosion

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MAINTENANCE TOOLS REQUIRED

- [ ] Digital Multimeter
- [ ] Clamp Meter (for current measurement)
- [ ] Insulation Tester (Megohmmeter)
- [ ] Compressed Air Supply (≤30 psi)
- [ ] Insulated Screwdriver Set
- [ ] Emery Paper (220-400 grit)
- [ ] Electrical Contact Cleaner
- [ ] Light Machine Oil
- [ ] Torque Wrench
- [ ] Non-contact Voltage Tester
- [ ] Flashlight/Inspection Lamp
- [ ] Soft Brush
- [ ] Clean Cloths
- [ ] Safety Glasses & Insulated Gloves
- [ ] Lockout/Tagout Devices

ANNUAL MAINTENANCE SUMMARY

Year: _____

Total Downtime for Maintenance: _____ hours

Total Maintenance Cost: $ _____

Major Repairs/Replacements:

1. _____
2. _____
3. _____

Overall Equipment Condition: ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Estimated Remaining Equipment Life: _____ years

Supervisor Review and Approval:

Name: _____ Signature: _____ Date: _____

NOTES AND RECOMMENDATIONS

Document Version: 1.0
Last Updated: November 19, 2025
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IMPORTANT: This checklist should be used in conjunction with manufacturer's maintenance guidelines and applicable safety standards (IEC, NEMA, NFPA 70B).

End of Checklist