

Low-voltage switched capacitor banks and switched detuned filters



AUTOVAR 300

AUTOVAR filter

AUTOVAR 600

AUTOVAR 300

Contents

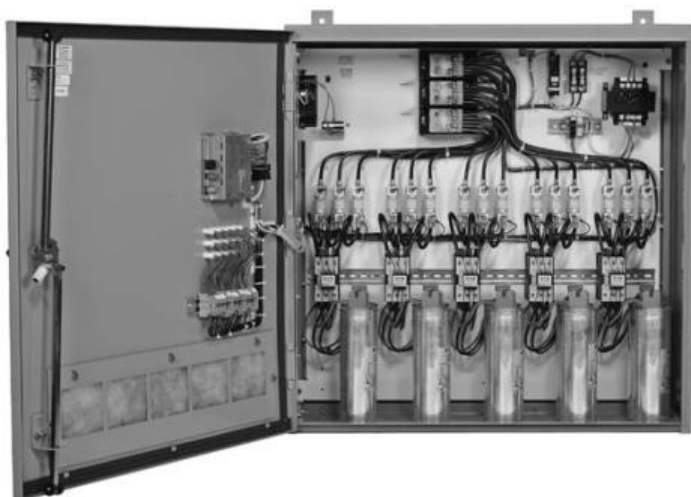
Description	Page
AUTOVAR 300 automatic power factor correction capacitor systems	2
AUTOVAR 600 and AUTOVAR detuned filter automatic power factor correction capacitor systems	7
Current transformers	18

Note: Images contained in this document may be shown with optional components and features not included as part of the base offering.



Powering Business Worldwide

AUTOVAR 300 automatic power factor correction capacitor systems



AUTOVAR 300

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
- Two-year warranty of cells against manufacturing defects
- Entire cabinet assembly is UL® 508A and CSA® C22.2 No. 190 Listed
- Capacitors are UL 810 recognized

Applications

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 and specifications

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
- Global alarm contact
- 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
- UL/CSA recognized
- IEC 6b rated

Options

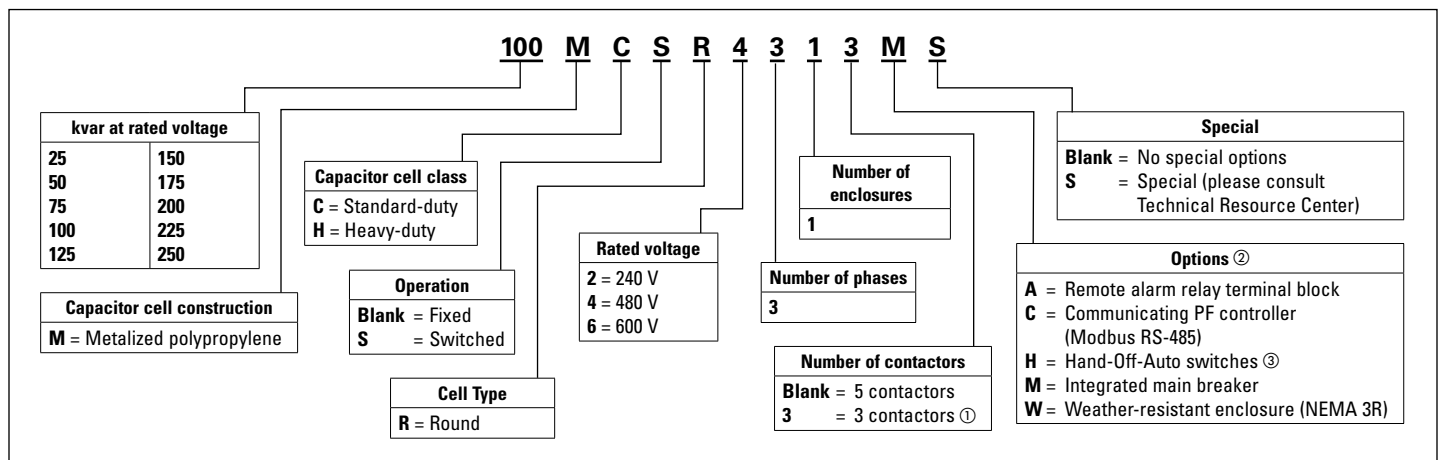
- Optional main molded-case circuit breaker
- NEMA 3R weather-resistant enclosure
- Hand-Off-Auto switches
- Remote alarm relay terminal block
- Communications capable controller

Support and service

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

Product selection

Table 1. AUTOVAR 300 catalog numbering system



① To obtain five levels of stepping, we incorporate 1:2:2 switching. For example, 75 kvar unit states 5x15 switching with obtainable output of 15, 30, 45, 60, and 75 kvar. This is created by having 1x15 kvar and 2x30 kvar stages on the three contactors. Output levels are then reached by switching the three contactors as 15 kvar 1:0:0, 30 kvar 0:1:0 or 0:0:1, 45 kvar 1:1:0 or 1:0:1, 60 kvar 0:1:1, and 75 kvar 1:1:1. Part numbers without five physical contactors switch individually in a round-robin fashion.

② Please include option codes at the end of the part number in alphabetical order. For example, if you ordered a 75MCSR6313AM and added a main breaker (M) and a remote alarm relay terminal (A), then the part number would be: 75MCSR6313AM. Remember that if you have any "Special" (S option), that letter must go at the end. For availability of S options, contact Eaton's Technical Resource Center (TRC) power factor application engineers at 1-800-809-2772, choose option #4, then option #2.

③ Manual control is always available through controller menu system, even if the H option is not selected.

Note: Not every configuration is available. See **Table 2**.

Table 2. Wallmounted AUTOVAR 300 switched capacitor banks—low-voltage applications, 60 Hz units

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

① To calculate AUTOVAR 300 weight:

1. Obtain base unit weight from **Table 2**.

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

Note: 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.

Table 3. Spare fuses

kvar rating/bank				
240 Volts	480 Volts	600 Volts	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

Table 4. Renewal parts

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

Table 5. 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 ①	H
Molded-case circuit breaker (see circuit breaker section)	M
Weather-resistant enclosure (NEMA 3R gasketed)	W

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

Table 6. Integrated main breakers—AUTOVAR 300

kvar	AUTOVAR rated current amperes	Breaker size (amperes) ①	Breaker interrupting rating (kA)	Breaker weight in lb (kg)	Standard wire lug size ②
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

① Breakers are sized at a minimum of 135% of the unit rated Amperes per the NEC.®

② See equipment drawings for actual lug sizes.

Dimensions in inches (mm)

