SPD, Power Conditioning, PF Capacitors and Harmonic Filters

Industrial Surge Protection Products

2.1 Surge Protection and Power Conditioning

2.2 Power Factor Correction and Harmonic Filtering

Industrial and Commercial Surge Protection

Contents

Introduction

Industrial and Commercial Surge Protection

- SPD Series for Integration into Electrical Distribution Equipment
- SPD Series for Mounting External to Electrical Distribution Equipment

SPD Series Integrated Units

Specification grade surge protective devices installed within Eaton's electrical assemblies.

SPD Series Integrated Unit

SPD Series Sidemount Units

Specification grade surge protective devices for installation external to electrical distribution equipment.

SPD Series Sidemount Unit

Critical Load Protection

Series filtering and surge protection for critical single-phase loads.

- Current ratings up to 60 A
- 120 and 240 Vac units
- 24 and 48 Vdc units
- DIN mounting available on some models
- Up to 80 kA of peak surge protection
- AC units are UL 1449 4th Edition and UL 1283 5th Edition listed

AEGIS Products

Commercial and Light Industrial Surge Protection

The SPC Series offers robust protection in a compact, flexible design and is configurable for a wide range of commercial and light industrial applications. The SPC combines surge suppression components and the options of EMI/RFI filtering, Form C contacts and an audible alarm.

Surges (also known as transients), due to lightning, utility grid switching, switching of external/internal inductive or capacitive loads, and other sources, travel on power line conductors throughout the electrical distribution system, causing system operating problems and equipment downtime.

SPC Series

Surge Protection for Sub-Panel and OEM Applications

In today's business environment that calls for 24 hours a day, 7 days a week uptime and reliability, Eaton's CVX050 and CVX100 surge protective devices (SPDs) ensure that a customer's investment in equipment and processes is protected from the damaging effects of voltage transients. Designed for installation on service entrance, branch panels or individual equipment disconnects, the CVX050/100 provides enhanced surge protection for mission-critical applications.

Panelboards with Integrated Surge Protective Devices

- Available in standard and custom configurations
- Ratings:
  - 120/240 Vac, single-phase, three-wire
  - 208Y/120 Vac, three-phase, four-wire
  - 480Y/277 Vac, three-phase, four-wire
  - 600Y/347 Vac, three-phase, four-wire (other voltage configurations are available)
- Copper bus
- 12, 18, 24, 30, 36 and 42 circuits
- Bolt-on branch breakers
- A full range of factory installed modifications and accessories
- Fully rated or series rated

Surge Protective Devices can be Integrated within a variety of Eaton Electrical Assemblies

Power Conditioning

Sag Ride-Through (SRT2)

The sag ride-through (SRT2) is a power conditioner that corrects voltage sags to maintain uptime and productivity.

Sag Ride-Through (SRT2)

Electronic Voltage Regulator (EVR)

The electronic voltage regulator (EVR) is designed to meet the needs of customers who experience voltage regulation problems due to brownout conditions from their electric utilities.

Electronic Voltage Regulator (EVR)

Facility-Wide Power Protection Solutions

A facility-wide protection approach should be employed to address power quality issues. This approach minimizes overall lifecycle costs and optimizes facility uptime. The following is a recommended design approach for implementing facility-wide Eaton power protection solutions.

The most accepted design methodology is based on two concepts:

1. Ensure proper grounding conditions exist. All forms of power protection/conditioning rely on good grounding, bonding and earthing practices.
2. Surge protection should be installed at key distribution panels and critical loads.

Application Description

Application Recommendations for Surge Products

Application Type	Eaton's Surge Product	Features and Competitive Advantages
Light Commercial		
Design build Chain stores Small facilities	SPD Series integrated units SPD Series sidemount units SPC units CVX units SP1 units	Ideal package for any commercial facility Cost-effective, reliable protection using the SPD Series or SPC units
Large Projects		
Including: Commercial Government Schools Institution Military	SPD Series integrated units in panelboards, switchboards, MCCs, switchgear, busway and automatic transfer switches SPD Series sidemount units SPD MAX units AEGIS units for critical load applications Power conditioners (EVR and SRT2 units)	Able to meet competitors' surge protection specifications Increased surge protection performance by using integrated SPD Series units Wall space savings by using integrated SPD Series units Quick-ship capabilities from Eaton assembly satellites and service centers Power conditioning capability for a wide variety of applications
Industrial		
Including: Small and large facilities WWTP	SPD Series integrated units in panelboards, switchboards, MCCs, switchgear, busway and automatic transfer switches SPD Series sidemount units SPD MAX units AEGIS units for critical load applications such as PLCs, robotics applications, etc. Power conditioners (EVR and SRT2 units)	Increased surge protection performance by using integrated SPD Series units Wall space savings by using integrated SPD Series units MCCs with SPD Series units installed protect drives from damage AEGIS products protect expensive critical loads from harmful damage EVR units correct voltage regulation problems SRT2 units correct voltage sag problems
OEM		
Any OEM customer including: Integrators Medical equipment Automation and control 	SPD Series integrated units SPD Series sidemount units CVX units SPC units SP1 units SP2 units AEGIS units for critical load applications	Years of experience in a variety of OEM applications Application assistance and recommendations Small footprint enables integration in a variety of applications Ability to meet customized requirements
Telecommunications		
Including: Cellular sites Microwave PCS Paging systems	Panelboards and automatic transfer switches with integrated SPD Series units SPD Series sidemount units CVX units SPC units SP1 units SP2 units	Ability to meet customized requirements Application assistance and recommendations

SPD Series Sidemount Units

Contents

Learn Online

Product Overview

Product Description

Eaton's SPD series surge protective devices are the latest and most advanced UL® 1449 4th Edition certified surge protectors. Units are available integrated within Eaton electrical assemblies, including panelboards, switchboards, motor control centers, switchgear, automatic transfer switches and bus plugs.

SPD Series Integrated Units

A complete offering of sidemount units designed for mounting external to electrical distribution equipment is also available. Application of SPD Series units throughout a facility will ensure that equipment is protected with the safest and most reliable surge protective devices available. SPD Series units are available in all common voltages and configurations and also in a variety of surge current capacity ratings from 50 through 400 kA. Three feature package options are also available to choose from, ensuring the proper unit is available for a variety of applications.

Features, Benefits and Functions

- Uses thermally protected metal oxide varistor (MOV) technology
- Three feature package options
- True protection status indicators report the status of the protection elements, not the status of the applied power
- Available integrated within the following Eaton electrical assemblies: panelboards, switchboards, motor control centers, switchgear, automatic transfer switches and bus plugs
- 10-year warranty (15-year warranty with online registration)

Safety Features

- All units use thermally protected metal oxide varistor technology (MOV) as their core surge suppression component. Usage of this technology ensures safe operation when the unit is subjected to abnormal conditions such as temporary overvoltage or high fault current conditions. Under such conditions, the self-protected MOVs are removed from the circuit quickly and safely before a potentially unsafe condition can occur
- SPD Series units contain no replaceable parts such as surge modules, fuses, or surge counter memory backup batteries. This prevents potential arc flash and shock hazards, as the units require no periodic service or user intervention after installation
- Integrated versions of the unit are factory installed and sidemount versions are factory sealed. These important safety measures further enhance user safety

Three Feature Package Options Available

The SPD Series provides users with the option of selecting between three feature packages. These feature packages are the basic, standard and standard with surge counter. The proper feature package can be selected based on the requirements of the application or specification. A side by side comparison of the individual features found in each package is below.

Basic Feature Package

The basic feature package is perfect for applications where basic, cost-effective, safe and reliable surge protection is required, but budgets don't allow for extra, additional features. Rather than sacrifice performance or safety due to cost, SPD Series units with the basic feature package provide you with high-performing surge protection without sacrificing safety or reliability. The basic feature package provides the same level of surge protection and safety provided by the standard and standard with surge counter feature packages minus some of the features found in them. The package contains dual-colored protection status LEDs that report the true status of the protection in each phase/mode. All four-wire plus ground units also contain an additional set of dual-colored protection status LEDs that report the status of the protection in the neutral/ground mode.

Standard Feature Package

The standard feature package includes all of the features found in the basic feature package, plus an audible alarm with silence button, EMI/RFI filtering, and a form 'C' relay contact that can be used for remote annunciation of the SPD's status. The audible alarm activates and the form 'C' relay contact changes state when any loss of protection is detected or a fault condition exists with the unit. Should such a condition occur, the audible alarm can be silenced by pressing the silence button. The EMI/RFI filter provides up to 50 dB of noise attenuation over the range of 10 kHz through 100 MHz.

Standard with Surge Counter Feature Package

The standard with surge counter feature package includes all of the features found in the standard feature package plus a six-digit surge counter with a reset button. The surge counter indicates the ongoing count of the number of surges the unit has been exposed to and stores them in nonvolatile memory. Should power to the SPD Series unit be completely interrupted, the surge counter will recall and display the surge count prior to the interruption when power is restored. Unlike many surge protectors, the SPD Series' surge counter memory feature does not require a backup battery that would require periodic replacement in order to achieve its memory functionality.

Side-By-Side Comparison of the SPD Series' Available Feature Packages

Feature Package Comparison	Basic	Standard	Standard with Surge Counter
Surge protection using self-protected MOV technology	■	■	■
Dual-colored protection status indicators for each phase	■	■	■
Dual-colored protection status indicators for the N-G protection mode	■	■	■
Audible alarm with silence button		■	■
Form 'C' relay contact		■	■
EMI/RFI filtering, providing up to 50 dB of noise attenuation from 10 kHz to 100 MHz		■	■
Surge counter with reset button			■

Standards and Certifications

- Integrated versions of the unit are UL 1449 4th Edition recognized components for the United States and Canada, covered by Underwriters Laboratories certification and follow-up service
- Sidemount versions are UL 1449 4th Edition listed devices and are also CSA approved

Technical Data and Specifications

- 20 kA nominal discharge current (I_n) rating (maximum rating assigned by UL)
- 50 through 400 kA surge current capacity ratings
- 200 kA short-circuit current rating (SCCR)

SPD Series Unit Integrated within an Eaton Panelboard

Contents

SPD Series for Integration into Electrical Distribution Equipment

Product Description

Eaton's SPD Series surge protective devices are the latest and most advanced UL 1449 4th Edition certified surge protectors. SPD Series units are available in all common voltages and configurations, and also in a variety of surge current capacity ratings from 50 to 400 kA.

Application Description

The SPD Series is available as an integrated device within the following Eaton electrical assemblies:

- Panelboards
- Switchboards
- Motor control centers
- Switchgear
- Automatic transfer switches
- Bus plugs

Features, Benefits and Functions

- Uses thermally protected metal oxide varistor (MOV) technology
- Three feature package options
- 10-year warranty (15-year with online registration)

The Integrated SPD Performance Advantage

Installation conductor length is the single most important factor related to an SPD's performance. Performance decreases as the connected conductor length increases. Integrating the SPD within the electrical assembly provides the best possible surge protection by keeping installation conductor lead lengths as short as possible. Integrating the SPD within an electrical assembly can decrease let-through voltages by hundreds of volts, providing you with the best possible surge protection for sensitive electronic loads.

Remote Display Mounting Option Available

The SPD Series offers the option of mounting its display remotely from the device. This is useful for applications where OEMs or other integrators would like to embed the unit within a piece of equipment and still be able to view its display.

In this installation, the SPD Series is mounted directly to the panelboard's bus bars. This type of installation will provide the best possible surge protection by minimizing the connected lead length.

The SPD Series is also available as an integrated unit interfaced via a circuit breaker resident in the electrical assembly. This installation keeps connected lead lengths short while providing a means of disconnecting power to the unit quickly and easily.

Standards and Certifications

- UL 1449 4th Edition recognized component for the United States and Canada, covered by Underwriters Laboratories certification and follow-up service
- UL 1283 5th Edition (Type 2 SPDs only)

Catalog Number Selection

SPD Series Units Mounted Internal to Electrical Distribution Equipment

SPD 250 480D 2 J

Series
SPD = Surge protective device

kA Rating
050 = 50 kA per phase
080 = 80 kA per phase
100 = 100 kA per phase
120 = 120 kA per phase
160 = 160 kA per phase
200 = 200 kA per phase
250 = 250 kA per phase
300 = 300 kA per phase
400 = 400 kA per phase

Voltage Code
240S = 120/240 single split-phase
208Y = 120/208 wye (4W+G)
220Y = 127/220 wye (4W+G)
400Y = 230/400 wye (4W+G)
480Y = 277/480 wye (4W+G)
600Y = 347/600 wye (4W+G)
240D = 240 delta (3W+G)
480D = 480 delta (3W+G)
600D = 600 delta (4W+G)
240H = 240 high-leg delta (4W+G) on 'B' phase ①

Feature Package
1 = Basic
2 = Standard
3 = Standard + surge counter

Application—Integrated Units ②
A = Panelboards (PRL1a, 2a, 3a, 3E), direct bus mounted
B = Switchgear (includes remote display)
C = Panelboards (PRL1a, 2a, 3a, 3E, 4), switchboards, busway
J = Motor control centers

Notes

① Please consult the factory for 240 high-leg delta (4W+G) applications with high leg on 'C' phase.

② Units used in PRL1a, 2a, 3a and 3E panelboard applications are available in 50–200 kA ratings only. Use the 'C' option for PRL1a, 2a, 3a and 3E panelboard applications when unit is connected through a circuit breaker.

Example: SPD250480D2J = SPD Series, 250 kA per phase, 480D voltage, standard feature package, motor control center application.

Technical Data and Specifications

SPD Series Specifications

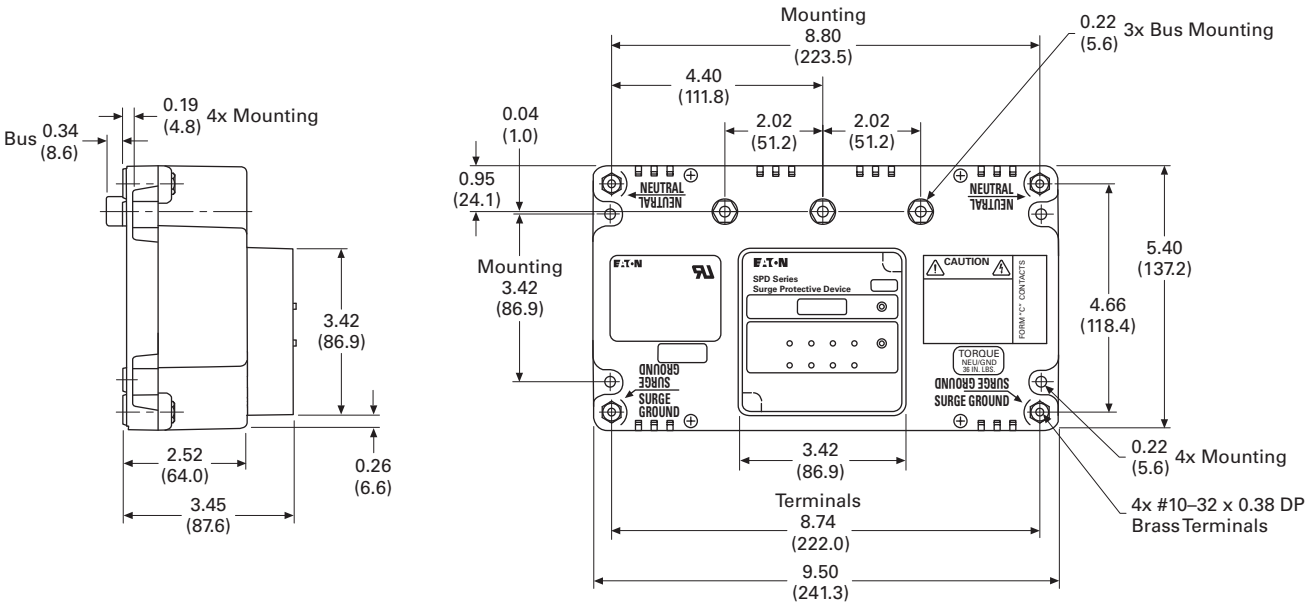
Description	Specification	
Surge capacity ratings available	50, 80, 100, 120, 160, 200, 250, 300, 400 kA per phase	
Nominal discharge current (I_n)	20 kA (maximum rating assigned by UL)	
Short-circuit current rating (SCCR)	200 kA	
SPD type	Basic feature package = Type 1 (can also be used in Type 2 applications) Standard and standard with surge counter feature packages = Type 2	
Single split-phase voltages available	120/240	
Three-phase wye system voltages available	120/208, 127/220, 230/400, 277/480, 347/600	
Three-phase delta system voltages available	240, 480, 600	
Input power frequency	50/60 Hz	
Power consumption (basic units):		
208Y, 220Y, 240S, 240D and 240H voltage codes	0.5 W	
400Y, 480Y and 480D voltage codes	1.1 W	
600Y and 600D voltage codes	1.3 W	
Power consumption (standard and standard with surge counter units):		
208Y, 220Y, 240S, 240D and 240H voltage codes	0.6 W	
400Y, 480Y and 480D basic voltage codes	1.7 W	
600Y and 600D voltage codes	2.1 W	
Protection modes	Single split-phase	L-N, L-G, N-G, L-L
	Three-phase wye	L-N, L-G, N-G, L-L
	Three-phase delta	L-G, L-L
	Three-phase high-leg delta	L-N, L-G, N-G, L-L
Maximum continuous operating voltage (MCOV):		
240S, 208Y, 220Y and 240H MCOV	150 L-N, 150 L-G, 150 N-G, 300 L-L	
400Y and 480Y MCOV	320 L-N, 320 L-G, 320 N-G, 640 L-L	
600Y MCOV	420 L-N, 420 L-G, 420 N-G, 840 L-L	
240D MCOV	320 L-G, 320 L-L	
480D MCOV	640 L-G, 640 L-L	
600D MCOV	840 L-G, 840 L-L	
Ports	1	
Operating temperature	–40 °F through 122 °F (–40 °C through 50 °C)	
Operating humidity	5% through 95%, noncondensing	
Operating altitude	Up to 16,000 ft (5000 m)	
Seismic withstand capability	Meets or exceeds the requirements specified in IBC 2006, CBC 2007 and UBC Zone 4	
Form C relay contact ratings	150 Vdc or 125 Vac, 1 A maximum	
Form C relay contact logic	Power ON, normal state—NO contact = open, NC contact = closed Power OFF or fault state—NO contact = closed, NC contact = open	
EMI/RFI filtering attenuation	Up to 50 dB from 10 kHz to 100 MHz	

Dimensions

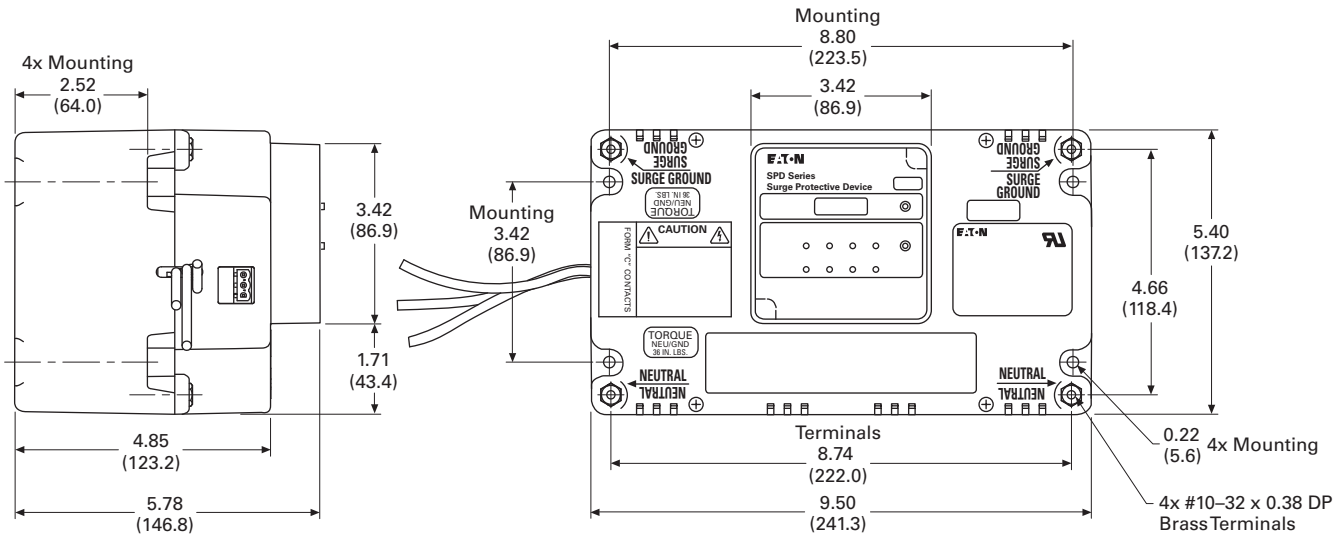
Approximate Dimensions in Inches (mm)

2

50–200 kA Integrated Units



250–400 kA Integrated Units



Weights

- 50–200 kA units approximately 3.5 lb (1.6 kg)
- 250–400 kA units approximately 7.0 lb (3.2 kg)

Eaton SPD Series Sidemount Unit Mounted Externally to an Eaton Panelboard

Contents

SPD Series for Mounting External to Electrical Distribution Equipment

Product Description

Eaton's sidemount versions of the SPD Series surge protective devices are the latest and most advanced UL 1449 4th Edition listed surge protectors. Application of SPD Series units throughout a facility will ensure that equipment is protected with the safest and most reliable surge protective devices available. Units are available in all common voltages and configurations, and also in a variety of surge current capacity ratings from 50 through 400 kA. Three feature package options are also available to choose from.

Features, Benefits and Functions

- Uses self-protected metal oxide varistor (MOV) technology
- Three feature package options
- 10-year warranty (15-year with registration)

Standards and Certifications

- UL 1449 4th Edition listed device
- Canadian Standards Association (CSA)
- UL 1283 5th Edition (Type 2 SPDs only)

Listed

All SPD Series sidemount units come prewired and include a factory-installed conduit interface, making installation very easy.

All SPD Series units are factory sealed, ensuring that the user/installer has no potential of coming into contact with harmful voltages present inside the unit.

Catalog Number Selection

2

SPD Series Units for Mounting External to Electrical Distribution Equipment

SPD 250 480D 2 K

Series
SPD = Surge protective device

kA Rating
050 = 50 kA per phase
080 = 80 kA per phase
100 = 100 kA per phase
120 = 120 kA per phase
160 = 160 kA per phase
200 = 200 kA per phase
250 = 250 kA per phase
300 = 300 kA per phase
400 = 400 kA per phase

Voltage Code
240S = 120/240 single split-phase
208Y = 120/208 wye (4W+G)
220Y = 127/220 wye (4W+G)
400Y = 230/400 wye (4W+G)
480Y = 277/480 wye (4W+G)
600Y = 347/600 wye (4W+G)
240D = 240 delta (3W+G)
480D = 480 delta (3W+G)
600D = 600 delta (4W+G)
240H = 240 high-leg delta (4W+G) on 'B' phase ①

Feature Package
1 = Basic
2 = Standard
3 = Standard + surge counter

Application—Sidemount Units
K = NEMA 1 enclosure
L = NEMA 1 flushmount enclosure ②
M = NEMA 1 enclosure with internal disconnect
N = NEMA 4 enclosure
O = NEMA 4 enclosure with internal disconnect
P = NEMA 4X enclosure (stainless steel)
Q = NEMA 4X enclosure with internal disconnect (stainless steel)

Notes

① Please consult the factory for 240 high-leg delta (4W+G) applications with high leg on 'C' phase.

② NEMA 1 flushmount units are available in 50–200 kA ratings only.

Example: SPD250480D2K = SPD Series, 250 kA per phase, 480D voltage, standard feature package, housed in NEMA 1 enclosure.

Technical Data and Specifications

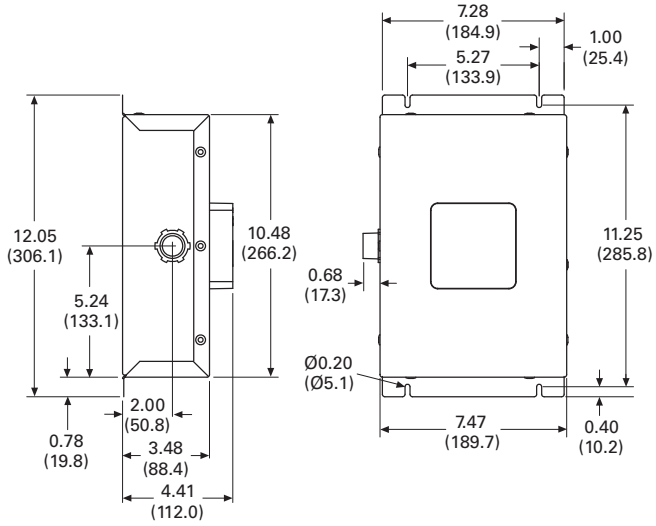
SPD Series Specifications

Description	Specification	
Surge capacity ratings available	50, 80, 100, 120, 160, 200, 250, 300, 400 kA per phase	
Nominal discharge current (I_n)	20 kA (maximum rating assigned by UL)	
Short-circuit current rating (SCCR)	200 kA	
SPD type	Basic feature package = Type 1 (can also be used in Type 2 applications) Standard and standard with surge counter feature packages = Type 2	
Single split-phase voltages available	120/240	
Three-phase wye system voltages available	120/208, 127/220, 230/400, 277/480, 347/600	
Three-phase delta system voltages available	240, 480, 600	
Input power frequency	50/60 Hz	
Power consumption (basic units):		
208Y, 220Y, 240S, 240D and 240H voltage codes	0.5 W	
400Y, 480Y and 480D voltage codes	1.1 W	
600Y and 600D voltage codes	1.3 W	
Power consumption (standard and standard with surge counter units):		
208Y, 220Y, 240S, 240D and 240H voltage codes	0.6 W	
400Y, 480Y and 480D basic voltage codes	1.7 W	
600Y and 600D voltage codes	2.1 W	
Protection modes	Single split-phase	L-N, L-G, N-G, L-L
	Three-phase wye	L-N, L-G, N-G, L-L
	Three-phase delta	L-G, L-L
	Three-phase high-leg delta	L-N, L-G, N-G, L-L
Maximum continuous operating voltage (MCOV):		
240S, 208Y, 220Y and 240H MCOV	150 L-N, 150 L-G, 150 N-G, 300 L-L	
400Y and 480Y MCOV	320 L-N, 320 L-G, 320 N-G, 640 L-L	
600Y MCOV	420 L-N, 420 L-G, 420 N-G, 840 L-L	
240D MCOV	320 L-G, 320 L-L	
480D MCOV	640 L-G, 640 L-L	
600D MCOV	840 L-G, 840 L-L	
Ports	1	
Operating temperature	–40 °F to 122 °F (–40 °C to 50 °C)	
Operating humidity	5% through 95%, noncondensing	
Operating altitude	Up to 16,000 ft (5000 m)	
Seismic withstand capability	Meets or exceeds the requirements specified in IBC 2006, CBC 2007 and UBC Zone 4	
Enclosure dimensions and weights	Refer to figures on **Pages V3-T2-14–V3-T2-15** for enclosure dimensions and weights	
Form C relay contact ratings	150 Vdc or 125 Vac, 1 A maximum	
Form C relay contact logic	Power ON, normal state—NO contact = open, NC contact = closed Power OFF or fault state—NO contact = closed, NC contact = open	
EMI/RFI filtering attenuation	Up to 50 dB from 10 kHz to 100 MHz	

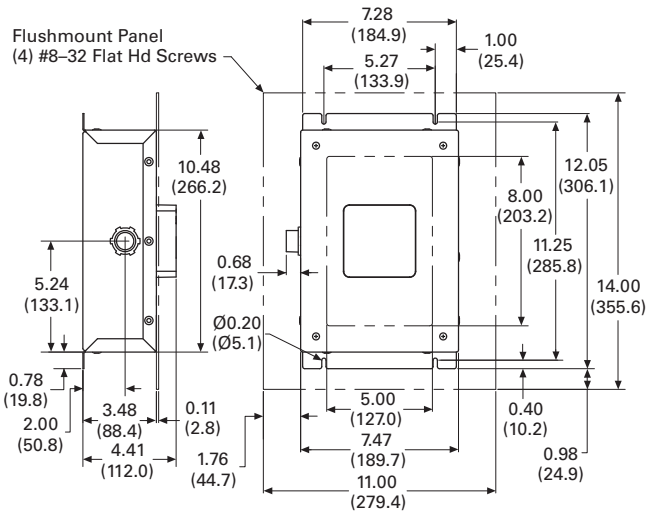
Dimensions

Approximate Dimensions in Inches (mm)

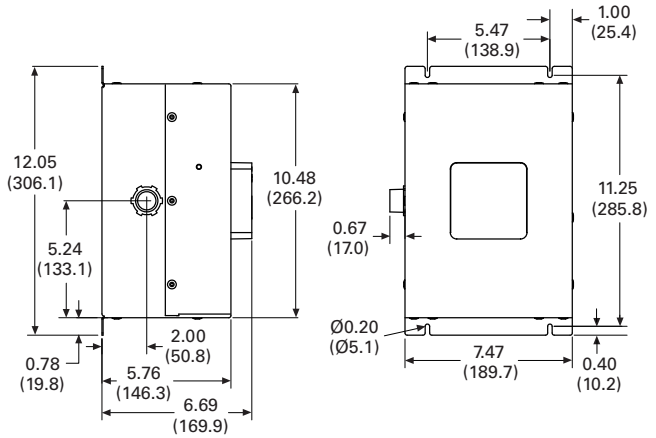
50–200 kA Units in a NEMA 1 Rated Enclosure, Weight = 6.8 Lb



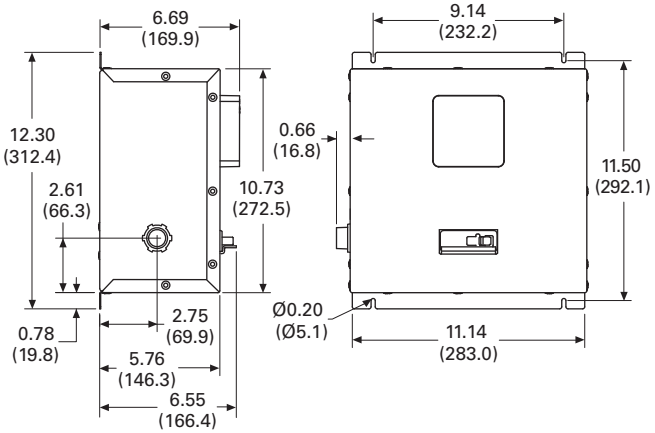
50–200 kA Units in a NEMA 1 Rated Flushmount Enclosure, Weight = 6.8 Lb



250–400 kA Units in a NEMA 1 Rated Enclosure, Weight = 13.5 Lb

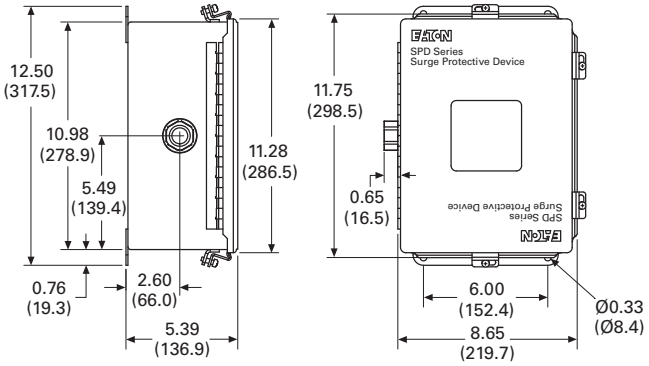


50–400 kA Units in a NEMA 1 Rated Enclosure with Internal Disconnect, Weight = 14.7 Lb

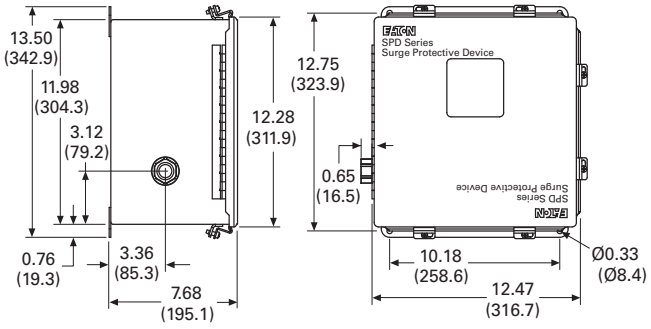


Approximate Dimensions in Inches (mm)

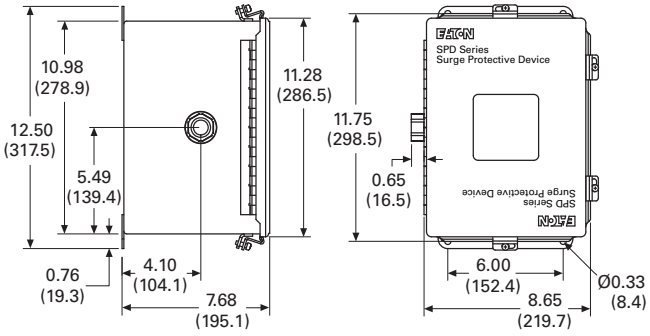
50–200 kA Units in a NEMA 4 or 4X Rated Enclosure, Weight = 14.6 Lb



50–400 kA Units in a NEMA 4 or 4X Rated Enclosure with Internal Disconnect, Weight = 27.5 Lb



250–400 kA Units in a NEMA 4 or 4X Rated Enclosure, Weight = 14.6 Lb



SPD MAX

Contents

SPD MAX Series Surge Protection

Product Description

Eaton's SPD MAX Series side-mounted surge protective devices are the latest and most advanced UL 1449 4th Edition certified surge protectors. Applying SPD MAX Series units at main service entrances and critical loads will ensure that equipment is protected with the safest and most reliable surge protective devices (SPDs) available. Units are available in all common voltages and configurations, and also in a variety of surge current capacity ratings from 100 kA through 800 kA. Additionally, you may choose from two feature package options.

