

EPCOS Product Brief 2018

# Power Quality Solutions

## Static Var Generator (SVG) PQvar Series

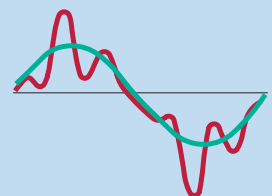
EPCOS has been offering a comprehensive range of key components for Power Factor Correction (PFC) and Power Quality Solutions (PQS) for many years. The rapid development of industry and infrastructure resulted in the increased usage of power electronic loads which demands a highly dynamic response time for reactive power compensation. Conventional reactive power compensation only with passive components cannot fully meet these conditions, especially when the reactive power requirement is rapidly changing. EPCOS Static Var Generator (SVG) PQvar Series utilizes three levels inverter topology to provide real time response to reactive power requirements.

### Static Var Generator (SVG) PQvar™ Series

- New approach to power factor correction and load balancing
- Fast response time < 15 ms, with dynamic reaction time less than 50  $\mu$ s
- Precise compensation after compensating the target power factor can reach a value of unity
- Capable of both inductive and capacitive compensation and will avoid under and over compensation issues
- Minimal loss, better energy efficiency, long-term safe and reliable operation
- Modular design, compact structure, small footprint, simple operation, easy maintenance



PQS



# Static Var Generator (SVG) PQvar Series

EPCOS Static Var Generator (SVG) PQvar Series is a Flexible AC Transmission Systems (FACTS) controller, whose capacitive or inductive output current can be controlled independent of the AC system voltage.

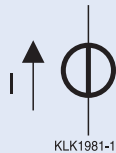
SVG PQvar Series is a parallel device connected to the grid and the main circuit is based on a three phase voltage source converter (VSI) topology. External CT measures load current and external DSP helps to calculate and analyze the required reactive current.

SVG PQvar Series controls PWM signals and sends control message to IGBT modules which generate reactive current in order to improve system power factor.

SVG PQvar Series provides faster compensation compared to conventional compensation systems such as capacitor banks. Thus, it is an ideal solution especially for fast loads of inductive or capacitive behavior. It can compensate both inductive and capacitive reactive current without under or over compensation.

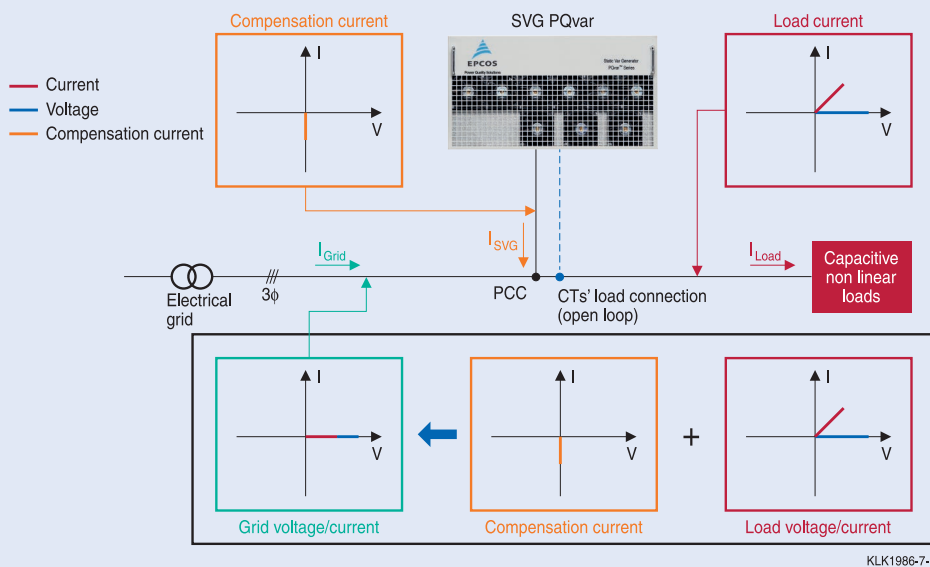
## Static Var Generator (SVG) PQvar Series

### Operating principle of SVG PQvar Series

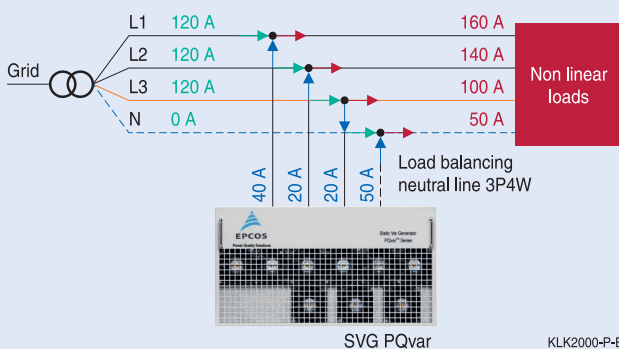


SVG PQvar Series generates a compensation current working as a dynamic current source, monitors the power factor value of power system, and generates real time compensation current in order to ensure to achieve the set target  $\cos \phi$ .

### Compensation of reactive power with SVG PQvar Series



### SVG PQvar Series load balancing for 3P3W and 3P4W



SVG PQvar Series can balance load between phases and unloaded neutral wire for input voltage connection systems such as three phase three wires (3P3W) and three phase four wires (3P4W). Therefore, it will be a perfect solution with applications having reactive power requirements along with unbalanced loads, which is the case with the electricity distribution in rural areas, some industrial applications and much more.

# Static Var Generator (SVG) PQvar Series

## General information

SVG PQvar Series is a new product which has rewritten the conventional approach of power factor correction. It is designed to compensate the rapid reactive power requirement, thereby improving the power factor and consequently reducing the costs. SVG PQvar Series monitors the current signal and utilizes three levels inverter topology which generate the reactive part of the measured current to compensate dynamically in order to improve the power factor. It can dynamically compensate power factor from -1 to 1.

## Features

- SVG PQvar Series can be considered as a controllable reactive current source, which helps to improve the system power factor to a target value of more than  $> 0.99$  without any over or under compensation.
- SVG PQvar Series has extremely rapid dynamic compensation reaction time, which is less than  $50 \mu\text{s}$  and a state response time of less than 15 ms.
- SVG PQvar Series is an active compensation device, which doesn't need capacitor or reactor for reactive power compensation which will avoid the condition of resonance caused by the traditional capacitor banks.
- SVG PQvar Series can compensate both inductive and capacitive reactive power and also provide load balancing.
- SVG PQvar Series can compensate reactive power in any scope and can be installed together with traditional capacitor banks.
- The grid voltage has no influence on the SVG PQvar Series compensation capacity. So even if the system voltage drops down, the required reactive power can be compensated by monitoring its requirement.
- SVG PQvar Series can compensate for the same capacity equivalent to the installed capacity, therefore it requires 20 to 30% lower capacity in comparison with the conventional capacitor banks.
- SVG PQvar Series has been designed to provide highest safety and reliability features.

