Hybrid Power Factor Correction

The integrated solution for Power Quality and Energy efficiency.

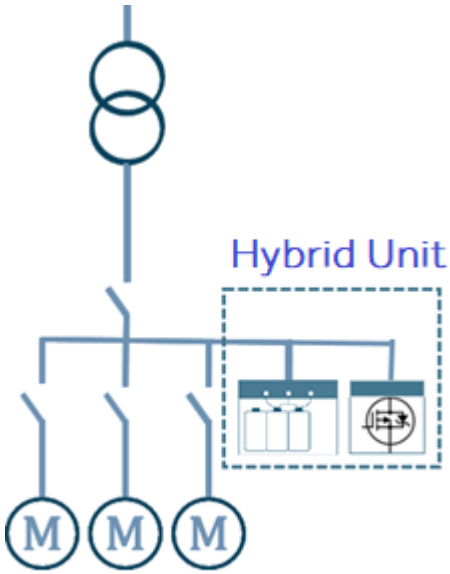
Hybrid Power Factor Correction

What is hybrid active correction?

Traditionally, poor power quality has been addressed through the integration of more dedicated and targeted device to solve the specific problem.

- A power factor correction unit is used if the power factor is inadequate.
- A harmonic filter (active or passive) is used if harmonics are identified as a problem.

Advances in diagnostic technology have led to the recognition that power quality problems arise from a combination of different problems and that a more flexible - **hybrid** - solution is needed, integrating troubleshooting into a single equipment.



How does it work?

Hybrid active power factor correction (HSVG) combines the technological advantages of dynamic generation with the discrete power of classical capacitor banks, driven by contactors or thyristors.

Connected in parallel to the load supply, the hybrid unit provides a dynamic and controlled current source that can adapt in real time to the changes in the grid.

Thanks to its logic, the system is able to simultaneously manage the steps of the capacitor banks providing the fundamental capacitive reactive power, and the dynamic power (both capacitive and inductive) provided by the integrated active system

The integration of the two technologies within the hybrid unit enables the simultaneous correction of reactive power, reduction of voltage fluctuations, flicker mitigation and phases unbalance in a single device.

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Hybrid Power Factor Correction

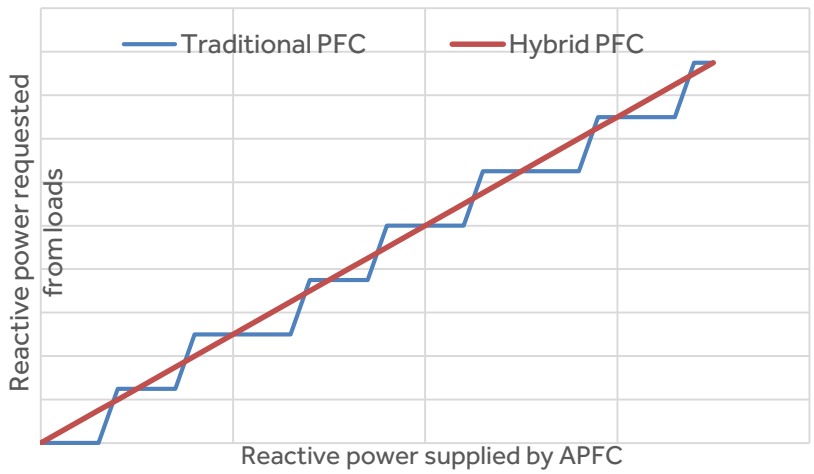
Benefits

The hybrid correction solution solves a number of additional problems compared to conventional PFC equipment or passive filters:

- voltage variations and fluctuations
- Injection of reactive energy into the grid both capacitive and inductive
- Unbalance between phases.
- Low costs compared to a 'pure' dynamic system due to conventional technology for reducing reactive power withdrawal from the grid

With the efficiency provided by electronic control

- Continuous, linear dynamic output: the typical 'steps' of systems with only capacitor banks or inductor banks are eliminated by the SVG component.
- Immediate reaction time
- The Human-Machine-Interface display allows intuitive and simple control.



Where is it needed?

Highly variable loads

- Machine tools, Presses, Laser/Plasma cutting
- Cranes, Overhead travelling cranes, Lifts
- Photovoltaic and wind power plants
- Electric arc furnaces
- Electric traction (rail, cable cars)
- Mills
- Pumps
- Extruders

Line imbalance compensation and power factor correction with single-phase loads

- **Offices, business centres**
- Shopping centres
- Single-phase welding machines

Voltage compensation (flicker)

- Presses, hammers, pulse hammers
- Band saws
- Welders
- Arc furnaces

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Technical data common to all hybrid series

Hybrid correction can be implemented on all current COMAR power factor correction series.