Application Description

The breadth of the SPD MAX Series' features, options and configurations ensures that the correct unit is available for all electrical applications, including service entrances, main switchgear, motor control centers, distribution switchboards, panelboards and point-of-use applications.

Features

- Uses thermally protected metal oxide varistor (MOV) technology
- Lockout and tagout provisions
- Safety barriers
- 20 kA nominal discharge current (I_n) rating (maximum rating assigned by UL)
- 100 kA through 800 kA surge current capacity ratings
- Installation flexibility, #10 to 1/0 wire may be used
- Two feature package options
- 200 kA short-circuit current rating (SCCR) (maximum rating assigned by UL)
- Field serviceable
- 15-year warranty standard, additional 5 years with product registration

Standards and Certifications

- UL 1449 3rd Edition
- UL 1283 5th Edition
- Canadian Standards Association (CSA)
- Built in an ISO 9001 facility
- Designed and tested in accordance with:
  - IEEE C62.41.1
  - IEEE C62.41.2
  - IEEE C62.43-2005
  - IEEE C62.45-2002
  - IEEE C62.48-2005
  - IEEE C62.62-2010

c UL us Listed

Catalog Number Selection

SPD MAX Series Surge Protection

SPM 250 480D 3 R

Series
SPM

kA Rating
100 = 100 kA per phase
120 = 120 kA per phase
160 = 160 kA per phase
200 = 200 kA per phase
250 = 250 kA per phase
300 = 300 kA per phase
320 = 320 kA per phase
400 = 400 kA per phase
600 = 600 kA per phase
800 = 800 kA per phase

Voltage Code Options ①
240S = 120/240 split-phase
208Y = 120/208 wye (4W+G)
220Y = 127/220 wye (4W+G)
400Y = 230/400 wye (4W+G)
600Y = 347/600 wye (4W+G)
240D = 240 delta (3W+G)
480D = 480 delta (3W+G)
600D = 600 delta (4W+G)
240H = 240 delta high-leg (4W+G) on 'B' phase
230L = 230 single-phase

Application Suffix
S = 2 module, NEMA 4 enclosure with internal circuit breaker
T = 1 module, NEMA 4 enclosure with internal terminal block
U = 2 module, NEMA 4 enclosure with internal terminal block
V = 1 module, NEMA 4X enclosure with internal circuit breaker
W = 2 module, NEMA 4X enclosure with internal circuit breaker
X = 1 module, NEMA 4X enclosure with internal terminal block
Y = 2 module, NEMA 4X enclosure with internal terminal block

Feature Package Options
1 = Basic Dual-colored LED per phase to indicate protection status Dual-colored LED to indicate protection status of the N–G mode on units with a neutral wire
3 = Standard with surge counter Dual-colored LED per phase to indicate protection status Dual-colored LED to indicate protection status of the N–G mode on units with a neutral wire Audible alarm with silence button Form C relay contact EMI/RFI filtering that provides up to 50 dB of noise attenuation from 10 kHz to 100 MHz Surge counter with alarm silence (reset) button

Notes

① Please consult the factory for 240 high-leg delta (4W+G) applications with high leg on 'C' phase.

SPD250480D3R = SPD MAX Series, 250 kA per phase, 480D voltage, standard with counter features package, NEMA 4 enclosure with internal circuit breaker.

Technical Data and Specifications

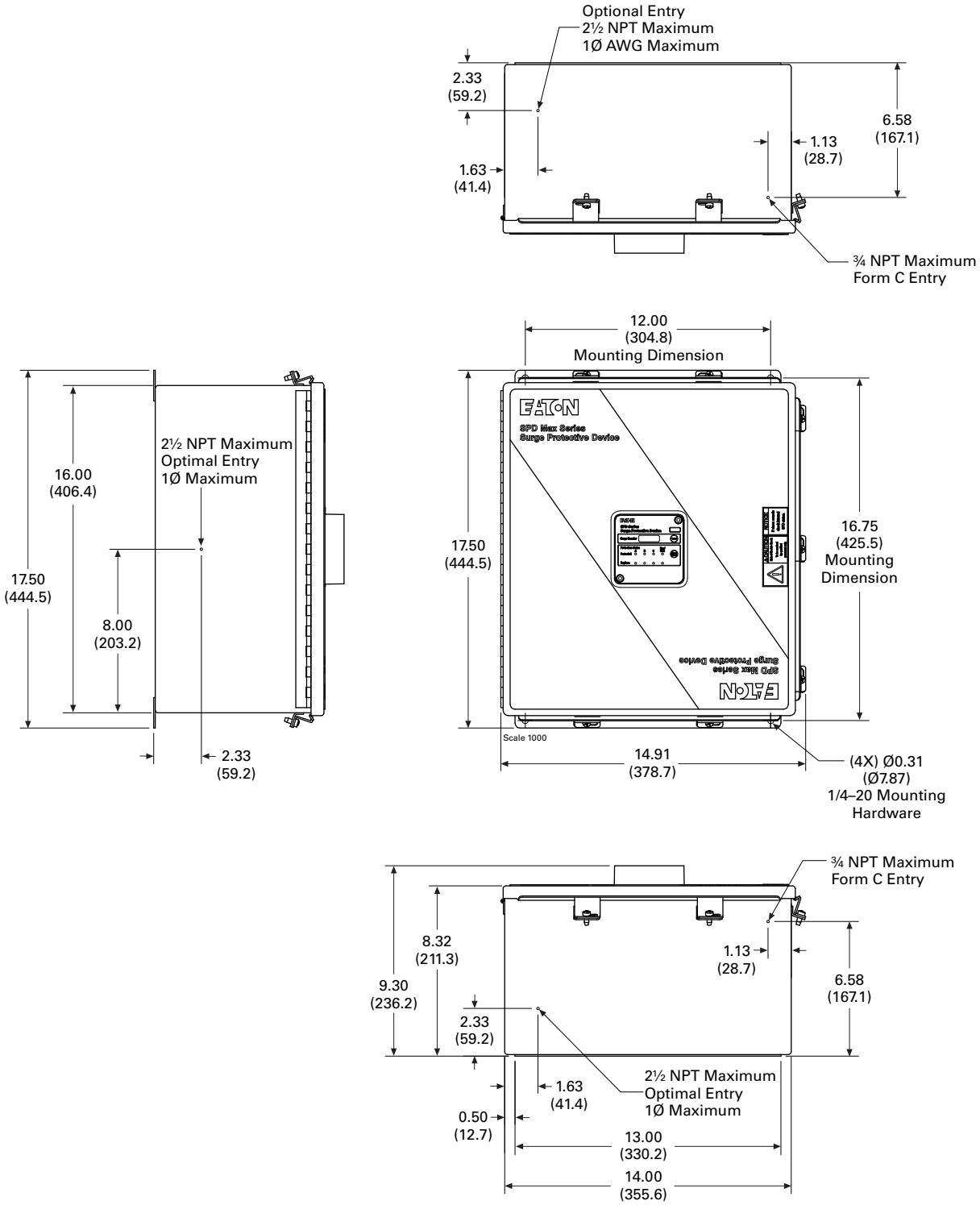
SPD MAX Series Surge Protection

Description	Specification
Surge current capacity per phase	100 kA, 120 kA, 160 kA, 200 kA, 250 kA, 300 kA, 320 kA, 400 kA, 600 kA, 800 kA ratings available
Nominal discharge current (I_n)	20 kA
Short-circuit current rating (SCCR)	200 kA
SPD type	Basic feature package = Type 1 (can also be used in Type 2 applications)
	Standard with surge counter feature package = Type 2
Enclosure types	NEMA 4, NEMA 4X enclosure
Circuit breaker—30 A	Eaton catalog number: FDC3030L
Circuit Breaker Load and Line	
Terminal torque specifications	#10 AWG 35 lb-in; #8 AWG 40 lb-in; #6–#4 AWG 45 lb-in; #3–1/0 AWG 50 lb-in (SPD maximum wire range #10–1/0 AWG)
Standard split-phase voltages available	120/240
Single-phase	230
Three-phase wye system voltages available	120/208, 127/220, 230/400, 277/480, 347/600
Three-phase delta system voltages	240, 480, 600
Three-phase high leg delta system voltages	120/240 high leg phase wire will be identified with a tag from the factory
Input power frequency	50/60 Hz
Power Consumption (Standard with Surge Counter Units)	
208Y, 220Y, 230L, 240S, 240D and 240H voltage codes	0.6 W
400Y, 480Y and 480D basic voltage codes	1.7 W
600Y and 600D voltage codes	2.1 W
Protection modes	Single split-phase L–N, L–G, N–G, L–L, single-phase L–N, L–G, N–G, three-phase delta L–G, L–L, three-phase wye L–N, L–G, N–G, L–L, three-phase high leg delta L–N, L–G, N–G, L–L
Maximum Continuous Operating Voltage (MCOV)	
230 V single-phase	320 V L–N, 320 V L–G, 320 V N–G
127 V/220 V wye, 120 V/240 V single split phase	150 V L–N, 150 V L–G, 150 V N–G, 300 V L–L
120 V/240 V hi leg	150 V L–N, 150 V L–G, 150 V N–G, 300 V L–L, 320 V H–N, 320 V H–G, 470 V H–L
230 V/400 V wye, 277 V/480 V wye	320 V L–N, 320 V L–G, 320 V N–G, 640 V L–L
347 V/600 V wye	420 V L–N, 420 V L–G, 420 V N–G, 840 V L–L
240 V delta	300 V L–G, 300 V L–L
480 V delta	640 V L–G, 640 V L–L
600 V delta	840 V L–G, 840 V L–L
Ports	1 or 2
Operating temperature and humidity	–20 °C through +50 °C (–4 °F through +122 °F), 5% through 95%, noncondensing
Storage temperature	–20 °C through +50 °C (–4 °F through +122 °F)
Operating altitude	Up to 16,000 ft (5000 m)
Weight	Not to exceed 52 lb
Form C relay contact ratings	Maximum 0.46 A, 150 Vac, 1 A, 30 Vdc
Form C terminal block ratings	Rated 300 V, 16 A, 30–12 AWG solid or stranded wire. Torque range 5–7 lb-in
Form C relay contact logic	Power on, normal state—NO contact = OPEN, NC contact = CLOSED Power off, fault state—NO contact = CLOSED, NC contact = OPEN
EMI/RFI filtering attenuation (standard with surge counter)	Up to 50 dB from 10 kHz to 100 MHz
Standards / agency certifications	UL 1449 Edition 3—standard for surge protective devices
	UL 1283 Edition 5—standard for EMI filters (Type 2 SPDs only)
	CSA Electrical Notice No. 516 Edition 1—surge/transient voltage suppressor (excludes 230 L voltage code)
	CSA 22.2 NO. 8-M1986 Edition 4—EMI filters
Warranty	15 years from the date of delivery to the purchaser, 20 years if the product is properly registered at www.eaton.com
RoHS compliant	Yes

Dimensions

Approximate Dimensions in Inches (mm)

SPD MAX Series Surge Protection



SPC

Contents

SPC Surge Protective Device

Product Description

Eaton's SPC Series surge protective devices are UL, 1449 4th Edition, certified surge protectors. Application of SPC Series units throughout a facility will ensure that equipment is protected with the safest and most reliable surge protective devices available. The compact design and NEMA 4X enclosure of the SPC Series allows for installation external to an electrical assembly in a variety of environments.

SPC Series units are available in all common voltages and configurations, and in a variety of peak surge current capacity ratings from 50 through 200 kA per phase. Several feature package options, including filtering, audible alarm and Form C contacts, are available to choose from. A range of configurable options is available to customize the SPC Series features for most electrical applications, including service entrances, distribution panelboards and point-of-use applications. The SPC Series belongs to Eaton's complete family of surge protection solutions, providing coverage for any application.

Application Description

Surge events—short-term transients in voltage threatening critical downstream equipment—happen for many reasons. The most common source, though, is internal devices powering on and off: motors, transformers, photocopiers, fluorescent lighting ballasts, light dimmers, fax machines and more. They can also be generated externally by events like lightning, grid switching or electrical equipment in adjacent buildings.

While seemingly innocent, surge events can wreak serious havoc on unprotected and inadequately protected facilities. They can disrupt, damage or destroy sensitive microprocessor-based devices (computers, programmable logic controls, etc.), resulting in premature aging of equipment, process interruptions and catastrophic failures.

The best way to prevent downtime from an electrical surge is through facility-wide cascaded surge protection at all stages of the electrical distribution system. When properly installed, surge protective devices can mitigate problems with susceptible equipment, keeping it and its related processes running reliably without surge-related disruptions.

Eaton's SPC Series surge protective device (SPD) is a key component to your cascaded protection strategy. It's compact, flexible and configurable to protect most electrical applications, including service entrances, distribution panelboards and point-of-use applications.

Features

- Thermally protected metal oxide varistor (MOV) technology
- Tri-colored LED protection status indicators
- 20 kA nominal discharge current (I_n) rating (maximum rating in the UL 1449 4th Edition standard)
- 50 through 200 kA per phase peak surge current capacity ratings
- Configure-to-order with eight custom feature combinations
- Corrosion-resistant NEMA 4X enclosure with mounting feet
- 200 kA short-circuit current rating (SCCR)
- Factory prewired with 36 inches of 10 AWG wire
- No user-serviceable parts or items requiring periodic maintenance
- 5-year warranty that can be extended to 10 years with product registration at Eaton.com/spc

Standards and Certifications

- UL 1449 4th Edition Type 1 and Type 2
- UL 1283 6th Edition (Feature packages: 2, 6, 7 and 8)
- Canadian Standards Association (CSA) Type 1 and Type 2

Listed

Catalog Number Selection

SPC

SPC 200 208Y 8 P

Series
SPC

kA Rating (Options)
050 = 50 kA per phase
080 = 80 kA per phase
100 = 100 kA per phase
120 = 120 kA per phase
150 = 150 kA per phase
160 = 160 kA per phase
200 = 200 kA per phase

Voltage Code (Options)
120N = 120 V single-phase (2 W +G)
240N = 240 V single-phase (2 W +G)
277N = 277 V single-phase (2 W +G)
480N = 480 V single-phase (2 W +G)
240S = 120/240 V split-phase (3 W +G)
240D = 240 V delta (3 W +G)
480D = 480 V delta (3 W +G)
600D = 600 V delta (3 W +G)
240H = 240 V high leg delta (4 W +G)
208Y = 120/208 V wye (4 W +G)
415Y = 240/415 V wye (4 W +G)
480Y = 277/480 V wye (4 W +G)
600Y = 347/600 V wye (4 W +G)

Features	
Options	**SPD Application**
1 = No options (standard configuration)	Type 1
2 = Filtering, UL 1283 5th Edition	Type 2
3 = Audible alarm	Type 1
4 = Form C relay	Type 1
5 = Audible alarm and Form C relay	Type 1
6 = Filtering and audible alarm	Type 2
7 = Filtering and Form C relay	Type 2
8 = Filtering, audible alarm and Form C relay	Type 2

Enclosure
P = NEMA 4X

Technical Data and Specifications

SPC

Description	Specification
Peak surge current capacity ratings available	50, 80, 100, 120, 150, 160, 200 kA per phase
Nominal discharge current (I_n)	20 kA
Short-circuit current rating (SCCR)	200 kA
Single-phase voltages available (2 W + G)	120, 240, 277, 480
Split-phase voltages available (3 W +G)	120/240
Three-phase wye system voltages available (4 W + G)	120/208, 240/415, 277/480, 347/600
Three-phase delta system voltages available (3 W + G)	240, 480, 600
Three-phase high leg delta system voltage available (4 W + G)	240
Input power frequency	50/60 Hz
Protection modes	Single-phase: L-N, N-G, L-G Split-phase: L-N, N-G, L-G, L-L Wye: L-N, N-G, L-G, L-L Delta: L-G, L-L
Maximum continuous operating voltage (MCOV):	
120N	150 L-N, 150 L-G, 150 N-G
240N, 277N	320 L-N, 320 L-G, 320 N-G
480N	550 L-N, 550 L-G, 550 N-G
240S, 208Y	150 L-N, 150 L-G, 150 N-G, 300 L-L
240H	150 L-N, 150 L-G, 150 N-G, 300 L-L, 470 H-L, 320 H-N, 320 H-G
415Y and 480Y	320 L-N, 320 L-G, 320 N-G, 640 L-L
600Y	320 L-N, 320 L-G, 320 N-G, 840 L-L
240D	320 L-G, 300 L-L
480D	550 L-G, 640 L-L
600D	840 L-G, 840 L-L
Ports	1
Operating temperature	–40 °F to 140 °F (–40 °C to 60 °C)
Storage temperature	–40 °F to 140 °F (–40 °C to 60 °C)
Operating humidity	5% through 95%, noncondensing
Operating altitude	Up to 2000 m (6561 ft)
Agency certification/listing	UL 1449 4th edition, UL 1283 6th edition, CSA C22.2 No. 269.1-14 for Type 1 SPD, CSA C22.2 No. 269.2-13 for Type 2 SPD, CSA C22.2 no. 8-13 for EMI Filter
Durability Repetitive Strike Test	Passed 15,000 strikes to ANSI/IEEE C62.41 (20 kV, 10 kA) Category C Waveform
SPD type	UL 1449 4th edition and CSA Type 1 and Type 2 SPD (dependent on feature options)
Enclosure dimensions and weights	Refer to **Page V3-T2-23** for enclosure dimensions and weights
Enclosure rating	NEMA 4X enclosure ①
Form C relay contact ratings	2A at 30 Vdc or 250 Vac
Form C relay contact logic	Power ON, normal state; NO contact = open, NC contact = closed Power OFF or fault state; NO contact = closed, NC contact = open
EMI/RFI filtering attenuation	Up to 40 dB from 10 kHz to 100 MHz
RoHS compliant	Yes
Warranty	5 years standard, 10 years with product registration on www.eaton.com/spc

SPC voltage configurations per enclosure size

P1 Enclosure	P2 Enclosure
120N/240N/277N/480N = 50–200 kA	240S = 120–200 kA
240S = 50–100 kA	208Y/415Y/480Y/600Y = 120–200 kA
208Y/415Y/480Y/600Y = 50–100 kA	240D/480D = 120–200 kA
240D/480D = 50–00 kA	600D = 50–200 kA
240H = 50–100 kA	240H = 120–200 kA

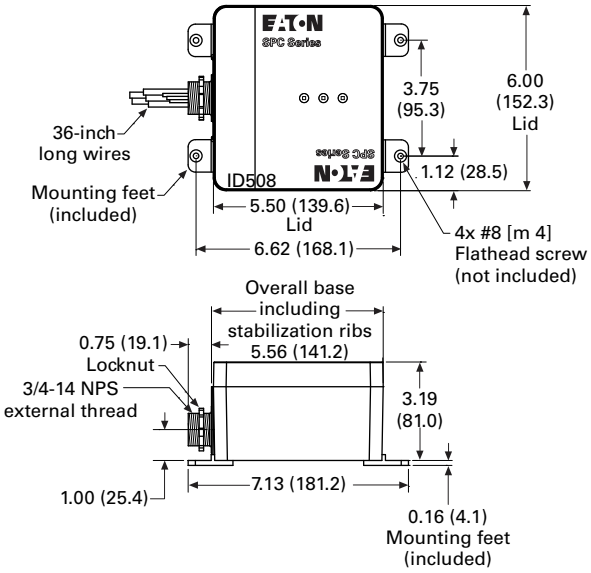
Note

① Mounting feet required to achieve NEMA 4X rating.

Dimensions

Approximate Dimensions in Inches (mm)

P1



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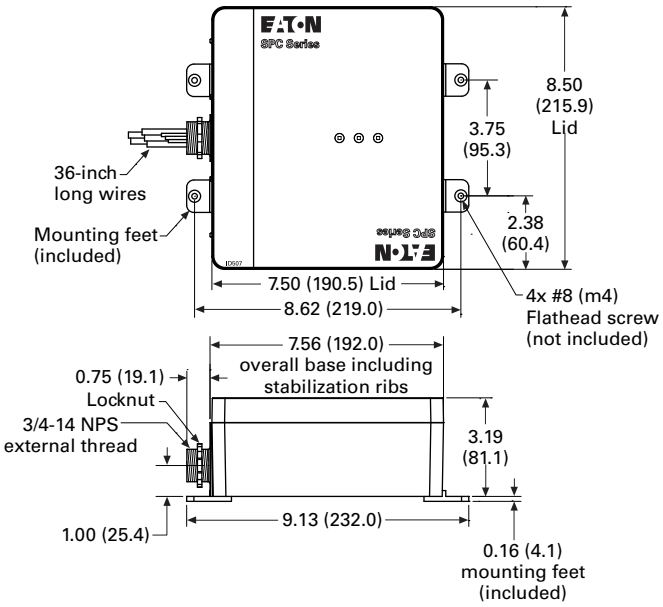


CVX050/100

Contents

CVX050/100

Product Description

With over two decades of experience in the surge suppression industry and extensive R&D initiatives, Eaton is considered a world leader in surge protective device (SPD) manufacturing. All of Eaton's products are manufactured in an ISO® 9001:2000 and ISO 14001 certified facility.

Eaton's CVX050/100 models are rugged, cost-effective, high-quality SPDs that feature self-protected MOVs that eliminate the failure characteristics of standard metal oxide varistors. This technology results in a fail-safe device that monitors the status of the metal oxide disk and disconnects itself from the power system when the disk is approaching breakdown.

The CVX050/100 is easy to install adjacent or even internal to electrical equipment. When installing an SPD in a retrofit environment, it is important to mount the device as close to the electrical equipment as possible. Keep the wiring (lead length) between the electrical equipment and SPD as short as possible, and twist or wire tie the conductors together to reduce the wire's impedance factor.

Application Description

Eaton's CVX050 and CVX100 SPDs protect electronic equipment from damaging transients. These units are suitable for medium and low exposure level applications that require cost-effective, high quality system protection including:

- Residential/small business
- Light industrial
- Light commercial
- Branch panel protection
- OEM applications

Features, Benefits and Functions

- Advanced surge path technology for high fault current capacity, low impedance, high frequency design
- Rugged NEMA® 4X (IP65) enclosure
- Large diameter, self-protected metal oxide varistors provide long life and fail-safe operation
- LED monitoring of each phase
- Wide range of voltage applications from 100 to 600 Vac and 48 and 125 Vdc
- 5-year free replacement warranty

Optional Features

- External mounting feet (catalog number MNTGFTX)
- Flush mounting plate (catalog number FLUSHMNTPLATE12)

Standards and Certifications

- UL 1449 4th Edition for surge protective devices
- CE marked
- Vibration tested IEC 60255-21-1 and -2

Note: CE, CSA and UL on AC unit only.

Catalog Number Selection

CVX050/100

CVX 050 - 240S

Per Phase Peak Surge Current
050 = 50 kA
100 = 100 kA

Configuration and Voltage Ranges	
230L	= Single-phase—200, 208, 220, 230, 240, 277 Vac
480L	= Single-phase—480 Vac
240S	= Split-phase—100/200, 110/220, 120/240 Vac
240H	= Three-phase high leg delta—120/240 Vac
208Y	= Three-phase wye (star)—100/174, 110/190, 120/208, 127/220 Vac
480Y	= Three-phase wye (star)—220/380, 230/400, 240/415, 277/480 Vac
600Y	= Three-phase wye (star)—305/525, 347/600 Vac
240D	= Three-phase delta—200, 208, 220, 230, 240 Vac
480D	= Three-phase delta—380, 400, 415, 440, 480 Vac
600D	= Three-phase delta—525, 600 Vac (600D available in 50 kA only)
048DC	= Direct current—48 Vdc ①
125DC	= Direct current—125 Vdc ①

Technical Data and Specifications

CVX050/100 Model Specifications

Description	Specification
Peak kA per phase	50, 100
Peak kA per mode	50
Nominal discharge current	20 kA ①
Short-circuit current rating	100 kA
Single-phase voltages	200, 208, 220, 230, 240, 277, 380, 400, 440, 460, 480 Vac
Split-phase voltages	100/200, 110/220/ 120/240 Vac
High leg delta voltages	240 Vac
Wye system voltages	100/175, 110/190, 120/208, 127/220, 220/380, 230/400, 240/415, 277/480, 305/525, 347/600 Vac
Delta system voltages	200, 208, 220, 230, 240, 380, 400, 415, 440, 480, 525, 600 Vac
Direct current Voltage ②	48 Vdc, 125 Vdc
Input power frequency	47–420 Hz (50/60 Hz typical)
Protection modes	Single-phase: L-N, N-G, L-G Split-phase: L-N, N-G, L-G, L-L High leg delta: L-N, N-G, L-G, L-L, H-N, H-G, H-L Wye: L-N, N-G, L-G, L-L Delta: L-G, L-L Direct current ① (DC): L-L, L-G
Number of ports	1
Specific energy	100 kJ/Ohm
Weight	≈2.0 lb (1.0 kg)
Operating temperature	–13 °F (–25 °C) to +140 °F (+60 °C)
Vibration tested	IEC 60255-21-1 and IEC 60255-21-2

Notes

① 480L, 600D and 600Y units rated 10 kA I_n.

② DC models only available in 50 kA.

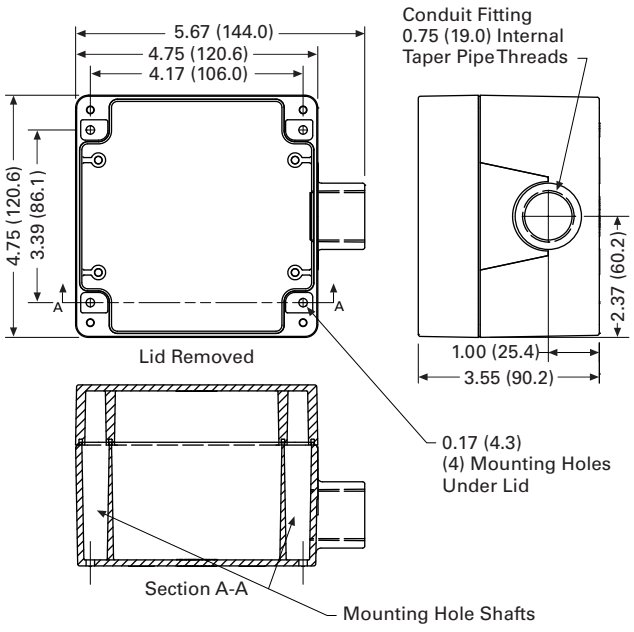
CVX050/100 Voltage Ratings

Model	System Configuration	Nominal System Voltage	MCOV L-L	MCOV L-N	MCOV L-G	MCOV N-G	UL 1449-3 VPR ① L-L	UL 1449-3 VPR ① L-N	UL 1449-3 VPR ① L-G	UL 1449-3 VPR ① N-G
CVX050										
230L	Single-phase two-wire + ground	200, 208, 220, 230, 240, 277	—	320	640	320	—	1200	1200	1200
480L	Single-phase two-wire + ground	380, 400, 440, 460, 480	—	550	1100	550	—	1800	4000	1800
240S	Split-phase three-wire + ground	100/200, 110/220, 120/240	300	150	300	150	1200	700	1200	800
208Y	Three-phase wye (star) four-wire + ground	100/175, 110/190, 120/208, 127/220	300	150	300	150	1200	700	1200	800
480Y	Three-phase wye (star) four-wire + ground	220/380, 230/400, 240/415, 277/480	640	320	640	320	2500	1200	2000	1200
600Y	Three-phase wye (star) four-wire + ground	305/525, 347/600	840	420	840	420	2500	1500	2500	1500
240D	Three-phase delta three-wire + ground	200, 208, 220, 230, 240	640	—	320	—	2000	—	1200	—
240H	Three-phase high leg delta	240	300	150	150	640	1500	700	1200	700
480D	Three-phase delta three-wire + ground	380, 400, 415, 440, 480	1100	—	550	—	3000	—	1800	—
600D	Three-phase delta three-wire + ground	525, 600	1100	—	700	—	3000	—	2500	—
048DC	Direct current	48 Vdc ②	130	—	65	—	—	—	—	—
125DC	Direct current	125 Vdc ②	288	—	144	—	—	—	—	—
CVX100										
230L	Single-phase two-wire + ground	200, 208, 220, 230, 240, 277	—	320	320	320	—	1200	1200	1200
480L	Single-phase two-wire + ground	380, 400, 440, 460, 480	—	550	550	550	—	1800	1800	1800
240S	Split-phase three-wire + ground	100/200, 110/220, 120/240	300	150	150	150	1200	700	800	700
208Y	Three-phase wye (star) four-wire + ground	100/175, 110/190, 120/208, 127/220	300	150	150	150	1000	600	700	700
480Y	Three-phase wye (star) four-wire + ground	220/380, 230/400, 240/415, 277/480	640	320	320	320	1800	1200	1200	1200
600Y	Three-phase wye (star) four-wire + ground	305/525, 347/600	840	420	420	420	2500	1500	1500	1500
240D	Three-phase delta three-wire + ground	200, 208, 220, 230, 240	640	—	320	—	1800	—	1200	—
240H	Three-phase high leg delta	240	300	150	150	150	1200	700	700	700
480D	Three-phase delta three-wire + ground	380, 400, 415, 440, 480	1100	—	550	—	3000	—	1800	—

Dimensions

Approximate Dimensions in Inches (mm)

CVX050/100 Standard Dimensions



Dimensions are in Inches (mm)

Notes

① UL 1449 3rd Edition VPR (voltage protection rating) test environment: All tests performed with 6-inch lead length, positive polarity.

② DC units available in 50 kA only. Voltages shown are the maximum suggested operating voltages and are not UL certified.

SP1 Surge Protective Device

Contents

SP1 Surge Protective Device

Product Description

Eaton's SP1 is a UL 1449 3rd Edition-listed surge protective device that provides reliable, cost-effective surge protection. This Type 1 SPD is capable of being installed on either the line or the load side of the service entrance disconnect, and can be used as a replacement for devices formerly known as secondary surge arresters or lightning arresters, which could not be manufactured after UL 1449 3rd Edition went into effect on September 29, 2009. The unit is available in many common voltages and configurations. Multiple mounting options coupled with a compact footprint enables installation of the SP1 in a wide range of applications, including panel-boards, loadcenters, pump panels, control cabinets, and other electrical assemblies and applications.

Installation and operation of the SP1 is simple. The unit comes pre-wired with 24.00 inches of 10-gauge wire and is mounted via the half-inch nipple that is molded into its enclosure. Wall or DIN rail mounting can also be accomplished with the addition of an optional kit. When powered, the unit's light-emitting diode (LED) indicator reports the status of the protection elements and is active when all of them are intact and providing protection. Any loss of protection is signaled when the LED extinguishes.