## Typical applications

Some typical applications which require rapid reactive power compensation includes the following:

- Data centers
- UPS systems
- Renewable power generation (e.g. photovoltaics and wind turbines)
- Sensitive equipment manufacturing (e.g. silicon wafer production, semiconductor production)
- Industrial production machines
- Electrical welding systems
- Plastic industry machinery (e.g. extruders, injection molders)

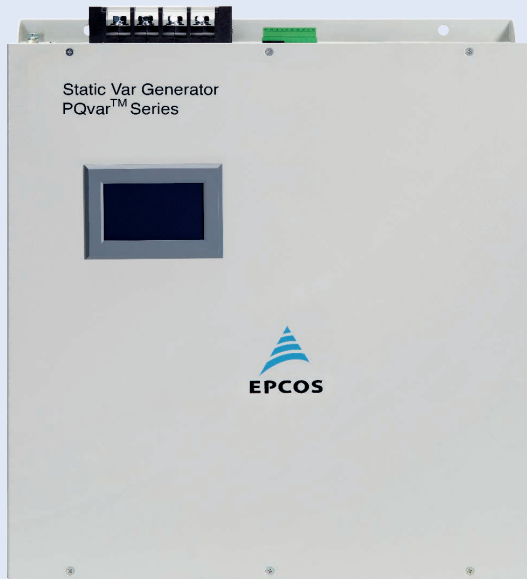
## Safety features

- Overload protection
- Internal short-circuit protection
- Overheating protection
- Overvoltage and undervoltage protection
- Inverter bridge protection
- Fan fault alarm

# Low-Voltage Static Var Generator (SVG) PQvar LV-Series

Depending on the customer needs, EPCOS offers either complete panels, wall mounted cabinets or even modules. The state of the art modular design of SVG PQvar Series offers the advantage of having a minimum downtime in case of a service or maintenance requirement.

SVG PQvar Series wall-mounted



SVG PQvar Series floor-mounted



PQvar module

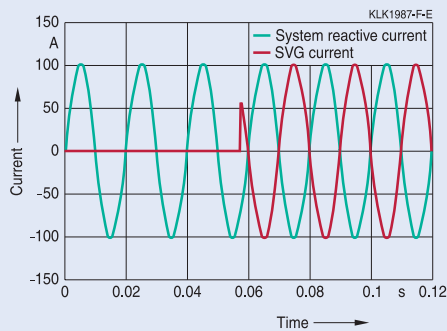


# Low-Voltage Static Var Generator (SVG) PQvar LV-Series

## SVG PQvar Series compensation performance

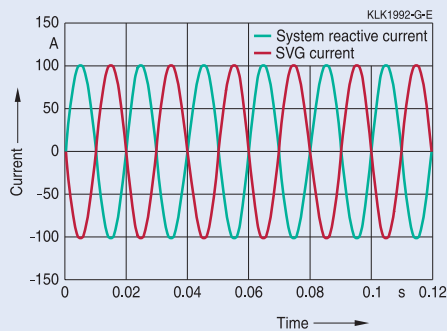
### Fast reaction

Extremely rapid reactive power generation, in order to achieve target PF, right at the SVG PQvar Series switch on.



### Perfect compensation

SVG PQvar Series identifies the system reactive power requirement and generates a reactive current same in magnitude but opposite in phase to ensure perfect compensation result.



### High performance

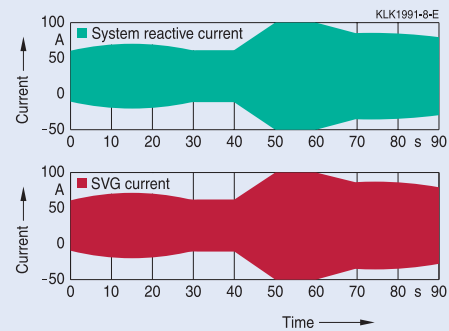
- Reactive power compensation up to  $\cos \varphi = 0.99$
- Load balancing between phases
- Fully inductive and capacitive current compensation from 0 to 100%

### Fast compensation response

- Compensation in real-time with steady state response time less than 15 ms
- Immediate load change of reaction time less than 50  $\mu$ s
- Accurate power factor correction, no over-compensation and under-compensation, no system harmonic resonance
- Capacity will not be affected in case of system voltage drop, output will be equal to rated capacity

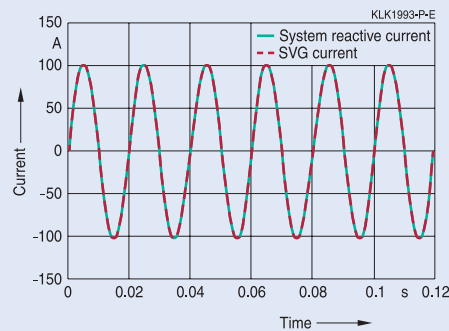
### Real-time tracking

While system reactive current changes, SVG PQvar Series also can generate dynamic real time compensation current to satisfy the changing power system requirement.



### Reverse and overlapping

The reversed waveform of reactive current generated by SVG PQvar Series overlaps with the power system reactive current.



### Modular design

SVG PQvar Series modular design is based on concept of components, the application just like traditional power factor compensation mode.

