

Active harmonic filters (AHF)

Active harmonic filters (AHF) are the ultimate answer to power quality problems and grid code requirements for a wide range of segments and applications. They are a high performance, flexible, compact, modular and cost-effective type of active power filters (APF) that provide an instantaneous and effective response in low or high voltage electric power systems. They enable longer equipment lifetime, higher process reliability, improved power system capacity and stability, and reduced energy losses, complying with most demanding power quality standards and grid codes.



AHF module rated 400 V 50/60 Hz 120 A

AHFs eliminate waveform distortions from the loads like harmonics, interharmonics and notching, by injecting in real-time in the electric power system the distorted current of same magnitude but opposite in phase. They can also work as harmonic generators for harmonic injection testing purposes. In addition, AHFs can take care of several other power quality problems and grid ancillary services by combining different functions in a single device.

Power quality	improvement capabilities	Solution
Waveform	Harmonics	Primary
distortions	Interharmonics	Primary
	Notching	Secondary
Short	Voltage sags	Primary
duration	Voltage swells	Primary
variations	Interruptions	None
Long	Undervoltages	Secondary
duration	Overvoltages	Secondary
variations	Sustained interruptions	None
Transients	Impulsive transients	Secondary
	Oscillatory transients	Secondary
Other power	Voltage unbalances	Primary
quality	Voltage fluctuations (flicker)	Primary
problems	Power frequency variations	None
	Low power factor (lag. or lead.)	Primary
Grid ancillary	services	Solution
Voltage	Voltage control	None
support	Reactive power control	Primary
	Power factor control	Primary
	Fast reactive current injection	Secondary
	Low voltage ride through (LVRT)	None
	High voltage ride through (HVRT)	None

Highlights

- Specifications from 50 A to 200 A (200-690 V) in 3- and 4-wire systems can be covered by a single module. Unlimited amount of AHF modules can be connected in parallel.
- Simple connection to high voltage systems.
- 3-level NPC inverter topology reduces losses, noise, size and extends module's lifetime.
- Overall response time <100 microseconds.
- Elimination of harmonic and interharmonic currents up to the 50th order (odd and even).
- Instantaneous, precise & stepless power factor correction of inductive and capacitive loads.
- Load balancing and unloading of neutral wires.
- Capability of switching contactors or thyristor switches of detuned filter capacitor bank steps.
- Compact and modular design optimized for installation, commissioning and maintenance.
- Remote monitoring & analysis capability / IIoT.

Typical segments

AHFs can be applied to small, medium or large applications in a wide range of segments.

Markets	Segments	Applications
Smart grid	Renewable generation	Primary
	Non-renewable generation	Secondary
	Transmission & distribution	Secondary
	Microgrids	Secondary
Raw material	Mining	Primary
extraction &	Oil & gas	Primary
processing	Minerals & cement	Primary
	Steel & metals	Primary
Manufacturing	Conventional manufacturing	Primary
&	Critical process industries	Primary
infrastructure	Transport	Primary
	Water & wastewater	Primary
Green	Healthcare facilities	Primary
buildings &	Critical process facilities	Primary
smart cities	Industrial & office facilities	Primary
	Retail & leisure facilities	Primary

Typical applications

AHFs have many low and high voltage potential applications where their use offers many benefits.

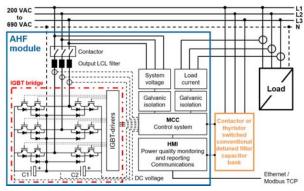
- Equipment using variable speed drives (VSD).
- Arcing devices: Electric arc furnaces (EAF), ladle furnaces (LF) and arc welders.
- Switch mode power supplies: Computers, TVs, photocopiers, printers, air cons, PLCs, etc.
- Battery chargers (incl. EV charging stations).
- Off-line, on-line & line-interactive UPS systems.
- Medical devices: MRI scanners, CT scanners, X-rays machines and linear accelerators.
- Lighting devices: LED, fluorescent, mercury vapor, sodium vapor & ultraviolet (UV) lamps.
- Solar inverters and wind turbine generators.
- Modulated phase controllers, cycloconverters and thyristor-controlled AC voltage regulators.
- Saturable/rotating devices: Induction heaters, transformers, generators, reactors and motors.

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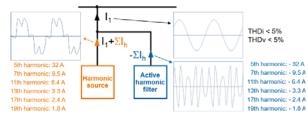
Design and operating principle

An AHF is a power electronics-based device connected in parallel with the load. The AHF works as a controlled current source providing any kind of current waveform in real time.



