Active harmonic filter

BLUEWAVE

The active harmonic filter BLUEWAVE analyzes the measured consumer current in terms of the phase length and harmonic proportion. After this is calculated, an inverted current signal with the same spectrum is fed into the relevant current node point. BLUEWAVE thereby controls the mains current in terms of minimal mains pollution and harmonics currents. This guarantees an optimal network quality without other consumers being impaired in their function.

BLUEWAVE 200 A / 250 A / 300 A
The largest model, for industrial purposes, provides the highest possible power in a compact space. The cabinet version contains interior air cooling and internal fluid cooling for the power electronics.

BLUEWAVE 30 A / 50 A (3-wire)
Space-saving through compact construction and with a power dissipation of only 1300 W, extremely economical.

BLUEWAVE 30 A / 60 A (4-wire)
Compensates the harmonics occurring in the neutral conductor. Optimal for building engineering due to low noise development.

BLUEWAVE 100 A / 120 A
The perfect standard solution in 3 and 4-wire networks with central coupling to the consumer.

BLUEWAVE

Power	**30 – 300 A** **400 – 480 V**
Technology	**3 / 4-wire**

BLUEWAVE 30A / 50 A (3-wire)

BLUEWAVE 30A / 60 A (4-wire)

Active harmonics filter

Highlights

- → Power from 30 A to 300 A
- → Uprating through parallel switching (up to 5 devices)
- → Extremely fast reaction time of less than 300 µs
- → Easy and space-saving installation through compact construction
- → Fully digitized controls
- → IP 54 standard ensures protection against dust and environmental influences
- → Automatic adjustment to network topologies and targeted compensation of individual disruption patterns

An overall view of **technical details** can be found on pages 188/189.

BLUEWAVE 100A / 120 A

BLUEWAVE 200A / 250 A / 300 A

Suitable products for every requirement

BLUEWAVE 30A / 50A (3-wire)
Even the smallest version of BLUEWAVE guarantees compensation of harmonics up to the 50th harmonic, as well as reactive energy. Small dimensions and low weight enable a simple and space-saving installation in every situation: both wall-mounted and switchgear cabinet are possible up to protection type IP 54. With a power dissipation of only 1300 W, this model is extremely economical. The reaction time of less than 300 µs in the UltraFast mode makes it possible to optimally compensate even dynamic consumers.

BLUEWAVE 30A / 60A (4-wire)
BLUEWAVE 30A / 60A also compensates the harmonics occurring in the neutral and is particularly suitable for compensating the third harmonic and all those above that dividable by three, up to the 50th harmonic. Due to its low noise development, this device is ideal for building technology – e.g. for banks, computer centers and hospitals.

BLUEWAVE 100A / 120A
Although hardly larger in weight and size than the compact versions of BLUEWAVE, this device is dimensioned for a current strength twice as high. This makes this filter at an excellent solution for all those who require more power and are looking for a central coupling to their consumers. The 3 and 4-wire technology enables it to be used in almost all surroundings.

BLUEWAVE 200A / 250A / 300A
Dimensioned for a current strength up to 300 amps, this version of BLUEWAVE is suitable for the highest technical requirements as can be found in large production plants – for example in the automobile industry. So that it can work reliably even under extrem conditions, the filter in the cabinet version contains an interior air fan and in addition has an internal fluid cooling for the power electronics, with an integrated water-air heat exchanger.

BLUEWAVE

The solution for better network quality

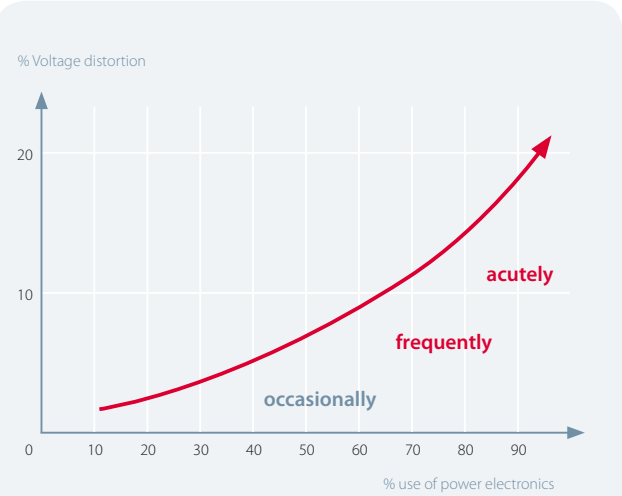
Situation:

There is a quality problem in the energy network of many companies.