- Maximum rated capacity of one single module is 200 kvar
- Customizable cabinet and maximum output capacity of a cabinet is 800 kvar
- Easily to operate, maintain and transport

### Different combinations

- SVG PQvar Series
- SVG PQvar Series with capacitor banks
- SVG PQvar Series with AHF (reactive power and harmonic compensation)

# Low-Voltage Static Var Generator (SVG) PQvar LV-Series

Technical data and specifications of low-voltage SVG PQvar Series 400 V		
Rated voltage	400 V; -40 ... +20%	
Mains frequency	50/60 Hz (range: 45 ... 63 Hz)	
Parallel operation	Unlimited	
Response time	< 15 ms	
Overall efficiency	> 97%	
Power grid structure	3P3W / 3P4W	
Current transformers	150/5 ... 10000/5	
Circuit topology	3-level	
Single-module compensation capacity	30/50 kvar	100/200 kvar
Module net weight	21/35 kg	48/66 kg
Dimensions (W × D × H)	30 kvar: 440 × 445 × 150 mm (module) 50 kvar: 500 × 510 × 190 mm (module)	100 kvar: 500 × 470 × 270 mm (module) 200 kvar: 500 × 650 × 350 mm (module)
Cooling mode	Smart air cooling: 220 L/sec	Smart air cooling: 405 L/sec
Target power factor	Adjustable from -1 ... +1	
Cabinet mounting	Floor-mounted, wall-mounted	
Communication ports	RS485, CAN, and network port	
Communication protocols	Modbus and PMBus	
Noise level	< 65 dB (depending on the model)	
Protection functions	Overvoltage, undervoltage, short-circuit, inverter bridge inverse, over-compensation	
Operating temperature	-10 ... +40 °C, other temperature ranges upon request	
Relative humidity	5 ... 95%, non-condensing	
Protection class	IP20 (other IP classes are customizable)	
Panel color	RAL7035 light grey	
Altitude	1500 m, 1% derating per 100 m plus	
General safety requirements for SVG PQvar Series use and operation area	EN 50178:1997/ IEC 50178:1997	
SVG PQvar Series EMC requirements	EN 61000_6_2(2005)/ EN55011, GROUP1, CLASS A IEC 61000_6_2(1999)/ CISPR11, GROUP1, CLASS A	
SVG PQvar Series performance requirements	EN 50091-3/ IEC 62040-3/ AS 62040-3(VFI SS 111)	

# Low-Voltage Static Var Generator (SVG) PQvar LV-Series



## 400 V SVG PQvar Series – 3P4W systems<sup>1)</sup>

Type	Reactive power kvar	System voltage min./max. V		Mounting variant	Approx. weight kg	Approx. dimensions (W x D x H) mm	Ordering code
PQSW8030V344	30	240	480	Wall-mounted	35	440 x 150 x 445	B44066F8030V344
PQSW8050V344	50	240	480	Wall-mounted	35	500 x 190 x 560	B44066F8050V344
PQSW8100V344	100	240	480	Wall-mounted	48	504 x 267 x 545	B44066F8100V344
PQSW8200V344	200	240	480	Wall-mounted	66	500 x 350 x 650	B44066F8200V344
PQSF8100V315	100	240	480	Floor-mounted	308	600 x 1000 x 2200	B44066F8100V315
PQSF8200V315	200	240	480	Floor-mounted	356	600 x 1000 x 2200	B44066F8200V315
PQSF8250V315	250	240	480	Floor-mounted	391	600 x 1000 x 2200	B44066F8250V315
PQSF8300V315	300	240	480	Floor-mounted	404	600 x 1000 x 2200	B44066F8300V315
PQSF8400V315	400	240	480	Floor-mounted	452	600 x 1000 x 2200	B44066F8400V315
PQSF8500V315	500	240	480	Floor-mounted	500	600 x 1000 x 2200	B44066F8500V315
PQSF8600V315	600	240	480	Floor-mounted	458	600 x 1000 x 2200	B44066F8600V315
PQSF8800V315	800	240	480	Floor-mounted	524	600 x 1000 x 2200	B44066F8800V315

## 400 V SVG PQvar Series – 3P3W systems<sup>1)</sup>

Type	Reactive power kvar	System voltage min./max. V		Mounting variant	Approx. weight kg	Approx. dimensions (W x D x H) mm	Ordering code
PQSW6030V344	30	240	480	Wall-mounted	35	440 x 150 x 445	B44066F6030V344
PQSW6050V344	50	240	480	Wall-mounted	35	500 x 190 x 560	B44066F6050V344
PQSW6100V344	100	240	480	Wall-mounted	48	504 x 267 x 545	B44066F6100V344
PQSW6200V344	200	240	480	Wall-mounted	66	500 x 350 x 650	B44066F6200V344
PQSF6100V315	100	240	480	Floor-mounted	308	600 x 1000 x 2200	B44066F6100V315
PQSF6200V315	200	240	480	Floor-mounted	356	600 x 1000 x 2200	B44066F6200V315
PQSF6250V315	250	240	480	Floor-mounted	391	600 x 1000 x 2200	B44066F6250V315
PQSF6300V315	300	240	480	Floor-mounted	404	600 x 1000 x 2200	B44066F6300V315
PQSF6400V315	400	240	480	Floor-mounted	452	600 x 1000 x 2200	B44066F6400V315
PQSF6500V315	500	240	480	Floor-mounted	500	600 x 1000 x 2200	B44066F6500V315
PQSF6600V315	600	240	480	Floor-mounted	458	600 x 1000 x 2200	B44066F6600V315
PQSF6800V315	800	240	480	Floor-mounted	524	600 x 1000 x 2200	B44066F6800V315

## 400 V SVG PQvar Series – modules

Type	Reactive power kvar	System voltage min./max. V		Connection variant	Approx. weight kg	Approx. dimensions (W x D x H) mm	Ordering code
PQSM8030V300	30	240	480	3P4W	35	440 x 445 x 150	B44066F8030V300
PQSM8050V300	50	240	480	3P4W	35	500 x 510 x 190	B44066F8050V300
PQSM8100V300	100	240	480	3P4W	48	500 x 470 x 270	B44066F8100V300
PQSM8200V300	200	240	480	3P4W	66	500 x 650 x 350	B44066F8200V300
PQSM6030V300	30	240	480	3P3W	35	440 x 445 x 150	B44066F6030V300
PQSM6050V300	50	240	480	3P3W	35	500 x 510 x 190	B44066F6050V300
PQSM6100V300	100	240	480	3P3W	48	500 x 470 x 270	B44066F6100V300
PQSM6200V300	200	240	480	3P3W	66	500 x 650 x 350	B44066F6200V300

## Accessories

Product description	Ordering code
Extra-large HMI Color LCD Display, 7", including 4 m connection cable	B44066F9999V230

Other types/designs upon request

<sup>1)</sup> In case of floor mounted systems include a 7" TFT color control display. In case of wall mounted systems include a 4.3" LCD touch color screen. External current transformers are not included.