Typical design of an AHF for direct low voltage connection

AHFs monitor the currents of the load and compensate produced harmonic and interharmonic currents by generating a compensation current for each selected order in phase opposition. The result is a reduction on the levels of harmonics and interharmonics of the installation to the requested limit by the customer.



AHF operating principle

Comparison with conventional solutions

Switching, transients and resonance reduce lifetime.

Passive harmonic filters Active harmonic filters Response Contactor switched solutions take 30 s to 40 s to mitigate the problem and thyristor switched solutions 20 ms to 30 ms. time Depends on step sizes, cannot match load demand in real Output Depends on grid voltage as capacitor units & reactors are u Steps inject extra capacitive reactive power in the system. Harmonic One filter needed for eliminating each single harmonic orde filtering Characteristics affected by network impedance and unbala Power factor Capacitor banks needed for inductive loads and shunt react correction banks for capacitive loads (problems in mixed loads' syster Not possible to guarantee unity power factor as they have s system will be having continuous over and undercompensa Sags, swells Do not correct sags, swells or flicker. & flicker Unbalance Do not correct load unbalance. **Design &** Extensive harmonic studies needed to size the proper solut Usually oversized to better adjust to changing load demand sizing Need to be designed considering system harmonics. Custom-built for specific load and network conditions. Resonance Parallel or series resonance can amplify currents in the sys Transients Created if switching not synchronised with the system wave Overloading Possible due to slow response and/or variation of loads. Footprint & Medium to large footprint, especially if several harmonic or installation Not simple installation, especially if loads upgraded frequen Expansion Limited and depends on load conditions and network topolo Maintenance Using components that need extensive maintenance like fu & lifetime circuit breakers, contactors, reactors and capacitor units.

Benefits

The main benefits of AHFs are:

- Optimized design for system integrators and OEMs for building together with VSDs cost efficient low harmonic drives with low losses.
- Simple dimensioning and installation.
- Lower system losses and higher efficiency.
- Reduced production or installation downtime.
- Increased lifetime of electrical equipment.
- Better use of transformers and generators.
- Controlled and selectable harmonic generation.
- · Can automatically adapt to changing load conditions and network topologies.
- Compliance with the strictest power quality standards and grid codes including G5/4, IEEE 519, IEC 61000, GOST 13109 and EN 50160.



AHF rated 415 V 50/60 Hz 400 A

	Active narmonic filters
he	Real-time mitigation of power quality problems as the overall response time is less than 100 μ s.
time. used.	Instantaneous, continuous, stepless and seamless. Grid voltage fluctuation has no influence on the output. No injection of extra capacitive reactive power.
er. Ince.	2nd to the 50th order simultaneously (odd and even). Unaffected by network impedance or unbalance.
ctor ms). steps, ation.	Corrects simultaneously from -1 to +1 power factor of lagging (inductive) and leading (capacitive) loads. Guaranteed unity power factor at all times without any over or undercompensation (stepless output).
	Reduction of voltage variations & mitigation of voltage fluctuations via instantaneous reactive power injection.
	Can correct by selecting the amount of load balancing.
ition. ds.	Not required extensive studies as it is adjustable. Mitigation capacity can be exactly what load demands. Unaffected by harmonic distortion in the system. Can adapt to load and network conditions & changes.
stem.	No risk of harmonic resonance with the network.
eform	Transient free switching.
	Not possible as current limited to max. RMS current.
ders. ntly.	Small footprint and simple installation as modules are compact in size. Existing switchgear can be used.
ogy.	Simple (and not dependant) by adding modules.
uses,	Simple maintenance and service life up to 15 years as there is no electro-mechanical switching and no risk of transients or resonance.