Safety and cost-effectiveness are central factors in companies. One prerequisite of this is that technical infrastructures in the form of machines, production systems or office equipment function without trouble. This is often not the case: usually without a directly apparent reason, and despite UPS back-up and emergency generators. The consequences are:

- → **Distribution lines and networks cannot be fully utilized**
- → **High percentage of energy losses in the networks**
- → **Increased wear and tear and limited availability of systems**
- → **Downtime for units and systems**

Often the reason for breakdowns and premature wear and tear are power quality problems in the internal energy network. Measurements and network analyses can often detect the sources of the underlying problem.



A clear global tendency: Voltage distortion increases along with the growing use of power electronics.

A clearly constructed and easily readable display represents the values.

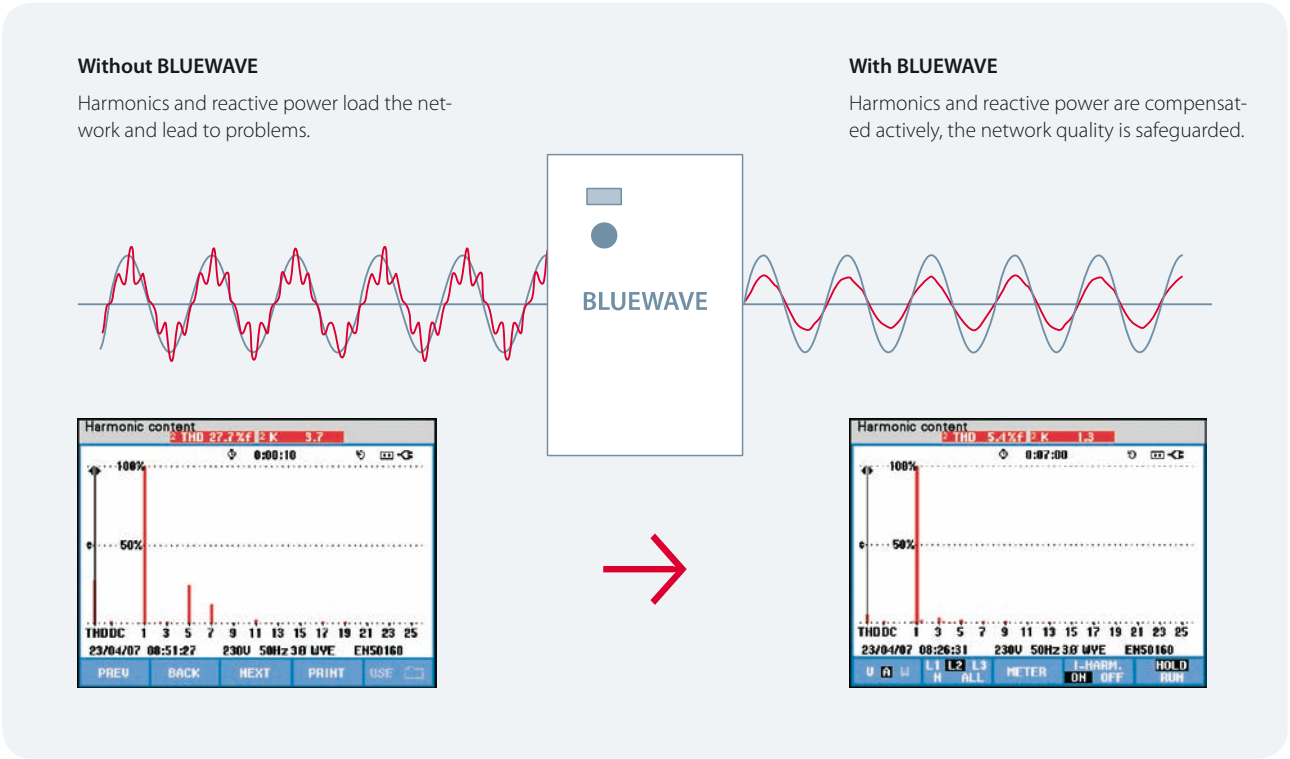
Solution:

BLUEWAVE eliminates harmonic and reduces the costs for reactive power

Nearly all non-linear consumers in the industrial world cause massive voltage distortions of the original pure sinus curve. This is where BLUEWAVE is applied. Harmonic up to the 50th harmonic, as well as cost intensive reactive power, are eliminated directly and reliably. This ensures a high network quality and reduces costs. Even saving reactive power is reflected in lower operating costs. Savings made as a consequence of lower equipment wear, fewer error searches or the prevention of production stoppages have a significantly higher impact. For this reason, BLUEWAVE pays for itself within a short time.

The advantages

As an active harmonic filter of the newest generation, BLUEWAVE offers many advantages over conventional technology. BLUEWAVE is powerful, compact and fully digital, reacts within microseconds and reliably compensates current harmonics and reactive power. With these features, the active harmonic filter presents itself as an all-in-one device for excellent power quality



→ **Compact models for every requirement**
Whether building technology or automation technology: with its extensive range of models, BLUEWAVE is ideal for the most diverse applications. Versions of the devices range from 30 to 300 Ampere and 380 to 480 Volts – and this in 3 or 4-wire technology.