# Low-Voltage Static Var Generator (SVG) PQvar LV-Series

Technical data and specifications of low-voltage SVG PQvar Series 690 V		
Rated voltage	690 V; -30 ... +15%	
Mains frequency	50/60 Hz (range: 45 ... 63 Hz)	
Parallel operation	Unlimited	
Response time	< 15 ms	
Overall efficiency	> 97%	
Power grid structure	3P3W / 3P4W	
Current transformers	150/5 ... 10000/5	
Circuit topology	3-level	
Single-module compensation capacity	50/75 kvar	95/110 kvar
Module net weight	66/66 kg	66/66 kg
Dimensions (W × D × H)	50 kvar: 544 × 640 × 250 mm (module) 75 kvar: 544 × 640 × 250 mm (module)	95 kvar: 544 × 640 × 250 mm (module) 110 kvar: 544 × 640 × 250 mm (module)
Cooling mode	Smart air cooling: 220 L/sec	Smart air cooling: 405 L/sec
Target power factor	Adjustable from -1 ... +1	
Cabinet mounting	Floor-mounted, wall-mounted	
Communication ports	RS485, CAN, and network port	
Communication protocols	Modbus and PMBus	
Noise level	< 65 dB (depending on the model)	
Protection functions	Overvoltage, undervoltage, short-circuit, inverter bridge inverse, over-compensation	
Operating temperature	-10 ... +40 °C, other temperature ranges upon request	
Relative humidity	5 ... 95%, non-condensing	
Protection class	IP20 (other IP classes are customizable)	
Panel color	RAL7035 light grey	
Altitude	1500 m, 1% derating per 100 m plus	
General safety requirements for SVG PQvar Series use and operation area	EN 50178:1997/ IEC 50178:1997	
SVG PQvar Series EMC requirements	EN 61000_6_2(2005)/ EN55011, GROUP1, CLASS A IEC 61000_6_2(1999)/ CISPR11, GROUP1, CLASS A	
SVG PQvar Series performance requirements	EN 50091-3/ IEC 62040-3/ AS 62040-3(VFI SS 111)	



# Low-Voltage Static Var Generator (SVG) PQvar LV-Series



## 690 V SVG PQvar Series – 3P4W systems<sup>1)</sup>

Type	Reactive power kvar	System voltage min./max. V		Mounting variant	Approx. weight kg	Approx. dimensions (W x D x H) mm	Ordering code
PQSW8050V644	50	483	794	Wall-mounted	66	504 x 253 x 640	B44066F8050V644
PQSW8075V644	75	483	794	Wall-mounted	66	504 x 253 x 640	B44066F8075V644
PQSW8095V644	95	483	794	Wall-mounted	66	504 x 253 x 640	B44066F8195V644
PQSW8110V644	110	483	794	Wall-mounted	66	504 x 253 x 640	B44066F8110V644
PQSF8110V615	110	483	794	Floor-mounted	326	600 x 1000 x 2200	B44066F8110V615
PQSF8220V615	220	483	794	Floor-mounted	392	600 x 1000 x 2200	B44066F8220V615
PQSF8330V615	330	483	794	Floor-mounted	458	600 x 1000 x 2200	B44066F8330V615
PQSF8440V615	440	483	794	Floor-mounted	524	600 x 1000 x 2200	B44066F8440V615
PQSF8550V615	550	483	794	Floor-mounted	850	2x 600 x 1000 x 2200	B44066F8550V615
PQSF8660V615	660	483	794	Floor-mounted	916	2x 600 x 1000 x 2200	B44066F8660V615
PQSF8770V615	770	483	794	Floor-mounted	982	2x 600 x 1000 x 2200	B44066F8770V615
PQSF8880V615	880	483	794	Floor-mounted	1048	2x 600 x 1000 x 2200	B44066F8880V615

## 690 V SVG PQvar Series – 3P3W systems<sup>1)</sup>

Type	Reactive power kvar	System voltage min./max. V		Mounting variant	Approx. weight kg	Approx. dimensions (W x D x H) mm	Ordering code
PQSW6050V644	50	483	794	Wall-mounted	66	504 x 253 x 640	B44066F6050V644
PQSW6075V644	75	483	794	Wall-mounted	66	504 x 253 x 640	B44066F6075V644
PQSW6095V644	95	483	794	Wall-mounted	66	504 x 253 x 640	B44066F6195V644
PQSW6110V644	110	483	794	Wall-mounted	66	504 x 253 x 640	B44066F6110V644
PQSF6110V615	110	483	794	Floor-mounted	326	600 x 1000 x 2200	B44066F6110V615
PQSF6220V615	220	483	794	Floor-mounted	392	600 x 1000 x 2200	B44066F6220V615
PQSF6330V615	330	483	794	Floor-mounted	458	600 x 1000 x 2200	B44066F6330V615
PQSF6440V615	440	483	794	Floor-mounted	524	600 x 1000 x 2200	B44066F6440V615
PQSF6550V615	550	483	794	Floor-mounted	850	2x 600 x 1000 x 2200	B44066F6550V615
PQSF6660V615	660	483	794	Floor-mounted	916	2x 600 x 1000 x 2200	B44066F6660V615
PQSF6770V615	770	483	794	Floor-mounted	982	2x 600 x 1000 x 2200	B44066F6770V615
PQSF6880V615	880	483	794	Floor-mounted	1048	2x 600 x 1000 x 2200	B44066F6880V615

## 690 V SVG PQvar Series – modules

Type	Reactive power kvar	System voltage min./max. V		Connection variant	Approx. weight kg	Approx. dimensions (W x D x H) mm	Ordering code
PQSM8050V600	50	483	794	3P4W	66	544 x 640 x 250	B44066F8050V600
PQSM8075V600	75	483	794	3P4W	66	544 x 640 x 250	B44066F8075V600
PQSM8095V600	95	483	794	3P4W	66	544 x 640 x 250	B44066F8095V600
PQSM8110V600	110	483	794	3P4W	66	544 x 640 x 250	B44066F8110V600
PQSM6050V600	50	483	794	3P3W	66	544 x 640 x 250	B44066F6050V600
PQSM6075V600	75	483	794	3P3W	66	544 x 640 x 250	B44066F6075V600
PQSM6095V600	95	483	794	3P3W	66	544 x 640 x 250	B44066F6095V600
PQSM6110V600	110	483	794	3P3W	66	544 x 640 x 250	B44066F6110V600

## Accessories

Product description	Ordering code
Extra-large HMI Color LCD Display, 7", including 4 m connection cable	B44066F9999V230

Other types/designs upon request

<sup>1)</sup> In case of floor mounted systems include a 7" TFT color control display. In case of wall mounted systems include a 4.3" LCD touch color screen. External current transformers are not included.

