
# Model M3628PCF
# Portable Capacitor Former

## Customer Reference Manual

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**Bonitron, Inc.**
Nashville, TN


***An industry leader in providing solutions for AC drives.***

## ABOUT BONITRON

Bonitron designs and manufactures quality industrial electronics that improve the reliability of processes and variable frequency drives worldwide. With products in numerous industries, and an educated and experienced team of engineers, Bonitron has seen thousands of products engineered since 1962 and welcomes custom applications.

With engineering, production, and testing all in the same facility, Bonitron is able to ensure its products are of the utmost quality and ready to be applied to your application.

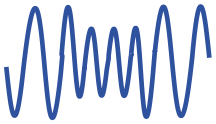
The Bonitron engineering team has the background and expertise necessary to design, develop, and manufacture the quality industrial electronic systems demanded in today's market. A strong academic background supported by continuing education is complemented by many years of hands-on field experience. A clear advantage Bonitron has over many competitors is combined on-site engineering labs and manufacturing facilities, which allows the engineering team to have immediate access to testing and manufacturing. This not only saves time during prototype development, but also is essential to providing only the highest quality products.

The sales and marketing teams work closely with engineering to provide up-to-date information and provide remarkable customer support to make sure you receive the best solution for your application. Thanks to this combination of quality products and superior customer support, Bonitron has products installed in critical applications worldwide.

# AC Drive Options

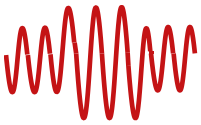
In 1975, Bonitron began working with AC inverter drive specialists at synthetic fiber plants to develop speed control systems that could be interfaced with their plant process computers. Ever since, Bonitron has developed AC drive options that solve application issues associated with modern AC variable frequency drives and aid in reducing drive faults. Below is a sampling of Bonitron's current product offering.

# World Class Products



**Undervoltage Solutions**

Uninterruptible Power for Drives
(DC Bus Ride-Thru)
Voltage Regulators
Chargers and Dischargers
Energy Storage



**Overvoltage Solutions**

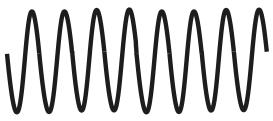
Braking Transistors
Braking Resistors
Transistor/Resistor Combo
Line Regeneration
Dynamic Braking for Servo Drives

**Common Bus Solutions**

Single Phase Power Supplies
3-Phase Power Supplies
Common Bus Diodes

**Portable Maintenance Solutions**

Capacitor Formers
Capacitor Testers



**Power Quality Solutions**

12 and 18 Pulse Kits

**Green Solutions**

Line Regeneration

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# 1. INTRODUCTION

## 1.1. WHO SHOULD USE

This manual is intended for use by trained personnel responsible for maintaining or testing capacitor banks.

Please keep this manual for future reference.

## 1.2. PURPOSE AND SCOPE

This manual is a user's guide for the Model M3628PCF. It will provide the user with the necessary information to successfully connect and operate the M3628PCF.

In the event of any conflict between this document and any publication and/or documentation related to any associated hardware (capacitor bank, etc.), the latter shall have precedence.

## 1.3. MANUAL VERSION AND CHANGE RECORD

Manual changed to reflect updated design in Rev 03a

**Figure 1-1: M3628PCF**

## 1.4. SYMBOL CONVENTIONS USED IN THIS MANUAL AND ON EQUIPMENT

| | |
|---|---|
|  | Earth Ground or Protective Earth |
|  | AC Voltage |
|  | DC Voltage |
|  **DANGER!** | Electrical Hazard - Identifies a statement that indicates a shock or electrocution hazard that must be avoided. |
|  **DANGER!** | DANGER: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. |
|  **CAUTION!** | CAUTION: Identifies information about practices or circumstances that can lead to property damage, or economic loss. Attentions help you identify a potential hazard, avoid a hazard, and recognize the consequences. |
|  **CAUTION!** | Heat or burn hazard - Identifies a statement regarding heat production or a burn hazard that should be avoided. |

# 2. PRODUCT DESCRIPTION / FEATURES

The M3628PCF is designed for maintenance of stored capacitors or as a bench top power supply.

When variable frequency drives are stored for more than eight months, the internal chemistry of their capacitor banks may change. If these drives are put into service before the capacitor bank is reformed, the bus capacitors may fail, destroying the drive. The Bonitron M3628PCF is ideal for reforming capacitors, providing a portable, variable voltage DC power supply capable of quickly charging capacitor banks to any voltage within its range, and holding them at that voltage for any length of time desired.