→ **Rapid compensation almost in real-time**
The faster an active harmonic filter reacts to disruptions in the network, the more exactly does it compensate them. Since BLUEWAVE is fully digital, a reaction time of less than 300 microseconds is possible. This way, BLUEWAVE ensures an excellent power quality and protects network components, cables and machines.

→ **Resistant towards external influences**
In industrial environments, clean room atmospheres do not always prevail. The high-tech components in BLUEWAVE are therefore protected from external influences. The 30 and 50-Ampere versions are equipped by default with protection type IP20, and thus protected from dust. The 300 Ampere version also resists spray water, thanks to protection class IP54.

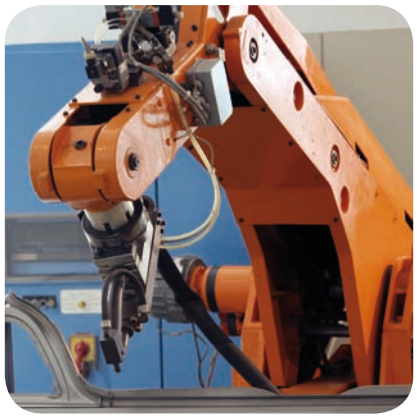
→ **High-performance in a confined space**
In comparison with other active power filters, BLUEWAVE requires little space. In its 50-Ampere version, the device has external dimensions of only 36 x 59 x 29 cm and weighs less than 50 kg. This makes wall assembly possible without any problems.

BLUEWAVE

Areas of deployment

The number of companies and institutions that could clearly optimize their network quality with BLUEWAVE is huge. An efficient use of the active harmonic filter and building technology, as well as in machine and automation technology, is highly recommended. It makes sense to include the device in the planning and implementation stages of new systems. Of course BLUEWAVE can be intelligently integrated into existing systems and plants in which power quality problems occur.

- → **Building technology**
- → **Lifts**
- → **Computer centers**
- → **Machines and drives**



- → **Automobile industry**
- → **Oil and gas drilling rigs**
- → **Paper industry**
- → **Ship engines**
- → **Welding equipment**
- → **Steel industry**

- → **Tunnel ventilation systems**
- → **Uninterruptible power supplies (UPS)**
- → **Water purification plants**
- → **Wind turbines**
- → **Cement industry**

Operating comfort

→ **Click-and-start configuration**

BLUEWAVE demonstrates flexibility in the fact that it can be coupled on the load or network side to the energy supply via a numerous of current transformers. Configured with just a few clicks, the existing network current is permanently measured, and any harmonics or phase shifts that occur are actively compensated. Within microseconds, BLUEWAVE calculates the appropriate compensation currents, makes these available and feeds them into the network. Fully digitized controls make this possible, along with a high level of computer processing power.

→ **Multilanguage menu and control via software**

Using a multi-language, menu-guided operating panel and display, the setup, selection and adjustment of individual parameters is very user-friendly for all BLUEWAVE device types. With the BLUETRACE firmware, installation and maintenance can be performed conveniently via PC. In remote operation via Ethernet and TCP/IP interface, the current status of the network quality can optionally be retrieved online, so that adjustments can be made.

The service solutions

→ **Individual solutions and comprehensive service**

So that you can find the optimal solution for excellent network quality, KBR is at your service as a competent BLUEWAVE system partner: from consultation about the network analysis and planning down to implementation and after sales service. **24 months warranty** from KBR provide you with additional security.

→ **Safe energy supply**

In accordance with the new German low-voltage connection directive (NAV), grid subscribers in Germany must operate their devices so that disruptions to other subscribers are ruled out. Otherwise the network operator is allowed to interrupt connections without any warning, to prevent disruptive feedback effects on systems of the network operator or other connection participants. Energy-consuming companies and institutions are for this reason forced to check their internal networks and ensure that limiting values are maintained. With BLUEWAVE, specified deviations can be reduced so that the value again lies within tolerance. This provides more safety.

