

StacoVAR® Selection Guide

Low voltage systems



Product Selection Guide

1. Determine voltage
2. Determine frequency
3. Determine total kVAR required
4. Determine switched or fixed equipment; if switched, determine kVAR per step and number of steps required
5. Determine if equipment is to be utilized in an indoor or outdoor environment
6. Determine product type and options, noted in the Price List
7. General wiring connection is three phase and ground; power factor controller utilizes an internal 120 Vac input signal and the current transformer utilizes an input signal 3000:5 multi-tap from an optional or customer supplied CT (current transformer).

Considerations when Harmonic Conditions are Present

1. Advise Staco Energy of harmonic applications, as this may affect the type of product and/or components utilized.
2. Provide information such as a harmonic spectrum, known harmonic orders, any power quality data collected from site survey or analysis, as required.

Product Type Descriptions

Staco Energy provides various solutions, specific to correction of poor power factor and/or harmonics. Equipment available: Fixed capacitors from 2 to 400 kVAR; automatically switched type from 75 to 600kVAR (240Vac) and 75 to 2400kVAR (480 and 600Vac).

Fixed Power Factor Correction Features:

PF StacoVAR

Upright style, wall-mounted and freestanding motor load "ML" products and "large" kVAR apparatus include heavy duty dry type or liquid filled ("green friendly") long life three phase power capacitors; both types include discharge resistors and over pressure protection, and can accommodate up to 10% THD environment. **PFH** fixed capacitors, as described above, with harmonic filter reactors tuned to the 4.7th order at 480Vac.

Automatic Power Factor Correction Standard Features:

- NEMA 1 enclosure, bottom or top entry access and modular design allowing for easy future expansion.
- UL 508A, c-UL listed, complete assembly.
- Heavy duty, metallized polypropylene, three phase power capacitors, with discharge resistors and over pressure protection.
- PA units accommodate up to 10% THD environment.
- (PH, and PR units use 480 volt rated capacitors for 240 volt system and 690 volt rated capacitors for 480 volt system, for even higher harmonic level protection.)
- 5-year warranty on the capacitors.
- Individual step fuse protection (200kaic) with blown fuse indication
- Control power transformer with fused primary & secondary, and nickel plated electrical grade copper bus bar system

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PA StacoVAR

Automatic Power Factor Correction

Additional features:

- Type of Switching: Electro-mechanical contactors with damping resistors to reduce switching inrush currents.
- Controller: Adjustable (0.5 to 300) second response microprocessor based power factor controller (twelve-step regulation) with front panel LED display.

PH StacoVAR

Automatic Power Factor Correction, Detuned for Harmonic Conditions

Additional features:

- Type of Switching: Electro-mechanical, heavy duty contactors.
- Controller: Adjustable (0.5 to 300) second response microprocessor based power factor controller (twelve-step regulation) with front panel LED display.
- Reactor: Three phase 5th order, iron-core reactors with a 227Hz tuning frequency.

PR StacoVAR ZXR—

Automatic Power Factor Correction REALTIME, Detuned for Harmonic Conditions and Transient Free
(Custom Engineered Systems Consult Factory)

Additional features:

- Type of Switching: Transient free thyristor switch.
- Controller: 16ms sub-cycle response microprocessor based power factor controller (twelve-step regulation) with front panel LED display.
- Reactor: Three phase 5th order, iron-core reactors with a 227Hz tuning frequency.

Custom Capacitor and Harmonic Filter Engineered Solutions

For applications where harmonics create isolated or wide spread problems on the electrical power network, a tuned filter may be applied. Tuned filters are application engineered to specifically trap or reduce problem harmonics and allow the power system to function properly. Consult the factory to discuss these and other unique power quality problems, along with integration of other controls, communications, systems and energy management.

Product Background - Application		CAP Type	TYPE of SWITCH		CONTROLLER		REACTOR
			Contactor	Thyristor	.5-300 ms	16-20 ms	
StacoVAR PF	Power factor correction, fixed only, no switching, no control, located at individual motor loads. PFH provides reactors for harmonic filtering.	Heavy Duty					
StacoVAR PA	Power factor correction, automatically switched (contactors), basic, economical. Product accommodates most requirements.	Heavy Duty	Y		Y		
StacoVAR PH	Power factor correction, automatically switched (contactors), for a harmonic environment where capacitors may be damaged. Use of iron-core reactors necessary for a detuning - majority of requirements for the 5th order. Product accommodates many applications and is cost effective.	Heavy Duty Derated	Y		Y		Y
StacoVAR PR ZXR	VAR compenstation, power factor correction, automatically switched, where load changes occur constantly. Use of thyristor switches, iron-core reactor for detuning and a fast response power factor controller. Controller, coordinated with the switches provides 16ms, sub-cycle switching. Due to power electronics and control, this product represents a greater cost than other PFC solutions. This product is more "niche" related for applications such as flicker, voltage sags, surges, load fluctuations.	Heavy Duty Derated		Y		Y	Y

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Options:

Options listed not intended for PF StacoVAR ML type fixed capacitor units.

Consult factory for:

1. Voltage and frequency requirements, other than 240 Vac and 480 Vac at 60Hz
2. Specific user and application requirements

Option B Circuit Breaker

(CONSULT FACTORY AS AN ADDITIONAL ENCLOSURE SECTION MAY BE REQUIRED, DEPENDING UPON TOTAL kVAR RATING AND TYPE EQUIPMENT)

Circuit breaker is three-pole molded case type, with a thermal-magnetic trip. Amperes are based upon breaker frame size. Circuit Breaker option may increase standard cabinet dimensions, consult factory for sizing.