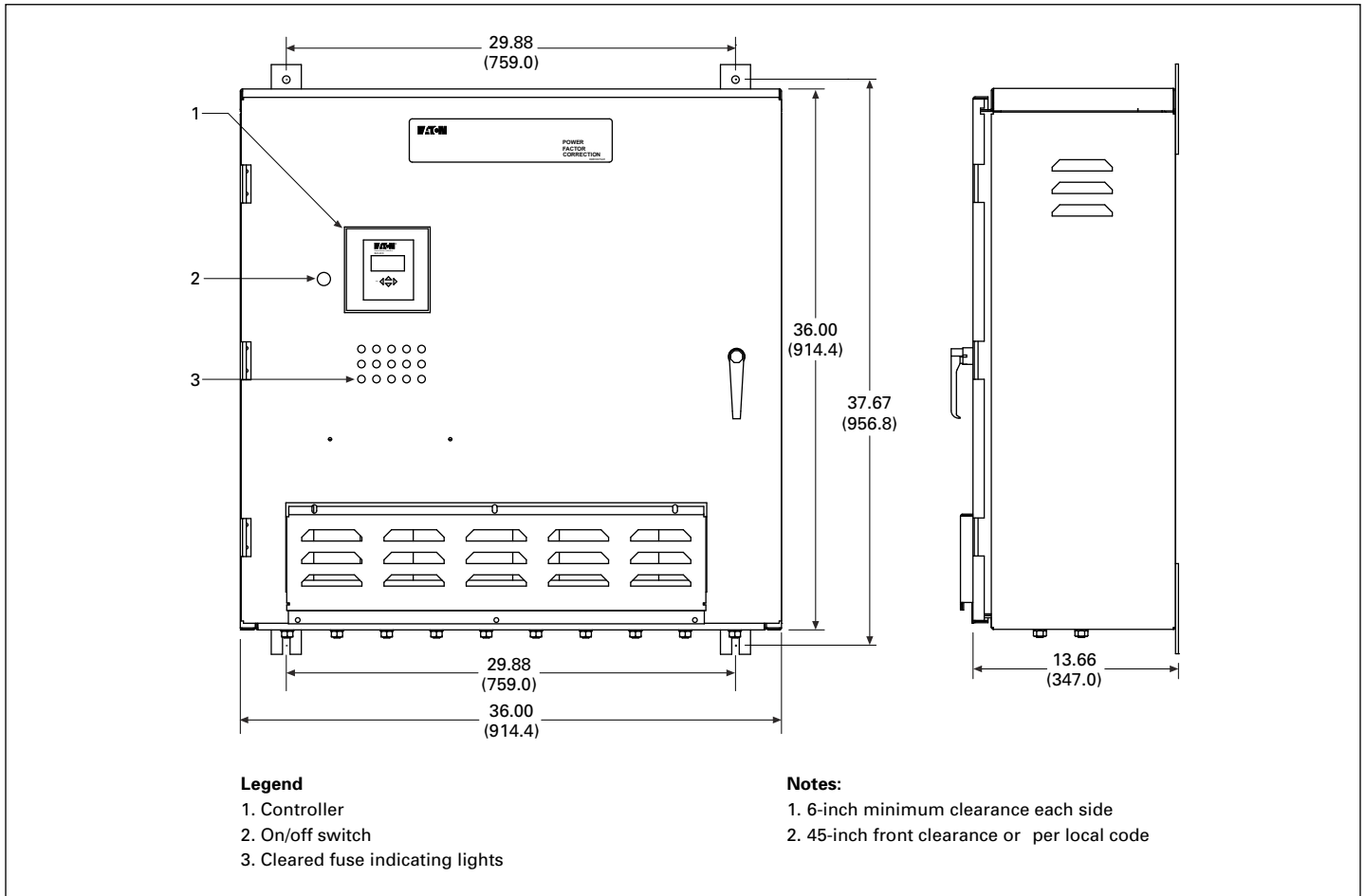


Figure 1. Enclosure J1—AUTOVAR 300 units without main breaker

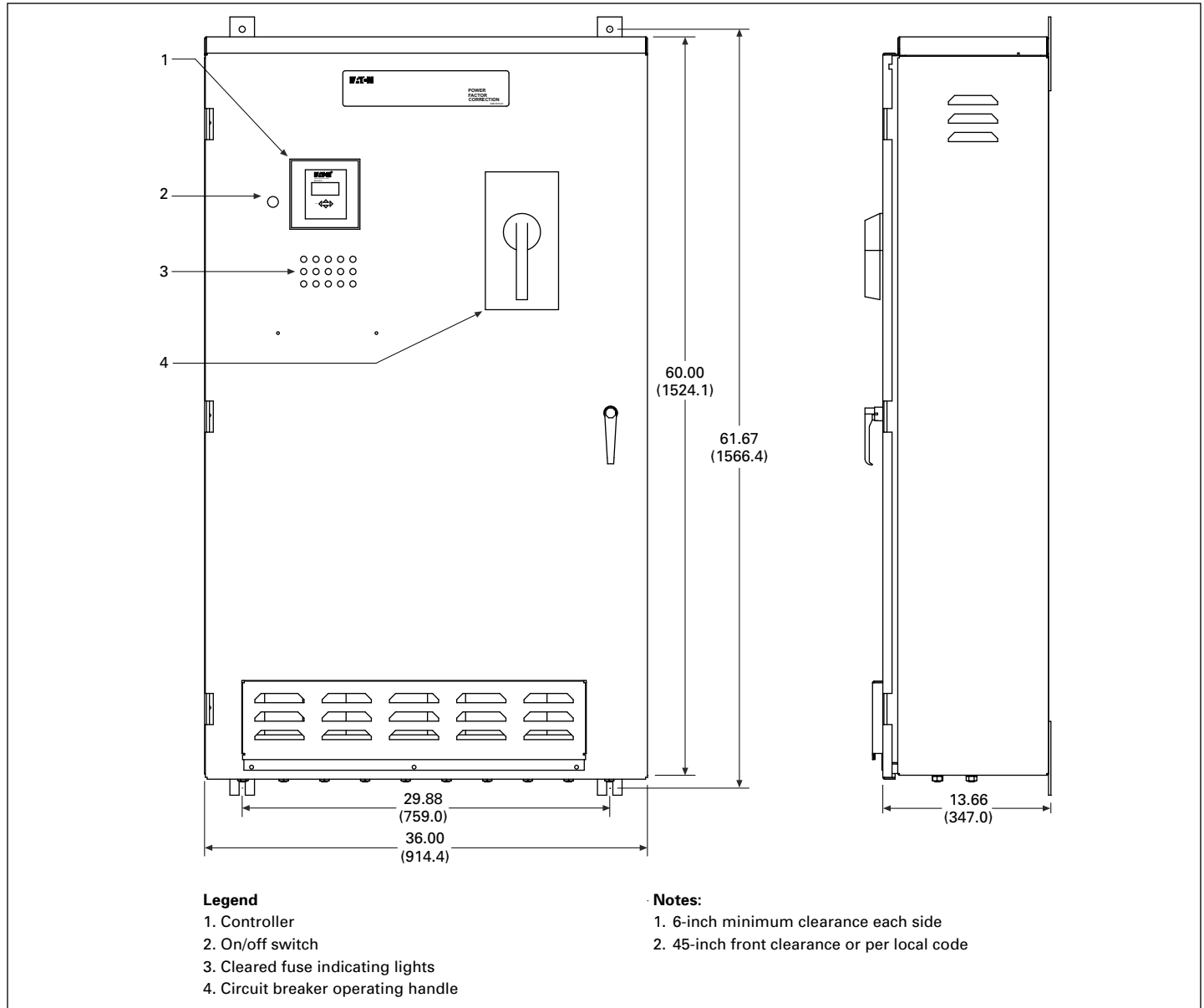


Figure 2. Enclosure J2—AUTOVAR 300 units with main breaker

AUTOVAR 600 and AUTOVAR detuned filter correction capacitor systems



AUTOVAR 600



AUTOVAR detuned filter



AUTOVAR detuned filter—interior view

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 (units with heavy-duty cells). Two-year warranty of cells against manufacturing defects (units with standard-duty cells)
- Entire cabinet assembly is UL 508A and CSA C22.2 No. 190 Listed

- Capacitors are UL 810 recognized
- Cool operating, 100% copper wound, thermal-protected reactors are sized up to 150% of rated capacitor current (AUTOVAR detuned filter only)

Applications

- 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 and specifications

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 $+46^{\circ}\text{C}$, and the storage temperature range is -40°C to $+55^{\circ}\text{C}$. 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
- Global alarm contact
- 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

Contactors

- 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
- UL/CSA recognized
- IEC 6b rated

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 kcmil. Typical ground lug can accept wire from 6 AWG to 350 kcmil. Lugs are compatible with copper wire 90 °C, used at the 75 °C rating. See **Table 16** for standard lug sizes, and consult equipment drawings for actual lug sizes
- 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 detuned filter—
capacitor cabinet