The Bonitron M3628PCF is a portable DC power supply with a manually variable output voltage. Digital displays indicate the Setpoint voltage, Output voltage, and Current. This product may be used for many purposes, including charging, discharging and forming of capacitors, as well as serving general DC power needs.

## 2.1. RELATED PRODUCTS

### M5628 ULTRA CAPACITOR/ BATTERY CHARGER

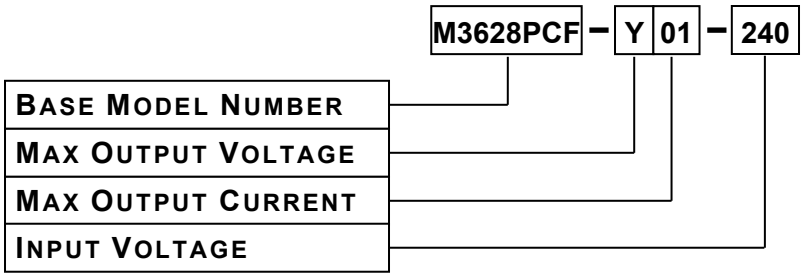
The M3528 charger can charge strings of batteries or ultracapacitors to voltages required for industrial and commercial applications. AC or DC input is available, along with separate float and equalization charge levels. The charger is current limited, and designed for use in integrated storage and backup systems, but can also be used in bench or mobile systems.

### KIT 3628 ULTRA CAPACITOR DISCHARGE CONTROLLER

Large capacitor banks store huge amounts of energy, and can be a hazard when systems are shut down for system maintenance. The KIT 3628 system discharges capacitor banks to safe working levels quickly, allowing work on the system to begin in seconds, rather than hours.

## 2.2. PART NUMBER BREAKDOWN

**Figure 2-1: Example of Part Number Breakdown**




### BASE MODEL NUMBER

The base model number for all portable capacitor formers is M3628PCF.

### MAX OUTPUT VOLTAGE RATING

The max output voltage rating indicates the maximum DC output voltage the unit can supply. The max output voltage is indicated by a code letter.

**Table 2-1: Max Output Voltage Ratings**

| RATING CODE | VOLTAGES (DC VOLTAGE OUTPUT) |
|---|---|
| Y* | 1100VDC |

*Units that have a C in the part number are legacy units. Please refer to the legacy manual for correct ratings.

### MAX OUTPUT CURRENT RATING

The max output current rating indicates the maximum DC current the unit can supply at its maximum voltage.

### INPUT VOLTAGE

This indicates the input voltage for the unit.

**Table 2-2: Input Voltage Ratings**

| RATING CODE** | INPUT VOLTAGE |
|---|---|
| 120 | 120 VAC |
| 240 | 240 VAC |

**Units that have 110 or 220 are legacy units. Please rever to the legacy manual for correct ratings.

## 2.3. GENERAL SPECIFICATIONS

**Table 2-3: General Specifications**

| PARAMETER | SPECIFICATION |
|---|---|
| Input Voltage | 110-120 VAC, 220-240 VAC 1ø |
| Output Voltage | 0-1100 VDC |
| Output Current | 1 ADC |
| Maximum Load Capacitance | 100,000 µF |
| Switch | Charging, off, or discharging |
| Displays | Setpoint Voltage (0-1100±5VDC)<br>Output Voltage (0-1100±5VDC) and Current (0-2000 ± 5mA) |
| Size | 10.50" high x 22.00" wide x 18.00" deep |
| Weight | 65 lbs. |
| Storage Temp | -20°C to +65°C |
| Humidity | Below 90% non-condensing |
| Atmosphere | Free of corrosive gas and conductive dust |

## 2.4. General Precautions and Safety Warnings

**ELECTROCUTION HAZARD!**

- **This unit produces voltages capable of causing injury or death!**
- **For use by qualified and trained personnel only!**
- **IMPROPER OPERATION OF THE PRODUCT OR IGNORING THESE WARNINGS MAY RESULT IN SERIOUS BODILY INJURY OR DEATH!**
- **Before connecting the M3628PCF to a capacitor bank, ensure that the bank is fully discharged by checking the red indicator light.**
- **Always ensure that the M3628PCF is deactivated and discharged before connecting or disconnecting any external equipment.**
- **Connecting the M3628PCF's voltage output to a load with the polarity reversed can cause damage to your equipment and potentially create a fire or explosion hazard, threatening lives. Ensure that the positive and negative terminals on both the source and load are positively identified and correctly connected before operation.**
- **Never operate this product with the enclosure cover removed.**