# Low-Voltage Static Var Generator (SVG) PQvar LV-Series

**E.g. B44066F8050V300**

Code for SVG PQvar series LV

Connection: 6 for 3-wire (3P3W)/ 8 for 4-wire (3P4W)

Module: 30 kvar / 50 kvar / 100 kvar / 200 kvar

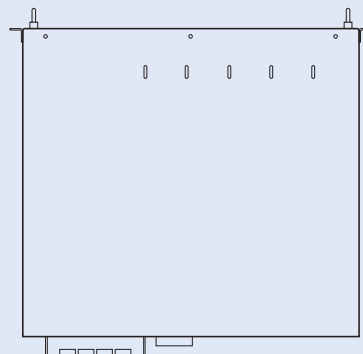
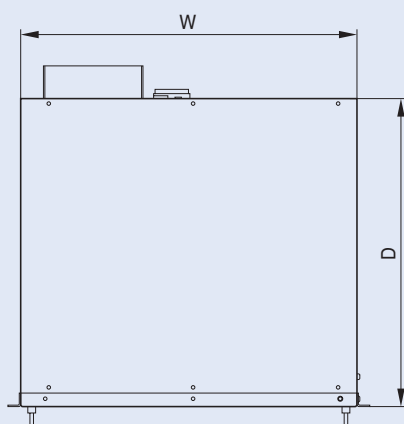
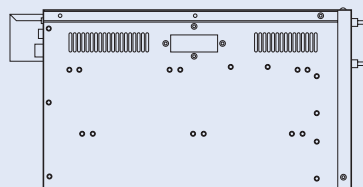
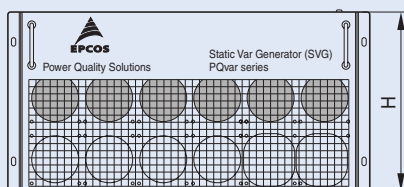
Version number

0 for module only/ 4 for 520 mm panel width/  
5 for 570 mm panel width/ ...

0 for module/ 1 for panel/ 4 for wall mounted/ ...

Rated voltage: e.g. 3 for 380 V

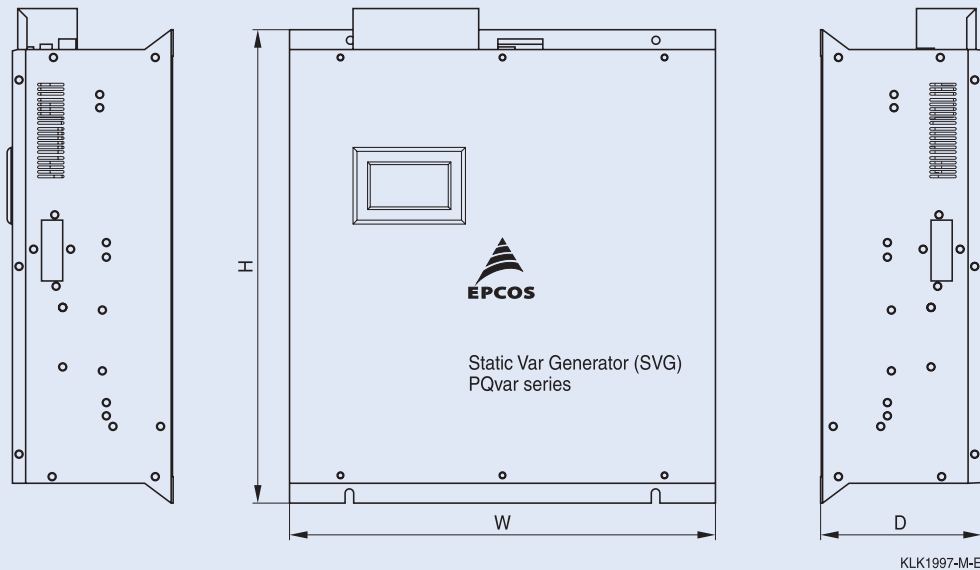
## 400 V SVG PQvar Series module 30 kvar, 50 kvar 100 kvar and 200 kvar



Modules	W mm	D mm	H mm
30 kvar	440	445	150
50 kvar	500	557	190
100 kvar	500	520	269
200 kvar	500	650	350

# Low-Voltage Static Var Generator (SVG) PQvar LV-Series

400 V SVG PQvar Series wall-mounted 30 kvar, 50 kvar, 100 kvar and 200 kvar

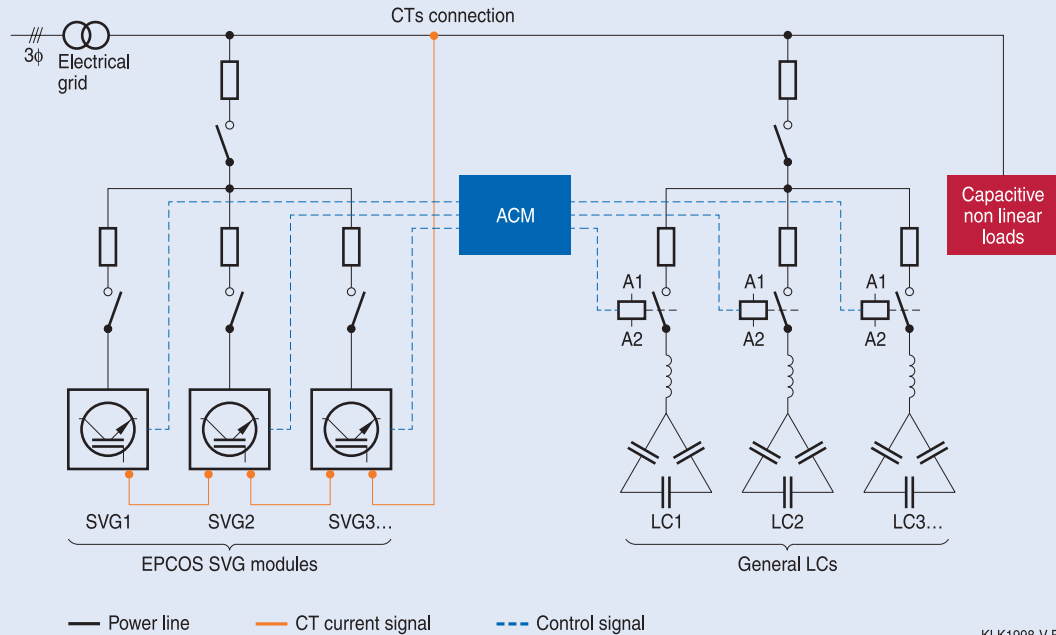


Model	W mm	D mm	H mm
30 kvar	440	160	481
50 kvar	500	191	582
100 kvar	500	271	582
200 kvar	500	350	650