AUTOVAR detuned filter—
reactor cabinet



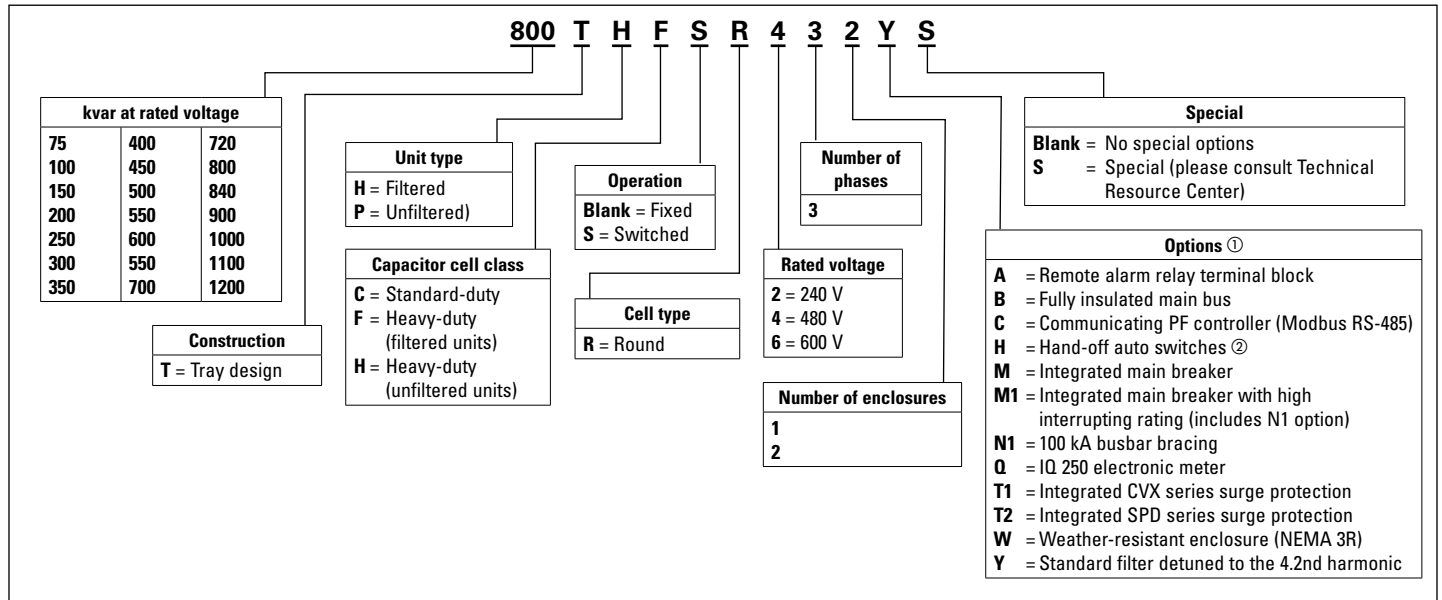
Modular step nest
assembly



Dust filter tray

Product selection

Table 7. Catalog numbering system



① Please include option codes at the end of the part number in alphabetical order. For example, if you ordered a 350THFSR432Y and added a main breaker (M) and a remote alarm relay terminal (A), then the part number would be: 350THFSR432AMY. Remember that if you have any "Special" (S option), that letter must go at the end. For availability of S options, contact Eaton's Technical Resource Center (TRC) power factor application engineers at 1-800-809-2772, choose option #4, then option #2.

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

Table 8. 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

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 11**, **Table 9**, or **Table 13** (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)

Table 9. AUTOVAR 600 floor-mounted switched capacitor banks units with standard-duty cells—low-voltage applications, 60 Hz units

kvar	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

Note: 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.

Table 10. AUTOVAR 600 sizing chart for units with standard-duty cells, 60 Hz units

kvar	Step x kvar	Enclosure size ①	
		NEMA 1, without main breaker, no suffix	NEMA 1, with main breaker, M suffix
240 Volt			
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 Volt			
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 Volt			
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

① 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

Table 11. AUTOVAR 600 floor-mounted switched capacitor banks units with heavy-duty cells—low-voltage applications, 60 Hz units

kvar	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	840	1826 (828.3)	700TPHSR431
800	8 x 100	960	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 50	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

Note: 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.

Table 12. AUTOVAR 600 sizing chart for units with heavy-duty cells, 60 Hz units

kvar	Step x kvar	Enclosure size ①			
		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 Volt					
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	KK	KK	KK	KK
400	8 x 50	KK	C/F	KK	C/F
480 Volt					
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 Volt					
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

① 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

**Table 13. Floor-mounted switched detuned filters—
low-voltage, 60 Hz units**

kvar	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

Note: 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.

TABLE 14. AUTOVAR detuned filter sizing chart, 60 Hz units

kvar	Step x kvar	Enclosure size ①			
		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 Volt					
150	6 x 25	L + L ②	L + L ②	L + L ②	L + L ②
200	8 x 25	L + L ②	L + L ②	L + L ②	L + L ②
250	10 x 25	L + L ②	L + L ②	L + L ②	L + L ②
300	12 x 25	L + L ②	KK	L + L ②	KK
350	7 x 50	KK	KK	L + KK ②	L + KK ②
400	8 x 50	L + KK ②	C/F	L + KK ②	C/F
480 Volt					
100	2 x 50	L	L	L + L ②	L + L ②
150	3 x 50	L	L	L + L ②	L + L ②
200	4 x 50	L	L	L + L ②	L + L ②
250	5 x 50	L	L + L ②	L + L ②	L + L ②
300	6 x 50	L + L ②	L + L ②	L + L ②	L + L ②
350	7 x 50	L + L ②	L + L ②	L + L ②	L + L ②
400	8 x 50	L + L ②	L + L ②	L + L ②	L + L ②
450	9 x 50	L + L ②	L + L ②	L + L ②	L + L ②
500	10 x 50	L + L ②	L + L ②	L + L ②	L + L ②
550	11 x 50	L + L ②	KK	L + L ②	L + KK ②
600	12 x 50	L + L ②	KK	L + L ②	L + KK ②
700	7 x 100	KK	KK	L + KK ②	L + KK ②
800	8 x 100	L + KK ②	C/F	L + KK ②	C/F
900	9 x 100	KK + KK ②	C/F	KK + KK ②	C/F
1000	10 x 100	KK + KK ②	C/F	KK + KK ②	C/F
1100	11 x 100	KK + KK ②	C/F	KK + KK ②	C/F
600 Volt					
100	2 x 50	L	L	L + L ②	L + L ②
150	3 x 50	L	L	L + L ②	L + L ②
200	4 x 50	L	L	L + L ②	L + L ②
250	5 x 50	L	L + L ②	L + L ②	L + L ②
300	6 x 50	L + L ②	L + L ②	L + L ②	L + L ②
350	7 x 50	L + L ②	L + L ②	L + L ②	L + L ②
400	8 x 50	L + L ②	L + L ②	L + L ②	L + L ②
450	9 x 50	L + L ②	L + L ②	L + L ②	L + L ②
500	10 x 50	L + L ②	L + L ②	L + L ②	L + L ②
550	11 x 50	L + L ②	KK	L + L ②	L + KK ②
600	12 x 50	L + L ②	KK	L + L ②	L + KK ②
700	7 x 100	KK	KK	L + KK ②	L + KK ②
800	8 x 100	L + KK ②	L + KK ②	L + KK ②	L + KK ②
900	9 x 100	KK + KK ②	KK + KK ②	KK + KK ②	KK + KK ②
1000	10 x 100	KK + KK ②	C/F	KK + KK ②	C/F
1100	11 x 100	KK + KK ②	C/F	KK + KK ②	C/F

① 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.

② Dual enclosure design requires customer installation of factory supplied interconnecting wires.