**DANGER!**

- **Never attempt to service this product.**
- **Certain parts inside this product may get hot during operation.**
- **Before connecting this device to any other product, be sure to review all documentation of that product for pertinent safety precautions.**

**ANY QUESTIONS AS TO APPLICATION, INSTALLATION, OR SERVICE SAFETY SHOULD BE DIRECTED TO THE EQUIPMENT SUPPLIER.**

# 3. INSTALLATION INSTRUCTIONS

## 3.1. ENVIRONMENT

While closed, the M3628PCF is water, dust, and crush resistant. When open and in operation, the unit should be used only in dry, clean areas. Ensure that the interior of the unit casing is kept dry.

## 3.2. WIRING AND CUSTOMER CONNECTIONS

### 3.2.1. POWER WIRING

The power input connector accepts 120VAC or 240VAC 50-60 Hz from the included standard C13 power cable. The input voltage must be selected when ordering, and cannot be changed in the field.
The DC output connectors supply DC voltage at the user-selected level via a pair of banana connectors. Output lead can be constructed as needed.

### 3.2.2. SOURCE CONSIDERATIONS

A three wire source with ground and neutral conductor is required for proper operation.
Input voltage should not exceed the specified input voltage damage to the unit may result. The source must be capable of supplying at least 1000VA to guarantee correct system operation at all output voltages.

**CAUTION!**

*Always use a three wire connection with a bonded neutral conductor. A floating or ungrounded source may result in incorrect readings on the voltmeters.*

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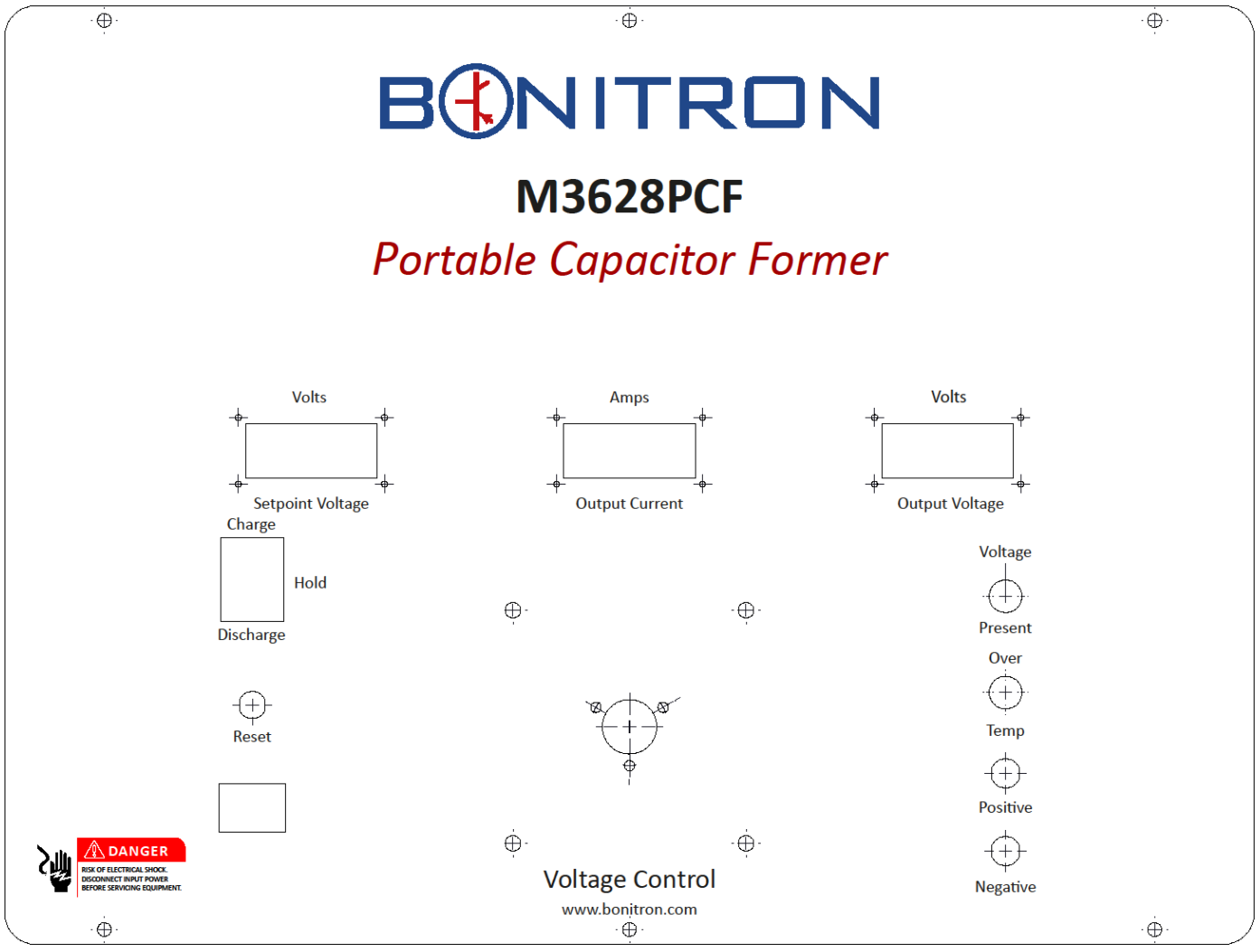
# 4. OPERATION