Features

- Type 1 SPD capable of installation on either the line or the load side of the service entrance disconnect
- 20 kA nominal discharge current rating (I_n) on most models
- 50 kA per phase surge current capacity
- Compact footprint—4.80-inch L x 2.90-inch W x 2.50-inch D
- Pre-wired with 24.00 inches of 10-gauge wire
- Half-inch nipple molded into enclosure enables quick and easy mounting
- Optional kit enables wall or DIN rail mounting
- Two-year warranty

Standards and Certifications

- UL 1449 3rd Edition-listed device

Catalog Number Selection

SP1

2

SP1 - XXXX

Series	Voltage Code
SP1	**240S** = 120/240 V single split-phase **208Y** = 120/208 wye **480Y** = 277/480 wye **600Y** = 347/600Y wye **240D** = 240 delta **480D** = 480 delta **600D** = 600 delta

SP1MNTGKIT = optional wall or DIN rail mounting kit
(order separately—not included with SP1 unit)

Technical Data and Specifications

SP1

Description	Ratings
Surge current capacity per phase	50 kA
Nominal discharge current (I_n)	20 kA for SP1-240S, 208Y, 480Y, 240D and 480D
	10 kA for SP1-600Y and 600D
Short-circuit current rating (SCCR)	200 kA
SPD type	Type 1 (can also be used in Type 2 applications)
System voltages available (Vac)	
Single split-phase	120/240
Three-phase wye	120/208, 277/480, 347/600
Three-phase delta	240, 480, 600
Protection modes	
Single split-phase and three-phase wye	L-N, L-L
Three-phase delta	L-G, L-L
Maximum continuous operating voltage (MCOV)	
SP1-240S and SP1-208Y	150 L-N, 300 L-L
SP1-480Y	320 L-N, 640 L-G
SP1-600Y	420 L-N, 840 L-G
SP1-240D	300 L-G, 300 L-L
SP1-480D	640 L-G, 640 L-L
SP1-600D	840 L-G, 840 L-L
Input power frequency	50/60 Hz
Enclosure rating	NEMA 4
Operating temperature	–20 °C to 50 °C (–4 °F to 122 °F)
Operating humidity	5–95%, noncondensing
Operating altitude	Up to 16,000 ft (5000 m)
Agency certification and approvals	UL 1449 3rd Edition Listed device
Warranty	2 years

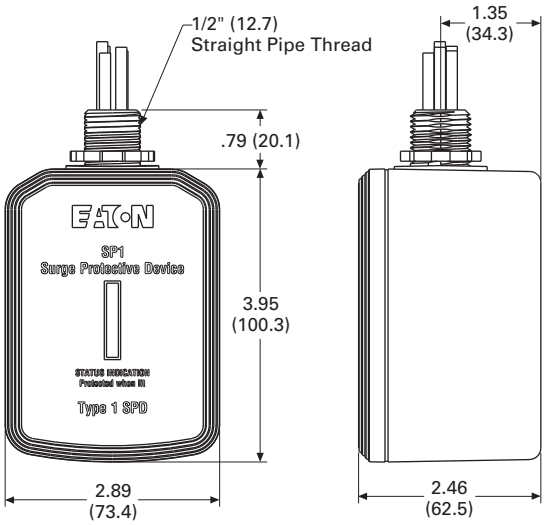
ANSI/UL 1449 3rd Edition Voltage Protection Ratings

	Protection Mode		
Catalog Number	**L-N**	**L-G**	**L-L**
SP1-240S	600	N/A	1000
SP1-208Y	600	N/A	1000
SP1-480Y	1200	N/A	2000
SP1-600Y	1500	N/A	2500
SP1-240D	N/A	1000	1000
SP1-480D	N/A	2000	2000
SP1-600D	N/A	2500	2500

Dimensions

Approximate Dimensions in Inches (mm)

SP1



SP2 Surge Protective Device

Surge Protection for Light Commercial and UL 508A Panel Applications

Contents

SP2 Surge Protective Device

Product Description

The SP2 provides basic surge protection for light commercial electrical systems and OEM equipment requirements. The SP2 is available in the most popular voltage and system configurations and delivers superior surge protection using MOV thermal disconnect technology that eliminates the need for additional overcurrent protection.

Application Description

By providing surge protection, the SP2 can suppress the transients that are prevalent throughout the power distribution system to support reliable operations in applications including:

- HVAC systems
- Control panels
- Automation cabinets
- Pumping systems
- Lighting systems
- Commercial facilities
- Food processing
- Warehouses
- Retail facilities
- Manufacturing operations

Features, Benefits and Functions

- Ease of installation—Compact design allows for easy installation on an electrical panel or meter socket, or integrated into control cabinets
- Type 1 UL 1449 Third Edition listed SP2s are easily selected and installed on the loadside or lineside of the service entrance overcurrent protective device
- Thermal disconnect technology eliminates the need for additional overcurrent protection
- Compact UV-resistant NEMA 4X enclosure for indoor or outdoor applications
- LED status indicators provide surge protection status at a glance—green when good, red to replace
- Voltage-specific models protect electrical systems and equipment, improving performance by more than 110% over "one-size-fits-all" economy surge arresters
- Compact enclosure takes up less space and can be installed in tight spaces
- Can be used on single-phase, split-phase, wye, delta, and high-leg delta systems
- All SP2 devices are individually marked with a serial number for easy tracking and identification
- Two-year warranty

Standards and Certifications

- UL 1449 Third Edition Type 1 SPD File No. E109835, cULus
- Built in an ISO 9001 facility
- Flammability rating UL 94VO
- Designed and tested in accordance with:
  - IEEE C62.41.1
  - IEEE C62.41.2
  - IEEE C62.43-2005
  - IEEE C62.45-2002
  - IEEE C62.48-2005
  - IEEE C62.62-2010

UL Listed

Product Selection

SP2

Nominal System Voltage	Maximum Continuous Operating AC Voltage (MCOV)	System Type	Voltage Protection Ratings (VPR)	Connection Points	Catalog Number
120	150	Single-phase, two-wire	700 L–N	2	**SP2-120**
240	320	Single-phase, two-wire	1200 L–N	2	**SP2-240**
120/240	150	Split-phase, three-wire	700 L–N, 1200 L–L	3	**SP2-240S**
240	320	Three-phase delta, three-wire + ground	1200 L–G, 2500 L–L	4	**SP2-240D**
480	550	Three-phase delta, three-wire + ground	1800 L–G, 3000 L–L	4	**SP2-480D**
120/208	150	Three-phase wye, three-wire + ground	700 L–G, 1200 L–L	4	**SP2-208Y**
277/480	320	Three-phase wye, three-wire + ground	1200 L–G, 2500 L–L	4	**SP2-480Y**
347/600	420	Three-phase wye, three-wire + ground	1500 L–G, 2500 L–L	4	**SP2-600Y**

Technical Data and Specifications

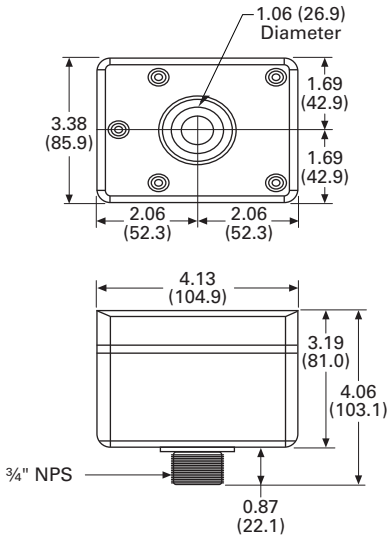
SP2

Description	Specification
Markets	Light commercial and UL 508 A panels
Product warranty	2 years
System types	Single, split, delta, and wye
Nominal system voltage	120, 208, 240, 480, 600 Vac
Installation	Two-, three-, four-wire
Maximum continuous operating AC voltage	Matched to nominal voltage
MCOV	150–550 Vac (see table above)
L–N protection	Yes (single-phase units)
L–L protection	Yes
L–G protection	Yes (three-phase units)
Protection	Surges and transients
SCCR	200 kA
Nominal discharge current (8 x 20 µs) In	10 kA
Maximum discharge current (8 x 20 µs) Imax	45 kA per phase
Response time tA	<25 ns
Voltage protection ratings (VPRs)	See table above
Overcurrent device (if required by local code)	Circuit breaker or fuse sized to protect wires per local codes
Frequency	50/60 Hz
Operating status / fault indication	One bi-color LED—green (good) / red (replace)
Conductor gauge/length	10 AWG stranded copper / 18 inches
Mounting	Chase nipple (¾" NPS)
Enclosure rating	NEMA 4X—UL 94-5VA
Degree of protection (installed state)	IP20 (finger-safe)
Install location	Indoor/outdoor
Circuit location	Lineside/loadside
Standards / agency information	UL 1449 Third Edition Type 1 Listed SPD—cULus, RoHS compliant
Operating temperature	–40 °C to +65 °C
Maximum operating altitude	12,000 ft (3657.6 m)
Weight	17 oz (476 g)

Dimensions

Approximate Dimensions in Inches (mm)

SP2 Enclosure



AEGIS Solutions

Contents

AEGIS Powerline Filters

Product Description

Eaton AEGIS™ Series line filters and surge protectors are specifically designed to protect sensitive electronics from hazards that exist within a facility. The AEGIS Series hybrid filter reacts instantly to changes in voltage regardless of phase angle or polarity. In comparison to other line filters, this technology provides a higher level of suppression, reliability and life expectancy.

Application Description

By providing surge protection and line filtering, AEGIS devices can suppress the noise and transients prevalent throughout the power distribution system to support reliable operations in applications including:

- Instrumentation
- Water treatment facilities
- Pulp and paper operations
- Refrigeration and heating plants
- Petrochemical and refinery
- Food processing
- Textiles
- Automotive assembly
- Manufacturing operations

No matter where transients originate, the application of AEGIS Series devices will help protect sensitive electronic equipment including:

- Programmable logic controllers (PLCs)
- Scanning devices
- Automatic teller machines (ATMs)
- Cash registers
- Alarm systems
- Microprocessor-controlled
- OEM products
- Robotics
- CAD/CAM systems
- Control equipment
- Medical electronics and devices

AEGIS Series devices are available in a variety of common voltages and configurations.

Why Should Sensitive Electronic Loads be Protected?

PLC manufacturers and service technicians recommend the use of power line filters and surge suppressors to prevent downtime and equipment damage due to surges and electrical line noise. Studies have shown that failure to protect sensitive electronic loads costs American manufacturing and commercial and service industries over $39 billion per year in lost time and revenue. Preventing these losses is a major cost-saving opportunity.

Features, Benefits and Functions

- Compact design with multiple mounting options
- Meets new UL safety standards for surge and filtering protection
- AC models available with up to 80 kA surge current capacity ratings
- DIN rail mounting available on most models
- Contains no replaceable parts or items that require periodic maintenance
- Alarm contact available
- Five- to ten-year warranty standard dependent on model; warranty extended an additional five years if registered

The breadth of the AEGIS Series' features, options and configurations ensures that the correct unit is available for all critical electrical applications, including control panels, security systems, measurement systems, lab equipment and other point-of-use applications.

The AEGIS PH Series Protects Critical Loads up to 20 A

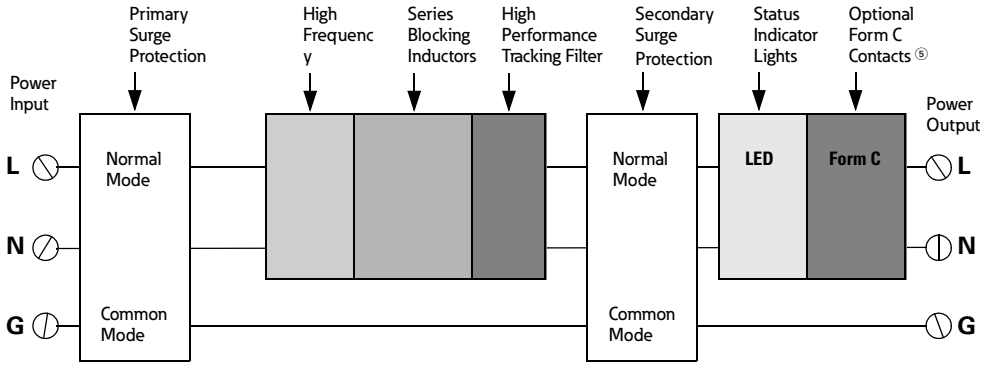
The AEGIS PV Series Protects Critical Loads up to 5 A

AEGIS Summary

Specifications	PH	PV	CF	CN
Voltage	120/240 Vac	120/240 Vac	120/240 Vac 24/48 Vdc	120/240 Vac 24/48 Vdc
Current range	3–20 A	1–5 A	10–60 A	30 A
DIN mounting	Yes	Yes	Yes ①	No
UL 1283 5th Edition & UL 1449 3rd Edition	Yes	Yes	Yes ②	Yes ②
Filtering	Yes	Yes	Yes	No
EMI/RFI filtering attenuation at 100 kHz	75 dB	50 dB	40 dB	N/A
L to G, L to N & N to G protection modes	Yes	Yes	Yes	Yes
Peak kA per phase / mode	60/30	40/20	80/40	80/40
UL nominal discharge current (I_n)	5 kA	5 kA	5 kA	5 kA
UL voltage protection rating (VPR) L–G / L–N ③	330/400	330/400	500/500	500/500
Short-circuit current rating (SCCR)	5 kA	5 kA	10 kA	10 kA
Alarm contacts	Yes	No	Yes ④	No
Standard warranty / registered warranty (years)	10/15	10/15	5/10	5/10
Communication line protection (UL 497A)	No	No	Yes ④	No

AEGIS PH and PV Series Hybrid Powerline Filters

Three-Wire Design has Normal and Common Mode Protection (L-N, L-G, N-G)



Notes

① Optional on 10 A and 30 A models only.
② 120 Vac models only.
③ Ratings shown for 120 Vac models, other voltages listed in Technical Data.
④ Optional on 30 A and 60 A models only.
⑤ Available on the PH Series only.



AEGIS Products

Standards and Certifications

- UL 1449 Fourth Edition
- UL 1283 Fifth Edition
- Built in an ISO® 9001 facility
- Designed and tested in accordance with:
  - IEEE® C62.41.1
  - IEEE C62.41.2
  - IEEE C62.43-2005
  - IEEE C62.45-2002
  - IEEE C62.48-2005
  - IEEE C62.62-2010

2

Catalog Number Selection

AEGIS

AG _ _ _ _ _

Product Family/OEM
AG

Protection/Filtering	Voltage	Amperage	Options
PH = Premium protection with hybrid filtering	**120** = 120 Vac **240** = 240 Vac	**03** = 3 A **05** = 5 A **10** = 10 A **15** = 15 A **20** = 20 A	
PV = Premium protection with filtering	**120** = 120 Vac **240** = 240 Vac	**01** = 1 A **03** = 3 A **05** = 5 A	
CF = Critical protection with filtering	**120** = 120 Vac **230** = 230 Vac **240** = 240 Vac **024** = 024 Vdc **048** = 048 Vdc	**10** = 10 A **15** = 15 A **30** = 30 A **60** = 60 A	**DIN** = DIN mount ① **DIN2** = DIN2 mount ② **CP** = Compact ③ **RJ** = Telcom protection and Form C status contacts ④
CN = Critical protection without filtering	**120** = 120 Vac **230** = 230 Vac **024** = 024 Vdc **048** = 048 Vdc	**30** = 30 A	

Notes

① Not available for 10 A, 230 V or 240 V versions.
② Only available for 10 A, 120 V or 240 V CF version.
③ Only available for 10 A, 120 V CF version.
④ Only available for 30 A and 60 A CF version.

Technical Data and Specifications

AEGIS PH and PV

Specifications	PH 120 Vac 3, 5, 10, 15, 20 A	PH 240 Vac 3, 5, 10, 15, 20 A	PV 120 Vac 1, 3, 5 A	PV 240 Vac 1, 3, 5 A
DIN mounting	Yes	Yes	Yes	Yes
UL 1283 5th Edition and UL 1449 3rd Edition	Yes	Yes	Yes	Yes
Filtering	Yes	Yes	Yes	Yes
EMI/RFI filtering attenuation at 100 kHz	75 dB	75 dB	50 dB	50 dB
L–G, L–N and N–G protection modes	Yes	Yes	Yes	Yes
Peak kA per phase/mode	60/30	60/30	40/20	40/20
UL nominal discharge current (I_n)	5 kA	5 kA	5 kA	5 kA
UL voltage protection rating (VPR) L–G / L–N / N–G	330/400/330	600/700/600	330/400/330	600/700/600
MCOV	150	275	150	275
Short-circuit current rating (SCCR)	5 kA	5 kA	5 kA	5 kA
Alarm contacts	Yes	Yes	No	No
Standard warranty / registered warranty (years)	10/15	10/15	10/15	10/15
Communication line protection (UL 497A)	No	No	No	No

AEGIS CF

	CF 24 Vdc		CF 48 Vdc		CF 120 Vac				CF 240 Vac			
Specifications	10 A	10 A	10 A	10 A	10 A	10 A	30 A	60 A	10 A	10 A	30 A	60 A
DIN mounting	Yes	No	Yes	No	Yes	No	Yes ①	Yes ①	Yes	No	No	Yes ①
UL 1283 5th Edition and UL 1449 3rd Edition	—	—	—	—	Yes	Yes	Yes	Yes	Yes	—	—	—
UL 1283 4th Edition	—	—	—	—	—	—	—	—	—	Yes	Yes	Yes
Filtering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
EMI/RFI filtering attenuation at 100 kHz	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB	40 dB
L–G, L–N and N–G protection modes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peak kA per phase/mode	6/2	6/2	20/6	20/6	30/10	40/20	80/40	80/40	30/10	24/8	56/24	56/24
UL nominal discharge current (I_n)	N/A	N/A	N/A	N/A	3 kA	5 kA	5 kA	5 kA	3 kA	N/A	N/A	N/A
UL voltage protection rating (VPR) L–G / L–N / N–G	N/A	N/A	N/A	N/A	500/500/500	500/500/500	500/500/500	500/500/500	900/800/900	N/A	N/A	N/A
MCOV	30	30	50	50	150	150	150	150	275	275	275	275
Short-circuit current rating (SCCR)	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Alarm contacts	No	No	No	No	No	No	No	No	No	No	No	No
Standard warranty / registered warranty (years)	5/10	5/10	5/10	5/10	5/10	5/10	5/10	5/10	5/10	5/10	5/10	5/10
Communication line protection (UL 497A)	No	No	No	No	No	No	Yes ①	Yes ①	No	No	Yes ①	Yes ①

Note

① Optional.

AEGIS CN

Specifications	24 Vdc 30 A	48 Vdc 30 A	120 Vac 30 A	240 Vac 30 A
DIN mounting	No	No	No	No
UL 1283 5th Edition and UL 1449 3rd Edition	—	—	Yes	—
UL 1283 4th Edition	—	—	—	Yes
Filtering	No	No	No	No
EMI/RFI filtering attenuation at 100 kHz	N/A	N/A	N/A	N/A
L–G, L–N and N–G protection modes	Yes	Yes	Yes	Yes
Peak kA per phase/mode	20/6	46/20	80/40	56/24
UL nominal discharge current (I_n)	N/A	N/A	5 kA	N/A
UL voltage protection rating (VPR) L–G / L–N / N–G	N/A	N/A	500/500/500	N/A
MCOV	30	50	150	275
Short-circuit current rating (SCCR)	10 kA	10 kA	10 kA	10 kA
Alarm contacts	No	No	No	No
Standard warranty / registered warranty (years)	5/10	5/10	5/10	5/10
Communication line protection (UL 497A)	No	No	No	No

Maximum EMI/RFI Attenuation—MIL-STD-220

Model	10 kHz	100 kHz	1 MHz	10 MHz	100 MHz	Maximum Attenuation Frequency
AGPH120AG	30 dB	74 dB	76 dB	37 dB	36 dB	101 dB at 0.5 MHz
AGPV120AG	27 dB	56 dB	55 dB	36 dB	28 dB	66 dB at 0.085 MHz
AGCF12010-CP	16 dB	35 dB	62 dB	40 dB	50 dB	68 dB at 1.25 MHz
AGCF12010-DIN	16 dB	35 dB	56 dB	29 dB	51 dB	66 dB at 0.7 MHz
AGCF12010	17 dB	35 dB	64 dB	33 dB	51 dB	64 dB at 1.0 MHz
AGCF12030	24 dB	44 dB	58 dB	42 dB	53 dB	67 dB at 0.6 MHz
AGCF12060	20 dB	48 dB	53 dB	29 dB	46 dB	69 dB at 0.4 MHz

Let-Through Voltages Based on IEEE Std. C62.62-2010 Testing Waveforms ①

Test Impulse	AEGIS Series AGPH120AG	AGPV120AG	AGCF12010	AGCF12010-DIN	AGCF12010-CP	AGCF12030AGx	AGCF12060AGx	AGCN12030
IEEE Category A 100 kHz ring wave 6000 V, 200 A	25 V	30 V	150 V	300 V	300 V	150 V	90 V	400 V
IEEE Category B 100 kHz ring wave 6000 V, 500 A	35 V	40 V	330 V	400 V	400 V	330 V	230 V	500 V
IEEE Category B combination wave 6000 V, 3000 A (UL 1449-3 VPR)	360 V	370 V	470 V	480 V	460 V	460 V	450 V	460 V

Note

① All tests conducted on 120 Vac units.

Sag Ride-Through (SRT2)

2

Contents

Sag Ride-Through (SRT2)

Product Description

Eaton's sag ride-through is the first of its kind.

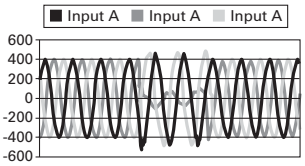
The SRT2 power conditioner prevents expensive electrical downtime. The SRT2 represents Eaton's state-of-the-art solution to today's power conditioning challenges.

The Problem—Voltage Sags and Brownouts

The ability of a plant to ride-through voltage sags can have a significant impact on operations and competitiveness. In the United States, voltage sags cost billions of dollars in lost production, interruption, damaged materials, retooling and scrap. In addition, sags can cause: increased operating costs, the need for product reworks, safety hazards, equipment damage and/or failure, reduced product quality, increased clean-up, additional labor costs, increased scrap material and costs associated with investigations into the problem.

Today's industrial and large commercial electricity customers are becoming more sensitive to power disturbances and are demanding better electric quality. However, the quality of power grids is not significantly improving. Customers still experience power quality problems that affect plant operations and profitability.

Deep, Single-Phase Sag



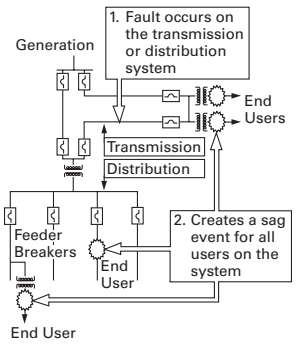
Definition of Voltage Sag

A voltage sag is a sudden, momentary decrease in supply voltage. It can last from a cycle to several seconds. Voltage sags are most often caused by faults on the electrical transmission or distribution system. They can be caused by lightning strikes, animal contact, starting of large motors or an internal fault within a customer's facility.

Depending on the proximity to the fault, which can be hundreds of miles away, the voltage during the sag is typically 40%–90% of nominal utility voltage. The operation of circuit breakers, fuses and reclosers limits most sags to less than 15 cycles.

Voltage sags are experienced 10 to 20 times more frequently than complete outages. However, voltage sags are equally disruptive to sensitive equipment.

Voltage Sags

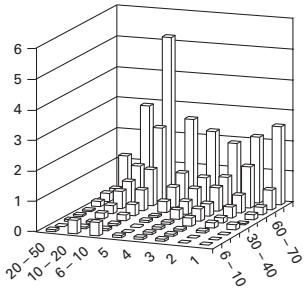


Regularity of Voltage Sags

EPRI conducted a two-year study of power quality levels on distribution systems in the United States. A variation event was recorded every time the voltage dropped below 90% of the nominal. The results are shown below.

A typical distribution system customer experiences about 50 events per year when the voltage drops below 90%, and only about two events per year when the voltage drops below 30% of nominal. The utility study concluded that sags represented almost all of the events experienced at a typical facility.

Events per Year



Application Description

Industries and Applications Affected by Sags

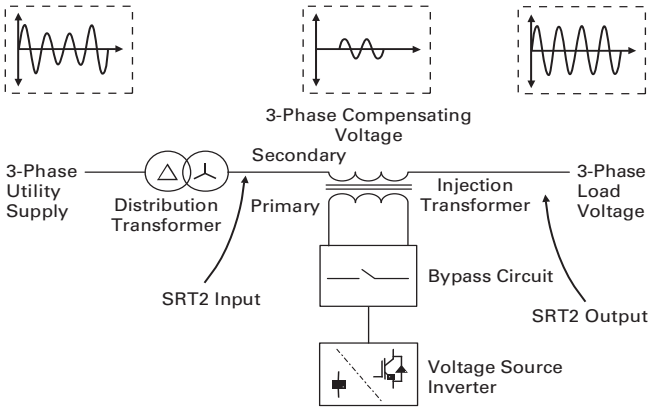
Key industries:

- Semi-conductor manufacturers
- Communications
- Steel mills
- Petroleum and chemical processing
- Health care
- Paper mills
- Automotives
- Textile
- Printing
- Plastics
- Other manufacturing

Equipment or processes:

- Manufacturing process controllers
- Variable speed drives
- Robotics
- Motor conductor
- Telephone systems
- HID lighting
- HVAC controls
- Medical equipment
- Computers

Block Diagram of the SRT2 Active Voltage Conditioner



Features, Benefits and Functions

Sag Correction Using the SRT2

The SRT2 is a high performance, inverter-based voltage conditioning device developed to provide protection to sensitive loads against commonly occurring voltage sags.

The SRT2 monitors the incoming supply voltage and when it deviates from the nominal voltage level, the SRT2 achieves voltage conditioning by injecting the appropriate correction voltage in series with the power supply. The SRT2 provides an extremely fast reaction time and subcycle response to sag events that would otherwise cause loads to drop out.

The SRT2 is designed for low voltage systems and is also offered in medium voltage applications from up to 50 MVA. Installation is simple and the SRT2 provides customers with a new solution to improve productivity and reduce downtime for sag related problems.

The SRT2 meets the stringent requirements of the Semi-F47 standard; a key requirement for SAG correction in the semi-conductor industry.

- Complete correction of single-phase voltage sags down to 63% for 30 seconds
- Partial correction of three-phase sags down to 50% for 30 seconds
- Correction of utility voltage unbalance (from network side of transformer)
- Attenuation of voltage flicker

Continuous Regulation

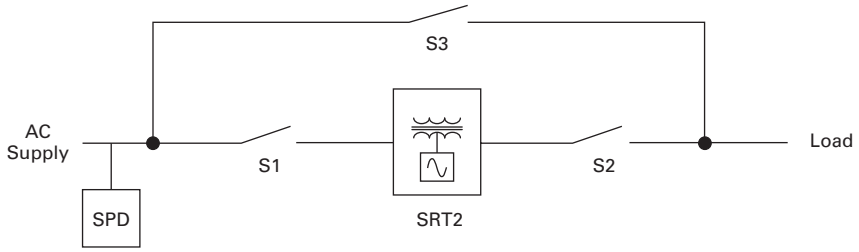
The Sag Ride-Through is an active voltage conditioner. This means it will constantly respond to voltage sags and swells in the +/–10% range with a regulated output in the +/–1% range. The SRT2 can be applied to the main service entrance, at branch locations or in front critical loads. The SRT2 provides an outstanding return on investment. It delivers operation productivity that is just not possible with traditional tap switching or ferroresonant technologies. The SRT2 consists of a voltage source inverter, bypass circuit and an injection transformer connected in series between the incoming utility supply and the load, as shown in the figure below. For the standard sag correcting model, the injection transformer consists of a boost component. The SRT2 monitors the incoming supply voltage and when it deviates from the nominal voltage level the SRT2 inserts an appropriate compensating voltage using the IGBT inverter and series injection transformer. Energy is sourced from the supply during this time. This regulates the load voltage to its nominal value, thus eliminating voltage disturbances from the utility supply affecting the load.

Product Selection

SRT2 ①

Load Capacity at Nominal Voltage 480 V (kVA) ②	Terminal Cabinet ③	Fault Capacity (kVA)	System Efficiency (%)	System Dissipation (Worst Case) (kW)	Airflow (m3/min)	Cabinet Dimensions H x W x D in Inches (mm)	Catalog Number ④
150	No	40	97.5	3.8	18	85.00 x 32.00 x 32.00 (2159.0 x 812.8 x 812.8)	**SRT20150480AA**
150	Yes	40	97.5	3.8	18	85.00 x 32.00 x 32.00 (2159.0 x 812.8 x 812.8)	**SRT20150480AA-TC**
225	No	40	97.7	5.2	18	85.00 x 32.00 x 32.00 (2159.0 x 812.8 x 812.8)	**SRT20225480AA**
225	Yes	40	97.7	5.2	18	85.00 x 32.00 x 32.00 (2159.0 x 812.8 x 812.8)	**SRT20225480AA-TC**
300	No	40	98.0	6.1	18	85.00 x 40.00 x 32.00 (2159.0 x 1016 x 812.8)	**SRT20300480AA**
300	Yes	40	98.0	6.1	18	85.00 x 40.00 x 32.00 (2159.0 x 1016 x 812.8)	**SRT20300480AA-TC**
450	No	40	98.2	8.0	36	85.00 x 40.00 x 32.00 (2159.0 x 1016 x 812.8)	**SRT20450480AA**
450	Yes	40	98.2	8.0	36	85.00 x 40.00 x 32.00 (2159.0 x 1016 x 812.8)	**SRT20450480AA-TC**
600	No	40	98.4	9.8	36	85.00 x 40.00 x 32.00 (2159.0 x 1016 x 812.8)	**SRT20600480AA**
600	Yes	40	98.4	9.8	36	85.00 x 40.00 x 32.00 (2159.0 x 1016 x 812.8)	**SRT20600480AA-TC**
750	No	40	98.4	12.2	54	85.00 x 96.00 x 48.00 (2159.0 x 2438.4 x 1219.2)	**SRT20750480AA**
750	Yes	40	98.4	12.2	54	85.00 x 96.00 x 48.00 (2159.0 x 2438.4 x 1219.2)	**SRT20750480AA-TC**
900	No	40	98.5	13.2	54	85.00 x 96.00 x 48.00 (2159.0 x 2438.4 x 1219.2)	**SRT20900480AA**
1200	No	40	98.5	18.1	72	85.00 x 126.00 x 96.00 (2159.0 x 3200.4 x 2438.4)	**SRT21200480AA**
1500	No	50	98.7	20.2	90	85.00 x 126.00 x 96.00 (2159.0 x 3200.4 x 2438.4)	**SRT21500480AA**
1800	No	50	98.8	22.1	108	85.00 x 126.00 x 96.00 (2159.0 x 3200.4 x 2438.4)	**SRT21800480AA**

SRT2 with External Maintenance Bypass Block Diagram



Note: A terminal cabinet may be needed if a bypass cabinet is not used. SRT2 units 900 kVA and larger do not require a terminal cabinet; however, an external three-breaker mechanical bypass with integrated surge protection is recommended.

Notes

① For 50 Hz international applications, consult factory.
② 480 V is standard. If additional voltage is needed, consult factory.
③ Eaton external three-breaker maintenance bypass cabinet is recommended. If a bypass is not used, a terminal cabinet may be required. Contact factory.
④ TC in the model number denotes terminal cabinet, which is not required for units of 900 kVA and larger.