C/F = Consult factory

AUTOVAR 600 and AUTOVAR detuned filter

Table 15. Renewal parts

Description	Catalog number
AUTOVAR 600	
Replacement PF controller, ACX type	SP039010-0035S
Replacement contactor, 72 A	SP039010-0014B
Contactor fuse (125 A) 600 V units with 50 kvar step size	SP030217-0037K
Contactor fuse (150 A) 240 V units with 25 kvar and 480 V units with 50 kvar step size	SP030217-0037L
Capacitor cell (240 V units with standard-duty cells), 12.5 kvar at 240 V	12X23PCRMB
Capacitor cell (240 V units with heavy-duty cells), 12.5 kvar at 240 V	12X23PHRMB
Capacitor cell (480 V units with standard-duty cells), 25 kvar at 480 V	2543PHRMB
Capacitor cell (480 V units with heavy-duty cells), 16.7 kvar at 480 V	16S43PHRMB
Capacitor cell (600 V units with standard-duty cells), 16.7 kvar at 600 V	2563PCRMB
Capacitor cell (600 V units with heavy-duty cells), 16.7 kvar at 600 V	16S63PHRMB
Dust filters for AUTOVAR 600 and AUTOVAR filter, 8 per package	AUTOVAR6FX8
Replacement PF controller, CM type, 12 step, with Modbus RS-485 communications	SP039010-00363A2M
Replacement fan, 115 V, 22 W, 60 Hz, 117 CFM	SP039010-0019A
Replacement fan, 115 V, 32 W, 60 Hz, 240 CFM	SP039010-0019AH
Door handle	SP1A85290H41
Door handle cam	SP1A85290H42
AUTOVAR detuned filter	
Replacement PF controller, ACX type	SP039010-0035S
Replacement contactor, 72 A	SP039010-0014B
Contactor fuse (110 A)	SP030217-0037Y
Capacitor cell (240 V units), 12.5 kvar at 240 V	12X23PHRMB
Capacitor cell (480 V units), 16.7 kvar at 480 V	16S43PHRMB
Capacitor cell (600 V units), 16.7 kvar at 600 V	16S63PHRMB
Reactor, 4.2 H, for 25 kvar at 240 V	REACT-25-2Y
Reactor, 4.7 H, for 25 kvar at 240 V	REACT-25-2
Reactor, 4.2 H, for 50 kvar at 480 V	REACT-50-4Y
Reactor, 4.7 H, for 50 kvar at 480 V	REACT-50-4
Reactor, 4.2 H, for 50 kvar at 600 V	REACT-50-6Y
Reactor, 4.7 H, for 50 kvar at 600 V	REACT-50-6
Dust filters for AUTOVAR 600 and AUTOVAR filter, 8 per package	AUTOVAR6FX8
Replacement PF controller, CM type, 12 step, with Modbus RS-485 communications	SP039010-00363A2M
Replacement fan, 115 V, 22 W, 60 Hz, 117 CFM	SP039010-0019A
Replacement fan, 115 V, 32 W, 60 Hz, 240 CFM	SP039010-0019AH
Door handle	SP1A85290H41
Door handle cam	SP1A85290H42

Table 16. Integrated main breakers—AUTOVAR 600 and AUTOVAR detuned filter

kvar	Rated current (amperes)	Breaker size (amperes) ①	M option breaker interrupting rating (kA) / busbar bracing ②⑤	M1 option breaker interrupting rating (kA) / busbar bracing ③⑤	Breaker weight in lb (kg)	Standard wire lug size with main breaker ④	Standard wire lug size without main breaker ④
240 V							
75	180	250	65	100	10 (4.5)	(1) #3-350	(2) #6-350
100	240	400	65	100	10 (4.5)	(2) #3/0-250	(2) #6-350
125	300	600	65	100	25 (11.4)	(2) #3/0-350	(2) #6-350
150	361	600	65	100	25 (11.4)	(2) #3/0-350	(2) #6-350
175	421	600	65	100	25 (11.4)	(2) #3/0-350	(2) #6-350
200	481	800	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
250	601	1000	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
300	720	1000	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
350	844	1200	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
480 V							
100	120	250	65	C/F	10 (4.5)	(1) #3-350	(2) #6-350
150	180	250	65	C/F	10 (4.5)	(1) #3-350	(2) #6-350
200	240	400	65	C/F	10 (4.5)	(2) #3/0-250	(2) #6-350
250	300	600	65	100	25 (11.4)	(2) #3/0-350	(2) #6-350
300	360	600	65	100	25 (11.4)	(2) #3/0-350	(2) #6-350
350	420	600	65	100	25 (11.4)	(2) #3/0-350	(2) #6-350
400	480	800	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
450	540	800	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
500	600	1000	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
550	660	1000	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
600	720	1000	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
660	792	1200	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
700	840	1200	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
720	864	1200	65	100	50 (22.7)	(4) #4/0-500	(4) #2-600
600 V							
100	96	250	35	C/F	10 (4.5)	(1) #3-350	(2) #6-350
150	144	250	35	C/F	10 (4.5)	(1) #3-350	(2) #6-350
175	168	250	35	C/F	10 (4.5)	(1) #3-350	(2) #6-350
200	192	400	35	C/F	10 (4.5)	(2) #3/0-250	(2) #6-350
250	240	400	35	C/F	10 (4.5)	(2) #3/0-250	(2) #6-350
300	288	400	35	C/F	10 (4.5)	(2) #3/0-250	(2) #6-350
350	336	600	35	50	25 (11.4)	(2) #3/0-350	(2) #6-350
400	384	600	35	50	25 (11.4)	(2) #3/0-350	(2) #6-350
450	432	600	35	50	25 (11.4)	(2) #3/0-350	(2) #6-350
500	480	800	35	50	50 (22.7)	(4) #4/0-500	(4) #2-600
550	529	800	35	50	50 (22.7)	(4) #4/0-500	(4) #2-600
600	576	800	35	50	50 (22.7)	(4) #4/0-500	(4) #2-600
660	634	1000	65	C/F	50 (22.7)	(4) #4/0-500	(4) #2-600
700	672	1000	65	C/F	50 (22.7)	(4) #4/0-500	(4) #2-600
720	692	1000	65	C/F	50 (22.7)	(4) #4/0-500	(4) #2-600
800	768	1200	65	C/F	50 (22.7)	(4) #4/0-500	(4) #2-600
840	808	1200	65	C/F	50 (22.7)	(4) #4/0-500	(4) #2-600
900	864	1200	65	C/F	50 (22.7)	(4) #4/0-500	(4) #2-600

① Breakers are sized at a minimum of 135% of the unit rated amperes per the NEC. Integrated main breakers are 100% rated.

② Lesser of the breaker interrupting rating and standard 65 kA bus bracing.

③ Lesser of the breaker interrupting rating and optional 100 kA bus bracing.

④ See equipment drawings for actual lug sizes. Optional lugs available. Consult factory for details.

⑤ Bus bracing kA ratings are calculated per UL 508A.

C/F = Consult factory

Dimensions in inches (mm)