## 4.1. FUNCTIONAL DESCRIPTION

The M3628PCF is a DC supply capable of sourcing 1A at between 0 and 1100VDC. The output voltage is controlled by a knob on the face of the unit, and the Setpoint Voltage, Output Voltage, and Output Current are shown on digital displays. The unit is capable of safely charging and discharging connected capacitors.

**Figure 4-1: Faceplate**




Note: When connected to non-capacitive loads (including bleeder resistors), the unit may not be able to reach the full 1100V output voltage. If your load has non-capacitive draw exceeding the available charge current of the PCF, you may need to disconnect these resistors in order to reach the full output voltage range of the unit.

## 4.2. FEATURES

### 4.2.1. AC POWER INPUT CONNECTOR

The M3628PCF is equipped with a standard IEC C14 connector for input power. This connector mates with a standard C13 cable, commonly used with desktop computers, to provide power to the unit.

**CAUTION!**

*Always use a three wire connection with a bonded neutral conductor. A floating or ungrounded source may result in incorrect readings on the voltmeters.*

### 4.2.2. DC OUTPUT CONNECTORS

Two banana jacks provide the user with DC output voltage between 0VDC and 1100VDC. These connectors accept standard 4mm banana plugs.

### 4.2.3. DISPLAYS

Three digital displays indicate the Setpoint Voltage in volts, the Output Voltage in volts, and Output Current in milliamps. These displays will be active when power is connected to the unit and may continue to function for several seconds after AC power is removed.

#### 4.2.3.1. SETPOINT VOLTAGE

This display shows the expected final charge voltage. It displays 1-volt increments with a tolerance of +-5V.

**CAUTION!**

*The setpoint voltage may climb as the charging current decreases. The output voltage at the end of a charge cycle may exceed the setpoint voltage displayed at the beginning of a charge cycle. Do not leave charging capacitors unattended!*

#### 4.2.3.2. OUTPUT CURRENT

This ammeter displays the current flowing to or from the load. Positive values indicate the supply is delivering power to the load, negative values indicate the supply is absorbing power from the load. The charging current may momentarily exceed the unit's current rating; this is expected behavior.

The ammeter displays 1mA increments with a tolerance of +/- 5mA

#### 4.2.3.3. OUTPUT VOLTAGE

This voltmeter displays the present voltage at the output. This voltage will rise as the load charges. With non-capacitive loads (including bleeder resistors), this voltage may stabilize at significantly less than the set point voltage.

The voltmeter displays 1 volt increments with a tolerance of ± 5V.

### 4.2.4. VOLTAGE CONTROL KNOB

This knob controls the output voltage of the system. Turning the knob clockwise increases the output voltage, while turning the knob counter-clockwise decreases the output voltage.

**DANGER!**

*Always monitor the output voltage while operating the unit.*
*Ensure that the attached loads do not exceed their rated voltage, as catastrophic damage, injury or death may occur!*

### 4.2.5. CONTROL SWITCH

The M3628PCF can be set to charge, discharge, or hold. The control switch selects the operation mode. Individual modes are described in Section 4.3.