# Hybrid PFC-Solution – SVG PQvar and Classic PFC Managed by Advanced Multi Controller (AMC)

## SVG PQvar Series plus discrete compensation (SVG modules plus LC reactive compensation)

### Operating principle of SVG with LC banks and AMC



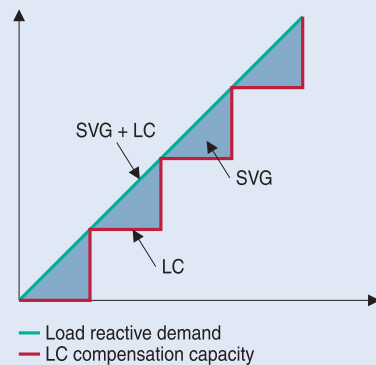
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## SVG PQvar Series plus discrete compensation (SVG modules plus LC reactive compensation)

### Performance comparison between SVG with LC banks discrete and traditional reactive compensation

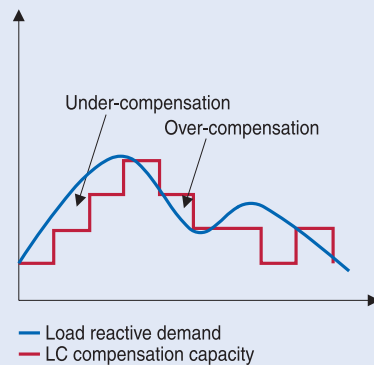
#### In SVG with LC banks

- LCs can implement stepwise switching compensation
- SVG modules can cover all blind points and implements step less switching



#### In traditional reactive compensation

- It may cause over-compensation and/ or under-compensation



KLK1988-N-E

# Hybrid PFC-Solution – SVG PQvar and Classic PFC Managed by Advanced Multi Controller (AMC)

Technical data and specifications of SVG PQvar Series Advanced Multi Controller (AMC) unit	
Operating voltage	24 V DC
<b>Compensation performance</b>	
Target PF	-1 ... +1
Reactive power compensation rate	> 99% (target PF is 1)
Response time	< 15 ms
Reaction time	< 50 $\mu$ s
<b>Capacitor switching performance</b>	
Compensation method	Three-phase/ split/ mixed compensation
Capacitance coding method	Optional
Capacitor switching method	Stack/ normal/ cycle/ individual
Switching manner	Auto/ manual
<b>External ports</b>	
RS485 port 1	Communication with SVG modules
RS485 port 2	External communication port
Network port	External communication port
USB port	Code upgrading port
Temperature detection	Measuring system's operating temperature or ambient temperature
Fan controlling dry contact	Controlling SVC cooling fan
Alarm indicator dry contact	For reserved external alarm indicator
Control output contact	Control outputs, up to 18 at most Contact support: 120 V AC / 10 A, 220 V AC / 8 A, 400 V AC / 3 A, 110 V DC / 0.2 A, 60 V DC / 0.6 A, 24 V DC / 5 A Level signal: 12 V DC / 30 mA
Reserved dry contact	One input / one output
Communication protocol	Modbus
Protection functions	Undervoltage, overvoltage, underfrequency, overfrequency, phase failure, high harmonic voltage, SVG overload, SVG overtemperature
Display	7" touch screen
<b>Installation requirements</b>	
Power consumption	< 25 W
Protection class	IP41 for the front panel, and IP20 for the rear panel
<b>Operating environment</b>	
Operating temperature	-20 ... +60 °C
Altitude	$\leq$ 2500 m
Humidity	$\leq$ 95%
Storage temperature	-40 ... +70 °C
CT ratio	150/5 ... 10000/5

# Hybrid PFC-Solution – SVG PQvar and Classic PFC Managed by Advanced Multi Controller (AMC)



SVG PQvar Series AMC (Advanced Multi Controller)	
Product description	Ordering code
Advanced Multi Controller (AMC) unit – HMI colour display 7" for switching thyristors	B44066F9989V230
Advanced Multi Controller (AMC) unit – HMI colour display 7" for switching contactors	B44066F9988V230

Component selection table for de-tuned PFC (classic)						
De-tuning factor %	Effect. filter output kvar	Capacitor quantity and ordering code	Reactor <sup>1)</sup> ordering code	Contactor ordering code	Cable <sup>2)</sup> cross section mm <sup>2</sup>	Fuse <sup>2)</sup> rating A
<b>Grid voltage: 400 V – 50 Hz detuned filters components selection table</b>						
5.67	12.5	1x B25667C4237A375	B44066D5012*400	B44066S1810J260	6	35
5.67	25	1x B25667C4467A375	B44066D5025*400	B44066S3210J230	16	63
5.67	50	2x B25667C4467A375	B44066D5050*400	B44066S6210J230	50	125
5.67	100	4x B25667C4467A375	B44066D5100*400	B44066S9910J230	120	250
7	25	1x B25667C4467A375	B44066D7025*400	B44066S3210J230	16	63
7	50	2x B25667C4467A375	B44066D7050*400	B44066S6210J230	50	125
7	10	4x B25667C4467A375	B44066D7100*400	B44066S9910J230	120	250
14	20	1x B25667C4347A375	B44066D1420*400	B44066S2410J230	10	50
14	25	1x B25667C4417A365	B44066D1425*400	B44066S3210J230	16	63
14	50	2x B25667C4417A365	B44066D1450*400	B44066S6210J230	50	125
14	100	4x B25667C4417A365	B44066D1499*400	B44066S9910J230	120	250

<sup>1)</sup> EPCOS offers reactors with slightly different specifications (e.g. dimensions) that can be used for the same application although sometimes with slightly different resulting performances. These types are distinguished by different letters at digit 12 of the product code.

<sup>2)</sup> The above mentioned values are guidelines for operation in normal conditions at ambient temperatures up to +35 °C. Various parameters such as temperature inside the cabinet, cable quality, maximum cable insulation temperature, single or multi core cable, cable length and laying system have to be considered for a proper selection. Upgrade/ downgrade accordingly if conditions differ. Additionally, do not forget to consider the regulations and standards which are valid for your country.

