

# Preventive Maintenance Checklist of Industrial Control and Drive System Equipment

Use the following checklist as a guide in performing preventive maintenance.



**ATTENTION:** Servicing energized industrial control equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment.

Recommended practice is to disconnect and lockout control equipment from power sources, and discharge stored energy in capacitors, if present. If it is necessary to work in the vicinity of energized equipment, only qualified personnel are permitted to perform such work. Adhere to all applicable safety practices and wear protective equipment.

**IMPORTANT** Review product manuals for detailed maintenance information relevant a particular model.

## Summary of Changes

This document contains new and updated information as indicated in the following table.

Topic	Page
Updated the guidance on bus capacitor maintenance and reforming.	3
Updated <a href="#">Figure 5</a> Bus Capacitor Reforming Guidelines.	4

## Periodic Inspection

Industrial control equipment must be inspected periodically. Inspection intervals are based on environmental/operating conditions, and adjusted as indicated by experience. We recommend an initial inspection within 3...4 months after installation. We recommend an annual inspection after initial inspection on an ongoing basis.

**☐ Contamination**

If inspection reveals that dust, dirt, moisture, or other contamination has reached the control equipment, the cause must be eliminated. This contamination can indicate an incorrect or ineffective enclosure, unsealed enclosure openings (conduit or other), or incorrect operating procedures. Dirty, wet, or contaminated parts must be replaced unless they can be cleaned effectively by vacuuming or wiping.



**ATTENTION:** Do not use compressed air or similar to clear dust or debris.

**☐ Cooling Devices**

Inspect blowers and fans that are used for forced air cooling. Replace any that have bent, chipped, missing blades or if the shaft does not turn freely. Apply power momentarily to check operation. If unit does not operate, check and replace wiring, fuse, blower, or fan motor as appropriate. Clean or change air filters as recommended.

The following codes are used to indicate the task that is associated with the components that are identified in the recommended tasks and maintenance schedule in [Table 1](#).

Code	Task	Description
I	Inspect	Inspect the component for signs of excessive accumulation of dust, dirt, or external damage. For example, inspect the filter capacitors for bulges in the case, inspect the filters/fan inlet screens for debris that can block the airflow path.
C	Clean	Clean the components that can be reused, specifically the door-mounted air filters and fan inlet screens.
R	Replace	This component has reached its mean operational life. Replace the component to decrease the chance of failure. It is likely that components can exceed the designed life in the drive, but component life is dependent on many factors such as usage and heat.

**Table 1 - Recommended Drives Maintenance Tasks and Schedule – PowerFlex 750-Series, 70, 700, 700S, DC**

Years >		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>Components and Activities</b>																						
<b>Air-Cooling System</b>	Door-mounted Air Filters <sup>(1)</sup>	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R
	Roof-mounted Assembly Air Filters <sup>(1)</sup>	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R	C/R
	Main Heatsink Cooling Fan(s)		I	I	I	I	R	I	I	I	I	R	I	I	I	I	R	I	I	I	I	R
	Door-mounted Cooling Fans		I	I	I	I	R	I	I	I	I	R	I	I	I	I	R	I	I	I	I	R
	Capacitor Bank Cooling Fans		I	I	I	I	R	I	I	I	I	R	I	I	I	I	R	I	I	I	I	R
	Converter Input Fuse Stirring Fan		I	I	I	I	R	I	I	I	I	R	I	I	I	I	R	I	I	I	I	R
	Converter Gate Board Stirring Fan		I	I	I	I	R	I	I	I	I	R	I	I	I	I	R	I	I	I	I	R
	DC Precharge Control Board Stirring Fan		I	I	I	I	R	I	I	I	I	R	I	I	I	I	R	I	I	I	I	R

(1) Inspect and replace filters every 3 months or more frequently, depending on the environment.

Inspect and clean the power section components (IGBTs, SCRs, and capacitors) as part of the annual clean and inspection cycle (as access allows). Do not remove the whole drive assembly to gain access to the components. The life expectancy of the power section components is designed to last for the life of the drive for wall-mounted drives. The actual life is dependent on ambient and environmental conditions, load, variation of load, power system configuration, output and carrier frequency configuration, cooling system, and other application-related factors.

The design life expectancy of the overall components normally exceeds 10 years (in some cases can last 20 years or more) in normal operating environments.

The PowerFlex® 755T product line has true predictive maintenance capabilities for many components that include all fans, IGBTs, LCL filter capacitors, and bus capacitors. This drive technology determines the remaining life of the product or maintenance components that are based on actual usage of the product and is updated in real time. This patented methodology is an advanced approach to predictive and preventative maintenance solution to achieve high levels of production uptime and apply maintenance or replacement only as needed. The intention is to use these predictive and preventative maintenance features with the other practices and recommendations in this manual.