### 4.2.6. VOLTAGE PRESENT INDICATOR

A red light indicates that there is voltage on the DC output of the unit.

**DANGER!**

*Do not use this light as an indication that the output is safe to work on! Always check the output with a working voltmeter before connecting or disconnecting equipment, as the lamp may be malfunctioning!*
***Electrocution Hazard** – This unit produces dangerous levels of voltage that can cause injury or death. Always follow safety protocols when working with high voltages!*

### 4.2.7. OVER TEMP INDICATOR

A yellow light indicates that the internal case temperature has risen too high for safe operation. Wait for the light to clear. This may take up to 30 minutes.

## 4.3. CONTROL (MODE) SWITCH

### 4.3.1. CHARGE MODE

In Charge Mode, the M3628PCF supplies voltage to the output, charging to the voltage setting on the voltage control knob. The internal charge resistance limits output current. The voltage and current displays show the present voltage on the load capacitor and the current being delivered to it.

### 4.3.2. HOLD MODE

In Hold Mode, the M3628PCF disconnects the charger and discharger from the output. Changes to the voltage control knob have no effect on the output voltage.
The Output Voltage will be operational to indicate the voltage present on the load. The Setpoint meter will indicate Ø.

### 4.3.3. DISCHARGE MODE

In Discharge Mode, the M3628PCF places a fixed resistance across the load, and the load discharges through it.
The Output Voltage meter will be operational. The Current Meter will show negative current.

**CAUTION!**

*Extended discharging may cause overheating.*
*Do not discharge loads above 50000 joules.*
*Do not leave unit unattended during discharging.*

## 4.4. CIRCUIT BREAKER

The unit is equipped with a circuit breaker to protect it from overload conditions. If the input circuit breaker is tripped, it may be reset by pressing the button to reengage the breaker.

# 5. TROUBLESHOOTING

If a problem occurs on start-up or during normal operation, refer to the problems described below. If a problem persists after following the steps below, contact the product supplier or your system integrator for assistance.

Repairs or modifications to this equipment are to be performed by Bonitron approved personnel only. Any repair or modification to this equipment by personnel not approved by Bonitron will void any warranty remaining on this unit.

## 5.1. DISPLAYS NEVER COME ON

- Ensure that the input power cable is connected firmly to the unit and to a functioning AC source of the correct voltage.
- If the connection and the power supply are good, make sure the input circuit breaker (Section 4.4) has not tripped.

## 5.2. SETPOINT VOLTAGE METER NEVER RISES ABOVE ZERO

- Ensure that the input power cable is connected firmly to the unit and to a functioning AC power source.
- Ensure that the control switch is set to charge.
- Make sure the voltage selection knob is above zero.

## 5.3. OUTPUT VOLTAGE METER NEVER RISES ABOVE ZERO

- Check the connections between the unit and the load, making sure that the connection is solid, the polarity is correct, and the output is not shorted.
- Check the output voltage with a separate voltage meter. If voltage is present, the internal voltmeter may need service. Consult Bonitron for service options.

## 5.4. CURRENT METER SHOWS NO OUTPUT CURRENT

- Check the output connections to make sure there is good contact.
- Make sure there is voltage at the output terminals.
- Make sure the circuit breaker is not tripped.

## 5.5. LOAD CAPACITOR TAKES A LONG TIME TO CHARGE/DISCHARGE

- Make sure the control switch and voltage control knob are set correctly.
- Large loads may take a long time to charge or discharge such as a load in excess of 100,000 µF.
- Check the load connection, making sure it is solid and the polarity is correct.
- Increasing the voltage control knob will raise the end charge voltage.

**ATTENTION!**

*If the former is in current limit, the displayed voltage may climb as the load charges. The final voltage may be higher than the voltage indicated on the voltmeters.*

**DANGER!**

*Always monitor the output voltage while operating the unit. The voltage control knob will set the final output voltage, not the present output voltage. Ensure that the attached loads do not exceed their rated voltage, as catastrophic damage, injury or death may occur!*

## 5.6. RED VOLTAGE PRESENT LIGHT IS ON

The voltage present light indicates that there is voltage between the output terminals of the unit. If the displays indicate that no voltage is present for more than 60 seconds, and the red light does not clear, contact Bonitron.

## 5.7. RED VOLTAGE PRESENT LIGHT NEVER TURNS ON DESPITE OUTPUT VOLTAGE

Check the output voltage with a separate voltmeter. If the voltage is above 50VDC, your unit may require service. Contact Bonitron.