Technical specifications – 200-480 VAC devices

LOOSE MODULES	A2-50	A2-60	A2-75	A2-100	A2-120	A2-150	A2-200
Rated voltage	200-480	VAC +/-10% (au	to sensing). Con	Electrical ratings nection to higher voltage	s through suitab	le YvΩ sten-un trans	former
Rated frequency	200-400	VAC 1/-10/0 (au	to sensing). Com	50/60 Hz (auto sensing)			ionner.
Phase RMS current output	50 A	60 A	75 A	100 A	120 A	150 A	200 A
Neutral RMS current output	150 A	180 A	225 A	300 A	360 A	450 A	600 A
				Electrical features			
Reaction / response time	Reaction time <			se time <100 microsecor			ectable mode).
Electrical system compatibility Earthing systems				480 VAC) and 3-phase 4 S, corner ground, centre			
Inverter features	3-loval N			oltage link (DC electroly			20 kHz
Controller / redundancy				r/master arrangement).			
Protection functions				lervoltage, overtemperat			•
Stand-by & AutoStart	Stand-by stops the	e IGBTs if require		current is below a limit. A		automatic start after	a network failure.
Remote discrete control			Ren	note stand-by, start and	stop.		
Operation modes		All horr	nonico / All horme	Functions onics but not fundament	al / Salaatabla b	armonico	
Harmonic filtering	2nd to 50th ha			ionics). Fully selectable			armonic order
				n on most complex mixe			innome order.
				ove 50% of module ration			uctive impedance
Interharmonic filtering				e 50th harmonic order (
Power factor correction				ole power factor correction			
Voltage support				and mitigation of voltage			
Load balancing				ses & neutral (programme fundamental system cu			
Harmonic generation function				d for validating the perfo			
			Capacitor ba	nk steps control (HPQ	functionality)		
Operation				thyristor switch modules			
Number of steps and size	6 capa	citor bank steps p	per module. One	digital output can switch	a step rated bet	ween 10 kvar to 200) kvar.
Divital in suite	C notontial fr		(DC an un to 077	Connections		in a second base to	in an alanna
Digital inputs Digital outputs				VAC. 3 inputs can be put be used for trip, alarm,			
Current transformers (CT)				ndary (5 A preferred). Cl			
CT location				id closed loop (CTs in th			
CT polarity	If one or mo	ore CTs are conn	ected with invers	ed polarity, it is possible	to change the lo	pad current polarity i	n the HMI.
Number of CTs required				tion of 1 module: 3 CTs.			
							nount of HMIs.
Connection of parallel modules	Unlimited scala	bility. Parallel op	eration of any rati		modules per or	e HMI. Unimited an	
Connection of parallel modules	Unlimited scala			Interfaces			
Connection of parallel modules HMI / display		7" touch scre	en multilingual gr	Interfaces aphical HMI (new langua	ages can be add	led on request).	
Connection of parallel modules		7" touch scre	en multilingual gr pabilities includin	Interfaces	ages can be add ns from both load	led on request).	
Connection of parallel modules HMI / display	On-site and remo	7" touch scre ote monitoring ca	en multilingual gr pabilities includin Reports data	Interfaces aphical HMI (new langua g waveforms & spectrun of power quality events IP. Software update is p	ages can be add ns from both load up to 30 days.	led on request). d and supply sides, a	and diagnostics.
Connection of parallel modules HMI / display Monitoring and reporting Communications	On-site and remo	7" touch scre ote monitoring ca ernet, USB port a	en multilingual gr pabilities includin Reports data nd Modbus TCP/	Interfaces aphical HMI (new langua g waveforms & spectrun of power quality events IP. Software update is p Mechanical features	ages can be add ns from both loar up to 30 days. ossible via Ether	led on request). d and supply sides, a rnet or USB flash dri	and diagnostics. ve.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement	On-site and remo	7" touch scre ote monitoring ca ernet, USB port a	en multilingual gr pabilities includin Reports data nd Modbus TCP/ e or wall installati	Interfaces aphical HMI (new langua g waveforms & spectrun of power quality events IP. Software update is p Mechanical features on. Designed for pollutic	ages can be add ns from both loar up to 30 days. ossible via Ether on degree 2 with	led on request). d and supply sides, a rnet or USB flash dri conformal coating o	and diagnostics. ve.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features	On-site and remo Ethe Loose module	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl	en multilingual gr pabilities includin Reports data nd Modbus TCP/ e or wall installati Compact IP20 g	Interfaces aphical HMI (new langua g waveforms & spectrun of power quality events IP. Software update is p Mechanical features on. Designed for pollutic alvanized steel enclosur	ages can be add ns from both load up to 30 days. ossible via Ether on degree 2 with re in black colou	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r.	and diagnostics. ve. n all PCBAs.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement	On-site and remo Ethe Loose module	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl	en multilingual gr pabilities includin Reports data nd Modbus TCP/ e or wall installati Compact IP20 g	Interfaces aphical HMI (new langua g waveforms & spectrun of power quality events IP. Software update is p Mechanical features on. Designed for pollutic	ages can be add ns from both load up to 30 days. ossible via Ether on degree 2 with re in black colou	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r.	and diagnostics. ve. n all PCBAs.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load)	On-site and remo Ethe Loose module Forced air	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl r by easy to servi 60 dB	en multilingual gr. pabilities includim, Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ce automatically of 64 dB	Interfaces aphical HMI (new langus g waveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutio alvanized steel enclosus controlled DC cooling far <2.3% 64 dB	ages can be add ns from both loar up to 30 days. ossible via Ether n degree 2 with re in black colou ns adjusted by m 65 dB	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB	and diagnostics. ve. n all PCBAs. ria PWM. 68 dB