Technical Data and Specifications

SRT2 Specifications

Features	Specifications
Load Capacity	
Capacity	150–1800 kVA (consult factory for custom design; up to 36 kVA available)
Displacement power factor of connected load	0 lagging to 0.9 leading
Crest factor for rated kVA	3 at 100% of rated load
Overload capacity (>90% supply voltage)	150%, 30 seconds, once per 500 s
Input Supply	
Nominal supply voltage (according to model)	480 V Voltages up to 36 kV available as custom applications ①
Power system type	Three-phase, center ground referenced
Supply voltage category	Level III transient voltage capability
Fault capacity	Refer to model tables
Operating Voltage Range for Regulation	
Supply voltage for regulation	90–110% of nominal input voltage unit rating
Output Supply	
Nominal voltage (V)	Set to match nominal supply voltage
Three-phase V regulation range	±10% continuous
Three-phase V regulation accuracy	±1%
Three-phase balanced sag/swell correction ability: 40% model	 +40% / –10% at least 30 s at full load
Sag correction accuracy (within specified range)	±2.5%
Sag correction response: Initial Complete	 <250 µs <0.25 cycle
Single-phase sag correction ability: 40% model (15% retained voltage / 85% sag)	 90% nominal
Equivalent series impedance (operating)	<4% typical
Efficiency of system	0.98 to 0.99 (refer to model tables)
Bypass	
Capacity	100% model rating (kVA)
Maximum overload capacity (in bypass): For 10 minutes For 1 minute For 1 second For 200 milliseconds Transfer time: Inverter to bypass	 125% 150% 500% 2000% <0.5 ms
Equivalent series impedance (in bypass)	<2.5% typical
Interface	
Access protocol	Ethernet connectivity; Modbus® TCP, dry contacts
Environmental	
Enclosure rating	NEMA® 1, IP20
Pollution degree rating	2
Minimum operating temperature	0 °C
Maximum operating temperature	40 °C
Temperature derating	Above 40 °C derate at 2% per °C to a maximum of 50 °C
Capacity elevation derating	–2% every 100 m above 1000 m
Cooling: Inverter Transformer	 Forced ventilation Fan assisted ventilation
Humidity	<95%, noncondensing
EMC emissions	CISPR 22 level G
Noise	65 dBA
Warranty	1 year

Note

① 480 V is standard. If additional voltage is needed, consult factory.

Electronic Voltage Regulator (EVR) Tap Changer

Contents

Electronic Voltage Regulator (EVR)

Product Description

Eaton's Electronic Voltage Regulator (EVR) is the ideal solution for keeping your facility and equipment up and running during brownouts, undervoltage conditions and other power problems. The EVR can significantly reduce the costs of equipment damage and downtime when these situations occur. The state-of-the-art design provides rapid response time, high efficiency, high inrush current capability, and operating advantages exclusive to Eaton.

The EVR maintains a tightly regulated output voltage by automatically activating the appropriate transformer tap through a silicone controlled rectifier (SCR). Tap changer response time is initiated at one cycle, ensuring rapid and precise regulation. Switching at zero current enables noise reduction during tap transitions.

Brownouts

In the United States, most facilities have sufficient voltage regulation. However, in some U.S. locations and many developing countries, regulation problems occur because of overstressed utility distribution systems.

In some cases, due to the excessive demand on the utility system, voltage may be below 10% of nominal (–10%) during the day. This condition is called a **voltage dip or brownout.** Customers may notice dim lights and reduced power. During the evening, voltage may rise above 10% of nominal (+10%) because large facilities and loads are shut down. This shutdown reduces the power demand on the grid and results in a voltage increase.

The IEEE defines voltage regulation as overvoltage or undervoltage. Voltage regulation events last from a **few minutes to many hours** with voltage varying by ±20%. Long-term regulation problems differ from short duration sags and dips, which are much deeper voltage drops.

The Solution

Prior to installing an expensive solution, Eaton encourages customers to monitor incoming voltage to determine if voltage regulation is a problem. The local utility may also be able to provide information on voltage expected at the facility.

Using a meter, it can quickly be determined if a voltage regulation problem or brownout condition exists. The appropriate solution would be an EVR. EVRs can be installed at the service entrance, branch panel or at critical loads.

Eaton's EVR is a solid-state tap changing power conditioner designed to protect against brownouts and long duration voltage regulation problems.

Features and Benefits

- Coordinated with standard thermal-magnetic breakers to allow motor starts
- Optional 50 kA or 100 kA per phase surge protection
- Input frequency range operation from 57–63 Hz
- Integral manual rotary maintenance bypass switch standard on 50 to 500 kVA units and optional on smaller units
- Not affected by load power factor. Can operate effectively in low-load applications due to "unique leakage reactance" technology
- Fail-safe bypass circuit, isolation transformer and overtemperature protection
- Less than 1% THD
- Optional Standard and Premium metering to monitor voltage, current, frequency, power, energy, PF with minimum and maximum, and communication capabilities

Catalog Number Selection

EVR

EVR XXX XXXX XXXX X X XX X

kVA Ratings and Dimensions					
kVA	Weight Lb	BTUs/ hr	Bypass	Metering	Dimensions in Inches (mm) (H x W x D)
010	440	1,025	Optional	No	30.20 x 22.20 x 29.00 (767.1 x 563.9 x 736.6)
010	520	1,205	Optional	Yes	44.20 x 22.20 x 29.00 (1122.7 x 563.9 x 736.6)
015	520	1,540	Optional	No	30.20 x 22.20 x 29.00 (767.1 x 563.9 x 736.6)
015	600	1,540	Optional	Yes	44.20 x 22.20 x 29.00 (1122.7 x 563.9 x 736.6)
025	870	2,560	Optional	Yes	44.20 x 22.20 x 29.00 (1122.7 x 563.9 x 736.6)
030	890	3,090	Optional	Yes	44.20 x 22.20 x 29.00 (1122.7 x 563.9 x 736.6)
045	950	4,600	Optional	Yes	44.30 x 45.90 x 29.00 (1125.2 x 1165.9 x 736.6)
050	1,176	7,332	Yes	Yes	66.00 x 29.00 x 35.50 (1676.4 x 736.6 x 901.7)
075	1,575	9,514	Yes	Yes	76.00 x 34.40 x 35.50 (1930.4 x 873.8 x 901.7)
100	2,014	11,833	Yes	Yes	76.00 x 34.40 x 35.50 (1930.4 x 873.8 x 901.7)
125	2,137	14,748	Yes	Yes	76.00 x 34.40 x 35.50 (1930.4 x 873.8 x 901.7)
150	2,240	17,698	Yes	Yes	76.00 x 34.40 x 35.50 (1930.4 x 873.8 x 901.7)
225	3,300	23,000	Yes	Yes	77.40 x 56.00 x 41.50 (1966.0 x 1422.4 x 1054.1)
300	4,000	30,750	Yes	Yes	77.40 x 56.00 x 41.50 (1966.0 x 1422.4 x 1054.1)
500	5,500	51,250	Yes	Yes	77.00 x 72.40 x 48.40 (1955.8 x 1839.0 x 1229.4)

Options
B = Bypass switch ①
M1 = Standard metering (IQ 130)
M2 = Premium metering (IQ 150)

Surge Protection
X = No
S = Yes

Frequency
A = 60 Hz
B = 50 Hz

Nominal Input Voltage (Delta Input: L, L, L, G)
208D = 208
240D = 240
400D = 400
480D = 480
600D = 600

Nominal Output Voltage (Wye Output: L, L, L, N, G)
208Y = 120/208
400Y = 230/400
480Y = 277/480
600Y = 347/600

Technical Data and Specifications

EVR Specification (10 to 500 kVA)

Feature	Description
Technology	Electronic tap changer
Input voltages	208–600 V, three-phase (three-wire)
Input voltage range	+10% to –23% of nominal rated input
Output voltage	±3% of nominal
Response time	1/2 cycle
Frequency	60 Hz, ±3%
Efficiency	97% typical
Line regulation	Output is ±3% of nominal for input variations of +10% to –23% of nominal
Load regulation	Output is maintained within 3% of nominal from no load to full load
Correction time	Output will be corrected to within ±3% of nominal in 1.5 cycles or less
Harmonic distortion	Less than 1.0% added to the output waveform under any dynamic linear loading conditions presented to the line regulator
Noise attenuation Common mode Normal mode	 146 dB 3 dB down at 1000 Hz, 40 dB/decade to below 50 dB with resistive load
Turn-on characteristics	When energized, voltage overshoot will be less than 5% of nominal for 1 cycle or less
Overload rating	1000% for 1 cycle and 200% for 10 seconds
Ambient rating	–10 ° to 40 °C
Monitoring	Three green LEDs (phase power on indication), one red LED (alert indication)
Surge protection (optional)	CVX 50 kA SPD device 50 kVA and below, CVX 100 kA SPD device 75 kVA and above
Input breaker	MCCB rated 125% of full rated current
Bypass switch	Normal and bypass selector
Metering (optional)	Standard metering (IQ 130)—voltage and current with minimum and maximum
	Premium metering (IQ 150)—voltage, current, frequency, power, energy, PF, with minimum and maximum, communications capabilities
Warranty	1-year parts

Notes

① Bypass is standard on 50 kVA and larger units and an option on 45 kVA and smaller units. The 'B' is not included in the part number for units 50 kVA and larger.

All weights are approximate. Monitor option includes main input circuit breaker.

Refer to PAD for pricing and availability.

Power-Sure 800

Superior Power Conditioning for Industrial and Commercial

Contents

Power-Sure 800

Product Description

Eaton's Power-Sure 800™ cleans up and purifies fluctuating and erratic power that exists in commercial and industrial facilities so that sensitive electronic equipment is not affected.

The Power-Sure 800 is a self-regulating isolation transformer. It was developed to protect against fluctuating voltages, brownouts, line noise, short-duration power outages, sags, surges, spikes and transients. The Power-Sure 800 also has one of the highest K-factors—K-30—and eliminates harmonic current in the power line, which helps prevent damage to building wiring.

Application Description

The Power-Sure 800 is ideal for use in industrial applications, such as computer programmable controllers and robotics. Use the Power-Sure 800 whenever continuous, well-regulated, transient-free power is required.

Features

- Superior isolation
- Tight voltage regulation
- High immunity to distortion
- Lightning and surge protection
- Protection against power interruptions
- Power factor correction
- Bi-directional harmonic filtering
- K-30 rated design
- Warranty: two years

Eaton's Power-Sure 800 power conditioners provide high-quality power with inherent surge protection, noise and bi-directional harmonic filtering, as well as superior isolation. These units range from office models to floor- or wall-/panel-mounted industrial models and provide an excellent solution for any application with noisy or poor power quality.

Standards and Certifications

- UL 1012, UL 544 and cUL listed
- Meets ANSI standards for computers with inputs as low as 50% of nominal

Listed

Catalog Number Selection

Power-Sure 800

T800 X - XXXXX X X - X

Configuration
R = Receptacles
P = Hardwired wall-/panel-mount
F = Hardwired floor-mount

VA rating
01000
01500
01600
02000
02100
02500
03000
03500
03501
05000
07500
08000
10000
15000
20000
25000

Receptacles
Quantity of: Blank for hardwire

Option/Frequency
Blank = 60 Hz
5 = 50 Hz

Custom Receptacle Options

Code	No. of Output Panels (Max. 4)	NEMA®	Volts	Amps
A	1	(1) 5-15R	120	15
B	1	(2) 5-15R	120	15
C	1	(1) 5-20R	120	20
D	1	(2) 5-20R	120	20
E	1.5	(1) 5-30R	120	30
F	1	(1) 6-15R	208/240	15
G	1	(2) 6-15R	208/240	15
H	1	(1) 6-20R	208/240	20
I	1	(2) 6-20R	208/240	20
J	1.5	(1) 6-30R	208/240	30
K	1.5	(1) 6-50R	208/240	50
L	1	(1) 14-20R	120/240	20
M	1.5	(1) 14-30R	120/240	30
N	1	(1) L5-15R	120	15
P	1	(2) L5-15R	120	15
R	1	(1) L5-20R	120	20
S	1	(1) L5-30R	120	30
T	1	(1) L6-15R	208/240	15
U	1	(2) L6-15R	208/240	15
V	1	(1) L6-20R	208/240	20
W	1	(1) L6-30R	208/240	30
X	1	(1) L14-20R	120/240	20
Y	1	(1) L14-30R	120/240	30

Product Selection

2

Power-Sure 800 Models

Rating (VA/Watts)	Input Voltage	Output Voltage	Input Interface	Output Interface	Part Number
Office Models (with Receptacles)					
1000/700	120	120	5-15P	(4) 5-20R	**T800R-01000**
1600/1200	120	120	5-15P	(4) 5-20R	**T800R-01600**
2100/1500	120	120	5-20P	(4) 5-20R	**T800R-02100**
2500/1750	120	120	5-30P	(4) 5-20R	**T800R-02500**
3500/2450	120	120/240	5-50P	(4) 5-20R	**T800R-03500**
3500/2450	208/240	120/240	6-20P	(4) 5-20R	**T800R-03501**
5000/3500	208/240	120/240	Hardwired	Custom ①	**T800R-05000**
7500/5250	208/240	120/240	Hardwired	Custom ①	**T800R-07500**
10,000/7000	208/240	120/240	Hardwired	Custom ①	**T800R-10000**
15,000/10,500	208/240	120/240	Hardwired	Custom ①	**T800R-15000**
Industrial Models (Hardwired Wall-/Panel-Mount)					
500/500	Range 1 ②④	Range 3 ⑤	Hardwired	Hardwired	**T800P-00500**
750/750	Range 1 ②④	Range 3 ⑤	Hardwired	Hardwired	**T800P-00750**
1000/1000	Range 1 ②④	Range 3 ⑤	Hardwired	Hardwired	**T800P-01000**
1500/1500	Range 1 ②④	Range 3 ⑤	Hardwired	Hardwired	**T800P-01500**
2000/2000	Range 1 ②④	Range 3 ⑤	Hardwired	Hardwired	**T800P-02000**
3000/3000	Range 1 ②④	Range 3 ⑤	Hardwired	Hardwired	**T800P-03000**
5000/5000	Range 1 ②④	Range 3 ⑤	Hardwired	Hardwired	**T800P-05000**
8000/8000	Range 2 ③④	Range 3 ⑤	Hardwired	Hardwired	**T800P-08000**
10,000/10,000	Range 2 ③④	Range 3 ⑤	Hardwired	Hardwired	**T800P-10000**
Industrial Models (Hardwired Floor-Mount)					
5000/5000	Range 1 ②④	Range 3 ⑤	Hardwired	Hardwired	**T800F-05000**
8000/8000	Range 2 ③④	Range 3 ⑤	Hardwired	Hardwired	**T800F-08000**
10,000/10,000	Range 2 ③④	Range 3 ⑤	Hardwired	Hardwired	**T800F-10000**
15,000/15,000	Range 2 ③④	Range 3 ⑤	Hardwired	Hardwired	**T800F-15000**
20,000/20,000	Range 2 ③④	Range 3 ⑤	Hardwired	Hardwired	**T800F-20000**
25,000/25,000	Range 2 ③④	Range 3 ⑤	Hardwired	Hardwired	**T800F-25000**

Notes

① See Catalog Numbering Selection on **Page V3-T2-43**; 5 panels available for distribution; HW output utilizes 1 panel, other 4 panels can be used for receptacle interface or cabling.
② Range 1: 120/208/240/480.
③ Range 2: 208/240/480.
④ Input and output voltage is field configurable; units will ship from the factory configured as follows: Range 1—120 V (input/output); Range 2—240 V (input/output).
⑤ Range 3: 120/208/240.

Technical Data and Specifications

- Line regulation: ±3% V-out for +10% to -20% V-in at 100% load
- Load regulation: ±3%for 0–75% load ±2%for 100% load
- Immunity to distortion: at 40% THD V-in, 5% max. THD V-out at 50% load or higher
- Ride-through capability: 1 cycle
- Voltage recovery: 2 cycles to 95%, 3 cycles to 100%
- K-factor: K-30 rated
- Power factor correction: input of 0.95 typical
- Harmonic attenuation: –23 dB for load-reflected harmonics
- Galvanic isolation: NEC 250.5d, 0.001 PF
- Surge protection: 330 V let-through voltage when tested to ANSI/IEEE® 62.41-Cat B3
- Common mode noise attenuation: 140 dB
- Transverse mode noise attenuation: 120 dB
- Reliability: 200,000 hours (MTBF)
- Audible noise: 52–56 dB measured at 1 meter, A scale
- Efficiency: approximately 92% at full load
- Operating temperature: –20 °C to +40 °C

Dimensions

Approximate Dimensions in Inches (mm)

Power-Sure 800 Models

Dimensions, W x D x H	Weight, Lb (kg)	Part Number
Office Models (with Receptacles)		
8.50 x 12.75 x 17.50 (215.9 x 323.9 x 444.5)	46 (21)	**T800R-01000**
8.50 x 12.75 x 17.50 (215.9 x 323.9 x 444.5)	62 (28)	**T800R-01600**
8.50 x 12.75 x 17.50 (215.9 x 323.9 x 444.5)	65 (29)	**T800R-02100**
8.50 x 12.75 x 17.50 (215.9 x 323.9 x 444.5)	68 (31)	**T800R-02500**
8.50 x 12.75 x 17.50 (215.9 x 323.9 x 444.5)	72 (33)	**T800R-03500**
8.50 x 12.75 x 17.50 (215.9 x 323.9 x 444.5)	73 (33)	**T800R-03501**
15.00 x 23.75 x 22.50 (381.0 x 603.3 x 571.5)	176 (80)	**T800R-05000**
15.00 x 23.75 x 22.50 (381.0 x 603.3 x 571.5)	210 (95)	**T800R-07500**
15.00 x 23.75 x 22.50 (381.0 x 603.3 x 571.5)	256 (116)	**T800R-10000**
15.00 x 23.75 x 22.50 (381.0 x 603.3 x 571.5)	314 (142)	**T800R-15000**
Industrial Models (Hardwired Wall-/Panel-Mount)		
9.00 x 14.00 x 10.00 (228.6 x 355.6 x 254.0)	52 (24)	**T800P-00500**
9.00 x 14.00 x 10.00 (228.6 x 355.6 x 254.0)	60 (27)	**T800P-00750**
9.00 x 14.00 x 10.00 (228.6 x 355.6 x 254.0)	82 (37)	**T800P-01000**
13.00 x 16.50 x 14.75 (330.2 x 419.1 x 374.7)	106 (48)	**T800P-01500**
13.00 x 16.50 x 14.75 (330.2 x 419.1 x 374.7)	125 (57)	**T800P-02000**
13.00 x 16.50 x 14.75 (330.2 x 419.1 x 374.7)	157 (71)	**T800P-03000**
27.00 x 22.50 x 28.50 (685.8 x 571.5 x 723.9)	437 (198)	**T800P-05000**
27.00 x 22.50 x 28.50 (685.8 x 571.5 x 723.9)	495 (225)	**T800P-08000**
27.00 x 22.50 x 28.50 (685.8 x 571.5 x 723.9)	537 (244)	**T800P-10000**
Industrial Models (Hardwired Floor-Mount)		
23.00 x 20.00 x 28.50 (584.2 x 508.0 x 723.9)	407 (185)	**T800F-05000**
23.00 x 20.00 x 28.50 (584.2 x 508.0 x 723.9)	465 (211)	**T800F-08000**
23.00 x 20.00 x 28.50 (584.2 x 508.0 x 723.9)	507 (230)	**T800F-10000**
35.00 x 25.00 x 39.50 (889.0 x 635.0 x 1003.3)	830 (376)	**T800F-15000**
35.00 x 25.00 x 39.50 (889.0 x 635.0 x 1003.3)	950 (431)	**T800F-20000**
35.00 x 25.00 x 39.50 (889.0 x 635.0 x 1003.3)	1070 (485)	**T800F-25000**

Eaton Power-Suppress 100

Ultra-Isolator Noise Suppressor and Isolation Provider

Contents

Power-Suppress 100

Product Description

Eaton's Power-Suppress™ 100 ultra-isolator noise suppressors protect sensitive equipment from electrical noise disturbances. Using exclusive double shielding techniques, the Power-Suppress 100 blocks all forms of electrical noise including radio frequency interface (RFI)/ electromagnetic interference (EMI), over a broad range of frequencies. Furthermore, the noise suppression is achieved without impeding normal power flow.

Power-Suppress 100 ultra-isolator noise suppressors can reduce a 6000-volt spike to an insignificant 0.0030 volt. These high-voltage transients contain enough energy to completely destroy the electrical circuit components that are vital to daily operation.

Application Description

Applications for the Power-Suppress 100 include audio and video equipment, computer and process equipment, telecommunications systems, and virtually any sensitive electronic instruments.

Features

- Traps unwanted harmonics
- Removes surge voltages and minimizes reflected THD
- Cleans and conditions the sine wave
- Eliminates load-generated feedback
- Available in both hardwired or line cord/receptacle models
- Fast and easy installation
- Long-life operation
- Small footprint—saves valuable space
- Two-year warranty complete unit, five-year warranty core and coil

Standards and Certifications

- UL 1012, UL 1449, cUL listed, ANSI/IEEE C57.12.91
- Meets FCC Category A, IEEE C62.41 Category A3

Listed

Catalog Number Selection

Power-Suppress 100

T100 __ - ___ - __

Connection Method	Size (VA)	Option/Frequency
R = Receptacles	**0500** = 500 VA	**Blank** = 60 Hz
H = Hardwired	**0750** = 750 VA	**5** = 50 Hz
	1000 = 1000 VA	
	1800 = 1800 VA	
	2400 = 2400 VA	
	2500 = 2500 VA	
	5000 = 5000 VA	
	5001 = 5000 VA ①	
	7500 = 7500 VA	
	7501 = 7500 VA ①	

Product Selection

Power-Suppress 100 Models

Input Voltages ②	Output Voltages ②	Output VA ③	I/O Interfaces (NEMA)	Catalog Number
Line-Cord/Receptacle Models				
120	120	500	5-15P/(1) 5-20R2	**T100R-0500**
120	120	750	5-15P/(1) 5-20R2	**T100R-0750**
120	120	1000	5-15P/(1) 5-20R2	**T100R-1000**
120	120	1800	L5-20P/(2) 5-20R2	**T100R-1800**
120	120	2400	L5-30P/(2) 5-20R2	**T100R-2400**
Terminal Style Models				
120/240	120/240	500	Hardwired	**T100H-0500**
120/240	120/240	750	Hardwired	**T100H-0750**
120/240	120/240	1000	Hardwired	**T100H-1000**
120/240	120/240	1800	Hardwired	**T100H-1800**
120/240	120/240	2500	Hardwired	**T100H-2500**
120/240	120/240	5000	Hardwired	**T100H-5000**
240/480	120/240	5000	Hardwired	**T100H-5001** ①
120/240	120/240	7500	Hardwired	**T100H-7500**
240/480	120/240	7500	Hardwired	**T100H-7501** ①

Notes

① Models T100H-5001 and T100H-7501 will ship configured to 240 V input and output voltage.
② Input and output voltages can be field configured for either 120 Vac or 240 Vac, 240 Vac or 480 Vac, as indicated above.
③ 500 VA to 7500 VA hardwired models will ship configured to 120 V input and output voltage.

Technical Data and Specifications

Technical Specifications

Description	Specifications
Input voltage/frequency	120, 240, 480 V ①/60 Hz
Common-mode noise	140 dB at100 kHz
Normal-mode noise	65 dB at100 kHz
Overload capacity	600% for 1 cycle, 300% for 30 seconds
Dielectric strength	2,500 Vac minimum
Frequency	60 Hz ±5%
Impedance	3–6% typical
Efficiency	93–97% typical
Input voltage range	±10% of nominal rated voltage
Harmonic distortion	Adds less than 1% THD, under linear loading
Coil insulation	200 °C
Temperature rise	115 °C max rise above a 40 °C ambient, depending on model
Electromagnetic interference	<0.2 gauss at 36 inches

Environments

Description	Specifications
Audible noise	Less than 50 dBA measured at 3 ft from the noise suppressor
Operating temperature	0 to 40 °C
Storage temperature	–20 to 50 °C
Operating altitude	Up to 12,000 ft (3657.6 m) (without derating)
Operating humidity	95% relative (noncondensing)

Plug and Receptacle Configuration Models

Rating	Input Plug	Output Receptacle
500–1000 VA	5-15P	5-20R duplex
1.8 kVA	L5-20P	2 x 5-20R duplex
2.4 kVA	L5-30P	2 x 5-20R duplex

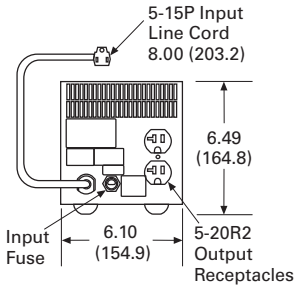
Dimensions

Approximate Dimensions in Inches (mm)

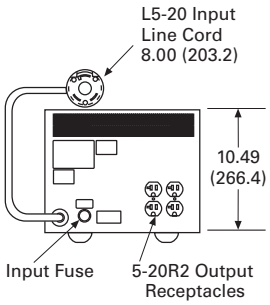
Power-Suppress 100 Models

Dimensions, W x D x H	Weight, Lb (kg)	Catalog Number
Line-Cord/Receptacle Models		
6.49 x 6.10 x 12.00 (164.8 x 154.9 x 304.8)	22 (10)	**T100R-0500**
6.49 x 6.10 x 12.00 (164.8 x 154.9 x 304.8)	28 (13)	**T100R-0750**
6.49 x 6.10 x 12.00 (164.8 x 154.9 x 304.8)	31 (14)	**T100R-1000**
10.49 x 11.10 x 17.00 (266.4 x 281.9 x 431.8)	54 (24)	**T100R-1800**
10.49 x 11.10 x 17.00 (266.4 x 281.9 x 431.8)	58 (26)	**T100R-2400**
Terminal Style Models		
6.42 x 6.10 x 12.00 (163.1 x 154.9 x 304.8)	22 (10)	**T100H-0500**
6.42 x 6.10 x 12.00 (163.1 x 154.9 x 304.8)	28 (13)	**T100H-0750**
6.42 x 6.10 x 12.00 (163.1 x 154.9 x 304.8)	31 (14)	**T100H-1000**
10.28 x 11.10 x 17.00 (261.1 x 281.9 x 431.8)	54 (24)	**T100H-1800**
10.28 x 11.10 x 17.00 (261.1 x 281.9 x 431.8)	58 (26)	**T100H-2500**
10.28 x 11.10 x 17.00 (261.1 x 281.9 x 431.8)	86 (39)	**T100H-5000**
10.49 x 11.10 x 17.00 (266.4 x 281.9 x 431.8)	92 (42)	**T100H-5001**
10.28 x 11.10 x 17.00 (261.1 x 281.9 x 431.8)	116 (53)	**T100H-7500**
10.28 x 11.10 x 17.00 (261.1 x 281.9 x 431.8)	111 (50)	**T100H-7501**

Line-Cord Style



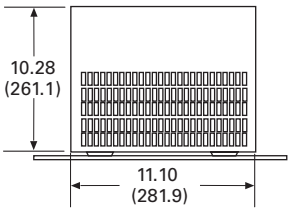
500 VA–1 kVA



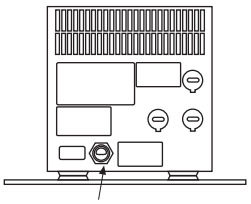
1.8–2.4 kVA

Terminal Style

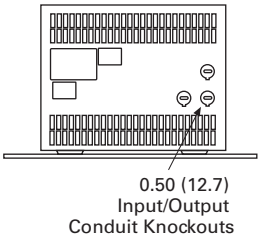
1.8–7.5 kVA Front View



500–1000 VA Rear View



1.8–7.5 kVA Rear View



Note

① 480 V available for 5 and 7.5 kVA models only.

Capacitor Cell with Cage Clamp Terminals

Contents

Product Overview

Product Description

Eaton's power factor correction capacitors and harmonic filters are an essential part of modern electric power systems. Power factor correction capacitors are the simplest and most economical means of increasing the capacity of any power system, minimizing energy losses and correcting load power factor. In addition, power factor penalties can be reduced and power quality can be greatly enhanced.

There are several reasons to correct poor power factor. The first is to reduce or eliminate a power factor penalty charged by the utility. Another reason is that your existing transformer is, or shortly will be, at full capacity and installing power factor correction capacitors can be a very cost-effective solution to installing a brand new service. Depending on the amount of power factor correction (kvar that needs to be injected into the electrical system to improve the power factor) and the dynamic nature of the load, a fixed or switched capacitor bank may be the best solution.

When capacity becomes a problem, the choice of a solution will be dependent upon the size of the increase needed. Like all power quality solutions, there are many factors that need to be considered when determining which solution will be best to solve your power factor problem.

Harmonic Filtering

As the world becomes more dependent on electric and electronic equipment, the likelihood that the negative impact of harmonic distortion increases dramatically. The efficiency and productivity gains from these increasingly sophisticated pieces of equipment have a negative side effect…increased harmonic distortion in the power lines. The difficult thing about harmonic distortion is determining the cause. Once this has been determined, the solution can be easy. Active harmonic filtering equipment will mitigate specific harmonic issues, and correct poor power factor as well.

Product Selection

2

Capacitor Cell Chart

Dimensions in Inches (mm)

Voltage	kvar ①	D	H	Weight in Lb (kg)	Catalog Number
240	1.5	3.1 (79.5)	7.9 (200.0)	1.1 (0.5)	**643PCRMB**
240	2	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**8B43PCRMB**
240	2.5	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**1043PCRMB**
240	3	3.5 (89.5)	9.4 (238.0)	1.8 (0.8)	**12X43PCRMB**
240	4	3.1 (79.5)	7.9 (200.0)	1.1 (0.5)	**423PCRMB**
240	5	3.5 (89.5)	12.3 (313.0)	2.6 (1.2)	**2043PCRMB**
240	6.3	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**6B23PCRMB**
240	7.5	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**7X23PCRMB**
240	8.3	3.5 (89.5)	9.4 (238.0)	3.3 (1.5)	**8B23PCRMB**
240	10	3.5 (89.5)	9.4 (238.0)	2.0 (0.9)	**1023PCRMB**
240	12.5	3.5 (89.5)	12.3 (313.0)	2.6 (1.2)	**12X23PCRMB**
240	15	3.5 (89.5)	12.3 (313.0)	2.6 (1.2)	**1523PCRMB**
480	1.5	2.1 (53.0)	5.0 (125.8)	0.7 (0.3)	**1X43PCRMA**
480	2	2.5 (63.5)	5.5 (140.8)	0.9 (0.4)	**243PCRMA**
480	2.5	2.5 (63.5)	5.5 (140.8)	0.9 (0.4)	**2X43PCRMA**
480	3	2.5 (63.5)	5.5 (140.8)	0.9 (0.4)	**343PCRMA**
480	4	2.5 (63.5)	6.5 (165.8)	0.9 (0.4)	**443PCRMA**
480	5	2.5 (63.5)	6.5 (165.8)	0.9 (0.4)	**543PCRMA**
480	6	3.1 (79.5)	7.9 (200.0)	1.1 (0.5)	**643PCRMB**
480	7.5	3.1 (79.5)	7.9 (200.0)	1.1 (0.5)	**7X43PCRMB**
480	8.3	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**8B43PCRMB**
480	9	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**943PCRMB**
480	10	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**1043PCRMB**
480	12.5	3.5 (89.5)	9.4 (238.0)	1.8 (0.8)	**12X43PCRMB**
480	15	3.5 (89.5)	9.4 (238.0)	1.8 (0.8)	**1543PCRMB**
480	18	3.5 (89.5)	12.3 (313.0)	2.6 (1.2)	**1843PCRMB**
480	20	3.5 (89.5)	12.3 (313.0)	2.6 (1.2)	**2043PCRMB**
480	25	3.5 (89.5)	12.3 (313.0)	2.6 (1.2)	**2543PCRMB**
600	5	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**563PCRMB**
600	7.5	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**7X63PCRMB**
600	10	3.1 (79.5)	9.4 (238.0)	1.3 (0.6)	**1063PCRMB**
600	12.5	3.5 (89.5)	9.4 (238.0)	1.8 (0.8)	**12X63PCRMB**
600	15	3.5 (89.5)	12.3 (313.0)	2.6 (1.2)	**1563PCRMB**
600	17.5	3.5 (89.5)	12.3 (313.0)	2.6 (1.2)	**17X63PCRMB**
600	20	3.5 (89.5)	12.3 (313.0)	3.3 (1.5)	**2063PCRMB**
600	25	3.5 (89.5)	15.3 (388.0)	3.3 (1.5)	**2563PCRMB**

Heavy-Duty Capacitor Cell Chart

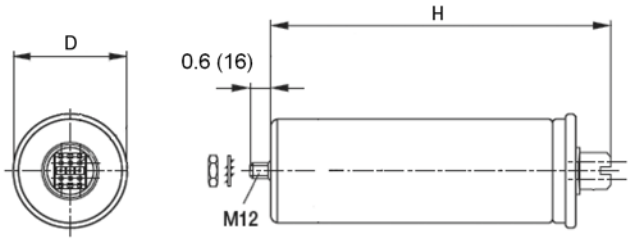
Dimensions in Inches (mm)

Name-plate Voltage	kvar	D	H	Internal Voltage Rating	Weight in Lb (kg)	Catalog Number
240	12.5	3.5 (89.5)	15.3 (388.0)	360	3.3 (1.5)	**12X23PHRMB**
480	15.0	3.5 (89.5)	12.3 (313.0)	525	2.6 (1.2)	**1543PHRMB**
480	16.7	3.5 (89.5)	15.3 (388.0)	600	3.3 (1.5)	**16S43PHRMBS**
480	20.0	3.5 (89.5)	15.3 (388.0)	525	3.3 (1.5)	**2043PHRMB**
480	25.0	3.5 (89.5)	15.3 (388.0)	525	3.3 (1.5)	**2543PHRMB**
600	12.3	3.5 (89.5)	12.3 (313.0)	660	2.6 (1.2)	**12A63PHRMB**
600	14.7	3.5 (89.5)	15.3 (388.0)	660	3.3 (1.5)	**14S63PHRMB**
600	16.7	3.5 (89.5)	15.3 (388.0)	660	3.3 (1.5)	**16S63PHRMB**

Dimensions

Approximate Dimensions in Inches (mm)

Capacitor Cell



Note

① kvar rating standard. Standard kvar tolerance is 0% to +5%. Part number shown is for three-phase units. Up to 5 kvar at 480 V—quick disconnect terminals are standard. Above 5 kvar at 480 V (and on all other voltages)—cage clamp terminals are standard.