## 5.8. YELLOW OVER TEMP LIGHT DOES NOT CLEAR

Move the unit to a cool environment and wait one hour, leaving the unit connected to power. If the light still does not clear contact Bonitron.

## 5.9. OUTPUT VOLTAGE DISPLAY IS UNSTABLE

The output voltage display may be unstable if the hot and neutral connections on the unit's AC input are swapped. Check the AC input to the unit, and ensure that the hot and neutral connections are wired in accordance with NEC standards.

## 5.10. OUTPUT DOES NOT REACH DESIRED VOLTAGE WHEN CONNECTED TO LOAD

Charge the capacitor after disconnecting any bleeder resistors, power supplies, fans, or other non-capacitive loads. (Section 4.1)

# 6. ENGINEERING DATA

## 6.1. RATINGS CHARTS

**Table 6-1: Ratings Table**

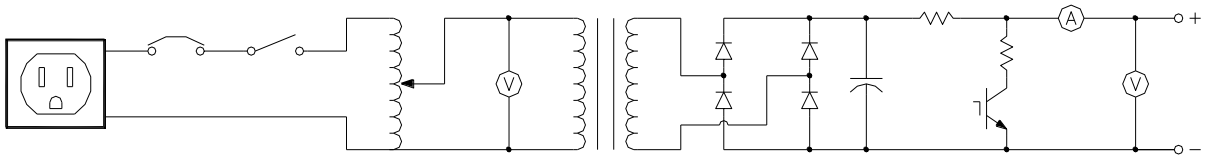
| | |
|---|---|
| Input Voltage | 110-120, 220-240VAC |
| Output Voltage | 0-1100VDC |
| Output Current | 0-1000mA |
| Output Resistor | 190Ω |
| Discharge Resistor | 120Ω |
| Isolation Transformer | 1 kVA |
| Internal Variac | 1.4 kVA |

**Table 6-2: Dimensions**

| | |
|---|---|
| Height | 10.5 in. (with top closed) |
| Width | 22.0 in. |
| Depth | 18.0 in. |

## 6.2. BLOCK DIAGRAM

**Figure 6-1: Block Diagram**



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# 7. APPENDIX

## 7.1. APPLICATION NOTES

### 7.1.1. TYPICAL CAPACITOR BANK FORMING PROCEDURE

Electrolytic capacitors undergo physical changes when stored for long periods. Depending on the ambient conditions of the storage, this can be from six months to two years. If the capacitors are rapidly taken to their rated voltage, excessive leakage current may cause them to overheat and fail.

If the capacitor bank is part of a larger system, as a Variable Frequency Drive, check with the drive manufacturer for specific instructions on how to reform the capacitor bank.

A short description is below.

1. Attach the output leads to the capacitor bank directly. If you are forming the capacitors in a drive, ensure that you are directly across the DC bus, not attached through the braking circuit.
2. Set the voltage control knob to zero.
3. Apply power to the M3628PCF and set the control switch to charge.
4. Slowly raise the output voltage by turning the voltage control knob. Listen for abnormal sounds or other indications in the capacitors or attached equipment. Monitor the current indicator to make sure there is not excessive leakage current, and the voltage indicator to see that the voltage is rising. Internal bleeder resistors on the capacitor bank may require current during the process. Consult the equipment manufacturer for more information.
5. Continue to raise the voltage to the point that the leakage current stabilizes and the voltage stabilizes at 10-15% of the rated voltage of the capacitor bank. Let the voltage remain at 10-15% for at least 10 minutes.
6. Increase the voltage on the capacitors by 10-15% again, and wait for 5-10 minutes.
7. Continue the process until the capacitors are at rated voltage. Always monitor the capacitor banks or attached equipment for abnormal signs, such as noise, heating, or smell.
8. Once the capacitor bank is at rated voltage, wait 15 minutes for the reforming to complete, or consult the equipment manufacturer for a suitable reforming time.
9. Switch the control switch to Hold and turn the voltage control knob to zero.
10. Allow the capacitor bank to drain either with the bleeder resistors in the equipment, or by switching the control switch to discharge until the load voltage is at a safe level, at least below 40VDC.
11. If the procedure is completed successfully, the capacitor bank or equipment can be returned to storage or put into use.