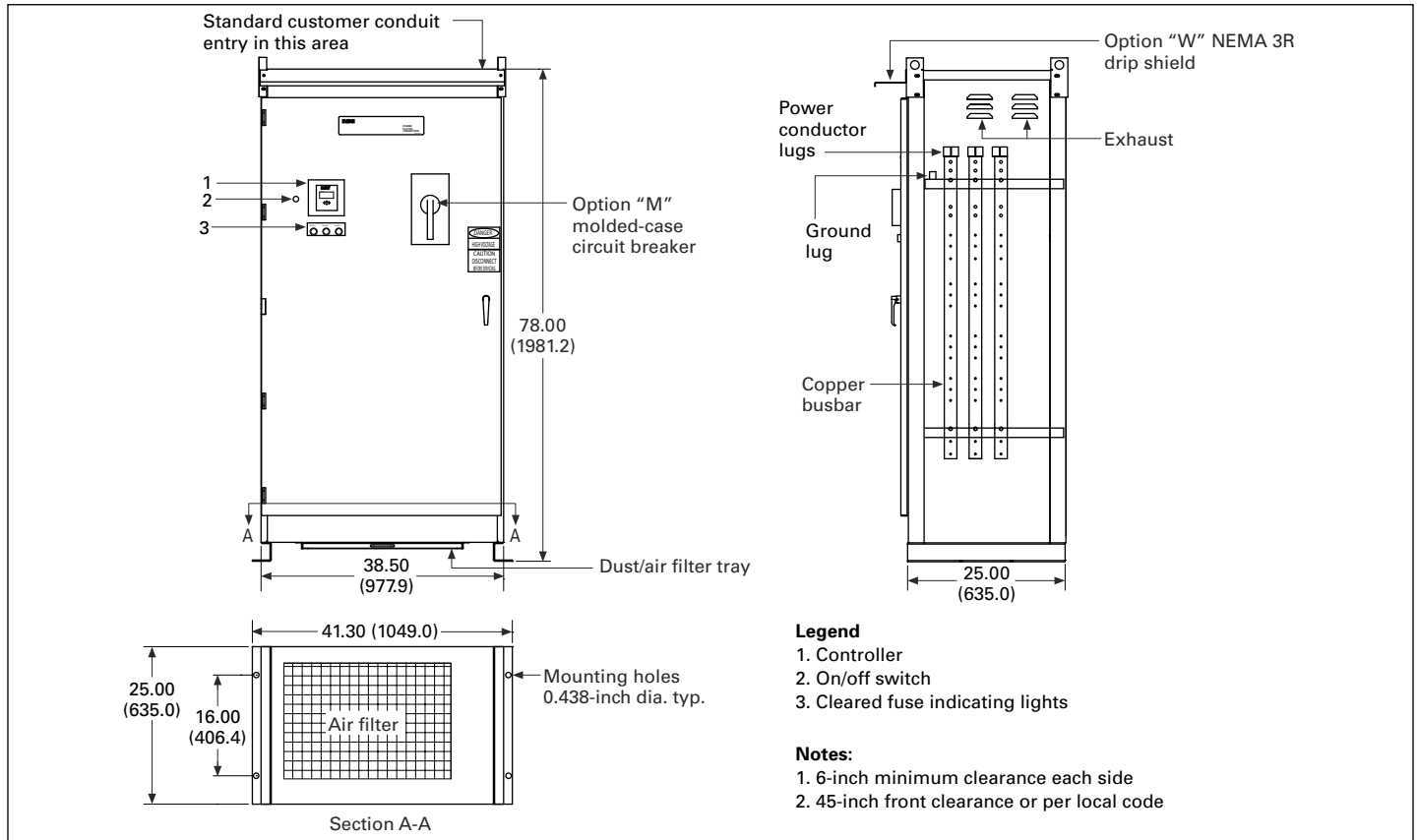


Figure 3. AUTOVAR "L" (single door) enclosure

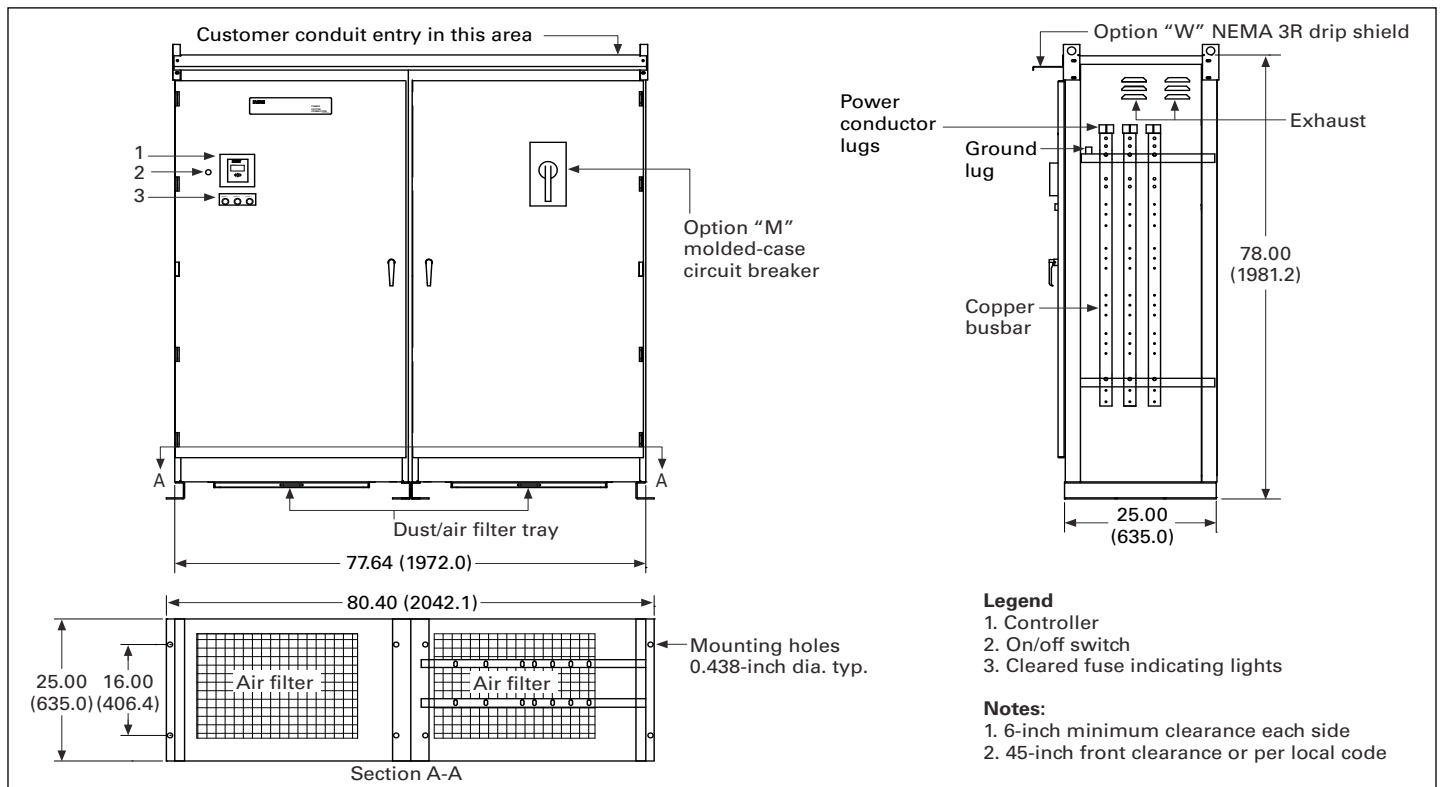


Figure 4. AUTOVAR "KK" (double door) enclosure