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Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load)	On-site and remo Ethe Loose module Forced air	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl r by easy to servi 60 dB	en multilingual gr pabilities includin Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ce automatically o 64 dB 225x850x500m 70 kg	Interfaces aphical HMI (new languz g waveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutic alvanized steel enclosus controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg	ages can be add ns from both loar up to 30 days. ossible via Ether on degree 2 with re in black coloui ns adjusted by m 65 dB 225x850x500mm 70 kg	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB	and diagnostics. ve. n all PCBAs. ria PWM. 68 dB
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Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WXHxD) Weight Temperature (without derating)	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl r by easy to servit 60 dB 225x850x500mm 70 kg	en multilingual gr pabilities includin Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg	Interfaces aphical HMI (new languz g waveforms & spectrum of power quality events. IP. Software update is p Mechanical features on. Designed for pollutic alvanized steel enclosu controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg nstallation and operatid +5°C to +40°C.	ages can be add ns from both load up to 30 days. ossible via Ether on degree 2 with re in black colou ns adjusted by m 65 dB 225x850x500mm 70 kg on	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 1 225x1150x500mm 110 kg	and diagnostics. ve. n all PCBAs. //a PWM. 68 dB 225x1150x500mr 110 kg
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Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WxHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Needed airflow for the module Ventilation requirements External fuses (NH00)	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl r by easy to servin 60 dB 225x850x500mm 70 kg num ambient ratir 350 m ³ /h	en multilingual gr pabilities includin Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg In ngs during operati 400 m ³ /h	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutic alvanized steel enclosur controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg mstallation and operatif +5°C to +40°C. on: Temperature +50°C Up to 1000 m. 450 m³/h v and above the module gL/gG 125 A	ages can be add ns from both load up to 30 days. ossible via Ether on degree 2 with re in black coloui sa adjusted by m 65 dB 225x850x500mm 70 kg on and humidity 85 500 m ³ /h	ied on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 1 225x1150x500mm 110 kg 5% RH (non-conden: 750 m³/h	and diagnostics. ve. n all PCBAs. /ia PWM. 68 dB 225x1150x500mi 110 kg sing).
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WXHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Needed airflow for the module Ventilation requirements	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl r by easy to servio 60 dB 225x850x500mm 70 kg num ambient ratir 350 m³/h 300mm	en multilingual gr pabilities includin Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg 10 10 10 kg 10	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutic alvanized steel enclosus controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg nstallation and operatit +5°C to +40°C. On: Temperature +50°C Up to 1000 m. 450 m³/h and above the module gL/gG 125 A Top or bottom.	ages can be add up to 30 days. ossible via Ether on degree 2 with re in black colouins adjusted by m 65 dB 225x850x500mm 70 kg on and humidity 85 500 m³/h required for air v gL/gG 160 A	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. oodule temperature v 67 dB 225x1150x500mm 110 kg 5% RH (non-conden: 750 m³/h ventilation.	and diagnostics. ve. n all PCBAs. //a PWM. 68 dB 225x1150x500mr 110 kg sing). 1000 m³/h