### 7.1.2. MANUFACTURES RECOMMENDED REFORMING PROCEDURES

The following information was copied directly from the manufactures manuals, service bulletins, or websites pertaining to the process of reforming the capacitors in their drives.

**Figure 7-1: Rockwell Automation (Part 1)**

☐ **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 Table 4) in increments of 50%, 75%, and 100% rated voltage, under no load, for 30 minutes at each increment. See Figure 5 on page 4 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 |

Rockwell Automation Publication DRIVES-TD001C-EN-P - May 2019 3

## Figure 7-2: Rockwell Automation (Part 2)

Preventive Maintenance Checklist of Industrial Control and Drive System Equipment

**Figure 5 - Bus Capacitor Reforming Guidelines**

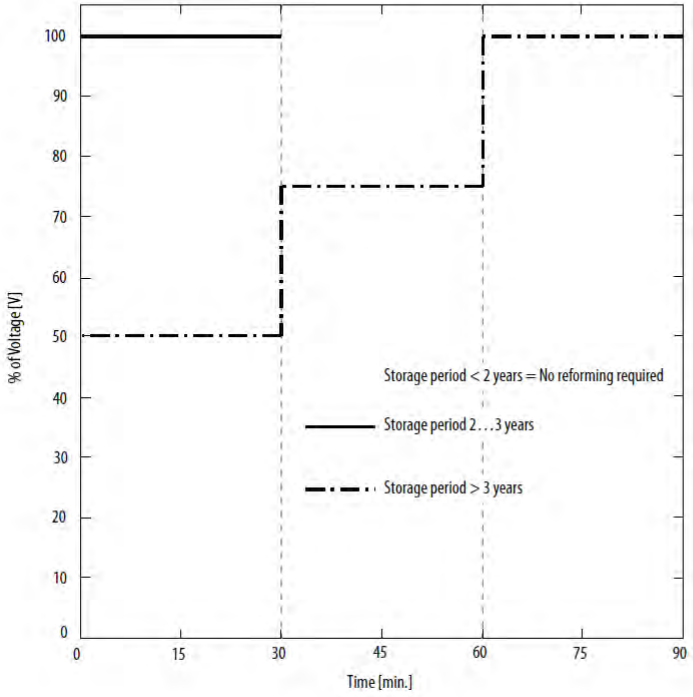

**Figure 7-3: ABB ACS 800 (Part 1)**



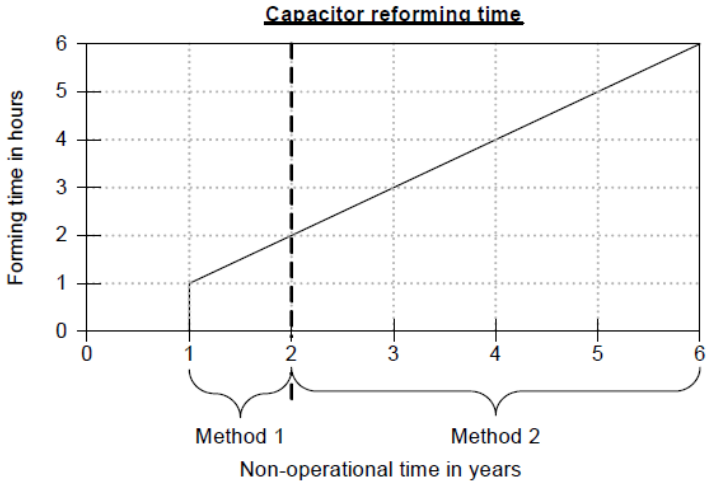


*Figure 1. Capacitor reforming time for Method 1 and Method 2*

## Converters stocked (non-operational) less than 2 years

Use method 1 (below) for capacitor reforming if the converters have been stocked (non-operational) for less than two years.

Switch the power on to the converter for a time given in Figure 1 (Method 1). The converter "wakes up" its capacitors on its own. Power the multidrive inverter units and the inverter modules up once a year to keep the capacitors in operational condition.

## Converters stocked (non-operational) for 2 years and over

Use method 2 A or method 2 B (below) for capacitor reforming if the converters have been stocked (non-operational) for two years or longer.

**WARNING!** The inverter module AC or DC supply voltage must be disconnected by removing the DC/AC fuses or by opening the disconnecting switch/fuse switch.

**Method 2 A:**

Capacitors are reformed via a composition of a rectifier and a resistor circuit, which is connected to the converter DC link. The reforming circuit is shown below. Component values for different voltages are given in the table below. See the reforming time from Figure 1.