Total kVAR	Voltage	Amperes	Option Suffix
25-75	240	250	B
100	240	400	B
125-175	240	600	B
200-225	240	800	B
250-300	240	1000	B
350	240	1200	B
400-450	240	1600	B
50-150	480	250	B
175-225	480	400	B
250-350	480	600	B
375-450	480	800	B
500-550	480	1000	B
600-700	480	1200	B
750-900	480	1600	B

Consult factory for 1600/2000 and higher ampere circuit breaker applications.
Above 450kVAR at 240VAC consult factory to verify installation requirements.
Above 900kVAR at 480VAC consult factory to verify installation requirements.

CT – Current Transformer

External Current Transformer is multi-tap, (3000:5, 2500:5, 2200:5, 2000:5, 1500:5, 1200:5, 1000:5, 800:5, 500:5, 300:5), split core type for ease of installation. CT's shipped loose. 1-5% accuracy, depending on the ratio.

Option P/N
712-1470

Option S TVSS— Transient Voltage Surge Suppression

TVSS (surge protection), rugged suppressor capable of handling high energy transients, rated at minimum 40kA per phase plug-in type; power circuitry provides the lowest possible clamping voltages, high energy withstand and discharge capabilities; dual MOV arrangement for primary and secondary protection; UL1449, c-UL, CSA, IEC compliant; common mode protection rated at 150VAC; includes visual status indication; surge suppressor for added safeguarding of controller, fuses, thermocouples and other electronic/electric/electro-mechanical devices located within the StacoVAR apparatus.

Option T Top Entry Input/Output connection location (Consult Factory)

Terminology for Power Factor Correction Equipment

Capacitor Bank or Cap Bank	Dynamic Compensation
Auto Bank	Reactive Compensation
Switched Bank	Cap Rack
Rack of Capacitors	VAR Regulation
Reactive Power Compensation	VAR Compensation
Real Time Power Factor Correction	

Terminology for Power Factor Correction Equipment with Reactors

Filter Bank	Harmonic Mitigation Capacitors
Detuned Capacitors	Harmonic Suppression with PFC
Anti-Resonant Bank	Automatic Capacitors with Filtering
Tuned System	Capacitor / Filter System
Harmonic Filter Bank	

Staco Catalog Numbering System

PA-0075-01A01B-N486F1-BST

1	2	3	4	5	6	7	8	9	10
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1. PA = StacoVAR Power Factor Correction
2. 0075 = 75 kVAR
3. 01A = (1), 25 kVAR step
01B = (1), 50 kVAR step
4. N = No reactors
5. 48 = 480 Vac
6. 6 = 60hz
7. F1 = Freestanding NEMA 1
8. B = Molded Case Circuit Breaker (option)
9. S = Surge Suppression (TVSS)
10. T = Top Entry Input/Output connection location (option)

Part Number Designation Guide:

1. Product Type

PF StacoVAR	PFC, Fixed ("ML" and larger kVAR)
PA StacoVAR	PFC, Switched
PH StacoVAR	PFC, Detuned
PR StacoVAR ZXR	PFC, Detuned, Transient-Free, Real Time
PX	Medium voltage systems greater than 1000 Volts

2. kVAR Rating

Total kVAR required, four (4) digit field

3. kVAR Steps and Size

Number of steps required and size of step. Total of Three (3) or six (6) digits comprised of: number of steps required, two digit field 01-12 (00 for fixed) followed by the size of steps, one (1) letter field:

A= 25 kVAR	C= 100 kVAR
B= 50 kVAR	D= 200 kVAR

CUSTOM engineered systems will use a four (4) digit special assigned number in place of the steps and size nomenclature.

4. **Reactor** N = Reactor not included
5 = 5th order, detuned

5. Voltage Rating

20 = 208Vac	24 = 240Vac	38 = 380Vac	40 = 400Vac
41 = 415Vac	48 = 480Vac	60 = 600Vac	

6. Frequency

5 = 50Hz	6 = 60Hz
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7. Enclosure Type

W1 = Wall Mounted or Upright NEMA 1 (standard)
W4X = Wall Mounted or Upright NEMA 4X
F1 = Freestanding NEMA 1 bottom entry (standard)
 F2 = Freestanding NEMA 12 bottom entry
 F3 = Freestanding NEMA 3R bottom entry
 F4X = Freestanding NEMA 4X bottom entry
 N1= No Enclosure (OEM type unit)

8. Circuit Breaker Option

B = Molded Case Circuit Breaker

9. Surge Suppression

S = Surge protection/TVSS

10. Top Entry Option

T = Top Entry Input/Output connection location

Enclosure and kVAR Ratings (without circuit breaker):

All StacoVAR enclosures are single door, each enclosure accommodates the following kVAR ratings:

PA, PF – Maximum 400kVAR @ 240Vac OR 800kVAR @ 480Vac

PH – Maximum 200kVAR @ 240Vac or 400kVAR @ 480Vac

Larger kVAR ratings utilize multiple enclosure assemblies, provided with internal bus.

About Staco Energy Products Company

Since 1937, customers worldwide have been relying on Staco Energy Products Company to deliver voltage control and power quality solutions tailored to their needs.

As a leading power quality resource, we offer our customers world-class support; from our thorough applications assessment, to our ability to design and deliver a solution that is tailored to the specific needs of our customers; through delivery and commissioning.

Our professional, factory trained service team is in place to ensure that our customers' revenues are protected, and their investment provides them with many years of trouble free operation.

Staco develops total power solutions for OEM and end user applications.

In addition to StacoVAR we offer a wide array of power quality products, including:

- Uninterruptible Power Supplies
- Power Conditioners
- Voltage Regulators
- Power Factor Correction and Harmonic Mitigation
- Active Harmonic Filters
- Variable Transformers
- Custom Engineered Test Sets



Your tailored power solutions provider

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