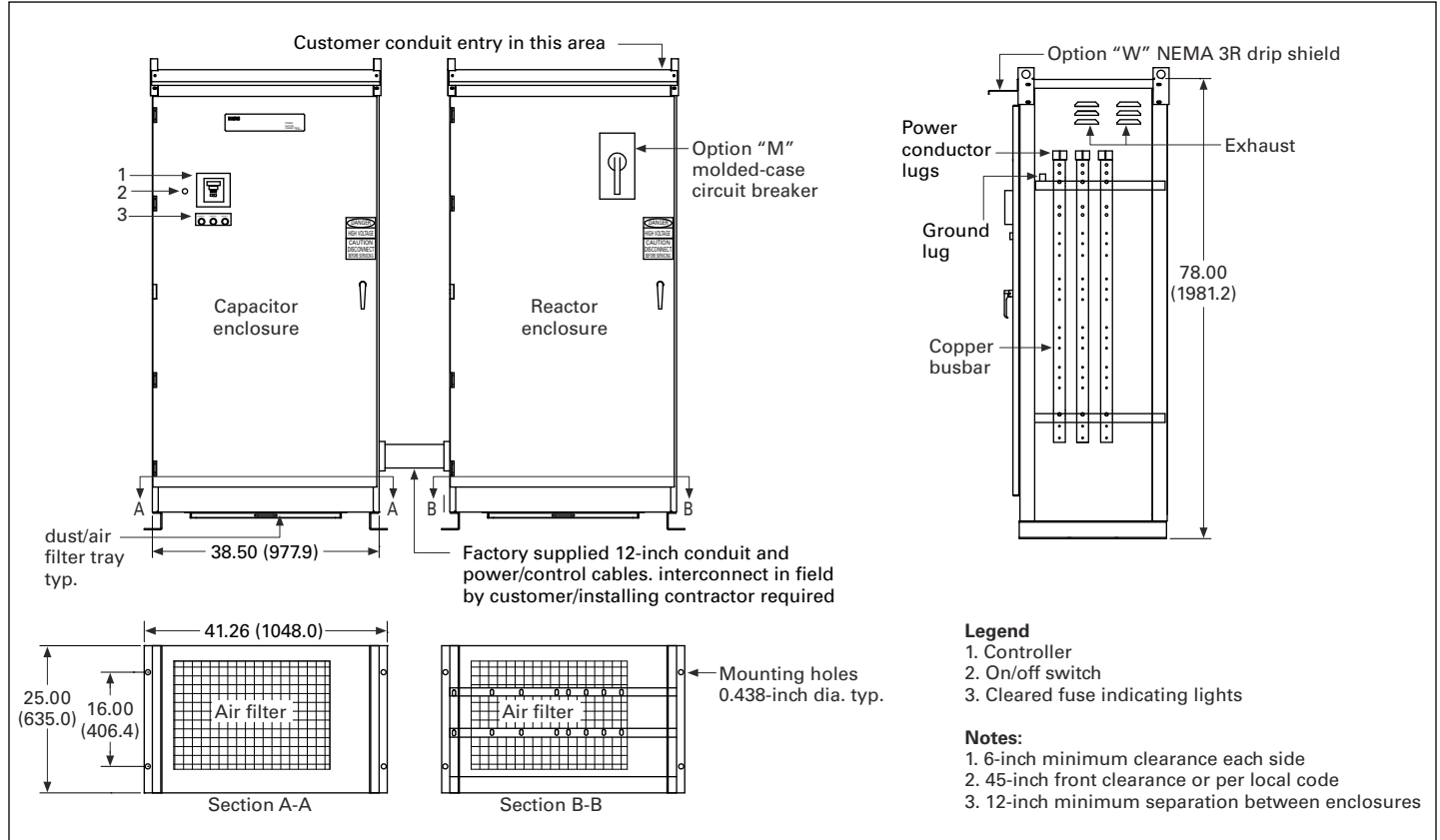


Figure 5. AUTOVAR "L + L" (2 single door) enclosures

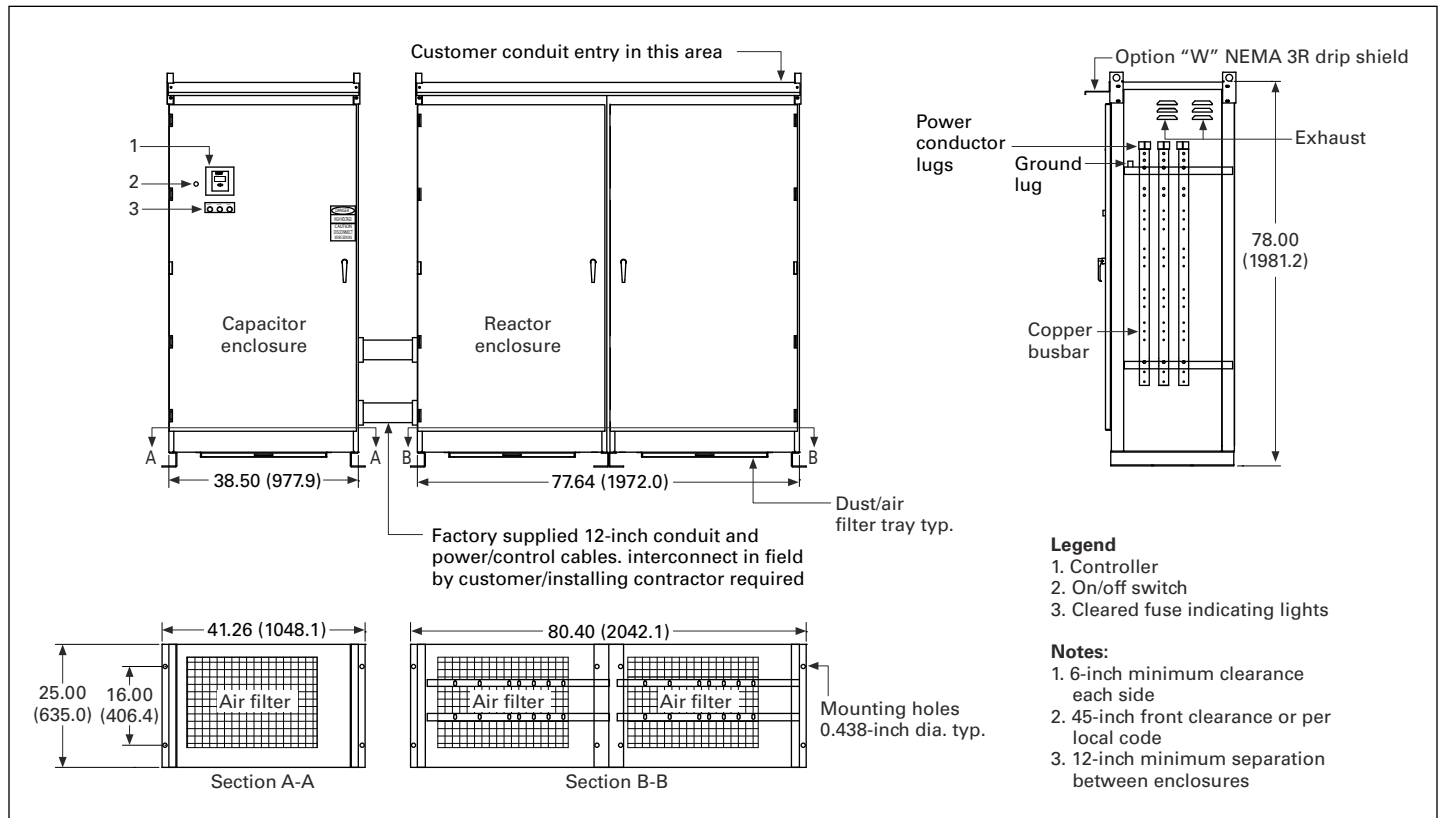


Figure 6. L + KK enclosure (AUTOVAR detuned filter only)