# Hybrid PFC-Solution – SVG PQvar and Classic PFC Managed by Advanced Multi Controller (AMC)



## Component selection table for dynamic PFC (classic)

De-tuning factor %	Effect. filter output kvar	Capacitor <sup>3)</sup> quantity and ordering code	Reactor <sup>1)</sup> quantity and ordering code	Thyristor ordering code	Cable <sup>2)</sup> cross section mm <sup>2</sup>	Fuse <sup>2)</sup> rating A
<b>Grid voltage: 400 V – 50 Hz detuned filters components selection table</b>						
5.67	25	2x B25667C5237A375	1x B44066D5025*400	1x B44066T0025E402	16	63
5.67	50	2x B25667C5347A375	1x B44066D5050*400	1x B44066T0050E402	50	125
7	12.5	2x B25667C5237A375	1x B44066D7012*400	1x B44066T0010E402	10	35
7	25	2x B25667C5237A375	1x B44066D7025*400	1x B44066T0025E402	16	63
7	50	2x B25667C5347A375 1x B25667C5237A375	1x B44066D7050*400	1x B44066T0050E402	50	125
7	100	4x B25667C5347A375 2x B25667C5237A375	1x B44066D7100*400	1x B44066T0100E402	120	250
14	12.5	1x B25667C5966A375 1x B25667C5127A375	1x B44066D1412*400	1x B44066T0010E402	10	35
14	25	1x B25667C5167A375 1x B25667C5237A375	1x B44066D1425*400	1x B44066T0025E402	16	63
14	50	3x B25667C5287A375	1x B44066D1450*400	1x B44066T0050E402	50	125
14	100	5x B25667C5347A375	1x B44066D1499*400	1x B44066T0100E402	120	250

<sup>1)</sup> EPCOS offers reactors with slightly different specifications (e.g. dimensions) that can be used for the same application although sometimes with slightly different resulting performances. These types are distinguished by different letters at digit 12 of the product code.

<sup>2)</sup> The above mentioned values are guidelines for operation in normal conditions at ambient temperatures up to +35 °C. Various parameters such as temperature inside the cabinet, cable quality, maximum cable insulation temperature, single or multi core cable, cable length and laying system have to be considered for a proper selection. Upgrade/ downgrade accordingly if conditions differ. Additionally, do not forget to consider the regulations and standards which are valid for your country.

<sup>3)</sup> In some cases special interconnection of the single-phase capacitors needed; in case you are not familiar please contact our sales office for further details.

## SVG PQvar Series Advanced Multi Controller (AMC) unit





# Medium-Voltage Static Var Generator (SVG) PQvar MV-Series

Technical data and specifications of medium voltage SVG PQvar MV-series			
Rated voltage <sup>1)</sup>	6 × (1 ±20%) kV	10 × (1 ±20%) kV	35 × (1 ± 20%) kV
Mains frequency	50 Hz (±2 Hz) / 60 Hz (±2 Hz) (not adaptive)		
Parallel operation	It is available to meet the demand of larger capacity		
Overall efficiency	> 99.2% (excluding transformer)		
Power grid structure	Three-phase, three-wire (3P3W)		
Circuit topology	2 level H-bridge series		
Single-module capacity (Mvar)	2, 3, 4, 5, 6, 7	2, 3, 4, 5, 6, 7, 8, 9, 10, 12	2, 3, 4, 5, 6, 7, 8, 9, 10, 12
Full response time	< 5 ms (10 ... 90%)		
Target power factor	Meet design requirements within capacity range		
Active power loss	< 0.8% rated power		
Mounting	Cabinet		
Cooling mode	Air cooling		
Communication interface / protocol	RS485 or Ethernet / Modbus TCP/IP or RTU		
Noise level	< 70 dB (A)		
Operation mode	Constant power factor, constant reactive and constant voltage control are optional		
Operation display	Operation parameter setting, touch key-press operation, multiple parameter display, operation data recording, fault recording and broadcasting, parameter and record data backup, remote control and parameter downloading, remote update of controller software		
Display accuracy	±2% FS		
Expansion capability	Parallel operation is available to meet the demand of larger capacity		
Protection functions	Overvoltage, undervoltage, fault-phase and default phase of power grid, equipment overcurrent, overvoltage of DC busbar, automatic current limiting protection in case of overload, overcurrent protection of power module, control power supply anomaly protection, communication fault protection, controller anomaly protection, control system power-off protection		
Operating temperature	-10 ... +45 °C, other temperature ranges upon request		
Storage temperature	-20 ... +65 °C		
Relative humidity	< 90% (when the temperature is +25 °C)		
Protection class	IP20		
Panel color	RAL7035 light grey		
Altitude	< 2500 m		
General safety requirements for SVG use and operation	EN ISO 13849-1		
SVG EMC requirements	IEC 61000-4-5:2005		

<sup>1)</sup> Other voltages upon request

# Medium-Voltage Static Var Generator (SVG) PQvar MV-Series



## 6 kV SVG PQvar Series – 3P3W systems

Type	Rated module reactive power kvar	Voltage class kV	Mounting variant	Approx. weight kg	Approx. dimensions (W x D x H) mm	Ordering code
PQSF6020X061	2000	6	Floor-mounted	2600	3400 x 1200 x 2200	B44066F6020X061
PQSF6030X061	3000	6	Floor-mounted	2600	5400 x 1200 x 2200	B44066F6030X061
PQSF6040X061	4000	6	Floor-mounted	4500	5400 x 1200 x 2200	B44066F6040X061
PQSF6050X061	5000	6	Floor-mounted	4500	5400 x 1200 x 2200	B44066F6050X061
PQSF6060X061	6000	6	Floor-mounted	6000	5400 x 1200 x 2600	B44066F6060X061
PQSF6070X061	7000	6	Floor-mounted	6000	5400 x 1200 x 2600	B44066F6070X061

## 10 kV SVG PQvar Series – 3P3W systems

Type	Rated module reactive power kvar	Voltage class kV	Mounting variant	Approx. weight kg	Approx. dimensions (W x D x H) mm	Ordering code
PQSF6020X101	2000	10	Floor-mounted	3500	4800 x 1200 x 2200	B44066F6020X101
PQSF6030X101	3000	10	Floor-mounted	3500	4800 x 1200 x 2200	B44066F6030X101
PQSF6040X101	4000	10	Floor-mounted	3500	7000 x 1200 x 2200	B44066F6040X101
PQSF6050X101	5000	10	Floor-mounted	3500	7000 x 1200 x 2200	B44066F6050X101
PQSF6060X101	6000	10	Floor-mounted	5500	7000 x 1200 x 2200	B44066F6060X101
PQSF6070X101	7000	10	Floor-mounted	5500	7000 x 1200 x 2200	B44066F6070X101
PQSF6080X101	8000	10	Floor-mounted	5500	7000 x 1200 x 2200	B44066F6080X101
PQSF6090X101	9000	10	Floor-mounted	7200	7000 x 1200 x 2600	B44066F6090X101
PQSF6100X101	10000	10	Floor-mounted	7200	7000 x 1200 x 2600	B44066F6100X101
PQSF6120X101	12000	10	Floor-mounted	7200	7000 x 1200 x 2600	B44066F6120X101