UNIPUMP

Contents

UNIPUMP

Product Description

Non-fused capacitors for outdoor irrigation and oil field installations.

- Designed expressly for outdoor pumping applications
- Pole or wall mounting
- Small, light-weight enclosure for easy installation
- SO-WA type flexible cable facilitates installation (4-conductor)
- Gland-type weatherproof bushings
- Strong outer case

Application Description

Outdoor irrigation and oil and gas field pumping.

Features, Benefits and Functions

Configuration

- **Outer case**: Heavy, No. 14 gauge steel finished with durable powder coat finish. Integral strap mounting bracket with keyhole at top for pole or wall installation. No knockouts

Capacitor Cells

- **Terminals**: Insulated finger-safe terminals rated for 3 kVAC withstand
- **Dielectric fill**: Dry-type cells use soft organic polymer resin—Resinol
- Eliminates potential for corona/partial discharge/ electrochemical oxidation
- Excellent heat dissipation
- Flash point: +444 °F (+229 °C)
- Fire point: +840 °F (+449 °C)
- **Design**: Self-healing metallized high crystalline polypropylene with ramp metallization film. Total losses less than 0.45 watt per kvar. (Dielectric losses less than 0.2 watt per kvar)
- **Ramp metallization**: Provides thicker film at higher current density areas, allowing for reduced internal losses, lower operating temperatures and longer life expectancy. Also prevents chain reaction breakdown by limiting propagation of film vaporization
- **Pressure sensitive interrupter**: Built-in, three-phase pop-up interrupter design. UL recognized. Removes capacitor from line before internal pressure can cause case rupture. Bulged capacitor cell top provides easy visual indication of interrupter operation
- **Ceramic discharge resistors**: Reduce residual voltage to less than 50 volts within one minute of de-energization. Selected for 20-year nominal life. Exceeds NEC requirements
- **Capacitor operating temperature**: -40 °F (–40 °C) to +115 °F (+46 °C)
- **Case**: Weatherproof aluminum housing
- **Warranty**: The longest in the industry—five full years of warranty on capacitor cells

Standards and Certifications

- UL 810 and C22.2 No. 190 listed

Product Selection

UNIPUMP

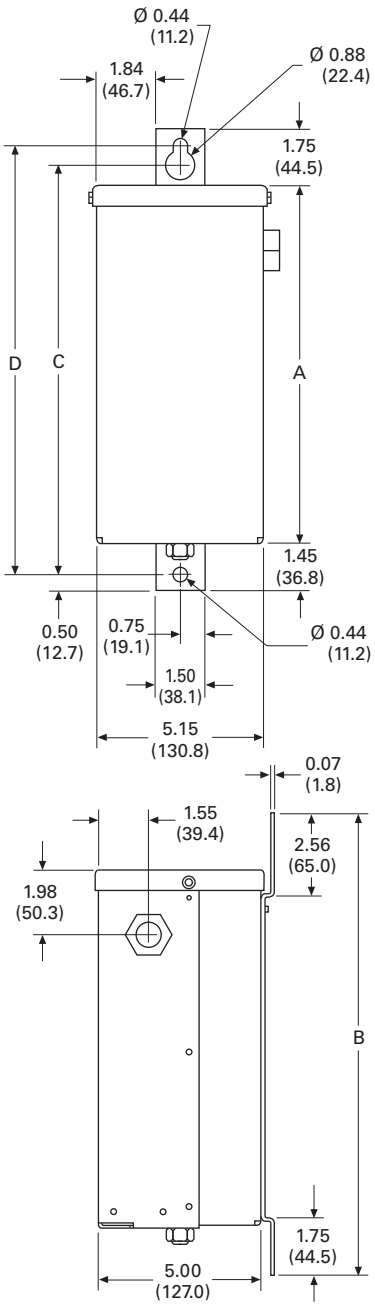
UNIPUMP

kvar	Rated Current	Case Size	Cable Size	Shipping Weight in Lb (kg)	Catalog Number
240 Vac					
2	4.8	AA	14	10.0 (4.5)	**223JMR**
2.5	6.0	AA	14	10.0 (4.5)	**2X23JMR**
3	7.2	AA	14	10.0 (4.5)	**323JMR**
4	9.6	AA	14	11.0 (5.0)	**423JMR**
5	12.0	BB	12	11.0 (5.0)	**523JMR**
6	14.4	BB	12	15.0 (6.8)	**623JMR**
7.5	18.0	BB	12	15.0 (6.8)	**7X23JMR**
480 Vac					
2	2.4	AA	14	10.4 (4.7)	**243JMR**
2.5	3.0	AA	14	10.4 (4.7)	**2X43JMR**
3	3.6	AA	14	10.4 (4.7)	**343JMR**
4	4.8	AA	14	10.4 (4.7)	**443JMR**
5	6.0	AA	14	10.4 (4.7)	**543JMR**
6	7.2	AA	14	10.6 (4.8)	**643JMR**
7.5	9.0	AA	14	10.6 (4.8)	**7X43JMR**
10	12.0	AA	14	10.8 (4.9)	**1043JMR**
12.5	15.0	BB	12	15.0 (6.8)	**12X43JMR**
15	18.0	BB	12	15.0 (6.8)	**1543JMR**
17.5	21.0	BB	8	15.8 (7.2)	**17X43JMR**
20	24.0	BB	8	16.8 (7.6)	**2043JMR**
25	30.0	BB	8	16.8 (7.6)	**2543JMR**
600 Vac					
5	4.9	AA	14	10.8 (4.9)	**563JMR**
7.5	7.4	AA	14	10.8 (4.9)	**7X63JMR**
10	9.8	AA	14	10.8 (4.9)	**1063JMR**
12.5	12.3	BB	12	15.0 (6.8)	**12X63JMR**
15	14.7	BB	12	15.8 (7.2)	**1563JMR**
17.5	17.2	BB	8	16.8 (7.6)	**17X63JMR**
20	19.6	BB	8	16.8 (7.6)	**2063JMR**

Dimensions

Approximate Dimensions in Inches (mm)

UNIPUMP



UNIPUMP Dimension Chart

Size Code	A	B	C	D
AA	11.00 (279.4)	14.20 (360.7)	12.60 (320.0)	13.20 (335.3)
BB	14.00 (355.6)	17.10 (434.3)	15.50 (393.7)	16.10 (408.9)

UNIPAK

Contents

UNIPAK

Product Description

UNIPAK Low Voltage Fixed Capacitor Banks

- Two-year warranty on capacitor cells (units with standard-duty cells)
- Five-year warranty on capacitor cells (units with heavy-duty cells)
- Indoor/outdoor service
- Wall-mount (up to C2) and floor-mounted units available
- Short lead-times
- Slim profile allows reduced footprint, conserving valuable floor space

UNIPAK with Heavy-Duty Capacitor Cells

- Standard fixed capacitor systems using heavy-duty capacitor cells
- For use in moderate harmonic environments where engineering evaluation allows in place of detuned filter designs
- Provides future conversion capability into a detuned filter system when required by facility growth or increased nonlinear load levels

UNIPAK Low Voltage Fixed Detuned Filters

- Detuned filter systems for low voltage, heavy-duty applications
- Correct power factor in high harmonic environments
- Two-enclosure design isolates capacitors from high-temperature operating reactors and allows for flexible installation
- Five-year cell warranty/ one-year reactor warranty
- Three-phase cell capacitor construction

Application Description

Designed for power factor correction in plants experiencing harmonics problems due to high amounts of nonlinear loads.

Features, Benefits and Functions

UNIPAK Low Voltage Fixed Capacitor Banks

- **Outer enclosure:** Heavy, No. 14 gauge steel finished with durable baked powder coat finish. Wall-mounting flanges and floor-mounting feet. Elimination of knockouts permits indoor/outdoor use. Manufactured to NEMA 1 and 3R requirements
- Elevated floor-mounting feet allow access for easy maintenance
- **Cover:** "L" shaped gasketed cover with multiple fasteners provides front opening for ease of installation and service
- **UNIPAK operating temperature:** –40 °F to +115 °F (–40 °C to +46 °C)
- **UNIPAK storage temperature:** –40 °F to +131 °F (–40 °C to +55 °C)
- **Power and ground terminal lugs:** Furnished inside enclosure
- **Pressure-sensitive interrupter:** All units have built-in UL recognized pressure-sensitive interrupter, and thermally or mechanically activated disconnecting link removes capacitor from the supply before dangerous pressure buildup or excessive fault current occurs. Bulged capacitor cell top provides easy visual indication of interrupter operation
- **Standard fusing:**
  - **Size Code A1:** Three midget-type fuses with 100,000 A interrupting capacity
  - **Size Code A2 and larger:** Slotted-blade type fuses with 200,000 A interrupting capacity; fuses mounted on stand-off bushings; solderless connectors for easy hookup of incoming line conductors
  - **Fuse indicating lights:** Red, neon cleared-fuse indicating lights are protected by transparent weatherproof guard
- **Options:**
  - Non-fused units available, selected sizes
  - Heavy-duty capacitor cells, selected sizes

UNIPAK Low Voltage Fixed Detuned Filters

- **Enclosures:** Standard NEMA 1 enclosures have durable baked powder coat finish
- **UNIPAK detuned filter operating temperature:** –40 °F to +115 °F (–40 °C to +46 °C)
- **UNIPAK detuned filter storage temperature:** –40 °F to +131 °F (–40 °C to +55 °C)
- **Power and ground terminal lugs:** Furnished inside enclosures

Standards and Certifications

UNIPAK Low Voltage Fixed Capacitor Banks

- UL 810 and CSA C.22.2 No.190 Listed

UNIPAK Low Voltage Fixed Detuned Filters

- UL 508A and CSA C22.2 No. 190 Listed

Listed

Product Selection

UNIPAK Low Voltage Fixed Capacitor Banks

2

UNIPAK

240 Vac UNIPAK Selection Chart

kvar	Rated Current (Amperes)	Enclosure	Shipping Weight in Lb (kg)	Catalog Number
1	2.4	A1	18 (8)	**123PMURF**
1.5	3.6	A1	18 (8)	**1X23PMURF**
2	4.8	A1	19 (9)	**223PMURF**
2.5	6	A1	19 (9)	**2X23PMURF**
3	7.2	A1	19 (9)	**323PMURF**
4	9.6	A1	20 (9)	**423PMURF**
5	12	A2	29 (13)	**523PMURF**
6	14.4	A2	29 (13)	**623PMURF**
7.5	18	A2	30 (14)	**7X23PMURF**
8	19.2	A2	31 (14)	**823PMURF**
10	24	A2	31 (14)	**1023PMURF**
12.5	30	A2	32 (14)	**12X23PMURF**
15	36	A2	33 (15)	**1523PMURF**
17.5	42	B1	44 (20)	**17X23PMURF**
20	48	B1	45 (20)	**2023PMURF**
22.5	54	B1	46 (21)	**22X23PMURF**
25	60	B1	46 (21)	**2523PMURF**
30	72	B1	47 (21)	**3023PMURF**
32.5	78	C1	47 (22)	**32X23PMURF**
35	84	C1	48 (22)	**3523PMURF**
37.5	90	C1	60 (27)	**37X23PMURF**
40	96	C1	64 (29)	**4023PMURF**
42.5	102	C1	65 (30)	**42X23PMURF**
45	108	C1	66 (30)	**4523PMURF**
50	120	C1	68 (31)	**5023PMURF**
60	144	C1	69 (31)	**6023PMURF**
70	168	C2	99 (45)	**7023PMURF**
75	180	C2	100 (46)	**7523PMURF**
80	192	C2	101 (46)	**8023PMURF**
90	216	C2	103 (47)	**9023PMURF**
100	240	D1	104 (47)	**10023PMURF**
120	288	D1	133 (60)	**12023PMURF**
140	336	E1	137 (62)	**14023PMURF**
150	360	E1	140 (64)	**15023PMURF**
160	384	E1	175 (80)	**16023PMURF**
180	432	E1	182 (83)	**18023PMURF**
200	480	E1	189 (86)	**20023PMURF**

Notes

Multiply the 240 Vac kvar rating by 0.75 to calculate the kvar value at 208 Vac.

Fused with blown-fuse indication available standard. Non-fused and no lights also available—please consult the factory.

Other ratings available, consult factory.

For dimensional information, refer to **Page V3-T2-61**.

Part Numbers:

PMURF—three fuses + three lights

PMURN—non-fused

480 Vac UNIPAK Selection Chart

kvar	Rated Current (Amperes)	Enclosure	Shipping Weight in Lb (kg)	Catalog Number
1.5	1.8	A1	17 (8)	**1X43PMURF**
2	2.4	A1	18 (8)	**243PMURF**
2.5	3	A1	18 (8)	**2X43PMURF**
3	3.6	A1	19 (9)	**343PMURF**
4	4.8	A1	19 (9)	**443PMURF**
5	6	A1	19 (9)	**543PMURF**
6	7.2	A1	19 (9)	**643PMURF**
7.5	9	A1	20 (9)	**7X43PMURF**
8	9.6	A1	20 (9)	**843PMURF**
9	10.8	A1	20 (9)	**943PMURF**
10	12	A1	20 (9)	**1043PMURF**
12.5	15	A2	29 (13)	**12X43PMURF**
15	18	A2	29 (13)	**1543PMURF**
17.5	21	A2	30 (14)	**17X43PMURF**
20	24	A2	31 (14)	**2043PMURF**
22.5	27	B1	44 (20)	**22X43PMURF**
25	30	A2	32 (15)	**2543PMURF**
27.5	33	B1	44 (20)	**27X43PMURF**
30	36	B1	44 (20)	**3043PMURF**
32.5	39	B1	45 (20)	**32X43PMURF**
35	42	B1	45 (20)	**3543PMURF**
37.5	45	B1	46 (21)	**37X43PMURF**
40	48	B1	46 (21)	**4043PMURF**
42.5	51	B1	47 (21)	**42X43PMURF**
45	54	B1	47 (22)	**4543PMURF**
50	60	B1	48 (22)	**5043PMURF**
55	66	C1	48 (22)	**5543PMURF**
60	72	C1	48 (22)	**6043PMURF**
65	78	C1	64 (29)	**6543PMURF**
70	84	C1	65 (30)	**7043PMURF**
75	90	C1	65 (30)	**7543PMURF**
80	96	C1	66 (30)	**8043PMURF**
85	102	C1	68 (31)	**8543PMURF**
90	108	C1	68 (31)	**9043PMURF**
100	120	C1	69 (31)	**10043PMURF**
120	144	C2	69 (31)	**12043PMURF**
125	150	C2	99 (45)	**12543PMURF**
140	168	C2	100 (46)	**14043PMURF**
150	180	C2	101 (46)	**15043PMURF**
160	192	D1	103 (47)	**16043PMURF**
180	216	D1	104 (47)	**18043PMURF**
200	240	D1	137 (62)	**20043PMURF**
225	270	D1	140 (64)	**22543PMURF**
250	300	E1	170 (77)	**25043PMURF**
300	360	E1	175 (80)	**30043PMURF**
350	420	E1	182 (83)	**35043PMURF**
400	480	E1	189 (86)	**40043PMURF**

600 Vac UNIPAK Selection Chart

kvar	Rated Current (Amperes)	Enclosure	Shipping Weight in Lb (kg)	Catalog Number
5	4.9	A1	19 (9)	**563PMURF**
7.5	7.4	A1	19 (9)	**7X63PMURF**
10	9.8	A1	20 (9)	**1063PMURF**
12.5	12.3	A1	20 (9)	**12X63PMURF**
15	14.7	A2	29 (13)	**1563PMURF**
17.5	17.2	A2	29 (13)	**17X63PMURF**
20	19.6	A2	30 (14)	**2063PMURF**
22.5	22.1	B1	44 (20)	**22X63PMURF**
25	24.5	B1	31 (14)	**2563PMURF**
27.5	27.0	B1	44 (20)	**27X63PMURF**
30	29.4	B1	45 (20)	**3063PMURF**
32.5	31.9	B1	45 (20)	**32X63PMURF**
35	34.3	B1	46 (21)	**3563PMURF**
37.5	36.8	B1	46 (21)	**37X63PMURF**
40	39.2	B1	47 (21)	**4063PMURF**
42.5	41.7	B1	47 (22)	**42X63PMURF**
45	44.1	B1	48 (22)	**4563PMURF**
50	49.0	B1	48 (22)	**5063PMURF**
55	53.9	C1	64 (29)	**5563PMURF**
60	58.8	C1	64 (29)	**6063PMURF**
65	63.7	C1	65 (30)	**6563PMURF**
70	68.6	C1	65 (30)	**7063PMURF**
75	73.5	C1	66 (30)	**7563PMURF**
80	78.4	C1	68 (31)	**8063PMURF**
85	83.3	C1	68 (31)	**8563PMURF**
90	88.2	C1	69 (31)	**9063PMURF**
100	98.0	C1	69 (31)	**10063PMURF**
120	117.6	C2	99 (45)	**12063PMURF**
125	122.5	C2	100 (46)	**12563PMURF**
140	137.2	C2	101 (46)	**14063PMURF**
150	147.0	C2	103 (47)	**15063PMURF**
160	156.8	D1	135 (61)	**16063PMURF**
180	176.4	D1	137 (62)	**18063PMURF**
200	196.0	D1	140 (64)	**20063PMURF**
225	220.5	D1	143 (65)	**22563PMURF**
250	245.0	E1	170 (77)	**25063PMURF**
300	294.0	E1	175 (80)	**30063PMURF**
350	343.0	E1	182 (83)	**35063PMURF**
400	392.0	E1	189 (86)	**40063PMURF**

Notes

Fused with blown-fuse indication available standard.

Non-fused and no lights also available—please consult the factory.

Other ratings available, consult factory.

For dimensional information, refer to **Page V3-T2-61**.

Part Number
PMURF—three fuses + three lights
PMURN—non-fused

UNIPAK—with Harmonic Cells

Harmonic Cells

Low Voltage Fixed Capacitor Systems with Heavy-Duty Cells

kvar	Rated Current (Amperes)	Case Size	Shipping Weight in Lb (kg)	Catalog Number
240 V				
15	36	B1	38.4 (17)	**1523HURF**
25	60	B1	38.4 (17)	**2523HURF**
30	72	C1	55.2 (25)	**3023HURF**
50	120	C1	57.6 (26)	**5023HURF**
60	144	C2	100.8 (46)	**6023HURF**
75	180	C2	104.4 (47)	**7523HURF**
100	240	D1	136.8 (62)	**10023HURF**
125	300	E1	189.6 (86)	**12523HURF**
480 V				
15	18	B1	25.2 (11)	**1543HURF**
25	30	B1	37.2 (17)	**2543HURF**
30	36	B1	38.4 (17)	**3043HURF**
50	60	C1	39.6 (18)	**5043HURF**
60	72	C1	52.8 (24)	**6043HURF**
75	90	C2	55.2 (25)	**7543HURF**
100	120	C2	57.6 (26)	**10043HURF**
125	150	D1	100.8 (46)	**12543HURF**
150	180	D1	104.4 (47)	**15043HURF**
200	240	E1	136.8 (62)	**20043HURF**
250	300	E1	186.0 (84)	**25043HURF**
600 V				
15	14.7	B1	37.2 (17)	**1563HURF**
25	24.5	B1	38.4 (17)	**2563HURF**
30	29.4	B1	39.6 (18)	**3063HURF**
50	49	C1	55.2 (25)	**5063HURF**
60	58.8	C1	57.6 (26)	**6063HURF**
75	73.5	C2	100.8 (46)	**7563HURF**
100	98	C2	104.4 (47)	**10063HURF**
125	122.5	D1	136.8 (62)	**12563HURF**
150	147	D1	136.8 (62)	**15063HURF**
200	196	E1	186.0 (84)	**20063HURF**
250	245	E1	189.6 (86)	**25063HURF**

Notes

Fused with blown-fuse indication standard.

Other ratings available, consult factory.

UNIPAK Low Voltage Fixed Detuned Filters

Fixed UNIPAK Detuned Filters

kvar	Rated Current (Amperes)	Capacitor Enclosure Size	Shipping Weight in Lb (kg)	Reactor Enclosure Case Size	Reactor Shipping Weight in Lb (kg)	Combined Shipping Weight in Lb (kg)	Catalog Number
240 V							
15	36	B1	48.4 (22.0)	R	90.0 (40.9)	138.4 (62.8)	**15232HMURFY**
25	60	B1	48.4 (22.0)	R	105.0 (47.7)	153.4 (69.6)	**25232HMURFY**
30	72	C1	65.2 (29.6)	R	110.0 (49.9)	175.2 (79.5)	**30232HMURFY**
50	120	C1	67.6 (30.7)	R	130.0 (59.0)	197.6 (89.7)	**50232HMURFY**
60	144	C2	110.8 (50.3)	R	160.0 (72.6)	270.8 (122.9)	**60232HMURFY**
75	180	C2	114.4 (51.9)	R	185.0 (84.0)	299.4 (135.9)	**75232HMURFY**
100	240	D1	146.8 (66.6)	R	240.0 (109.0)	386.8 (175.6)	**100232HMURFY**
125	300	E1	199.6 (90.6)	S	280.0 (127.1)	479.6 (217.7)	**125232HMURFY**
150	360	E1	220.0 (99.9)	S	280.0 (127.1)	500.0 (227.0)	**150232HMURFY**
480 V							
15	18	B1	35.2 (16.0)	R	90.0 (40.9)	125.2 (56.8)	**15432HMURFY**
25	30	B1	47.2 (21.4)	R	105.0 (47.7)	152.2 (69.1)	**25432HMURFY**
30	36	B1	48.4 (22.0)	R	110.0 (49.9)	158.4 (71.9)	**30432HMURFY**
50	60	C1	49.6 (22.5)	R	130.0 (59.0)	179.6 (81.5)	**50432HMURFY**
60	72	C1	62.8 (28.5)	R	160.0 (72.6)	222.8 (101.2)	**60432HMURFY**
75	90	C2	65.2 (29.6)	R	185.0 (84.0)	250.2 (113.6)	**75432HMURFY**
100	120	C2	67.6 (30.7)	R	240.0 (109.0)	307.6 (139.7)	**100432HMURFY**
125	150	D1	110.8 (50.3)	R	280.0 (127.1)	390.8 (177.4)	**125432HMURFY**
150	180	D1	114.4 (51.9)	S	280.0 (127.1)	394.4 (179.1)	**150432HMURFY**
200	240	E1	146.8 (66.6)	S	330.0 (149.8)	476.8 (216.5)	**200432HMURFY**
250	300	E1	196.0 (89.0)	T	570.0 (258.8)	766.0 (347.8)	**250432HMURFY**
600 V							
15	14.7	B1	47.2 (21.4)	R	90.0 (40.9)	137.2 (62.3)	**15632HMURFY**
25	24.5	B1	48.4 (22.0)	R	90.0 (47.7)	153.4 (69.6)	**25632HMURFY**
30	29.4	B1	49.6 (22.5)	R	105.0 (49.9)	159.6 (72.5)	**30632HMURFY**
50	49	C1	65.2 (29.6)	R	110.0 (59.0)	195.2 (88.6)	**50632HMURFY**
60	58.8	C1	67.6 (30.7)	R	130.0 (72.6)	227.6 (103.3)	**60632HMURFY**
75	73.5	C2	110.8 (50.3)	R	160.0 (84.0)	295.8 (134.3)	**75632HMURFY**
100	98	C2	114.4 (51.9)	R	185.0 (109.0)	354.4 (160.9)	**100632HMURFY**
150	147	D1	146.8 (66.6)	S	280.0 (127.1)	426.8 (193.8)	**150632HMURFY**
200	196	E1	196.0 (89.0)	T	330.0 (149.8)	526.0 (238.8)	**200632HMURFY**
250	245	E1	199.6 (90.6)	T	570.0 (258.8)	769.6 (349.4)	**250632HMURFY**

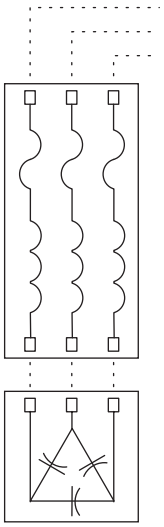
Notes

Other ratings available, consult factory.

Fused with blown-fuse indication standard.

Wiring Diagram

Filter Schematic with Wiring Interconnects



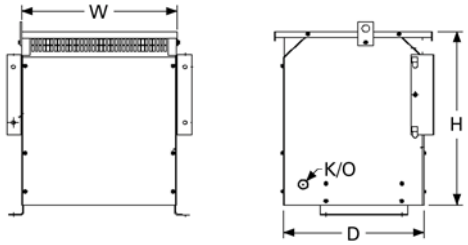
Note

① Refer to NEC.

Dimensions

Approximate Dimensions in Inches (mm)

Reactor Cabinet

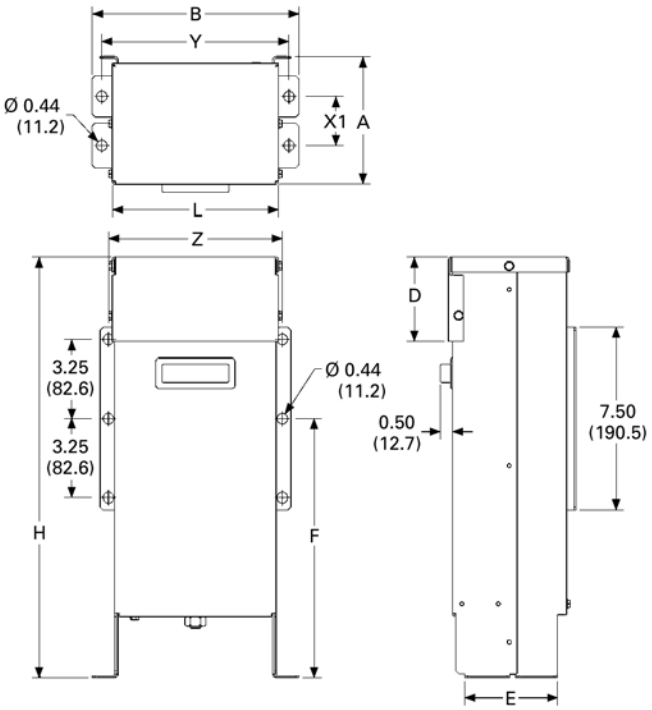


Reactor Cabinet

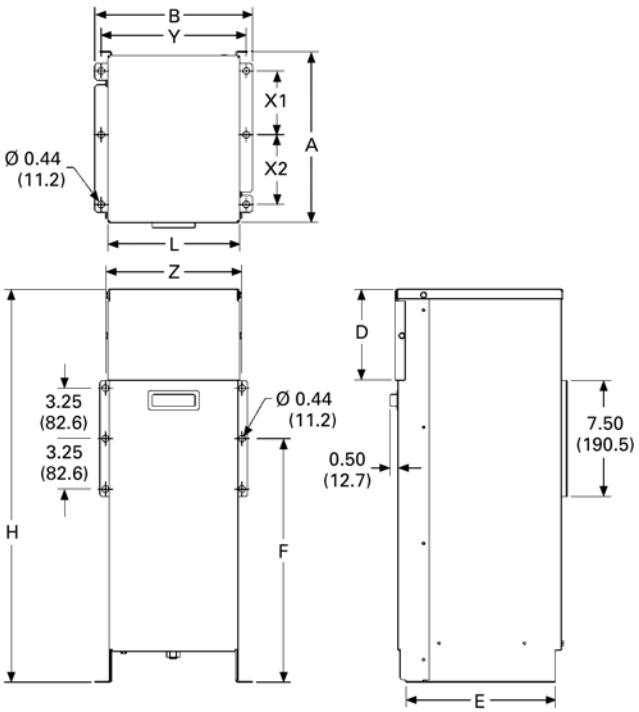
Case Size	Height	Width	Depth
R	24.75 (628.7)	20.00 (508.0)	18.13 (460.5)
S	25.00 (635.0)	24.25 (616.0)	20.25 (514.4)
T	31.00 (787.4)	25.00 (635.0)	32.75 (831.9)

Low Voltage Fixed Capacitor Banks and Fixed Harmonic Filters

Case A1, A2



Case B1



UNIPAK Enclosures

Case Size	A	B	D	E	F	H	L	X1	X2	X3	Y	Z
A1	5.30 (134.6)	8.50 (215.9)	3.50 (88.9)	3.80 (96.5)	10.60 (269.2)	17.30 (439.4)	6.80 (172.7)	2.00 (50.8)	N/A	N/A	7.70 (195.6)	7.20 (182.9)
A2	6.00 (152.4)	8.50 (215.9)	5.60 (142.2)	4.50 (114.3)	13.30 (337.8)	22.30 (566.4)	6.80 (172.7)	2.30 (58.4)	N/A	N/A	7.70 (195.6)	7.20 (182.9)
B1	11.10 (281.9)	10.10 (256.5)	5.80 (147.3)	9.60 (243.8)	15.70 (398.8)	25.30 (642.6)	8.50 (215.9)	4.10 (104.1)	4.50 (114.3)	N/A	9.30 (236.2)	8.80 (223.5)

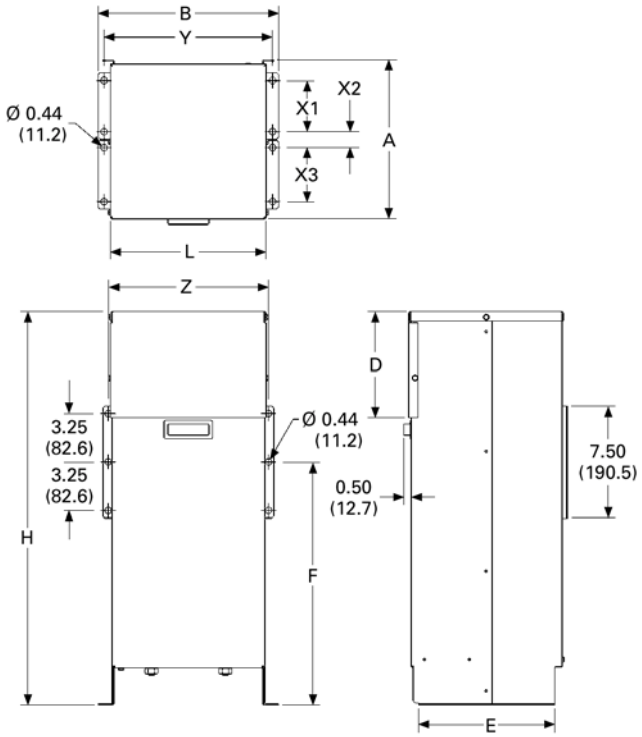
Legend:

A = Total depth
B = Total width
D = Height of removable front cover
E = Depth of feet
F = Height of middle mounting hole in wall bracket
H = Total height
L = Width without feet and brackets
X = Depth between front and rear mounting holes in inches
Y = Width between floor mounting holes
Z = Width between wall bracket mounting holes

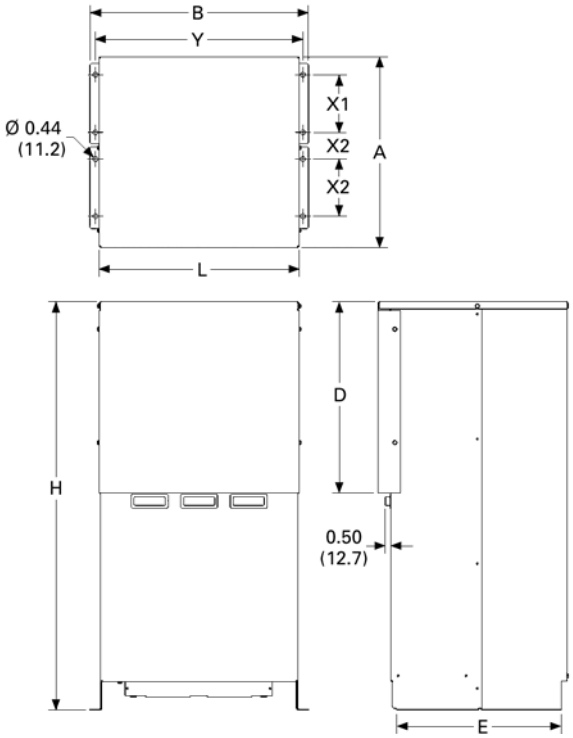
Approximate Dimensions in Inches (mm)

2

Case C1, C2



Case D1, E1

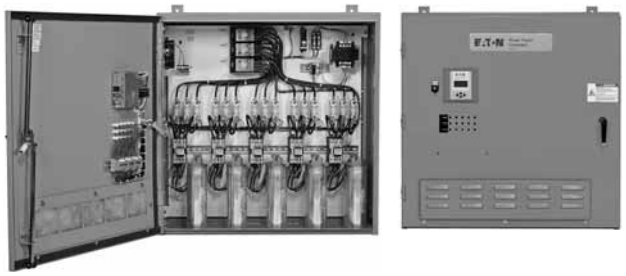


UNIPAK Enclosures

Case Size	A	B	D	E	F	H	L	X1	X2	X3	Y	Z
C1	10.60 (269.2)	12.10 (307.3)	7.10 (180.3)	9.10 (231.1)	16.20 (411.5)	26.30 (668.0)	10.40 (264.2)	3.40 (86.4)	1.10 (27.9)	3.60 (91.4)	11.30 (287.0)	10.70 (271.8)
C2	12.00 (304.8)	19.30 (490.2)	16.90 (429.3)	9.50 (241.3)	16.30 (414.0)	36.00 (914.4)	17.70 (449.6)	3.00 (76.2)	1.50 (38.1)	3.80 (96.5)	18.30 (464.8)	18.00 (457.2)
D1	16.80 (426.7)	19.30 (490.2)	16.90 (429.3)	14.60 (370.8)	N/A	36.00 (914.4)	17.70 (449.6)	5.10 (129.5)	2.40 (61.0)	5.00 (127.0)	18.30 (464.8)	N/A
E1	22.30 (566.4)	24.40 (619.8)	16.80 (426.7)	19.50 (495.3)	N/A	36.00 (914.4)	22.70 (576.6)	6.50 (165.1)	4.40 (111.8)	5.00 (127.0)	22.40 (569.0)	N/A

Legend:
A = Total depth
B = Total width
D = Height of removable front cover
E = Depth of feet
F = Height of middle mounting hole in wall bracket
H = Total height
L = Width without feet and brackets
X = Depth between front and rear mounting holes in inches
Y = Width between floor mounting holes
Z = Width between wall bracket mounting holes

AUTOVAR 300



Contents

AUTOVAR 300 Automatic Power Factor Correction Capacitor Systems

Product Description

Automatically switched power factor correction systems for low voltage applications.