The installation is similar to that of conventional power factor correction units, with the only additional need to carry the amperometric (CT) signals of all 3 phases.

The equipment leaves the factory already fully configured and therefore does not require any setting by the installer

You can find 3 series given as examples

GENERAL TECHNICAL DATA COMMON TO ALL SERIES

Enclosure	Made of steel sheet, protected against corrosion by phosphating and epoxy powder coating. Colour RAL 7035. External degree of protection: IP31 Internal degree of protection: panels with interlocked switch-disconnector IP20 live parts; IP 20 protection in additional modules Capacitor banks are assembled on drawers that can be pulled out from the front of the cabinet for quick maintenance Cabinets are equipped with eyebolts for lifting
Installation	Indoor installation, in a well ventilated position free from solar radiation. Pollution degree 1 Working temperature: -5 / +40 °C; Relative humidity RH50% @40°C (EN61435-1) Altitude: <1000 asl
Main Disconnector	Three-phase off-load disconnector with door interlock.
Wiring	Internal connections are made with FS17-450/750V insulated, flame-retardant low smoke emission cables. On non-preinsulated cable lugs, the connection point is covered with a durable heat-shrink sleeve. Auxiliary circuits are appropriately identified in accordance with current standards.
Bank insertion	The banks are driven by three-phase contactors (Class AC6-b). Series without tuning reactor have contactors with a pre-insertion resistor to limit peak inrush current Static insertion series are fitted with thyristor insertion modules controlled by microprocessor such that switching on/off occurs when the potential difference between the mains and the capacitors is zero. (zero crossing). The switching time for the insertion of the capacitor banks is approximately 200 ms.
Fuses	The capacitive banks are protected by high breaking capacity fuses (100kA). The protection system for the power circuits uses NH-00 curve gG fuses; for the auxiliary circuits sectionable fuse holders and 10.3x38 fuses.
Auxiliary circuits	230 Vac Internal transformer
Capacitors	Single-phase capacitors made of self-healing metallised polypropylene (MKP), equipped with over-pressure device and discharge resistance. Impregnated with PCBs-free vegetable oilf. Delta connection. Continuous duty type. - overvoltage: 1.1 x Un (8h / 24h) - current overload: 1.3 x In - capacitance tolerance: -5% / +10%. - Dielectric losses: ≤0.2 W/kvar; total dissipation losses: ≤0.4 W/kvar - temperature category: -25 / D In the higher-performance series, **'Heavy Duty'** capacitors made of high thickness film and multiple elements in series are installed to reduce the effect of high currents on the element heads
Tuning reactor (where present)	Iron core with oriented crystals; aluminium windings Resin impregnation Dissipation loss (average): 6W/kvar Over-temperature control probe
SVG	• Mosfest SiC technology • Real-time correction of reactive power and unbalance 99% efficiency • Connection: 3-phase (3-phase + neutral connection on request) Response time: 20ms
Controllers	• HPR+HMI 7" interconnected controllers with three-phase measurement • amperometric signals: by means of 3 current transformers with 5A secondary (not included) • response time: 20ms
Safety	Automatic unit shut-down for high THDi, THDu, loss of capacitance of the banks, over-temperature >50°C, under and overvoltage. bank block for inductance overtemperature (where present), low capacitance Dry contact NC for extreme internal temperature (>70°C)
Testing	100% of the equipment undergoes visual inspection, phase-to-phase and phase-to-ground insulation tests, bank efficiency and ventilation circuit checks.
Standards	Capacitors: IEC/EN 60831-1 / 2 certified by IMQ (V1927) Equipment: IEC/EN 61439-1 / 2, IEC/EN 61921; 2014/35/EC Electromagnetic compatibility: 2014/30/EC.

AAR/100-ST-HSVG

Hybrid Power Factor Correction with detuning reactors and static switching

PERFORMANCE DATA

- **Rated voltage** 400 Vac (others on request)
- **Rated frequency** 50 Hz (60 Hz on request)
- **Insulation voltage** 690 Vac
- **Voltage overload** 1.1 Un (nominal voltage)
- **Capacitors** Un=500; Umax 550

HARMONIC CONTENT

THD(I)max. = 100 % in the grid

THD(U)max. = 3%. in the grid

p = 7%

The **AAR/100-ST-HSVG** series hybrid equipments are particularly suitable for three-phase networks with high harmonic content. These fully **static devices** guarantee accurate compensation, **transient-free switching,** even in the presence of impulsive and unbalanced loads, thanks to a hybrid logic that manages the SVG system and the multi-step system. The systems are capable of compensating inductive and capacitive loads.