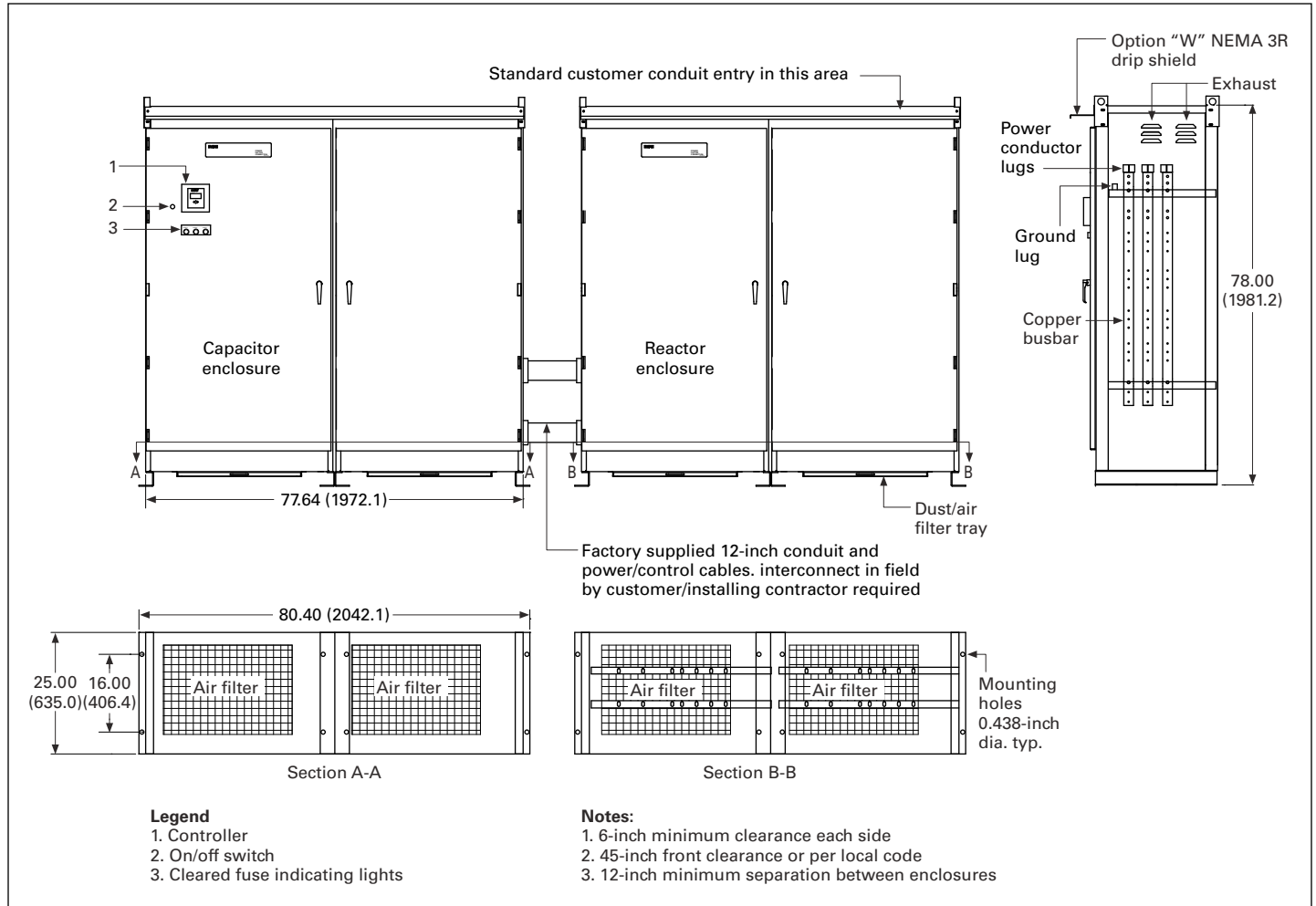


Figure 7. AUTOVAR "KK + KK" enclosures

Current transformers

Features

- Split core (TX2, TX4, and TX5)
- Multi tap (TX2, TX4, and TX5)
- Metering class

Technical data

- 600 V insulation
- Terminals are brass with 8–32 threads
- Accuracy is 1% at 25.0 VA burden (TX2, TX4, and TXSUM-2) or 1% at 30.0 VA burden (TX5)

Table 17. Terminal connections for appropriate CT current rating

TX2		TX4		TX5	
CT secondary terminals	CT ampere rating	CT secondary terminals	CT ampere rating	CT secondary terminals	CT ampere rating
X1-x5	3000	X1-x5	4000	X1-X5	5000
X1-x4	2500	X2-x5	3500	X1-X4	4000
X1-x3	2200	X1-x4	3000	X2-X5	3500
X2-x5	2000	X2-x4	2500	X3-X5	3000
X2-x4	1500	X1-x3	2000	X2-X4	2500
X2-x3	1200	X2-x3	1500	X3-X4	2000
X1-x2	1000	X3-x4	1000	X1-X2	1500
X3-x5	800	X1-x2	500	X4-X5	1000
X4-x5	500	—	—	X2-X3	500
X3-x4	300	—	—	—	—

Note: The CT secondary rating for all the taps is 5 A. To calculate the CT ratio, use the CT primary ampere rating and divide by 5 to get the CT ratio. TX2 example: For X1–X5, the CT ratio is 600 (=3000/5). TX4 example: For X1–X5, the CT ratio is 800 (=4000/5). TX5 example: For X1–X5 on the TX2, the CT ratio is 600 (=3000/5).

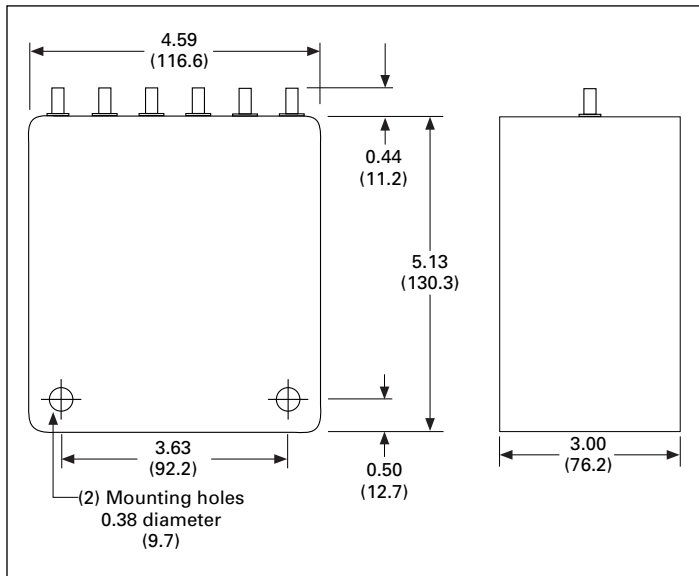


Figure 8. TXSUM-2, summing current transformer, 5 A

Dimensions in inches (mm)