- Wallmount design is ideal for minimum space requirements
- Programmable to automatically add/subtract capacitor stages to maintain preset target power factor
- Heavy-duty, three-phase capacitor construction
- Five-year warranty of cells against manufacturing defects

Application Description

AUTOVAR 300 is an ideal capacitor bank to automatically regulate power factor where floor space is limited and expansion of the facility's electrical load is not expected.

Features

Configuration

- **Cabinet**: Wallmounting 12 gauge steel with ANSI 61 gray, NEMA 1 (gasketed)
- **Power line interconnect**: Rugged, power distribution block connection. Typical power distribution block can accommodate phase wire sizes from 4 AWG to 500 kcmil; typical ground lug can accommodate wire sizes from 14 AWG to 2/0 AWG. Consult equipment approval drawings for actual lug size
- **Control wiring**: UL type MTW/AWM, CSA TEW 105 °C copper wire is standard
- **Fusing**: 200,000 A interrupting capacity provided on all three phases of each stage. Blade-type fuses mounted on insulator stand-offs with cleared-fuse indicating lights
- **Cleared-fuse lights**: Cleared-fuse neon indicating lights for each phase and stage located on the door
- **Door interlock:** Door interlock automatically disengages capacitors. Power continues to be provided to the unit until the disconnect is open
- **Exhaust fan**: Provides ventilation; dust filtering included
- **Safety**: Ground fault interruption provides protection in case of accidental contact with control power and ground
- **Conduit/cable entry**: Available in top/side cable entry
- **Thermal sensing**: Built-in thermal sensing, alarming, and protection feature allows the unit to operate in optimal temperature while alerting the user of ambient temperature exceeding the nominal operating range. Stages will be automatically switched off if temperature exceeds the maximum specified temperature
- **Temperature range**: The operating temperature range is –20 °C to +46 °C, and the storage temperature range is –40 °C to +55 °C. For optimal equipment life, the temperature should not exceed 35 °C annual average, and the environment should not exceed Pollution Degree 2 as defined in UL 61010-1

Controller

- Visual indication of incorrect CT polarity
- Digital display of power factor and number of energized stages
- Automatic setting of c/k value (sensitivity based on CT ratio and kvar available)
- Visual indication of insufficient kvar to reach target power factor
- Automatic sensing of kvar values per step
- Optional communications capable controller (RS-485/ Modbus®)
- Standard metering capability:
  - Voltage
  - Current (sensed phase only)
  - Frequency
  - Active power (kW)
  - Reactive power (kvar)
  - Apparent power (kVA)
  - Total voltage harmonic distortion (VTHD)
  - Individual harmonic voltage distortion (odd orders up to the 19th harmonic)
- Built-in manual mode allows for testing and manual operation of stages
- Multiple user-friendly alarm displays. Controller provides easy-to-understand alarms for various conditions, such as:
  - Undervoltage or overvoltage
  - Undercurrent or overcurrent
  - Target power factor not met
  - Harmonic overload
  - Faulty step/stages
  - Overtemperature alarm

Contactor

- Fully rated for capacitor switching
- Integral pre-charge/pre-insertion module standard. The contactor reduces damaging switching transients, providing safety and durability for the system
  - Lessens the chance of disrupting sensitive electronic equipment
  - Reduced inrush current extends the life of the capacitor cells

Options

- Optional main molded-case circuit breaker
- NEMA 3R weather-resistant enclosure
- Hand-Off-Auto switches
- Remote alarm relay terminal block
- Communications capable controller

Support and Service

- Renewal parts are available through local Eaton distributors
- Factory trained service personnel are available through Eaton's Electrical Services & Systems

Standards and Certifications

- UL/CSA listed and recognized
- Entire cabinet assembly is UL 508A and CSA C22.2 No. 190 Listed
- Capacitors are UL 810 recognized
- Contactor is UL/CSA recognized and IEC 6b rated

Listed

Product Selection

Wallmounted AUTOVAR 300 Switched Capacitor Banks—Low Voltage Applications

kvar	Step x kvar	Rated Current Amperes	Base Shipping Weight in Lb (kg) ①	Catalog Number
240 V				
25	5 x 5	60	217 (98.5)	**25MCSR2313**
50	5 x 10	120	255 (115.8)	**50MCSR2313**
75	5 x 15	180	260 (118.0)	**75MCSR2313**
100	5 x 20	240	270 (122.6)	**100MCSR231**
125	5 x 25	300	292 (132.6)	**125MCSR231**
480 V				
50	5 x 10	60	200 (90.8)	**50MCSR4313**
75	5 x 15	90	210 (95.3)	**75MCSR4313**
100	5 x 20	120	210 (95.3)	**100MCSR4313**
125	5 x 25	150	240 (109.0)	**125MCSR4313**
150	5 x 30	180	240 (109.0)	**150MCSR4313**
175	5 x 35	210	260 (118.0)	**175MCSR431**
200	5 x 40	241	270 (122.6)	**200MCSR431**
225	5 x 45	270	290 (131.7)	**225MCSR431**
250	5 x 50	300	292 (132.6)	**250MCSR431**
600 V				
50	5 x 10	48	200 (90.8)	**50MCSR6313**
75	5 x 15	72	210 (95.3)	**75MCSR6313**
100	5 x 20	96	210 (95.3)	**100MCSR6313**
125	5 x 25	120	240 (109.0)	**125MCSR6313**
150	5 x 30	144	240 (109.0)	**150MCSR6313**
175	5 x 35	168	260 (118.0)	**175MCSR631**
200	5 x 40	192	270 (122.6)	**200MCSR631**
225	5 x 45	216	290 (131.7)	**225MCSR631**
250	5 x 50	240	292 (132.6)	**250MCSR631**

Spare Fuses

kvar Rating/Bank

240 V	480 V	600 V	Amperes	Eaton Fuse Part Number
5	10	10	30	**SP030217-0029J**
—	15	20	50	**SP030217-0037D**
10	20	—	60	**SP030217-0037E**
—	25	25–30	80	**SP030217-0037G**
15	30	40	100	**SP030217-0037J**
20	40	50	125	**SP030217-0037K**
25	50	—	150	**SP030217-0037L**

Renewal Parts

Description	Catalog Number
Replacement PF controller, ACX type	**SP039010-0035U**
Replacement contactor, 72 A	**SP039010-0014B**
Replacement contactor, 32 A	**SP039010-0014C**

Options

Description	Option Code
Remote alarm relay terminal block—relay terminal block for a remote alarm to indicate controller alarm status	**A**
Communicating controller (Modbus RS-485)	**C**
Hand-Off-Auto switch—provides manual control to connect or disconnect capacitor stages regardless of controller output ②	**H**
Molded-case circuit breaker (see circuit breaker section)	**M**
Weather-resistant enclosure (NEMA 3R gasketed)	**W**

Integrated Main Breakers—AUTOVAR 300

kvar	AUTOVAR Rated Current Amperes	Breaker Size (Amperes) ③	Breaker Interrupting Rating (kA)	Breaker Weight in Lb (kg)	Standard Wire Lug Size ④
240 V					
25	60	125	100	10 (4.5)	(1) #3–350
50	120	250	100	10 (4.5)	(1) #3–350
75	180	250	100	10 (4.5)	(1) #3–350
100	240	400	100	10 (4.5)	(2) #3/0–250
125	300	600	100	25 (11.4)	(2) #3/0–350
480 V					
50	60	125	65	10 (4.5)	(1) #3–350
75	90	125	65	10 (4.5)	(1) #3–350
100	120	250	65	10 (4.5)	(1) #3–350
125	150	250	65	10 (4.5)	(1) #3–350
150	180	250	65	10 (4.5)	(1) #3–350
175	210	400	65	10 (4.5)	(2) #3/0–250
200	240	400	65	10 (4.5)	(2) #3/0–250
225	270	400	65	10 (4.5)	(2) #3/0–250
250	300	600	65	25 (11.4)	(2) #3/0–350
600 V					
50	48	125	35	10 (4.5)	(1) #3–350
75	72	125	35	10 (4.5)	(1) #3–350
100	96	250	35	10 (4.5)	(1) #3–350
125	120	250	35	10 (4.5)	(1) #3–350
150	144	250	35	10 (4.5)	(1) #3–350
175	168	250	35	10 (4.5)	(1) #3–350
200	192	400	35	10 (4.5)	(2) #3/0–350
225	216	400	35	10 (4.5)	(2) #3/0–350
250	240	400	35	10 (4.5)	(2) #3/0–350

Notes

① To calculate AUTOVAR 300 weight:
1. Obtain base unit weight from table above.
2. Add option weights as necessary:
   A = 1 lb
   C = 1 lb
   H = 5 lb
   W = 10 lb
   M = 50 lb enclosure weight adder plus circuit breaker weight (see circuit breaker table)
   S = Consult Eaton's Technical Resource Center (TRC) at 1-800-809-2772, choose option #4, then option #2

Heavy-duty cells, 50 Hz units, and other ratings available, please consult factory. A minimum of one CT is required per AUTOVAR unit. kvar output is voltage and frequency dependent. 60 Hz units are shown. For other voltages and frequencies, consult Eaton Technical Resource Center (TRC) at 1-800-809-2772, choose option #4, then option #2.

② Manual control is always available through controller menu system, even if the H option is not selected.

③ Breakers are sized at a minimum of 135% of the unit rated Amperes per the NEC®.

④ See equipment drawings for actual lug sizes.

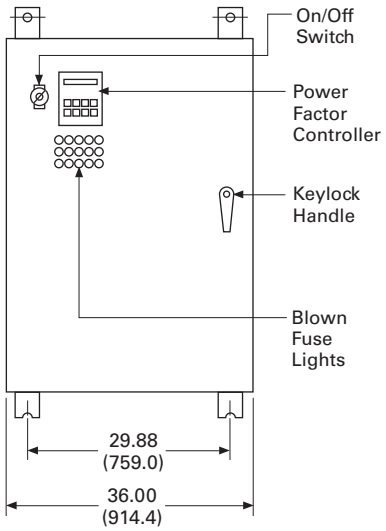
Dimensions

Approximate Dimensions in Inches (mm)

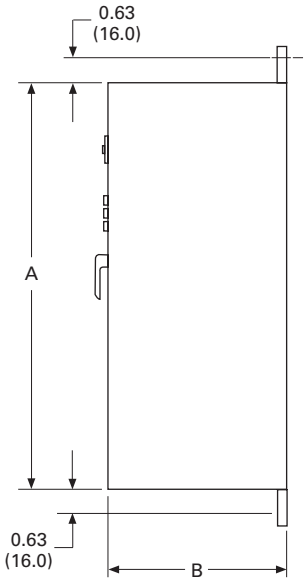
2

Enclosure J

Front View



Side View



Description	Height A	Depth B
J1	36.00 (914.4)	14.00 (355.6)
J2	60.00 (1524.0)	14.00 (355.6)

AUTOVAR 600

Contents

AUTOVAR 600 Automatic Power Factor Correction Capacitor Systems

Product Description

- Programmable to automatically add/subtract capacitor stages to maintain preset target power factor
- Three-phase capacitor cell construction
- Five-year warranty of cells against manufacturing defects
- Cool operating, 100% copper wound, thermal-protected reactors are sized up to 150% of rated capacitor current (AUTOVAR detuned filter only)

Application Description

- Service entrance or substation power factor correction installations requiring precise maintenance of target power factor (AUTOVAR 600)
- Service entrance or substation power factor correction installations requiring precise maintenance of target power factor in three-phase, nonlinear, high harmonic environments (AUTOVAR detuned filter)
- Typically connected at main low voltage switchgear

Features

Configuration

- **Cabinet**: 12 gauge steel with ANSI 61 gray, baked finish. Removable lift bolts standard, NEMA 1 (gasketed)
- **Power line interconnect**: Rugged, copper busbar connection with access provided for top entry. Contact factory for availability of bottom entry. Busbars are braced for 65 kA (optional 100 kA rating available). All internal power wiring connections from bus are laid out on a most direct basis with minimum bends for ease of troubleshooting. Clear barrier limiting access to live parts included standard
- **Modular tray design**: Capacitor stages arranged in modular trays with capacitors, fuses, cleared-fuse indicating lights, and contactors grouped in a logical, easily understood layout. This permits easy access, quick identification of operating problems, and ease of expandability
- **Fusing**: UL recognized, 200,000 A interrupting capacity provided on all three phases of each stage. Blade-type fuses mounted on insulator stand-offs
- **Cleared-fuse indicating lights**: LEDs located door-mounted and neon at individual fuses to facilitate tracing of cleared fuses
- **Push-to-test**: Allows testing of door-mounted LED cleared fuse indicating lights
- **AutoLocate**: When door is open and bus is energized, fuse circuit automatically checks for cleared fuses. If a fuse has cleared, the light at the fuse turns on for easy troubleshooting
- **Door interlock**: Door interlock automatically turns off control circuit when engaged. Power continues to be provided to the unit until disconnect is open
- **Exhaust fans**: Two side louver fans per cabinet provide cooling and reduce operator exposure to discharge. Replaceable dust filtering provided. Dust filters can be replaced without opening cabinet
- **Ease of expansion**: Capacitor stage nests are self-contained and can be added in the field. Two bolts mount the nest in the field. Control wire plugs connect to factory standard wire harness on the left side of the cabinet
- **Ease of replacement**: Cells can be easily replaced individually by removing the mounting bolt and lifting out of the nest without removal of any other components
- **Thermal sensing**: Built-in thermal sensing, alarming, and protection feature allows the unit to operate in optimal temperature while alerting the user of ambient temperature exceeding the nominal operating range. Stages will be automatically switched off if temperature exceeds the maximum specified temperature
- **Temperature range**: The operating temperature range is –20 °C to +46 °C, and the storage temperature range is –40 °C to +55 °C. For optimal equipment life, the temperature should not exceed 35 °C annual average, and the environment should not exceed Pollution Degree 2 as defined in UL 61010-1

Controller

- Visual indication of incorrect CT polarity
- Digital display of power factor and number of energized stages
- Automatic setting of c/k value (sensitivity based on CT ratio and kvar available)
- Visual indication of insufficient kvar to reach target power factor
- Automatic sensing of kvar values per step
- Optional communications capable controller (RS-485/ Modbus)
- Standard metering capability:
  - Voltage
  - Current (sensed phase only)
  - Frequency
  - Active power (kW)
  - Reactive power (kvar)
  - Apparent power (kVA)
  - Total voltage harmonic distortion (VTHD)
  - Individual harmonic voltage distortion (odd orders up to the 19th harmonic)
- Built-in manual mode allows for testing and manual operation of stages
- Multiple user-friendly alarm displays. Controller provides easy-to-understand alarms for various conditions, such as:
  - Undervoltage or overvoltage
  - Undercurrent or overcurrent
  - Target power factor not met
  - Harmonic overload
  - Faulty step/stages
  - Overtemperature alarm

Contactor

- Fully rated for capacitor switching
- Integral pre-charge/pre-insertion module standard. The contactor reduces damaging switching transients, providing safety and durability for the system
  - Lessens the chance of disrupting sensitive electronic equipment
  - Reduced inrush current extends the life of the capacitor cells

Reactors

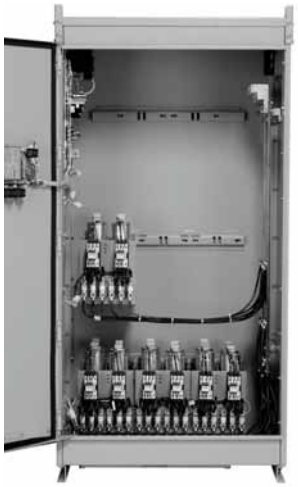
- **Detuning**: Standard reactor designs are detuned to the 4.2nd harmonic and recommended to protect capacitors against harmonic resonance. Detuning to the 4.7th harmonic is available as an option. The harmonic spectrum should be evaluated for applications involving reactors detuned to the 4.7th harmonic to ensure optimal equipment life, specifically when used in conjunction with six-pulse motor drives
- **Windings**: 80 °C temperature rise design 100% copper windings for minimal losses
- **Thermal overload protection**: Each reactor includes three normally closed, auto reset thermostats that open at 180 °C. When thermostats engage, the contactor opens
- **Insulation**: 220 °C insulation system
- **Warranty**: One-year replacement of reactors

Additional Features

- Optional molded-case main circuit breaker
- Ground fault interruption provides protection in case of accidental contact with control power and ground
- Control wiring—standard NEC color-coded modular bundles with quick disconnect feature for ease of troubleshooting or ease of expendability. UL type MTW/AWM, CSA TEW 105 °C copper wire is standard.
- Optional digital metering—IQ 250
- Mechanical wire lugs are included as standard equipment. Typical phase lugs range from (2) 6 AWG–350 kcmil to (4) 3 AWG–750 MCM. Typical ground lug can accept wire from 6 AWG to 350 kcmil. Lugs are compatible with copper wire 90 °C
- Heavy-duty capacitor cells are standard on AUTOVAR detuned filter and optional on AUTOVAR 600. For 480 V units, standard-duty cells are 525 V rated, and heavy-duty cells are 600 V rated

Support and service

- Renewal parts are available through local Eaton distributors
- Factory trained service personnel are available through Eaton's Electrical Services & Systems



AUTOVAR 600—Interior View

Modular Step Nest Assembly

Dust Filter Tray

Standards and Certifications

- Entire cabinet assembly is UL 508A and CSA C22.2 No. 190 Listed
- Capacitors are UL 810 recognized
- Contactor is UL/CSA recognized and IEC 6b rated

Listed

Product Selection

Options—AUTOVAR 600 and AUTOVAR Detuned Filter

Description	Option Code
Remote alarm relay terminal block—relay terminal block for a remote alarm to indicate controller alarm status	**A**
Fully insulated main bus	**B**
Communicating PF controller (Modbus RS-485)	**C**
Hand-off-auto switch provides manual control to connect or disconnect capacitor stages regardless of controller output ①	**H**
Integrated main breaker	**M**
Integrated main breaker with high interrupting rating (see breaker table for more information), includes 100 kA busbar bracing	**M1**
100 kA busbar bracing	**N1**
Integrated CVX series surge protection, without sine wave tracking	**T1**
Integrated SPD series surge protection, 160 kA per phase, with sine wave tracking	**T2**
IQ 250 electronic meter ②	**Q**
Weather resistant enclosure (NEMA 3R gasketed) ③	**W**
Standard filter detuned to the 4.2nd harmonic ④	**Y**

Notes

① Manual control is always available through menu controller on system, even if the H option is not selected.

② Not available on NEMA 3R units (W option).

③ Only available on AUTOVAR 600 with heavy-duty cells and AUTOVAR detuned filters using 'L + L', 'L + KK', and 'KK + KK' enclosures.

④ Tuning to the 4.2nd harmonic is the preferred option. Other tunings available. Contact Eaton's Technical Resource Center (TRC) power factor application engineers at 1-800-809-2772, choose option #4, then option #2.

To calculate AUTOVAR 600 or AUTOVAR detuned filter weight:

Obtain base unit weight from tables on **Pages V3-T2-70–V3-T2-72** (as appropriate).

Add option weights as necessary:
A = 1 lb (0.5 kg)
B = 10 lb (4.5 kg)
C = 1 lb (0.5 kg)
H = 10 lb (4.5 kg)
M = Circuit breaker weight (see circuit breaker table)
M1 = 10 lb (4.5 kg) hardware weight adder plus circuit breaker weight (see circuit breaker table)
N1 = 10 lb (4.5 kg)
T1 = 5 lb (2.3 kg)
T2 = 10 lb (4.5 kg)
Q = 5 lb (2.3 kg)
W = 10 lb (4.5 kg) per door
Y = 0 lb (0 kg)

AUTOVAR 600 Floor-Mounted Switched Capacitor Banks Units with Standard-Duty Cells—Low Voltage Applications

kvar ①	Step x kvar	Rated Current Amperes	Base Shipping Weight in Lb (kg)	Base Catalog Number
240 Vac				
75	3 x 25	180	644 (292.4)	**75TPCSR231**
100	4 x 25	240	692 (314.2)	**100TPCSR231**
125	5 x 25	300	740 (336.0)	**125TPCSR231**
150	6 x 25	361	788 (357.8)	**150TPCSR231**
200	8 x 25	481	884 (401.3)	**200TPCSR231**
250	10 x 25	600	944 (428.6)	**250TPCSR231**
300	12 x 25	720	1022 (464.0)	**300TPCSR231**
350	7 x 50	844	1616 (734.0)	**350TPCSR231**
400	8 x 50	965	1704 (774.0)	**400TPCSR231**
480 Vac				
100	2 x 50	120	588 (266.7)	**100TPCSR431**
150	3 x 50	180	632 (287.0)	**150TPCSR431**
200	4 x 50	240	676 (306.9)	**200TPCSR431**
250	5 x 50	300	720 (326.9)	**250TPCSR431**
300	6 x 50	360	764 (346.9)	**300TPCSR431**
350	7 x 50	420	808 (366.8)	**350TPCSR431**
400	8 x 50	480	852 (386.8)	**400TPCSR431**
450	9 x 50	540	896 (406.8)	**450TPCSR431**
500	10 x 50	600	944 (428.6)	**500TPCSR431**
550	11 x 50	660	984 (446.7)	**550TPCSR431**
600	12 x 50	720	1022 (464.0)	**600TPCSR431**
660	11 x 60	792	1010 (458.5)	**660TPCSR431**
700	7 x 100	840	1616 (734.0)	**700TPCSR431**
720	12 x 60	864	1050 (476.7)	**720TPCSR431**
800	8 x 100	960	1704 (774.0)	**800TPCSR431**
900	9 x 100	1080	1792 (814.0)	**900TPCSR431**
1000	10 x 100	1200	1888 (857.0)	**1000TPCSR431**
1100	11 x 100	1320	1966 (893.0)	**1100TPCSR431**
1200	12 x 100	1440	2044 (928.0)	**1200TPCSR431**
600 Vac				
100	2 x 50	46	588 (266.7)	**100TPCSR631**
150	3 x 50	144	632 (287.0)	**150TPCSR631**
200	4 x 50	192	676 (306.9)	**200TPCSR631**
250	5 x 50	240	720 (326.9)	**250TPCSR631**
300	6 x 50	288	764 (346.9)	**300TPCSR631**
350	7 x 50	336	808 (366.8)	**350TPCSR631**
400	8 x 50	384	852 (386.8)	**400TPCSR631**
450	9 x 50	432	896 (406.8)	**450TPCSR631**
500	10 x 50	480	944 (428.6)	**500TPCSR631**
550	11 x 60	528	984 (446.7)	**550TPCSR631**
600	12 x 50	576	1022 (464.0)	**600TPCSR631**
660	11 x 60	634	1010 (458.5)	**660TPCSR631**
700	7 x 100	672	1616 (734.0)	**700TPCSR631**
720	12 x 60	692	1050 (476.7)	**720TPCSR631**
800	8 x 100	768	1704 (774.0)	**800TPCSR631**
900	9 x 100	864	1792 (814.0)	**900TPCSR631**
1000	10 x 100	960	1888 (857.0)	**1000TPCSR631**
1100	11 x 100	1056	1966 (893.0)	**1100TPCSR631**
1200	12 x 100	1152	2044 (928.0)	**1200TPCSR631**

AUTOVAR 600 Sizing Chart for Units with Standard-Duty Cells

		Enclosure Size ②	
kvar	Step x kvar	NEMA 1, without Main Breaker, No Suffix	NEMA 1, with Main Breaker, M Suffix
240 V			
75	3 x 25	L	L
100	4 x 25	L	L
125	5 x 25	L	L
150	6 x 25	L	L
200	8 x 25	L	L
250	10 x 25	L	L
300	12 x 25	L	L
350	7 x 50	KK	KK
400	8 x 50	KK	C/F
480 V			
100	2 x 50	L	L
150	3 x 50	L	L
200	4 x 50	L	L
250	5 x 50	L	L
300	6 x 50	L	L
350	7 x 50	L	L
400	8 x 50	L	L
450	9 x 50	L	L
500	10 x 50	L	L
550	11 x 50	L	L
600	12 x 50	L	L
660	11 x 60	L	L
700	14 x 50	KK	KK
720	12 x 60	L	L
800	8 x 100	KK	C/F
900	9 x 100	KK	C/F
1000	10 x 100	KK	C/F
1100	11 x 100	KK	C/F
1200	12 x 100	KK	C/F
600 V			
100	2 x 50	L	L
150	3 x 50	L	L
200	4 x 50	L	L
250	5 x 50	L	L
300	6 x 50	L	L
350	7 x 50	L	L
400	8 x 50	L	L
450	9 x 50	L	L
500	10 x 50	L	L
550	11 x 50	L	L
600	12 x 50	L	L
660	11 x 60	L	L
700	14 x 50	KK	KK
720	12 x 60	L	L
800	8 x 100	KK	KK
900	9 x 100	KK	KK
1000	10 x 100	KK	C/F
1100	11 x 100	KK	C/F
1200	12 x 100	KK	C/F

Notes

① Other ratings available. Please consult factory. kvar output is voltage and frequency dependent. 60 Hz units are shown. For other voltages and frequencies, consult Eaton Technical Resource Center (TRC) at 1-800-809-2772, choose option #4, then option #2.

② Enclosure sizing for units with integrated surge protection or bottom entry can vary and may not be available on all kvar sizes. Contact Eaton's Technical Resource Center at 1-800-809-2772, choose option #4, then option #2.