**Table 2 - Recommended Cooling Devices Replacement Interval – PowerFlex 4-Series, PowerFlex 520-Series**

Interval <sup>(1)</sup>	Drive Series <sup>(2)</sup>							
	PowerFlex 4M	PowerFlex 4	PowerFlex 40	PowerFlex 40P	PowerFlex 400	PowerFlex 523	PowerFlex 525	PowerFlex 527
2 years upon startup	—	—	—	—	—	—	—	—
3 years upon startup	X	X	X	X	X	X	X	X
4 years upon startup	—	—	—	—	—	—	—	—
5 years upon startup	—	—	—	—	—	—	—	—

(1) Recommendation is based on designed lifespan, interval to be reduced for harsh ambient conditions.

(2) For unlisted drives family, refer to their specific user manual.

## □ Bus Capacitors

For drives that are in storage and do not have voltage applied, maintenance of the capacitors in the drive can be required. Follow these requirements and the guidelines listed in [Table 3](#) for bus capacitor maintenance and reforming:

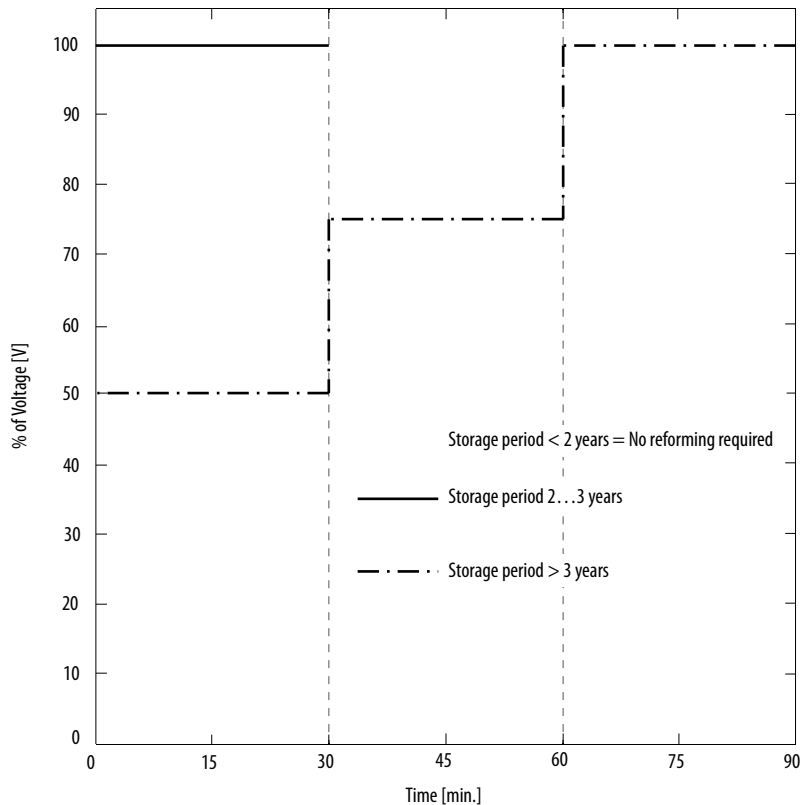
- The reforming voltage must be 1.35...1.45 times the rated AC system voltage
- During the reforming process, the power supply current draw must not exceed 500 mA
- For PowerFlex 753 and 755 frame 6 and 7 drives disconnect all internal stirring fans before applying voltage to the bus capacitors.

**Table 3 - Drive Storage Duration and Reforming Recommendations**

Duration	Reforming Guideline
Under 2 years	No reforming required.
2 ... 3 years	Apply rated voltage, per the normal method, for 30 minutes under no load.
Over 3 years	Using a DC power supply connected directly to the DC terminals of the product, ramp-up the voltage from 0... 100% of DC bus voltage (as per <a href="#">Table 4</a> ) in increments of 50%, 75%, and 100% rated voltage, under no load, for 30 minutes at each increment. See <a href="#">Figure 5 on page 4</a> for an illustration of this method.

**Table 4 - DC Bus Voltage Ramp-up Values**

AC Input Voltage	Voltage Across the DC Bus
230V	325V DC
400/480V	680V DC
600V	848V DC
600/690V	976V DC

**Figure 5 - Bus Capacitor Reforming Guidelines**

### □ Operating Mechanisms

Check for proper functioning and freedom from sticking or binding. Replace any broken, deformed, or badly worn parts or assemblies according to individual product renewal parts lists. Check and securely re-tighten (if necessary) any loose fasteners. Lubricate (if specified) per individual product instructions.