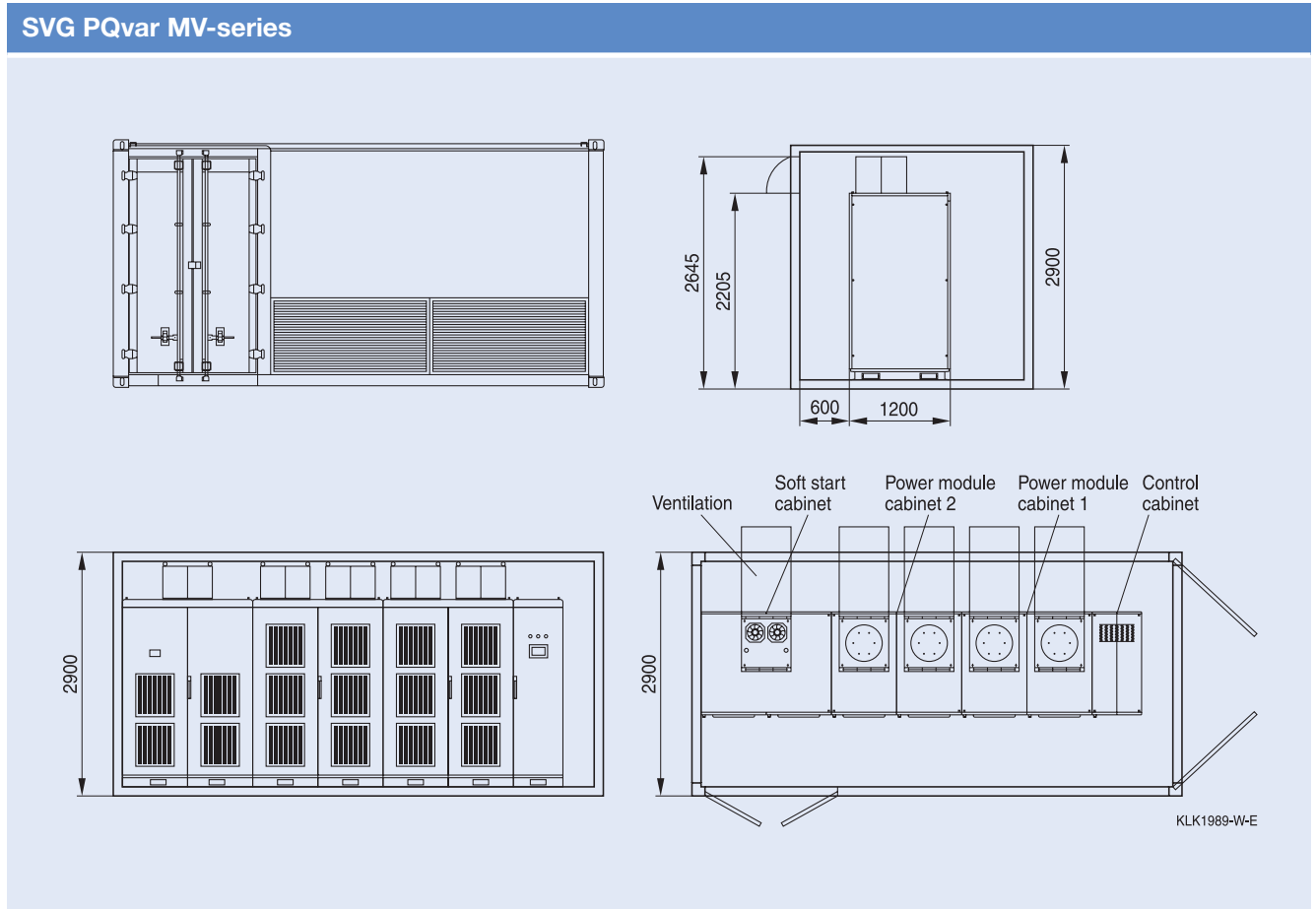
## 35 kV SVG PQvar Series – 3P3W systems<sup>1)</sup>

Type	Rated module reactive power kvar	Voltage class kV	Mounting variant	Approx. weight kg	Approx. dimensions (W x D x H) <sup>2)</sup> mm	Ordering code
PQSF6020X351	2000	35	Floor-mounted	3500	4800 x 1200 x 2200	B44066F6020X351
PQSF6030X351	3000	35	Floor-mounted	3500	4800 x 1200 x 2200	B44066F6030X351
PQSF6040X351	4000	35	Floor-mounted	3500	7000 x 1200 x 2200	B44066F6040X351
PQSF6050X351	5000	35	Floor-mounted	3500	7000 x 1200 x 2200	B44066F6050X351
PQSF6060X351	6000	35	Floor-mounted	5500	7000 x 1200 x 2200	B44066F6060X351
PQSF6070X351	7000	35	Floor-mounted	5500	7000 x 1200 x 2200	B44066F6070X351
PQSF6080X351	8000	35	Floor-mounted	5500	7000 x 1200 x 2200	B44066F6080X351
PQSF6090X351	9000	35	Floor-mounted	7200	7000 x 1200 x 2600	B44066F6090X351
PQSF6100X351	10000	35	Floor-mounted	7200	7000 x 1200 x 2600	B44066F6100X351
PQSF6120X351	12000	35	Floor-mounted	7200	7000 x 1200 x 2600	B44066F6120X351

<sup>1)</sup> Transformer must be used additionally (35/6 kV or 35/10 kV)

<sup>2)</sup> Dimensions are only for SVG modules without transformers

# Medium-Voltage Static Var Generator (SVG) PQvar MV-Series



## E.g. B44066F6050X061

Code for SVG PQvar series MV

Connection: 6 for 3-wire (3P3W)

Module: 20 for 2000 kvar/ 35 for 3500 kvar/ ...

Version number

1 for panel/ 2 for container

Rated voltage: e.g. 6 for 6 kV/ 10 for 10 kV/ 35 for 35 kV

### Display of ordering codes for EPCOS products

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Edition 04/2018 · Ordering No. EPC:26071-7600 · Printed in Germany · PB 04181.