C/F = Consult factory

AUTOVAR 600 Floor-Mounted Switched Capacitor Banks Units with Heavy-Duty Cells—Low Voltage Applications

kvar ①	Step x kvar	Rated Current Amperes	Base Shipping Weight in Lb (kg)	Base Catalog Number
240 Vac				
75	3 x 25	180	659 (298.9)	**75TPHSR231**
100	4 x 25	240	712 (323.0)	**100TPHSR231**
125	5 x 25	300	765 (347.0)	**125TPHSR231**
150	6 x 25	361	818 (371.0)	**150TPHSR231**
200	8 x 25	481	924 (419.1)	**200TPHSR231**
250	10 x 25	601	994 (450.9)	**250TPHSR231**
300	12 x 25	720	1082 (490.8)	**300TPHSR231**
350	7 x 50	844	1686 (764.8)	**350TPHSR231**
400	8 x 50	965	1784 (809.2)	**400TPHSR231**
480 Vac				
100	2 x 50	120	617 (279.9)	**100TPHSR431**
150	3 x 50	180	677 (307.1)	**150TPHSR431**
200	4 x 50	240	736 (333.8)	**200TPHSR431**
250	5 x 50	300	795 (360.6)	**250TPHSR431**
300	6 x 50	360	854 (387.4)	**300TPHSR431**
350	7 x 50	420	913 (414.1)	**350TPHSR431**
400	8 x 50	480	972 (440.9)	**400TPHSR431**
450	9 x 50	540	1031 (467.7)	**450TPHSR431**
500	10 x 50	600	1094 (496.2)	**500TPHSR431**
550	11 x 50	660	1149 (521.2)	**550TPHSR431**
600	12 x 50	720	1202 (545.2)	**600TPHSR431**
700	14 x 50	792	1826 (828.3)	**700TPHSR431**
800	8 x 100	462	1944 (881.8)	**800TPHSR431**
900	9 x 100	1083	2062 (935.3)	**900TPHSR431**
1000	10 x 100	1203	2198 (997.0)	**1000TPHSR431**
1100	11 x 100	1323	2296 (1041.4)	**1100TPHSR431**
1200	12 x 100	1443	2404 (1090.4)	**1200TPHSR431**
600 Vac				
100	2 x 50	96	617 (279.9)	**100TPHSR631**
150	3 x 50	144	677 (307.1)	**150TPHSR631**
200	4 x 50	192	736 (333.8)	**200TPHSR631**
250	5 x 50	240	795 (360.6)	**250TPHSR631**
300	6 x 50	288	854 (387.4)	**300TPHSR631**
350	7 x 50	336	913 (414.1)	**350TPHSR631**
400	8 x 50	384	972 (440.9)	**400TPHSR631**
450	9 x 50	432	1031 (467.7)	**450TPHSR631**
500	10 x 50	480	1094 (496.2)	**500TPHSR631**
550	11 x 60	529	1149 (521.2)	**550TPHSR631**
600	12 x 50	576	1202 (545.2)	**600TPHSR631**
700	7 x 100	672	1826 (828.3)	**700TPHSR631**
800	8 x 100	768	1944 (881.8)	**800TPHSR631**
900	9 x 100	864	2062 (935.3)	**900TPHSR631**
1000	10 x 100	962	2198 (997.0)	**1000TPHSR631**
1100	11 x 100	1058	2296 (1041.4)	**1100TPHSR631**
1200	12 x 100	1155	2404 (1090.4)	**1200TPHSR631**

AUTOVAR 600 Sizing Chart for Units with Heavy-Duty Cells

		Enclosure Size ②			
kvar	Step x kvar	NEMA 1, without Main Breaker, No Suffix	NEMA 1, with Main Breaker, M Suffix	NEMA 3R, without Main Breaker, W Suffix	NEMA 3R, with Main Breaker, MW Suffix
240 V					
75	3 x 25	L	L	L	L
100	4 x 25	L	L	L	L
125	5 x 25	L	L	L	L
150	6 x 25	L	L	L	L
200	8 x 25	L	L	L	L
250	10 x 25	L	L	L	L
300	12 x 25	L	L	L	L
350	7 x 50	L	KK	KK	KK
400	8 x 50	KK	C/F	KK	C/F
480 V					
100	2 x 50	L	L	L	L
150	3 x 50	L	L	L	L
200	4 x 50	L	L	L	L
250	5 x 50	L	L	L	L
300	6 x 50	L	L	L	L
350	7 x 50	L	L	L	L
400	8 x 50	L	L	L	L
450	9 x 50	L	L	L	L
500	10 x 50	L	L	L	L
550	11 x 50	L	L	L	L
600	12 x 50	L	L	L	L
700	14 x 50	KK	KK	KK	KK
800	8 x 100	KK	C/F	KK	C/F
900	9 x 100	KK	C/F	KK	C/F
1000	10 x 100	KK	C/F	KK	C/F
1100	11 x 100	KK	C/F	KK	C/F
1200	12 x 100	KK	C/F	KK	C/F
600 V					
100	2 x 50	L	L	L	L
150	3 x 50	L	L	L	L
200	4 x 50	L	L	L	L
250	5 x 50	L	L	L	L
300	6 x 50	L	L	L	L
350	7 x 50	L	L	L	L
400	8 x 50	L	L	L	L
450	9 x 50	L	L	L	L
500	10 x 50	L	L	L	L
550	11 x 50	L	L	L	L
600	12 x 50	L	L	L	L
700	14 x 50	KK	KK	KK	KK
800	8 x 100	KK	KK	KK	KK
900	9 x 100	KK	KK	KK	KK
1000	10 x 100	KK	C/F	KK	C/F
1100	11 x 100	KK	C/F	KK	C/F
1200	12 x 100	KK	C/F	KK	C/F

Notes

① Other ratings available. Please consult factory. kvar output is voltage and frequency dependent. 60 Hz units are shown. For other voltages and frequencies, consult Eaton Technical Resource Center (TRC) at 1-800-809-2772, choose option #4, then option #2.

② Enclosure sizing for units with integrated surge protection or bottom entry can vary and may not be available on all kvar sizes. Contact Eaton's Technical Resource Center at 1-800-809-2772, choose option #4, then option #2.

C/F = Consult factory

Floor-Mounted Switched Detuned Filters—Low Voltage

kvar ①	Step x kvar	Rated Current Amperes	Base Shipping Weight in Lb (kg)	Base Catalog Number
240 Vac				
150	6 x 25	361	1830 (830.8)	**150THFSR232Y**
200	8 x 25	481	2222 (1008.8	**200THFSR232Y**
250	10 x 25	601	2525 (1146.4)	**250THFSR232Y**
300	12 x 25	720	2830 (1284.8)	**300THFSR232Y**
350	7 x 50	844	3090 (1401.6)	**350THFSR231Y**
400	8 x 50	965	3560 (1614.8)	**400THFSR232Y**
480 Vac				
100	2 x 50	120	1105 (501.2)	**100THFSR431Y**
150	3 x 50	180	1242 (564.6)	**150THFSR431Y**
200	4 x 50	240	1438 (652.9)	**200THFSR431Y**
250	5 x 50	300	1634 (741.8)	**250THFSR431Y**
300	6 x 50	360	1830 (830.8)	**300THFSR432Y**
350	7 x 50	420	2026 (919.8)	**350THFSR432Y**
400	8 x 50	480	2222 (1008.8)	**400THFSR432Y**
450	9 x 50	540	2371 (1076.4)	**450THFSR432Y**
500	10 x 50	600	2525 (1146.4)	**500THFSR432Y**
550	11 x 50	660	2750 (1248.5)	**550THFSR432Y**
600	12 x 50	720	2830 (1284.8)	**600THFSR432Y**
700	7 x 100	792	3090 (1401.6)	**700THFSR431Y**
800	8 x 100	962	3560 (1614.8)	**800THFSR432Y**
900	9 x 100	1083	3900 (1769.0)	**900THFSR432Y**
1000	10 x 100	1203	4240 (1923.2)	**1000THFSR432Y**
1100	11 x 100	1323	4500 (2041.2)	**1100THFSR432Y**
600 Vac				
100	2 x 50	96	1105 (501.2)	**100THFSR631Y**
150	3 x 50	144	1242 (564.6)	**150THFSR631Y**
200	4 x 50	192	1438 (652.9)	**200THFSR631Y**
250	5 x 50	240	1634 (741.8)	**250THFSR631Y**
300	6 x 50	288	1830 (830.8)	**300THFSR632Y**
350	7 x 50	336	2026 (919.8)	**350THFSR632Y**
400	8 x 50	384	2222 (1008.8)	**400THFSR632Y**
450	9 x 50	432	2371 (1076.4)	**450THFSR632Y**
500	10 x 50	480	2525 (1146.4)	**500THFSR632Y**
550	11 x 50	529	2750 (1248.5)	**550THFSR632Y**
600	12 x 50	576	2830 (1284.8)	**600THFSR632Y**
700	7 x 100	672	3090 (1401.6)	**700THFSR631Y**
800	8 x 100	768	3560 (1614.8)	**800THFSR632Y**
900	9 x 100	864	3900 (1769.0)	**900THFSR632Y**
1000	10 x 100	962	4240 (1923.2)	**1000THFSR632Y**
1100	11 x 100	1058	4500 (2041.2)	**1100THFSR632Y**

AUTOVAR Detuned Filter Sizing Chart

		Enclosure Size ②			
kvar	Step x kvar	NEMA 1 without Main Breaker, No Suffix	NEMA 1 with Main Breaker, M Suffix	NEMA 3R without Main Breaker, W Suffix	NEMA 3R with Main Breaker, MW Suffix
240 V					
150	6 x 25	L + L ③	L + L ③	L + L ③	L + L ③
200	8 x 25	L + L ③	L + L ③	L + L ③	L + L ③
250	10 x 25	L + L ③	L + L ③	L + L ③	L + L ③
300	12 x 25	L + L ③	KK	L + L ③	KK
350	7 x 50	KK	L + KK ③	L + KK ③	KK
400	8 x 50	L + KK ③	C/F	L + KK ③	C/F
480 V					
100	2 x 50	L	L	L + L ③	L + L ③
150	3 x 50	L	L	L + L ③	L + L ③
200	4 x 50	L	L	L + L ③	L + L ③
250	5 x 50	L	L + L ③	L + L ③	L + L ③
300	6 x 50	L + L ③	L + L ③	L + L ③	L + L ③
350	7 x 50	L + L ③	L + L ③	L + L ③	L + L ③
400	8 x 50	L + L ③	L + L ③	L + L ③	L + L ③
450	9 x 50	L + L ③	L + L ③	L + L ③	L + L ③
500	10 x 50	L + L ③	L + L ③	L + L ③	L + L ③
550	11 x 50	L + L ③	KK	L + L ③	L + KK ③
600	12 x 50	L + L ③	KK	L + L ③	L + KK ③
700	7 x 100	KK	KK	L + KK ③	L + KK ③
800	8 x 100	L + KK ③	C/F	L + KK ③	C/F
900	9 x 100	KK + KK ③	C/F	KK + KK ③	C/F
1000	10 x 100	KK + KK ③	C/F	KK + KK ③	C/F
1100	11 x 100	KK + KK ③	C/F	KK + KK ③	C/F
600 V					
100	2 x 50	L	L	L + L ③	L + L ③
150	3 x 50	L	L	L + L ③	L + L ③
200	4 x 50	L	L	L + L ③	L + L ③
250	5 x 50	L	L + L ③	L + L ③	L + L ③
300	6 x 50	L + L ③	L + L ③	L + L ③	L + L ③
350	7 x 50	L + L ③	L + L ③	L + L ③	L + L ③
400	8 x 50	L + L ③	L + L ③	L + L ③	L + L ③
450	9 x 50	L + L ③	L + L ③	L + L ③	L + L ③
500	10 x 50	L + L ③	L + L ③	L + L ③	L + L ③
550	11 x 50	L + L ③	KK	L + L ③	L + KK ③
600	12 x 50	L + L ③	KK	L + L ③	L + KK ③
700	7 x 100	KK	KK	L + KK ③	L + KK ③
800	8 x 100	L + KK ③	L + KK ③	L + KK ③	L + KK ③
900	9 x 100	KK + KK ③	KK + KK ③	KK + KK ③	KK + KK ③
1000	10 x 100	KK + KK ③	C/F	KK + KK ③	C/F
1100	11 x 100	KK + KK ③	C/F	KK + KK ③	C/F

Notes

① kvar output is voltage and frequency dependent. 60 Hz units are shown. For other voltages and frequencies, consult Eaton Technical Resource Center (TRC) at 1-800-809-2772, choose option #4, then option #2.

② Enclosure sizing for units with integrated surge protection or bottom entry can vary and may not be available on all kvar sizes. Contact Eaton's Technical Resource Center at 1-800-809-2772, choose option #4, then option #2.

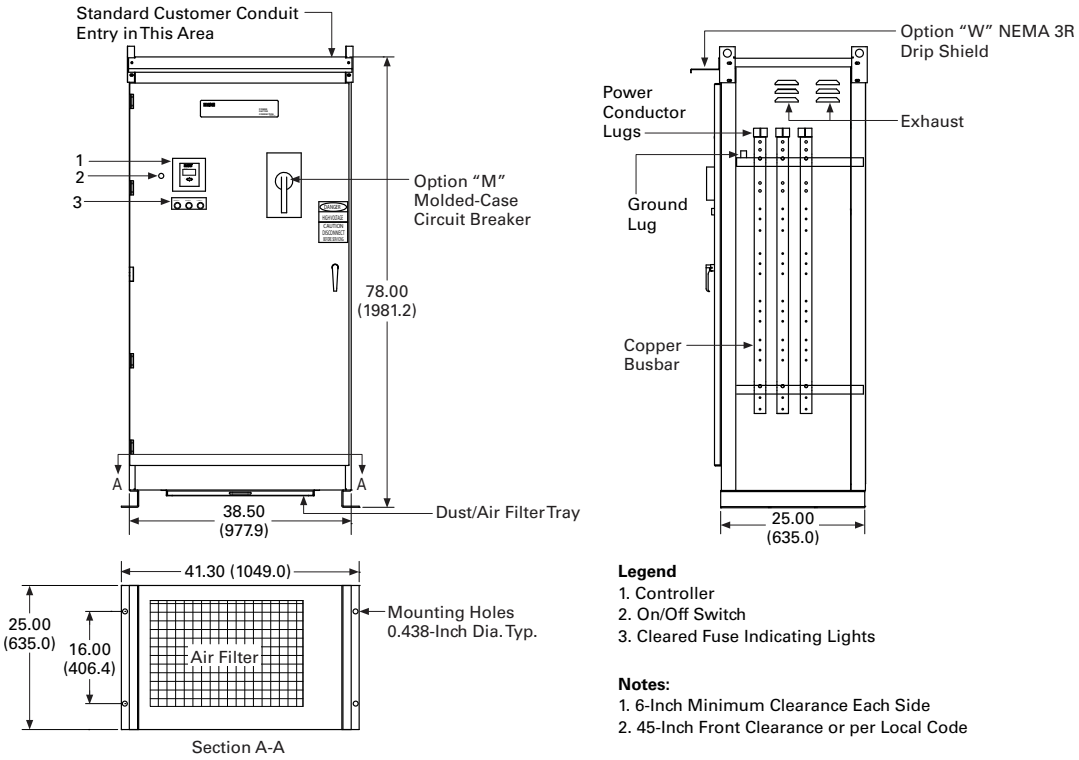
③ Dual enclosure design requires customer installation of factory supplied interconnecting wires.

C/F = Consult factory

Dimensions

Approximate Dimensions in Inches (mm)

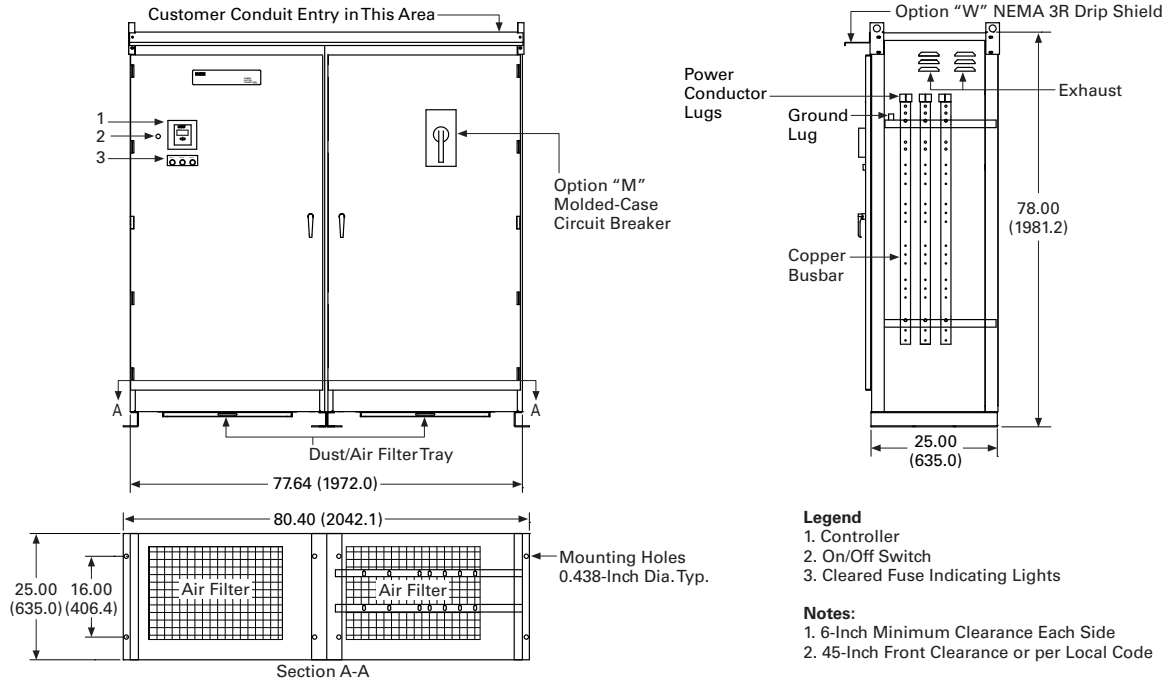
Enclosure L Front View



Legend
1. Controller
2. On/Off Switch
3. Cleared Fuse Indicating Lights

Notes:
1. 6-Inch Minimum Clearance Each Side
2. 45-Inch Front Clearance or per Local Code

Enclosure KK Front and Side Views



Legend
1. Controller
2. On/Off Switch
3. Cleared Fuse Indicating Lights

Notes:
1. 6-Inch Minimum Clearance Each Side
2. 45-Inch Front Clearance or per Local Code

AUTOVAR Filter

Contents

AUTOVAR Filter—LV Automatic Detuned Filter

Product Description

- Programmable to automatically add/subtract capacitor stages to maintain preset target power factor
- Three-phase capacitor cell construction
- Five-year warranty of cells against manufacturing defects
- Cool operating, 100% copper wound, thermal-protected reactors are sized up to 150% of rated capacitor current (AUTOVAR detuned filter only)

Application Description

- Service entrance or substation power factor correction installations requiring precise maintenance of target power factor (AUTOVAR 600)
- Service entrance or substation power factor correction installations requiring precise maintenance of target power factor in three-phase, nonlinear, high harmonic environments (AUTOVAR detuned filter)
- Typically connected at main low voltage switchgear

Features

Configuration

- **Cabinet**: 12 gauge steel with ANSI 61 gray, baked finish. Removable lift bolts standard, NEMA 1 (gasketed)
- **Power line interconnect**: Rugged, copper busbar connection with access provided for top entry. Contact factory for availability of bottom entry. Busbars are braced for 65 kA (optional 100 kA rating available). All internal power wiring connections from bus are laid out on a most direct basis with minimum bends for ease of troubleshooting. Clear barrier limiting access to live parts included standard
- **Modular tray design**: Capacitor stages arranged in modular trays with capacitors, fuses, cleared-fuse indicating lights, and contactors grouped in a logical, easily understood layout. This permits easy access, quick identification of operating problems, and ease of expandability
- **Fusing**: UL recognized, 200,000 A interrupting capacity provided on all three phases of each stage. Blade-type fuses mounted on insulator stand-offs
- **Cleared-fuse indicating lights**: LEDs located door-mounted and neon at individual fuses to facilitate tracing of cleared fuses
- **Push-to-test**: Allows testing of door-mounted LED cleared fuse indicating lights
- **AutoLocate**: When door is open and bus is energized, fuse circuit automatically checks for cleared fuses. If a fuse has cleared, the light at the fuse turns on for easy troubleshooting
- **Door interlock**: Door interlock automatically turns off control circuit when engaged. Power continues to be provided to the unit until disconnect is open
- **Exhaust fans**: Two side louver fans per cabinet provide cooling and reduce operator exposure to discharge. Replaceable dust filtering provided. Dust filters can be replaced without opening cabinet
- **Ease of expansion**: Capacitor stage nests are self-contained and can be added in the field. Two bolts mount the nest in the field. Control wire plugs connect to factory standard wire harness on the left side of the cabinet
- **Ease of replacement**: Cells can be easily replaced individually by removing the mounting bolt and lifting out of the nest without removal of any other components
- **Thermal sensing**: Built-in thermal sensing, alarming, and protection feature allows the unit to operate in optimal temperature while alerting the user of ambient temperature exceeding the nominal operating range. Stages will be automatically switched off if temperature exceeds the maximum specified temperature
- **Temperature range**: The operating temperature range is –20 °C to +46 °C, and the storage temperature range is –40 °C to +55 °C. For optimal equipment life, the temperature should not exceed 35 °C annual average, and the environment should not exceed Pollution Degree 2 as defined in UL 61010-1

Controller

- Visual indication of incorrect CT polarity
- Digital display of power factor and number of energized stages
- Automatic setting of c/k value (sensitivity based on CT ratio and kvar available)
- Visual indication of insufficient kvar to reach target power factor
- Automatic sensing of kvar values per step
- Optional communications capable controller (RS-485/ Modbus)
- Standard metering capability:
  - Voltage
  - Current (sensed phase only)
  - Frequency
  - Active power (kW)
  - Reactive power (kvar)
  - Apparent power (kVA)
  - Total voltage harmonic distortion (VTHD)
  - Individual harmonic voltage distortion (odd orders up to the 19th harmonic)
- Built-in manual mode allows for testing and manual operation of stages
- Multiple user-friendly alarm displays. Controller provides easy-to-understand alarms for various conditions, such as:
  - Undervoltage or overvoltage
  - Undercurrent or overcurrent
  - Target power factor not met
  - Harmonic overload
  - Faulty step/stages
  - Overtemperature alarm

Contactor

- Fully rated for capacitor switching
- Integral pre-charge/pre-insertion module standard. The contactor reduces damaging switching transients, providing safety and durability for the system
  - Lessens the chance of disrupting sensitive electronic equipment
  - Reduced inrush current extends the life of the capacitor cells

Reactors

- **Detuning**: Standard reactor designs are detuned to the 4.2nd harmonic and recommended to protect capacitors against harmonic resonance. Detuning to the 4.7th harmonic is available as an option. The harmonic spectrum should be evaluated for applications involving reactors detuned to the 4.7th harmonic to ensure optimal equipment life, specifically when used in conjunction with six-pulse motor drives
- **Windings**: 80 °C temperature rise design 100% copper windings for minimal losses
- **Thermal overload protection**: Each reactor includes three normally closed, auto reset thermostats that open at 180 °C. When thermostats engage, the contactor opens
- **Insulation**: 220 °C insulation system
- **Warranty**: One-year replacement of reactors

Additional Features

- Optional molded-case main circuit breaker
- Ground fault interruption provides protection in case of accidental contact with control power and ground
- Control wiring—standard NEC color-coded modular bundles with quick disconnect feature for ease of troubleshooting or ease of expendability. UL type MTW/AWM, CSA TEW 105 °C copper wire is standard.
- Optional digital metering—IQ 250
- Mechanical wire lugs are included as standard equipment. Typical phase lugs range from (2) 6 AWG–350 kcmil to (4) 3 AWG–750 MCM. Typical ground lug can accept wire from 6 AWG to 350 kcmil. Lugs are compatible with copper wire 90 °C
- Heavy-duty capacitor cells are standard on AUTOVAR detuned filter and optional on AUTOVAR 600. For 480 V units, standard-duty cells are 525 V rated, and heavy-duty cells are 600 V rated

Support and service

- Renewal parts are available through local Eaton distributors
- Factory trained service personnel are available through Eaton's Electrical Services & Systems

AUTOVAR Filter—Reactor Cabinet

Standards and Certifications

- Entire cabinet assembly is UL 508A and CSA C22.2 No. 190 Listed
- Capacitors are UL 810 recognized
- Contactor is UL/CSA recognized and IEC 6b rated

Listed

Product Selection

Options—AUTOVAR 600 and AUTOVAR Detuned Filter

Description	Option Code
Remote alarm relay terminal block—relay terminal block for a remote alarm to indicate controller alarm status	**A**
Fully insulated main bus	**B**
Communicating PF controller (Modbus RS-485)	**C**
Hand-off-auto switch provides manual control to connect or disconnect capacitor stages regardless of controller output ①	**H**
Integrated main breaker	**M**
Integrated main breaker with high interrupting rating (see breaker table for more information), includes 100 kA busbar bracing	**M1**
100 kA busbar bracing	**N1**
Integrated CVX series surge protection, without sine wave tracking	**T1**
Integrated SPD series surge protection, 160 kA per phase, with sine wave tracking	**T2**
IQ 250 electronic meter ②	**Q**
Weather resistant enclosure (NEMA 3R gasketed) ③	**W**
Standard filter detuned to the 4.2nd harmonic ④	**Y**

Notes

① Manual control is always available through menu controller on system, even if the H option is not selected.

② Not available on NEMA 3R units (W option).

③ Only available on AUTOVAR 600 with heavy-duty cells and AUTOVAR detuned filters using 'L + L', 'L + KK', and 'KK + KK' enclosures.

④ Tuning to the 4.2nd harmonic is the preferred option. Other tunings available. Contact Eaton's Technical Resource Center (TRC) power factor application engineers at 1-800-809-2772, choose option #4, then option #2.

To calculate AUTOVAR 600 or AUTOVAR detuned filter weight:

Obtain base unit weight from table on **Page V3-T2-77** (as appropriate).

Add option weights as necessary:
A = 1 lb (0.5 kg)
B = 10 lb (4.5 kg)
C = 1 lb (0.5 kg)
H = 10 lb (4.5 kg)
M = Circuit breaker weight (see circuit breaker table)
M1 = 10 lb (4.5 kg) hardware weight adder plus circuit breaker weight (see circuit breaker table)
N1 = 10 lb (4.5 kg)
T1 = 5 lb (2.3 kg)
T2 = 10 lb (4.5 kg)
Q = 5 lb (2.3 kg)
W = 10 lb (4.5 kg) per door
Y = 0 lb (0 kg)

Floor-Mounted Switched Detuned Filters—Low Voltage

kvar ①	Step x kvar	Rated Current Amperes	Base Shipping Weight in Lb (kg)	Base Catalog Number
240 Vac				
150	6 x 25	361	1830 (830.8)	**150THFSR232Y**
200	8 x 25	481	2222 (1008.8	**200THFSR232Y**
250	10 x 25	601	2525 (1146.4)	**250THFSR232Y**
300	12 x 25	720	2830 (1284.8)	**300THFSR232Y**
350	7 x 50	844	3090 (1401.6)	**350THFSR231Y**
400	8 x 50	965	3560 (1614.8)	**400THFSR232Y**
480 Vac				
100	2 x 50	120	1105 (501.2)	**100THFSR431Y**
150	3 x 50	180	1242 (564.6)	**150THFSR431Y**
200	4 x 50	240	1438 (652.9)	**200THFSR431Y**
250	5 x 50	300	1634 (741.8)	**250THFSR431Y**
300	6 x 50	360	1830 (830.8)	**300THFSR432Y**
350	7 x 50	420	2026 (919.8)	**350THFSR432Y**
400	8 x 50	480	2222 (1008.8)	**400THFSR432Y**
450	9 x 50	540	2371 (1076.4)	**450THFSR432Y**
500	10 x 50	600	2525 (1146.4)	**500THFSR432Y**
550	11 x 50	660	2750 (1248.5)	**550THFSR432Y**
600	12 x 50	720	2830 (1284.8)	**600THFSR432Y**
700	7 x 100	792	3090 (1401.6)	**700THFSR431Y**
800	8 x 100	962	3560 (1614.8)	**800THFSR432Y**
900	9 x 100	1083	3900 (1769.0)	**900THFSR432Y**
1000	10 x 100	1203	4240 (1923.2)	**1000THFSR432Y**
1100	11 x 100	1323	4500 (2041.2)	**1100THFSR432Y**
600 Vac				
100	2 x 50	96	1105 (501.2)	**100THFSR631Y**
150	3 x 50	144	1242 (564.6)	**150THFSR631Y**
200	4 x 50	192	1438 (652.9)	**200THFSR631Y**
250	5 x 50	240	1634 (741.8)	**250THFSR631Y**
300	6 x 50	288	1830 (830.8)	**300THFSR632Y**
350	7 x 50	336	2026 (919.8)	**350THFSR632Y**
400	8 x 50	384	2222 (1008.8)	**400THFSR632Y**
450	9 x 50	432	2371 (1076.4)	**450THFSR632Y**
500	10 x 50	480	2525 (1146.4)	**500THFSR632Y**
550	11 x 50	529	2750 (1248.5)	**550THFSR632Y**
600	12 x 50	576	2830 (1284.8)	**600THFSR632Y**
700	7 x 100	672	3090 (1401.6)	**700THFSR631Y**
800	8 x 100	768	3560 (1614.8)	**800THFSR632Y**
900	9 x 100	864	3900 (1769.0)	**900THFSR632Y**
1000	10 x 100	962	4240 (1923.2)	**1000THFSR632Y**
1100	11 x 100	1058	4500 (2041.2)	**1100THFSR632Y**

AUTOVAR Detuned Filter Sizing Chart

kvar	Step x kvar	Enclosure Size ② NEMA 1 without Main Breaker, No Suffix	NEMA 1 with Main Breaker, M Suffix	NEMA 3R without Main Breaker, W Suffix	NEMA 3R with Main Breaker, MW Suffix
240 V					
150	6 x 25	L + L ③	L + L ③	L + L ③	L + L ③
200	8 x 25	L + L ③	L + L ③	L + L ③	L + L ③
250	10 x 25	L + L ③	L + L ③	L + L ③	L + L ③
300	12 x 25	L + L ③	KK	L + L ③	KK
350	7 x 50	KK	L + KK ③	L + KK ③	KK
400	8 x 50	L + KK ③	C/F	L + KK ③	C/F
480 V					
100	2 x 50	L	L	L + L ③	L + L ③
150	3 x 50	L	L	L + L ③	L + L ③
200	4 x 50	L	L	L + L ③	L + L ③
250	5 x 50	L	L + L ③	L + L ③	L + L ③
300	6 x 50	L + L ③	L + L ③	L + L ③	L + L ③
350	7 x 50	L + L ③	L + L ③	L + L ③	L + L ③
400	8 x 50	L + L ③	L + L ③	L + L ③	L + L ③
450	9 x 50	L + L ③	L + L ③	L + L ③	L + L ③
500	10 x 50	L + L ③	L + L ③	L + L ③	L + L ③
550	11 x 50	L + L ③	KK	L + L ③	L + KK ③
600	12 x 50	L + L ③	KK	L + L ③	L + KK ③
700	7 x 100	KK	KK	L + KK ③	L + KK ③
800	8 x 100	L + KK ③	C/F	L + KK ③	C/F
900	9 x 100	KK + KK ③	C/F	KK + KK ③	C/F
1000	10 x 100	KK + KK ③	C/F	KK + KK ③	C/F
1100	11 x 100	KK + KK ③	C/F	KK + KK ③	C/F
600 V					
100	2 x 50	L	L	L + L ③	L + L ③
150	3 x 50	L	L	L + L ③	L + L ③
200	4 x 50	L	L	L + L ③	L + L ③
250	5 x 50	L	L + L ③	L + L ③	L + L ③
300	6 x 50	L + L ③	L + L ③	L + L ③	L + L ③
350	7 x 50	L + L ③	L + L ③	L + L ③	L + L ③
400	8 x 50	L + L ③	L + L ③	L + L ③	L + L ③
450	9 x 50	L + L ③	L + L ③	L + L ③	L + L ③
500	10 x 50	L + L ③	L + L ③	L + L ③	L + L ③
550	11 x 50	L + L ③	KK	L + L ③	L + KK ③
600	12 x 50	L + L ③	KK	L + L ③	L + KK ③
700	7 x 100	KK	KK	L + KK ③	L + KK ③
800	8 x 100	L + KK ③	L + KK ③	L + KK ③	L + KK ③
900	9 x 100	KK + KK ③	KK + KK ③	KK + KK ③	KK + KK ③
1000	10 x 100	KK + KK ③	C/F	KK + KK ③	C/F
1100	11 x 100	KK + KK ③	C/F	KK + KK ③	C/F

Notes

① kvar output is voltage and frequency dependent. 60 Hz units are shown. For other voltages and frequencies, consult Eaton Technical Resource Center (TRC) at 1-800-809-2772, choose option #4, then option #2.

② Enclosure sizing for units with integrated surge protection or bottom entry can vary and may not be available on all kvar sizes. Contact Eaton's Technical Resource Center at 1-800-809-2772, choose option #4, then option #2.

③ Dual enclosure design requires customer installation of factory supplied interconnecting wires.