BLUEWAVE Technical details

DEVICE TYPE	3-WIRE	BLUEWAVE 030-480-3	BLUEWAVE 050-480-3	–
	4-WIRE	BLUEWAVE 030-400-4	–	BLUEWAVE 060-400-4
COMPENSATION CURRENT	3-wire	30 A	50 A	–
	4-wire	30 / 90 A	–	60 / 180 A
SWITCHING FREQUENCY		16 kHz		
OVERLOAD CAPACITY [1]		75 A for 10 ms	125 A für 10 ms	150 A für 10 ms
COOLING TYPE		Air cooling		
AMBIENT TEMPERATURE		40 °C [3]		30 °C [3]
PARALLEL OPERATION		With up to five devices		
INTERFACES		Modbus RTU (RS485), Modbus TCP/IP (Ethernet)		
POWER DISSIPATION	3-wire	< 900 W	< 1.300 W	–
	4-wire	< 950 W	–	< 1800 W
COOLING AIR REQUIREMENT fan speed-controlled	3-wire	< 350 m³ / h	< 550 m³ / h	–
	4-wire	< 400 m³ / h	–	< 600 m³ / h
NOISE LEVEL (1m)	3-wire	65 dBA	65 dBA	–
	4-wire	63 dBA	–	63 dBA
FILTER CAPACITY		Up to 50th harmonic number		
INSTALL HEIGHT		1.000 m / derating bis 4.000 m, 1 % / 100 m		
MAINS VOLTAGE	3-wire	380 V (AC) ± 15 % ... 480 V (AC) ± 10 %		
	4-wire	380 V (AC) ± 15 % ... 415 V (AC) ± 10 %		
MAINS FREQUENCY		47 bis 63 Hz		
REACTION TIME		300 µs		
CONTROLLER TOPOLOGY		Digital with FFT analysis		
CURRENT RESTRICTION		Rated current		
CURRENT TRANSFORMER		100 : 5 bis 50.000 : 5		
DIMENSIONS (H x W x D in mm)	3-wire	360 x 590 x 290	360 x 590 x 290	–
	4-wire	415 x 840 x 300	–	415 x 840 x 300
WEIGHT	3-wire	47 kg	47 kg	–
	4-wire	70 kg	–	70 kg
MODE OF PROTECTION		Standard IP20, optional IP54		
REGISTRATION		CE, UL [5]		

[1] peak value [2] Derating to 40 °C, 1.2 % / K [3] Derating to 55 °C [4] Other network voltages on request [5] UL only for 3-phase types
[6] Available as version without UL license (FN 3420-xxx-480-3) and as UL-listed version (FN 3420-xxx-480-3-UL) – Not available

	BLUEWAVE 100-480-3 BLUEWAVE 100-400-4	BLUEWAVE 120-480-3 BLUEWAVE 120-400-4	BLUEWAVE 200-480-3 BLUEWAVE 200-400-4	BLUEWAVE 250-480-3 BLUEWAVE 250-400-4	BLUEWAVE 300-480-3 BLUEWAVE 300-400-4
	100 A	120 A	200 A	250 A	300 A
	100 / 300 A	120 / 360 A	200 / 600 A	250 / 750 A	300 / 750 A
	16 kHz				
	250 A for 10 ms	250 A for 10 ms	500 A for 10 ms	625 A for 10 ms	750 A for 10 ms
	Air cooling		Air cooling (internal fluid cooling)		
	40 °C [3]	30 °C [2,3]	40 °C [3]		
	With up to five devices				
	Modbus RTU (RS485), Modbus TCP/IP (Ethernet)				
	< 2.200 W	< 2.500 W	< 5.000 W	< 6.000 W	< 7.500 W
	< 3.000 W	< 3.000 W	< 5.500 W	< 6.300 W	< 8.500 W
	< 1.400 m^3 / h	< 1.400 m^3 / h	< 2.600 m^3 / h	< 3.100 m^3 / h	< 3.400 m^3 / h
	< 1.700 m^3 / h	< 1.700 m^3 / h	< 2.800 m^3 / h	< 3.300 m^3 / h	< 3.600 m^3 / h
	68 dBA	68 dBA	70 dBA	70 dBA	70 dBA
	69 dBA	69 dBA	70 dBA	70 dBA	70 dBA
	Up to 50th harmonic number				
	1,000 m / derating to 4.000 m, 1 % / 100 m				
	380 V (AC) ± 15 % ... 480 V (AC) ± 10 %		50 Hz: 380 V (AC) ± 15 % ... 415 V (AC) ± 10 % 60 Hz: 480 V (AC) ± 10 %		
	380 V (AC) ± 15 % ... 415 V (AC) ± 10 %		50 Hz: 380 V (AC) ± 15 % ... 415 V (AC) ± 10 %		
	47 to 63 Hz		50 Hz or 60 Hz ± 5 %		
	300 µs				
	Digital with FFT analysis				
	Rated current				
	100 : 5 to 50,000: 5				
	468 x 970 x 412	468 x 970 x 412	800 x 2.000 x 600 Height plus base (200 mm standard) Depth including heat exchanger 760 mm		
	468 x 1460 x 412	468 x 1460 x 412			
	150 kg	150 kg	415 kg	415 kg	415 kg
	145 kg	145 kg	495 kg	495 kg	495 kg
	Standard IP20, optional IP54		IP54		
	CE, UL [5]	–	CE, UL [5,6]		