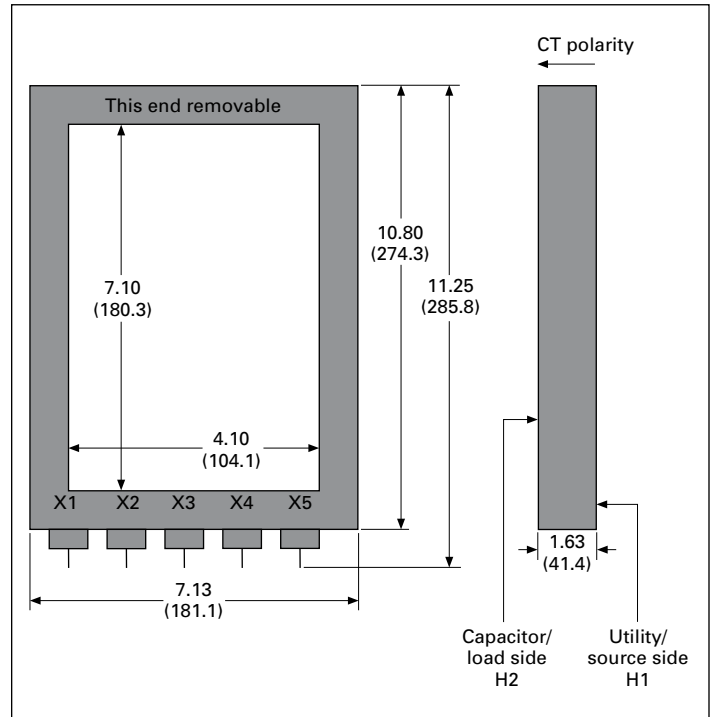


Figure 9. TX2—current transformer, 3000 A, split core, multi tap

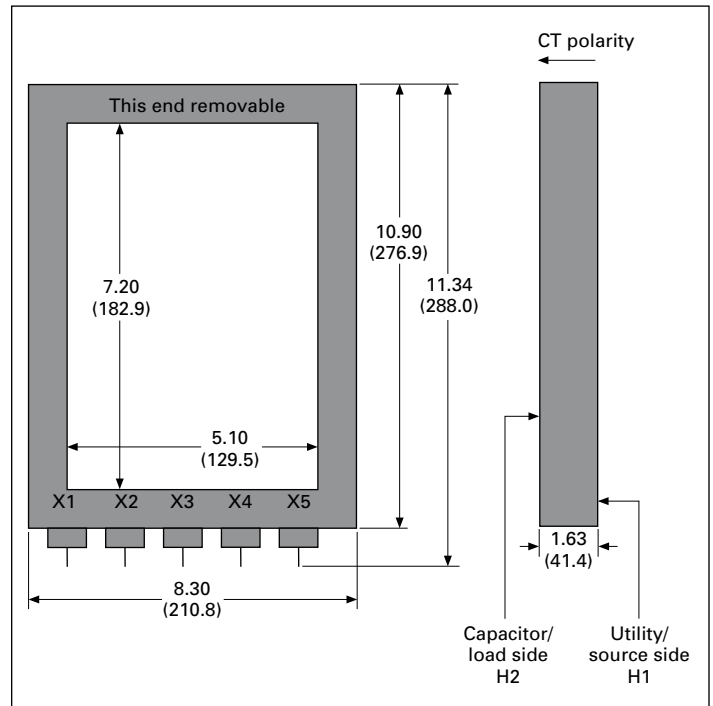


Figure 10. TX4—current transformer, 4000 A, split core, multi tap

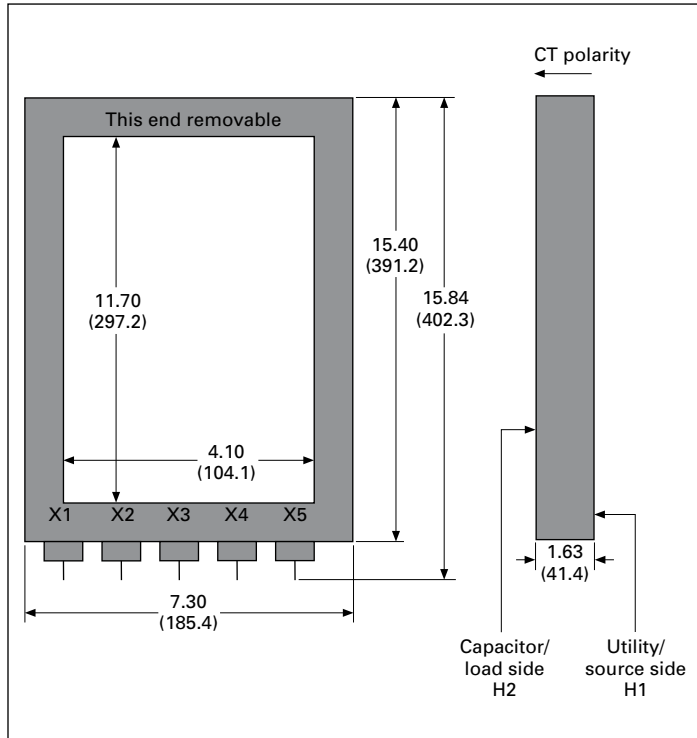


Figure 11. TX5—current transformer, 5000 A, split core, multi tap

Typical current transformer configurations

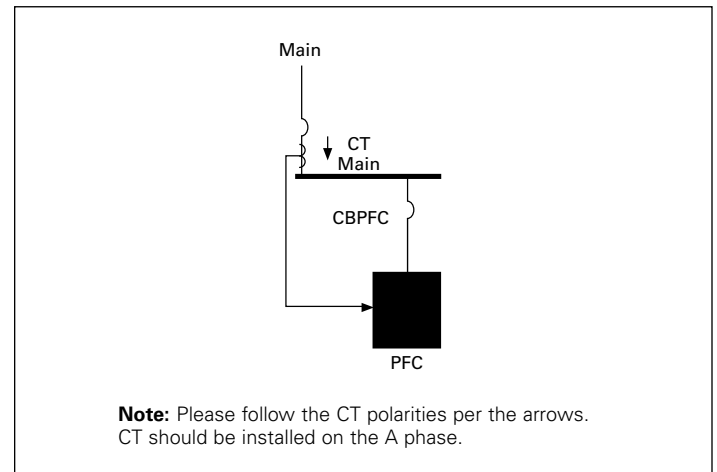


Figure 12. Typical current transformer scheme for single-ended operation

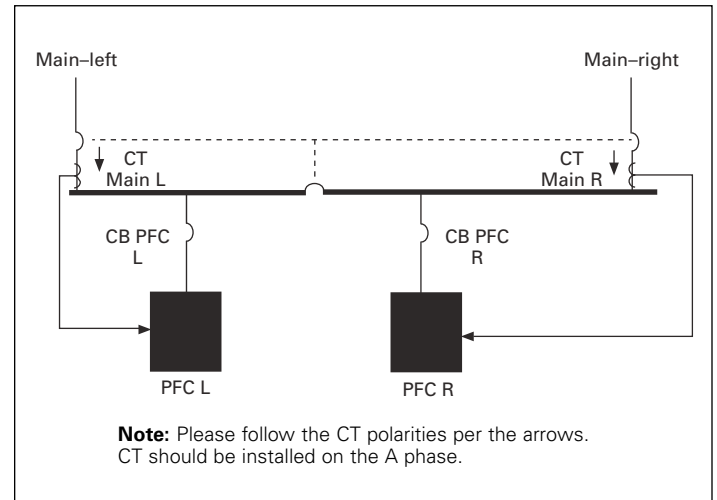


Figure 13. Typical transformer scheme for double single-ended operation

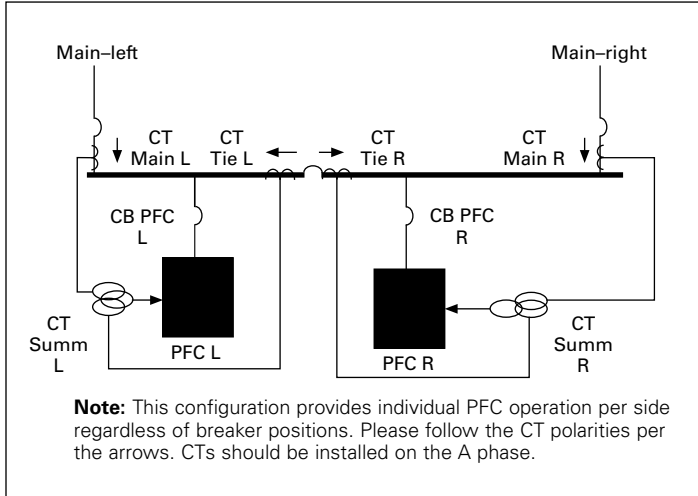


Figure 14. Typical current transformer scheme for main-tie-main configuration with parallel operation

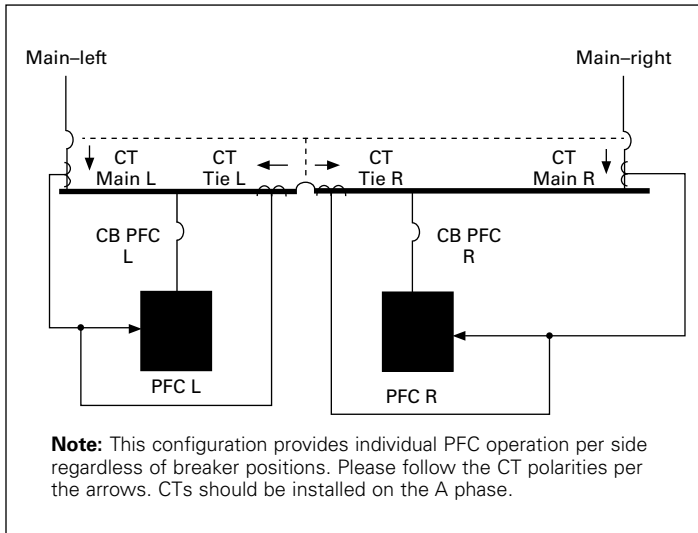


Figure 15. Typical current transformer scheme for main-tie-main configuration without parallel operation

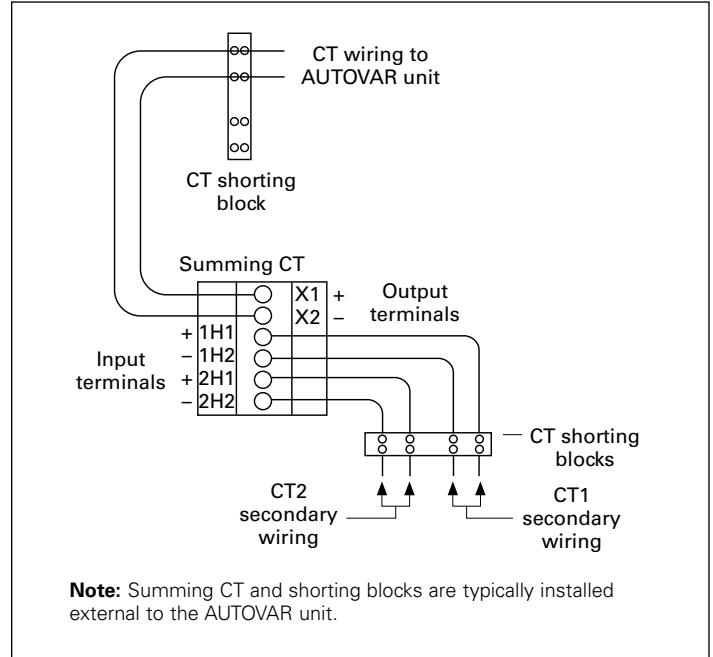


Figure 16. TXSUM-2 summing CT

For product support, please contact Eaton's Technical Resource Center (TRC) power factor application engineers at **1-800-809-2772**, choose option #4, then option #2.
pfc@eaton.com

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

© 2016 Eaton
All Rights Reserved
Printed in USA
Publication No. TD157004EN / Z18246
May 2016