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STANDARD CONFIGURATIONS

Code	Type	Qn (kvar)	Cable entry	In (A)	SVG power (kvar)	bank power (kvar)	Disconnector (A)	Dimension (WxDxH) (mm)	Weight (kg)
8610100400HS0	G6E	100	↓	144	50	2x12,5+50	160	600x600x1660	180
8610150400HS0	G6E	150	↓	216	50	2x25+50	200	600x600x1660	200
8610200400HS0	G8E	200	↓	432	50	25+2x50	315	600x600x2070	220
8610250400HS0	G8E	250	↓	540	50	25+50+75	400	600x600x2070	240

Note

Legenda for cable entry (power supply) ↑ from below, ↙ side up, ↓ from above,
Rated power is expressed at rated voltage (Un)

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AAR/100-HSVG

Hybrid Power Factor Correction with detuning reactors

PERFORMANCE DATA

- **Rated voltage** 400 Vac (others on request)
- **Rated frequency** 50 Hz (60 Hz on request)
- **Insulation voltage** 690 Vac
- **Voltage overload** 1.1 Un (nominal voltage)
- **Capacitors** Un=500; Umax 550

HARMONIC CONTENT

THD(I)max. = 100 % in the grid

THD(U)max. = 3%. in the grid

p = 7%

The AAR/100-HSVG series **hybrid** equipments are particularly suitable for three-phase networks with **high harmonic content**. These devices guarantee accurate correction, even in the presence of impulsive and unbalanced loads, thanks to a hybrid logic that manages the SVG system and the multi-step system. **The AAR/100-HSVG** systems can correct **inductive and capacitive loads**.

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STANDARD CONFIGURATIONS

Code	Type	Qn (kvar)	Cable entry	In (A)	SVG power (kvar)	bank power (kvar)	Disconnector (A)	Dimension (WxDxH) (mm)	Weight (kg)
8560150400HS0	G6E	150	↓	216	50	2x50	400	600x600x1660	200
8560175400HS0	G6E	175	↓	252	50	50+75	400	600x600x1660	220
8560225400HS0	G6E	225	↓	324	75	2x75	400	600x600x1660	240
8560300400HS0	G8E	300	↑	432	75	3x75	800	600x600x2070	270
8560375400HS0	G8E(II)	375	↑	540	75	4x75	800	1200x600x2070	300

Note

Legenda for cable entry (power supply) ↑ from below, ↙ side up, ↓ from above,
Rated power is expressed at rated voltage (Un)

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B50-HSVG

Hybrid Power Factor Correction

PERFORMANCE DATA

- **Rated voltage** 415Vac (others on request)
- **Rated frequency** 50 Hz (60 Hz on request)
- **Insulation voltage** 690 Vac
- **Voltage overload** 1.1 Un (nominal voltage)
- **Capacitors** Un=500; Umax 550

HARMONIC CONTENT
RESONANCE NOT ADMITTED

THD(I)max. = 35% in rete

THD(I)max. = 80% On capacitors

The hybrid **B50-HSVG** series are particularly suitable for three-phase networks with **medium** harmonic content. These devices guarantee accurate compensation thanks to a hybrid logic that manages the SVG system and the multi-step system. The systems are capable of compensating inductive and capacitive loads.

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STANDARD CONFIGURATIONS

Code	Type	Qn (kvar)	Cable entry	In (A)	SVG power (kvar)	Battery power (kvar)	Disconnector (A)	Dimension WxDxH (mm)	Weight (kg)
8680100400HS0	G6E	100	↓	144	50	50	400	600x600x1660	150
8680150400HS0	G6E	150	↓	216	50	2x50	400	600x600x1660	170
8680200400HS0	G6E	200	↓	288	50	50+100	400	600x600x1660	190
8680225400HS0	G6E	225	↓	324	75	2x75	630	600x600x1660	200
8680300400HS0	G8E	300	↑	432	100	2x100	630	600x600x2070	250
8680350400HS0	G8E	350	↑	504	100	100+150	800	600x600x2070	280
8680400400HS0	G8E	400	↑	576	100	3x100	800	600x600x2070	310

Note
Legenda for cable entry (power supply) ↑ from below, ↙ side up, ↓ from above,
Rated power is expressed at rated voltage (Un)

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Avete altre domande?

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