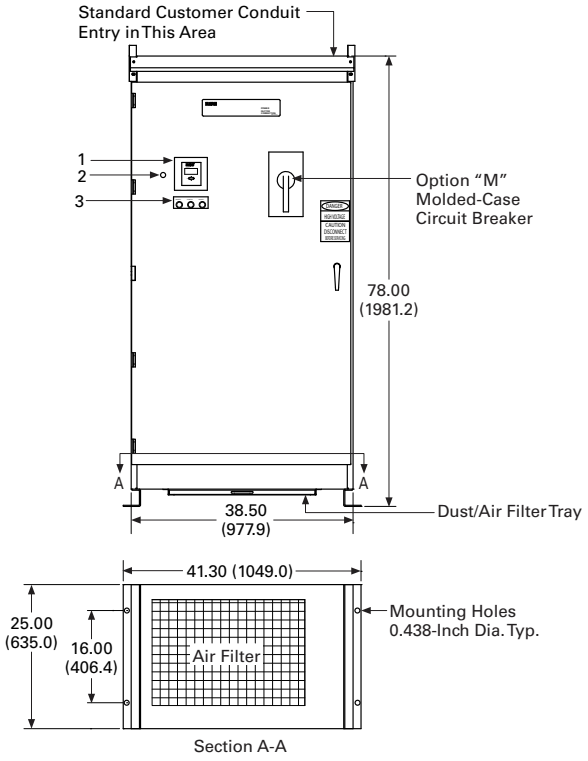
C/F = Consult factory

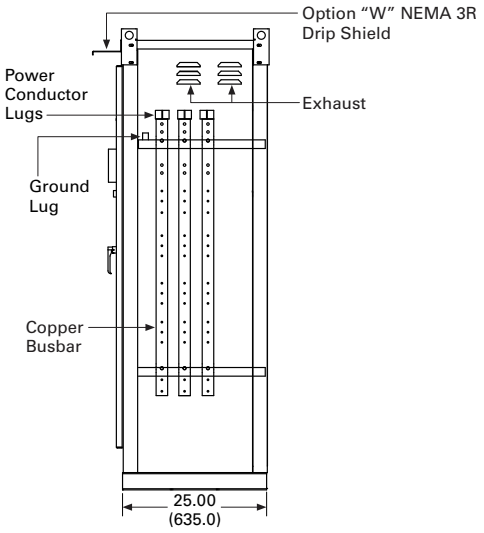
Dimensions

Approximate Dimensions in Inches (mm)

2

AUTOVAR "L" (Single Door) Enclosure

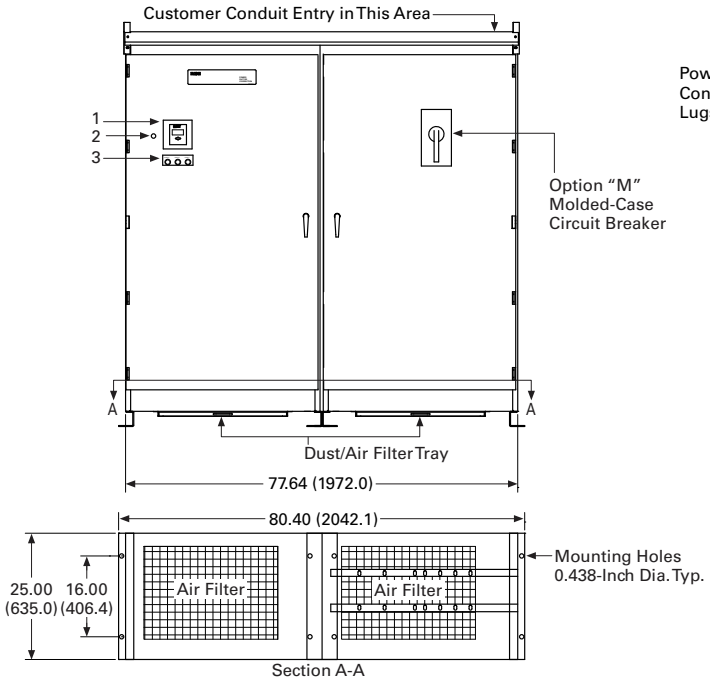


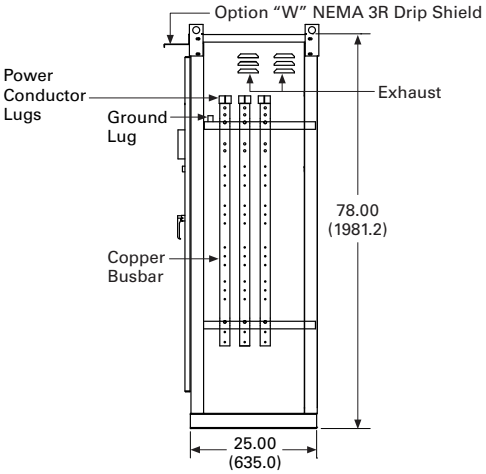


Legend
1. Controller
2. On/Off Switch
3. Cleared Fuse Indicating Lights

Notes:
1. 6-Inch Minimum Clearance Each Side
2. 45-Inch Front Clearance or per Local Code

AUTOVAR "KK" (Double Door) Enclosure



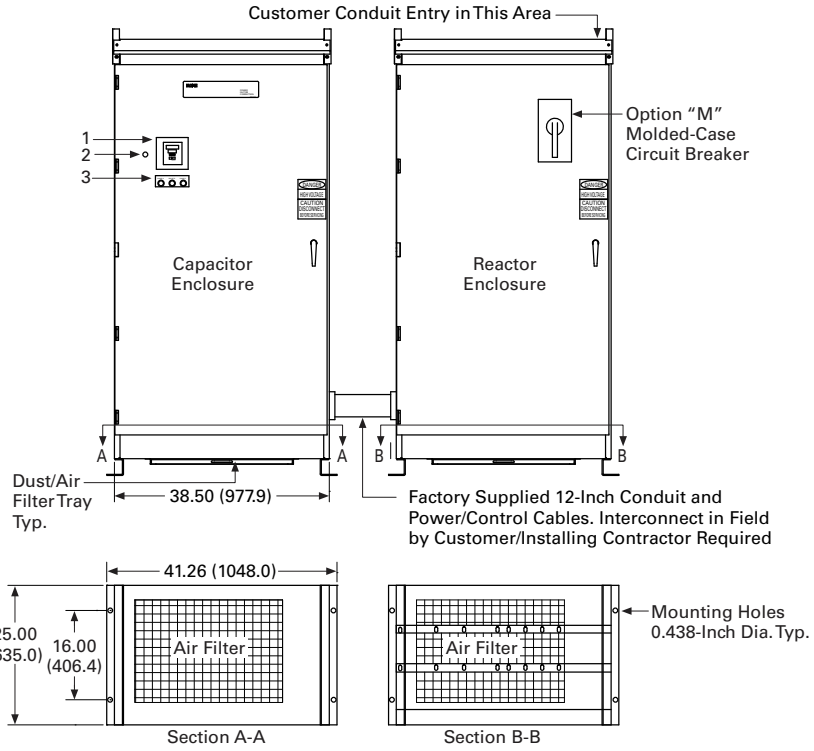


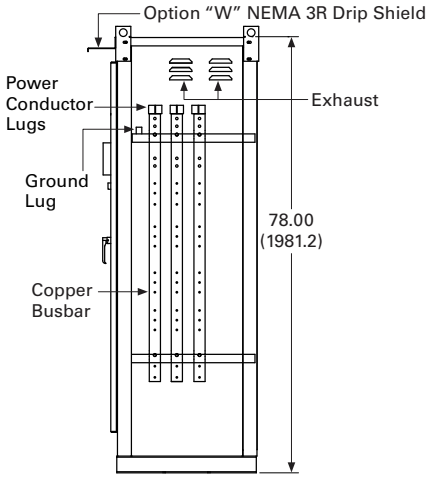
Legend
1. Controller
2. On/Off Switch
3. Cleared Fuse Indicating Lights

Notes:
1. 6-Inch Minimum Clearance Each Side
2. 45-Inch Front Clearance or per Local Code

Approximate Dimensions in Inches (mm)

AUTOVAR "L + L" (2 Single Door) Enclosures

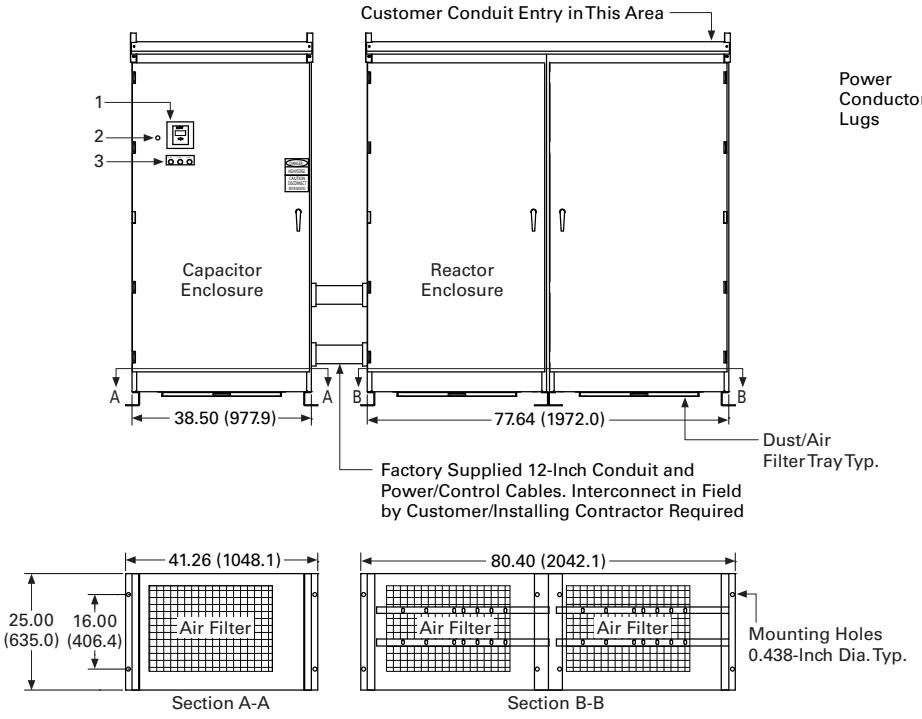


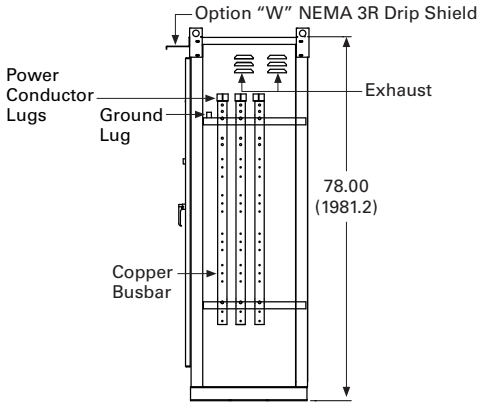


Legend
1. Controller
2. On/Off Switch
3. Cleared Fuse Indicating Lights

Notes:
1. 6-Inch Minimum Clearance Each Side
2. 45-Inch Front Clearance or per Local Code
3. 12-Inch Minimum Separation Between Enclosures

L + KK Enclosure (AUTOVAR Detuned Filter Only)



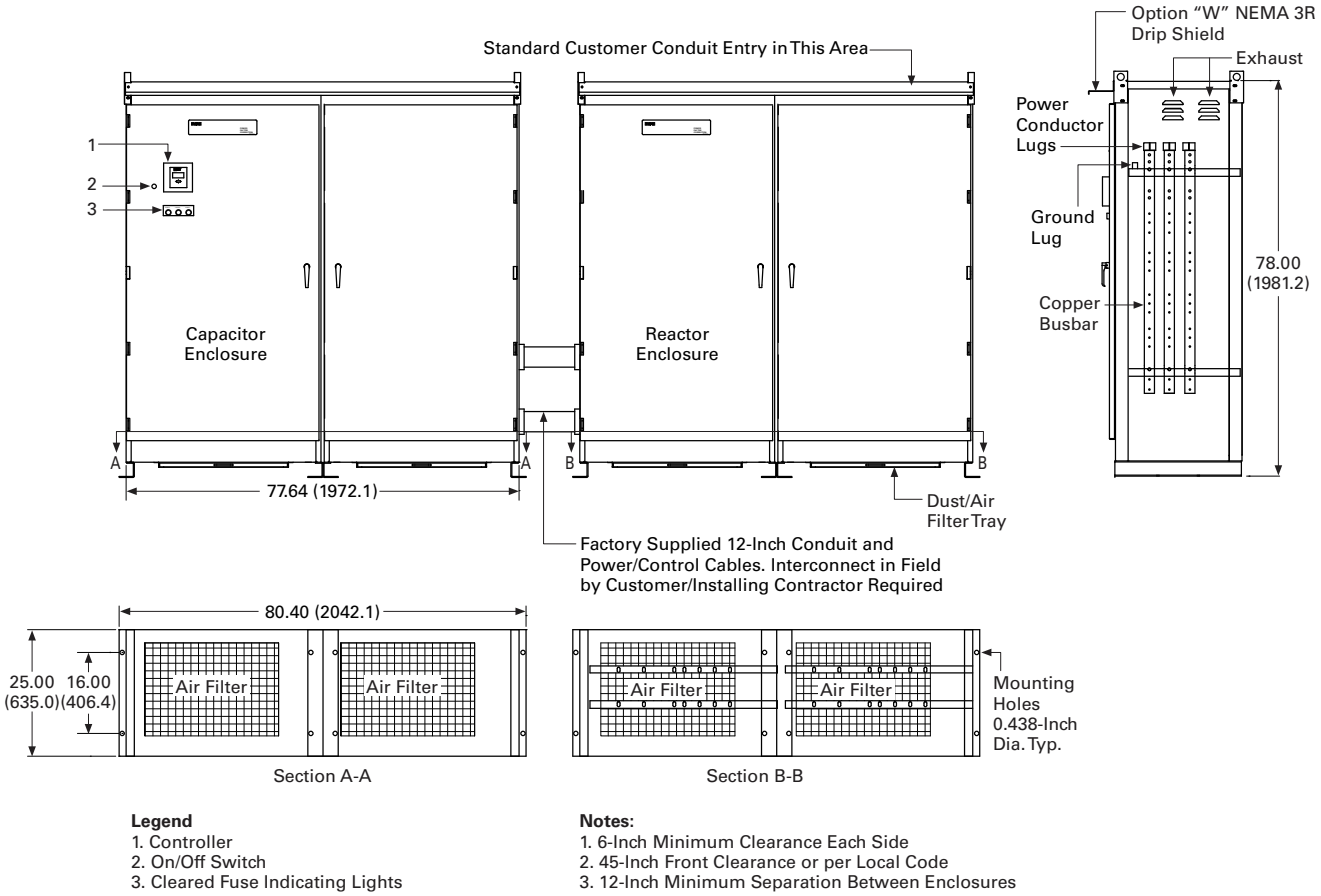


Legend
1. Controller
2. On/Off Switch
3. Cleared Fuse Indicating Lights

Notes:
1. 6-Inch Minimum Clearance Each Side
2. 45-Inch Front Clearance or per Local Code
3. 12-Inch Minimum Separation Between Enclosures

Approximate Dimensions in Inches (mm)

2 AUTOVAR "KK + KK" Enclosures



Legend
1. Controller
2. On/Off Switch
3. Cleared Fuse Indicating Lights

Notes:
1. 6-Inch Minimum Clearance Each Side
2. 45-Inch Front Clearance or per Local Code
3. 12-Inch Minimum Separation Between Enclosures

Transient-Free Power Factor Correction System

Contents

Transient-Free Static Switching Power Factor Correction Units

Product Description

Transient-free statically switch capacitor units are available in two models.

The FTE model is a real-time transient-free system, used to compensate extremely rapid loads within one cycle of operation (typically 5–20 msec).

The FTA model is a fast transient-free system, used to compensate any loads within 3–4 seconds.

The FTA and FTE units employ a fast or real-time response, and include the ability to switch larger steps without creating significant line noise. These relatively maintenance-free units reside in a smaller footprint and are ideal for use in applications such as flicker control, large motor starting, bus voltage stabilization, fault ride-through solutions, power factor correction and many more.

Application Description

- Motor starting
- On-site generation support
- Spot welding
- Wind turbines
- Other dynamic loads

Three current transformers with a 5 ampere secondary are required to operate this capacitor bank.

Rating based on Service Entrance Ampacity. For other ratios, please consult factory.

- Startup and Commissioning by factory trained personnel is required for proper operation and warranty of this system

Standards and Certifications

Enclosure

- EMC—EN50081-2, EN50082-2, EN55011, EN61000-4-2/3/4/5, ENV50204, ENV50141
- CE Mark—73/23/EEC am. 93/68, 98/37/EC art. 4(2)
- Safety—EN61010-1, EN60439-1, EN60204
- UL 508
- CSA

Product Selection

Transient-free reactive power compensation systems

The transient-free systems are custom engineered to order.

The Eaton transient-free statically switched capacitor systems represent the "next level" of power system enhancements by using semi-conductor devices to switch capacitors at the same potential or zero potential difference, thereby eliminating the possible problem of transients caused by capacitor switching and increasing the speed of capacitive var compensation.

This level of performance is needed when high-current loads rapidly switch on and off and require power factor, voltage flicker, sag, or harmonic improvement. These disturbances can be found in many industries, including rockcrushing, arc-welding, plastic injection molding, and crane applications.

Please call Eaton's Technical Resource Center at 1-800-809-2772, option #4, suboption #2 to discuss your application. See TD02607012E for additional technical information on Eaton's transient-free reactive power compensation systems. Pricing and availability is available through Eaton's Technical Resource Center. Please fill out the following questionnaire before requesting a quotation.

Transient-Free Reactive Power Compensation Systems Questionnaire

Type of industry	_____	(Automotive, alternative energy, lumber, etc.)
Type of application	_____	(Welding, wind turbine, sawmill, etc.)
Project objectives	_____	(PF correction, voltage control, reactive power control, damping of power oscillations, unbalance control, motor starting)
Amount of kvar required (if known)	_____	kvar (300 to 3000 kvar)
Nominal system voltage	_____	V
Nominal system frequency	_____	Hz
Integral main breaker needed	_____	(Yes/No)
Harmonic tuning order required (if known)	_____	(2.67, 3.8, 4.5, or other)
Compensation time required (if known)	_____	(3–4 seconds or 5–20 milliseconds)

HCU2 Active Harmonic Filters

Contents

HCU2 Harmonic Correction Unit

Product Description

Eaton's HCU2 active harmonic filters are engineered to provide dynamic harmonic correction by actively injecting the required currents into an electrical distribution system to cancel the entire spectrum of harmonic currents at the point of connection.

HMI Home Screen Shot

Application Description

Typical applications include locations with large amounts of nonlinear loads including 6- and 12-pulse PWM alternating current (AC) variable frequency drives, direct current (DC) drives, as well as other switch-mode power supply equipment. This equipment can be found in water and wastewater treatment facilities, industrial manufacturing and warehousing plants, military bases and commercial locations.

Unlike passive filters, Eaton's HCU2 can provide effective harmonic correction for varying load conditions and harmonic spectrums by providing dynamic correction up to their rated capacity. The HCU2 also has the secondary benefit of providing power factor correction with any excess capacity after correcting all harmonic conditions.

Features, Benefits and Functions

- Fast-acting harmonic correction
- NEMA 1, NEMA 2, NEMA 12, IP31, IP54 enclosures, and chassis mount versions available
- 60, 120, 200 and 300 A units available (ampere rating given at 380–480 V)
- Touchscreen human machine interface (HMI)
- Communications connectivity
- Designed for use in environmentally controlled conditions
- Can be sized to meet specific levels of harmonic correction, providing compliance with IEEE® 519 recommended levels
- Engineered to prevent overloading
- Scalable design can be expanded without impacting performance
- Broad spectrum of cancellation for robust protection (2nd to 51st harmonic)
- Helps improve power factor to maximize efficiency
- Easier and less expensive installation than passive filters, as active filter design reduces the need for detailed engineering studies
- HMI provides comprehensive control through icon-driven interface

Improvements from HCUE to HCU2

- Closed loop control: A higher degree of harmonic correction is available with closed loop control than open loop control
- Reduced kW losses: Lower kW losses result in lower operating expenses and reduced requirements for equipment room HVAC systems. The maximum heat loss for a 300 A, 480 V unit is 7.1 kW
- Reduced footprint: Wall-mounted 480 V NEMA® 1 units are available in 60, 120, 200 and 300 A ratings
- Ease of maintenance and service: A standard USB service port is provided for firmware updates

Standards and Certifications

- UL/CSA approved

Catalog Number Selection

2

HCU2 Harmonic Correction Unit

HCU2 060 D5 N2

Equipment Type
HCU2 = Harmonic correction unit

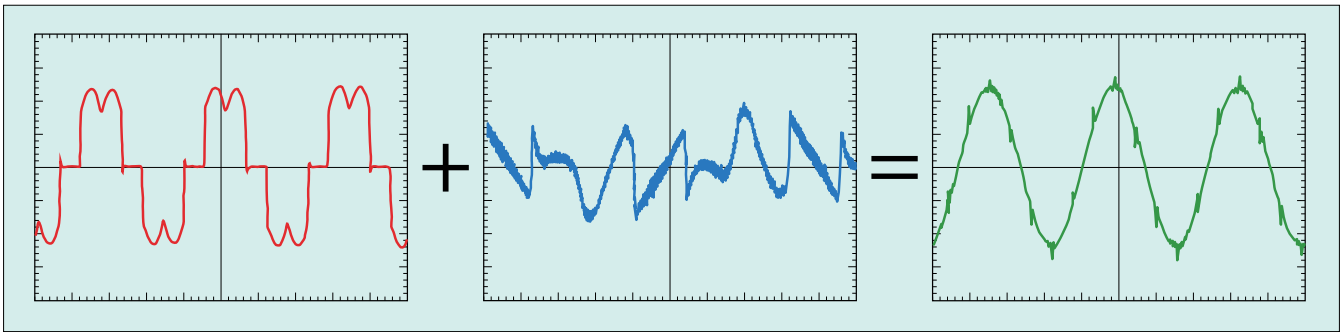
Ampere Rating
380–480 V only
060 = 60 A **120** = 120 A **200** = 200 A **300** = 300 A
600 V only
047 = 47 A **094** = 94 A **157** = 157 A **235** = 235 A
690 V only
040 = 40 A **080** = 80 A **133** = 133 A **200** = 200 A

Voltage	
D5 = 380–480 V **D6** = 600 V	**D7** = 3690 V

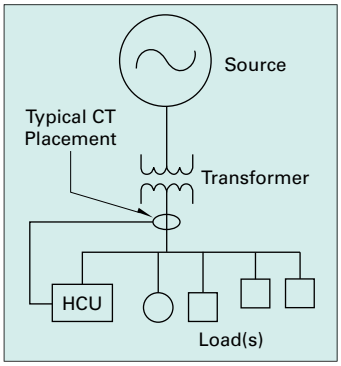
Enclosure Type	
IP00	= Chassis mount
N1	= NEMA 1 wall mount
N2	= NEMA 2 floor mount
N12	= NEMA 12 floor mount
IP31	= IP31 floor mount
IP54	= IP54 floor mount

Technical Data and Specifications

Typical Uncorrected 6-Pulse Rectifier (Before) Current + HCU2 Injection Current = Corrected (After) Current



Recommended Placement



Eaton HCU2 Specifications

Specification	Description
Technical Specifications	
Standard rms output current ratings	60 A, 120 A, 200 A, 300 A at 380 Vac to 480 Vac 47 A, 94 A, 157 A, 235 A at 600 Vac 40 A, 80 A, 133 A, 200 A at 690 Vac
Nominal frequency	50/60 Hz, ±3 Hz auto sensing
Number of phases	3-phase
Topology	Digital harmonic FFT Digital reactive power
Losses	To 480 Vac <3%; to 690 Vac <5%
CT VA loading	1.0 VA (5 A CT secondary)
Spectrum cancellation	2nd to 51st, discrete; fully selectable per harmonic order (amplitude and on/off)
Control basis	Closed loop (for new installations) Open loop compatible for retrofit applications
Harmonic attenuation	Closed loop: <3% THD(i); max. 20:1 THD(i) reduction with load harmonic current above 50% of HCU2 rating Open loop: <5% TDD Requires 3% or higher inductive impedance per nonlinear load
Harmonic operational features	% THDi set point % THDv set point
Harmonic avoidance	Output at specific harmonic order turned off if resonance or lack-of impedance detected; or manually turned off
Parallel operation	Up to 10 units per set of CT (to 51st order), any size combination Backward compatibility with Eaton HCUE operated in parallel Contact Eaton for applications of more than 10 units
Parallel operation options	Master/master Master/slave Multi-master/multi-slave Same as Eaton HCUE for retrofits
Parallel sequence options	Lead/lag with unit rotation: one unit operates to full capacity before next unit turns on; timed rotation Load share: All operating units function at the same ouput percentage
Parallel HMI control	Any unit permits viewing and changing parameter settings of complete system or any other unit in parallel system
Parallel communications	Proprietary COM bus between operating units
Power factor correction	Optimized unity PF, leading (capacitive) or lagging (inductive) power factor (Cos f) to target
Control response time	25 µs
Harmonic correction time	2 cycles
Reactive correction time	1/4 cycle
Display	144 mm QVGA TFT 64k-color touchscreen
Display parameters	Hundreds of parameters are available. Examples include THDi, THDv, oscilloscope for viewing many selected parameters, phasor diagrams, load power, measured currents for Ih, Is, If, I neg seq, PF (Cos f), injected currents for Ih, I reactive, I neg seq, etc.

Specification	Description
Technical Specifications (Continued)	
Communications capability	Modbus® RTU, Modbus TCP/IP
Discrete input/outputs	4 input and 4 output dry contacts; assignable
Noise level (ISO3746)	<70 dB at 1 meter from unit surface
Earthing (grounding) systems	EMC filter ground switch for Isolated Terra, high resistance
Environmental Condition	
Operating temperature	0 °C to 40 °C
Relative humidity	0–95%, noncondensing
Seismic rating	Complies with IBC and ASCE7
Operating altitude	1000 m, (derate 1%/100 m above), maximum 4800 m
Automatic rollback of output	Occurs whenever heatsink temperature sensor exceeds temperature limit
Ambient temperature protection	Absolute shutdown if air inlet temperature reaches 51 °C
Preset output limits (rms)	Programmable set limit due to altitude or ambient temperature—becomes fixed output limit
Reference Standards	
Design	CE EMC Certification IEC/EN 60439-1, EN 61000-6-4 Class A, EN 61000-6-2
Protection (enclosure)	IP00, IP20, IP31, IP54, NEMA 1, NEMA 2, NEMA 12, UL Type Open (chassis mount)
Standards compliance/ certification	cULus (UL 508 , CSA 22.2 No. 14) CE Certified, ABS, Lloyds, other local standards
Installation	
Wall mount	Chassis mount (UL Type open) and NEMA 1 configurations
Free-standing	IP31, IP54, NEMA 2 and NEMA 12
Circuit protection	NEMA 1 and chassis mount—external means required Free-standing enclosures—incoming circuit breaker with mechanical door interlock
AIC rating (input circuit breaker)	To 415 Vac—200 kA cULus; 125 kA IEC To 480 Vac—200 kA cULus; 75 kA IEC To 600 Vac—100 kA cULus; 100 kA IEC To 690 Vac—No cULus; 100 kA IEC
Cable entry	Wall mount and chassis mount—bottom only Free-standing—top and bottom entry through gland plates
PCBA protection	Conformal coating on all PCBs Pollution Degree 2
Cooling configuration	Separate air plenums for heatsink section and PCBA section: Heatsink (high heat plenum) input from bottom and exhaust out top. All components in high heat plenum rated IP54 or better ≥ no filtering required PCBA air supply must be clean and dry (filtering may be required) No conductive particles permitted

Harmonic Correction Unit Ratings

Model	Voltage (V)	Frequency (Hz)	Total Current Amperes (rms)	Watt Losses (kW)	HCU2 Enclosure Type	Version	Integral Disconnect
HCU2060D5N1	380–480	50/60	60	1.3	Wall mount NEMA 1	UL/CSA	No
HCU2120D5N1	380–480	50/60	120	2.8	Wall mount NEMA 1	UL/CSA	No
HCU2200D5N1	380–480	50/60	200	5.4	Wall mount NEMA 1	UL/CSA	No
HCU2300D5N1	380–480	50/60	300	7.1	Wall mount NEMA 1	UL/CSA	No
HCU2060D5IP00	380–480	50/60	60	1.3	Chassis mount	UL/CSA	No
HCU2120D5IP00	380–480	50/60	120	2.8	Chassis mount	UL/CSA	No
HCU2200D5IP00	380–480	50/60	200	5.4	Chassis mount	UL/CSA	No
HCU2300D5IP00	380–480	50/60	300	7.1	Chassis mount	UL/CSA	No
HCU2060D5IP31	380–480	50/60	60	1.3	Floor mount IP31	CE	Yes
HCU2120D5IP31	380–480	50/60	120	2.8	Floor mount IP31	CE	Yes
HCU2200D5IP31	380–480	50/60	200	5.4	Floor mount IP31	CE	Yes
HCU2300D5IP31	380–480	50/60	300	7.1	Floor mount IP31	CE	Yes
HCU2060D5N2	380–480	50/60	60	1.3	Floor mount NEMA 2	UL/CSA	Yes
HCU2120D5N2	380–480	50/60	120	2.8	Floor mount NEMA 2	UL/CSA	Yes
HCU2200D5N2	380–480	50/60	200	5.4	Floor mount NEMA 2	UL/CSA	Yes
HCU2300D5N2	380–480	50/60	300	7.1	Floor mount NEMA 2	UL/CSA	Yes
HCU2060D5N12	380–480	50/60	60	1.3	Floor mount NEMA 12	UL/CSA	Yes
HCU2120D5N12	380–480	50/60	120	2.8	Floor mount NEMA 12	UL/CSA	Yes
HCU2200D5N12	380–480	50/60	200	5.4	Floor mount NEMA 12	UL/CSA	Yes
HCU2300D5N12	380–480	50/60	300	7.1	Floor mount NEMA 12	UL/CSA	Yes
HCU2060D5IP54	380–480	50/60	60	1.3	Floor mount IP54	CE	Yes
HCU2120D5IP54	380–480	50/60	120	2.8	Floor mount IP54	CE	Yes
HCU2200D5IP54	380–480	50/60	200	5.4	Floor mount IP54	CE	Yes
HCU2300D5IP54	380–480	50/60	300	7.1	Floor mount IP54	CE	Yes
HCU2047D6IP31	600	50/60	47	1.8	Floor mount IP31	CE	Yes
HCU2094D6IP31	600	50/60	94	3.9	Floor mount IP31	CE	Yes
HCU2157D6IP31	600	50/60	157	7.2	Floor mount IP31	CE	Yes
HCU2235D6IP31	600	50/60	235	9.9	Floor mount IP31	CE	Yes
HCU2047D6N2	600	50/60	47	1.8	Floor mount NEMA 2	UL/CSA	Yes
HCU2094D6N2	600	50/60	94	3.9	Floor mount NEMA 2	UL/CSA	Yes
HCU2157D6N2	600	50/60	157	7.2	Floor mount NEMA 2	UL/CSA	Yes
HCU2235D6N2	600	50/60	235	9.9	Floor mount NEMA 2	UL/CSA	Yes
HCU2047D6IP54	600	50/60	47	1.8	Floor mount IP54	CE	Yes
HCU2094D6IP54	600	50/60	94	3.9	Floor mount IP54	CE	Yes
HCU2157D6IP54	600	50/60	157	7.2	Floor mount IP54	CE	Yes
HCU2235D6IP54	600	50/60	235	9.9	Floor mount IP54	CE	Yes
HCU2047D6N12	600	50/60	47	1.8	Floor mount NEMA 12	UL/CSA	Yes
HCU2094D6N12	600	50/60	94	3.9	Floor mount NEMA 12	UL/CSA	Yes
HCU2157D6N12	600	50/60	157	7.2	Floor mount NEMA 12	UL/CSA	Yes
HCU2235D6N12	600	50/60	235	9.9	Floor mount NEMA 12	UL/CSA	Yes
HCU2040D7IP31	690	50/60	40	2.1	Floor mount IP31	CE	Yes
HCU2080D7IP31	690	50/60	80	4.5	Floor mount IP31	CE	Yes
HCU2133D7IP31	690	50/60	133	8.2	Floor mount IP31	CE	Yes
HCU2200D7IP31	690	50/60	200	11.4	Floor mount IP31	CE	Yes
HCU2040D7N2	690	50/60	40	2.1	Floor mount NEMA 2	UL/CSA	Yes
HCU2080D7N2	690	50/60	80	4.5	Floor mount NEMA 2	UL/CSA	Yes
HCU2133D7N2	690	50/60	133	8.2	Floor mount NEMA 2	UL/CSA	Yes
HCU2200D7N2	690	50/60	200	11.4	Floor mount NEMA 2	UL/CSA	Yes
HCU2040D7IP54	690	50/60	40	2.1	Floor mount IP54	CE	Yes
HCU2080D7IP54	690	50/60	80	4.5	Floor mount IP54	CE	Yes
HCU2133D7IP54	690	50/60	133	8.2	Floor mount IP54	CE	Yes
HCU2200D7IP54	690	50/60	200	11.4	Floor mount IP54	CE	Yes
HCU2040D7N12	690	50/60	40	2.1	Floor mount NEMA 12	UL/CSA	Yes
HCU2080D7N12	690	50/60	80	4.5	Floor mount NEMA 12	UL/CSA	Yes
HCU2133D7N12	690	50/60	133	8.2	Floor mount NEMA 12	UL/CSA	Yes
HCU2200D7N12	690	50/60	200	11.4	Floor mount NEMA 12	UL/CSA	Yes