---

**IMPORTANT** Allen-Bradley® magnetic starters, contactors, and relays are designed to operate without lubrication - do not lubricate these devices. Oil or grease on the pole faces (mating surfaces) of the operating magnet can cause the device to malfunction. Some parts of other devices are lubricated at the factory. If lubrication during use or maintenance of these devices is needed, it is specified in their individual instructions. If in doubt, consult the nearest Rockwell Automation sales office for information

---

### □ Contacts

Check contacts for excessive wear and dirt accumulations. Discoloration and slight pitting are acceptable. Do not file contacts. Do not use contact spray cleaners as residues can cause sticking or interfere with electrical continuity. Replace the contacts only after the silver has become badly worn. Always replace contacts in complete sets to avoid misalignment and uneven contact pressure.

### □ Terminals

Loose connections can cause overheating that can lead to equipment malfunction or failure. Check the tightness of all terminals and bus bar connections – securely tighten any loose connections. Replace any parts or wiring that is damaged by overheating. Also check ground connection integrity.

### Coils

If a coil exhibits evidence of overheating (cracked, melted, or burned insulation), it must be replaced. In that event, check for and correct overvoltage or undervoltage conditions, which can cause coil failure. Be sure to clean any residues of melted coil insulation from other parts of the device or replace such parts.

### Pilot Lights

Replace any burned out lamps or damaged lenses.

### Solid-state Devices

Solid-state devices require little more than a periodic visual inspection. Inspect the printed circuit boards to determine whether they are properly seated in the edge connectors. Board locking tabs must be in place. Necessary replacements must be made only at the personal computer board or plug-in component level. Do not use solvents on printed circuit boards. When blowers are used, air filters must be cleaned or changed periodically depending on the specific environmental conditions encountered.



**ATTENTION:** Use of other than factory recommended test equipment for solid-state controls can result in damage to the control or test equipment or unintended actuation of the controlled equipment.

---

### Locking and Interlocking Devices

Check these devices for proper working condition and capability of performing their intended functions.

### Replacements

Make any necessary replacements only with Allen-Bradley renewal parts or kits. Assure that parts are properly matched to the model, series, and revision level of the equipment.

### Final Check Out

After maintenance or repair of industrial controls, always test the control system for proper functioning under controlled conditions that avoid hazards if a control malfunction occurs.

### Keep Good Maintenance Records

This rule is most helpful to locate possible intermittent problems by pointing to a particular area of constant trouble within the overall system. Further, good maintenance records reduce major costly shutdowns by demanding the use of proper test equipment and an appropriate inventory of spare parts.

We recommend that a complete record of parameter settings be kept close to the drive for future reference. Some drives also incorporate an operator interface that can store a copy of the parameter settings.

## Rockwell Automation Support

Use the following resources to access support information.

<b>Technical Support Center</b>	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	<a href="http://www.rockwellautomation.com/knowledgebase">www.rockwellautomation.com/knowledgebase</a>
<b>Local Technical Support Phone Numbers</b>	Locate the phone number for your country.	<a href="http://www.rockwellautomation.com/global/support/get-support-now.page">www.rockwellautomation.com/global/support/get-support-now.page</a>
<b>Direct Dial Codes</b>	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	<a href="http://www.rockwellautomation.com/global/support/direct-dial.page">www.rockwellautomation.com/global/support/direct-dial.page</a>
<b>Literature Library</b>	Installation Instructions, Manuals, Brochures, and Technical Data.	<a href="http://www.rockwellautomation.com/literature">www.rockwellautomation.com/literature</a>
<b>Product Compatibility and Download Center (PCDC)</b>	Get help determining how products interact, check features and capabilities, and find associated firmware.	<a href="http://www.rockwellautomation.com/global/support/pcdc.page">www.rockwellautomation.com/global/support/pcdc.page</a>

## Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at [http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002\\_-en-e.pdf](http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf).

Rockwell Automation maintains current product environmental information on its website at <http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page>.

Allen-Bradley, LISTEN. THINK. SOLVE., PowerFlex, Rockwell Automation, and Rockwell Software are trademarks of Rockwell Automation, Inc. Trademarks not belonging to Rockwell Automation are property of their respective companies.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

**[www.rockwellautomation.com](http://www.rockwellautomation.com)**

### Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444  
Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640  
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication DRIVES-TD001C-EN-P - May 2019

Supersedes Publication DRIVES-TD001B-EN-P - January 2018

Copyright © 2019 Rockwell Automation, Inc. All rights reserved. Printed in the U.S.A.