**WARNING!** The converter supply must be disconnected while reforming circuit is connected.

**Figure 7-4: ABB ACS 800 (Part 2)**

**Method 2 B:**

Capacitor reforming is based on DC power supply, which is connected to converter DC link. Power supply current charges the converter capacitors. If power supply cannot limit the current, voltage is increased gradually (with e.g. 100 V steps). Maximum recommended reforming current is 500 mA. An appropriate reforming voltage is (1.35 ... $\sqrt{2}$ ) × $U_X$ ($U_X$ = Nominal supply voltage of the converter (VAC). See reforming time from Figure 1.

**WARNING!** The converter supply must be disconnected while reforming circuit is connected.

*Capacitor reforming guide*

**Figure 7-5: Schneider ATV61/71**

How and when do you reform or trickle charge capacitors on an ATV61 or ATV71 Drive that has been setting in storage for a long time?

**Issue**:
How and when do you reform or trickle charge capacitors on an ATV61 or ATV71 Drive that has been setting in storage for a long time?

**Product Line**:
ATV61/71 series

**Environment**:
All serial numbers for ATV61/71 series

**Cause**:
N/A

**Resolution**:
Procedure for applying voltage to an Altivar after a long duration storage:

As a function of the length of storage, you must re-apply voltage progressively to the product to re-form the capacitors. Calculate the storage time from the date code of the product and not from the date of delivery.

Up to 1 year:
Apply voltage normally

More than 1 year (performed without a motor connected and without a run command):
Use a variable AC power supply to increase the voltage in such a fashion so as to have:
- 25% of nominal voltage for 30 minutes
- 50% of nominal voltage for 30 minutes
- 75% of nominal voltage for 30 minutes
- 100% of nominal voltage for 30 minutes

**Warning: This process MUST be followed and is not optional. Applying full line voltage immediately could result in serious damage to the drive, and possible personal injury (when the drive has been sitting for more than 1 year).**

**Figure 7-6: Siemens Micromaster 440**



## 2.1 Installation after a Period of Storage

Following a prolonged period of storage, you must reform the capacitors in the inverter.

**Frame Sizes A to F**

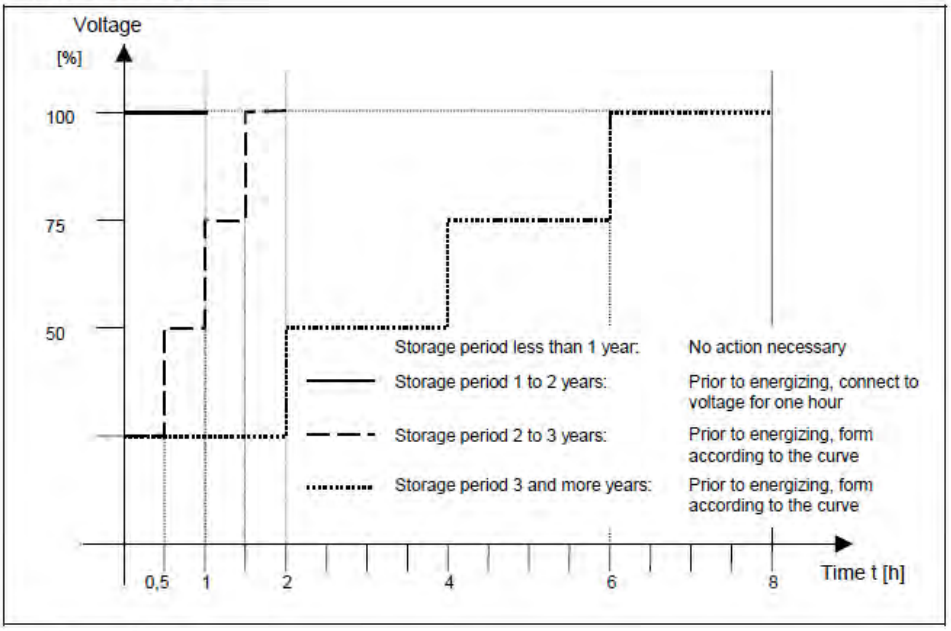


Fig. 2-1 Forming

**Frame Sizes FX and GX**

Reforming the capacitors can be accomplished by applying 85% of the rated input voltage for at least 30 minutes without load.

# ***NOTES***

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