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WxHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Needed airflow for the module Ventilation requirements External fuses (NH00) Cable entry	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h	7" touch scre ote monitoring ca ernet, USB port a e ready for cubick t by easy to servit 60 dB 225x850x500mm 70 kg num ambient ratir 350 m³/h 300mm gL/gG 80 A	en multilingual gr pabilities includin Reports data nd Modbus TCP/ e or wall installati Compact IP20 g be automatically of 64 dB 225x850x500m 70 kg In ngs during operati 400 m ³ /h free space below gL/gG 100 A	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutic alvanized steel enclosur controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg mstallation and operatif +5°C to +40°C. on: Temperature +50°C Up to 1000 m. 450 m³/h v and above the module gL/gG 125 A	ages can be add ns from both load up to 30 days. ossible via Ether on degree 2 with re in black colou s adjusted by m 65 dB 225x850x500mm 70 kg on and humidity 85 500 m ³ /h required for air w gL/gG 160 A ons	ied on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature of 67 dB 1225x1150x500mm 110 kg 5% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A	and diagnostics. ve. n all PCBAs. //a PWM. 68 dB 225x1150x500mr 110 kg sing). 1000 m³/h
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WxHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Needed airflow for the module Ventilation requirements External fuses (NH00)	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h gL/gG 63 A	7" touch scre ote monitoring ca ernet, USB port a e ready for cubick r by easy to servie 60 dB 225x850x500mm 70 kg num ambient ratir 350 m³/h 300mm gL/gG 80 A	en multilingual gr pabilities includin; Reports data nd Modbus TCP/ e or wall installatii Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg In ags during operati 400 m³/h free space below gL/gG 100 A St Electrical safety: compatibility: Emi	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutio alvanized steel enclosus controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg nstallation and operatif +5°C to +40°C. 01 Temperature +50°C Up to 1000 m. 450 m³/h r and above the module gL/gG 125 A Top or bottom. andards and certificati EN 50178, UL 508 and (ssions EN/IEC 61000-6:	ages can be add ns from both load up to 30 days. ossible via Ether on degree 2 with re in black colouins adjusted by m 65 dB 225x850x500mm 70 kg on and humidity 85 500 m ³ /h required for air v gL/gG 160 A ONS CSA C22.2 No. 1 4 and immunity	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 225x1150x500mm 110 kg 5% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A	and diagnostics. ve. n all PCBAs. via PWM. 68 dB 225x1150x500mr 110 kg sing). 1000 m³/h gL/gG 250 A
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WxHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Needed airflow for the module Ventilation requirements External fuses (NH00) Cable entry Design standards Compliance directives	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h gL/gG 63 A	7" touch scre ote monitoring ca ernet, USB port a e ready for cubick r by easy to servie 60 dB 225x850x500mm 70 kg num ambient ratir 350 m³/h 300mm gL/gG 80 A	en multilingual gr pabilities includin; Reports data nd Modbus TCP/ e or wall installatii Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg In ags during operati 400 m³/h free space below gL/gG 100 A St Electrical safety: compatibility: Emi	Interfaces aphical HMI (new languz gwaveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutic alvanized steel enclosus controlled DC cooling far <2.3% 64 dB m 225x850x500m 2 70 kg mstallation and operatit +5°C to +40°C. 0n: Temperature +50°C Up to 1000 m. 450 m³/h and above the module gL/gG 125 A Top or bottom. andards and certificati EN 50178, UL 508 and (U, RoHS 2011/65/EU, V	ages can be add ns from both load up to 30 days. ossible via Ether on degree 2 with re in black colouins adjusted by m 65 dB 225x850x500mm 70 kg on and humidity 85 500 m ³ /h required for air v gL/gG 160 A ONS CSA C22.2 No. 1 4 and immunity	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 225x1150x500mm 110 kg 5% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A	and diagnostics. ve. n all PCBAs. via PWM. 68 dB 225x1150x500mr 110 kg sing). 1000 m³/h gL/gG 250 A
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Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WXHXD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without d	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h gL/gG 63 A	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicle r by easy to servin 60 dB 225x850x500mm 70 kg num ambient ratir 350 m³/h 300mm gL/gG 80 A Electromagnetic c 2014/35/EU, EM	en multilingual gr pabilities including Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg 10 400 m³/h free space below gL/gG 100 A St Electrical safety: compatibility: Emi //EMC 2014/30/E Mo to sensing). Conr iossible. Unlimited	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events. IP. Software update is p Mechanical features on. Designed for pollutic alvanized steel enclosur controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg m225x850x500mm 2 70 kg m225x850x500mm 2 70 kg m3tallation and operatif +5°C to +40°C. on: Temperature +50°C Up to 1000 m. 450 m³/h r and above the module gL/gG 125 A Top or bottom. andards and certificati EN 50178, UL 508 and 0 ssions EN/IEC 61000-6 U, RoHS 2011/65/EU, W CE, UL, RoHS. dules installed in cubi Electrical ratings nection to higher voltage d parallel operation of ar ectrical features (cubi 2.5 kV/1 min 6 kV o select the protection le	ages can be add ns from both load up to 30 days. ossible via Ether in degree 2 with re in black colouins adjusted by m 65 dB 25x850x500mm 70 kg on and humidity 85 500 m ³ /h required for air v gL/gG 160 A CSA C22.2 No. 1 4 and immunity VEEE 2012/19/E cles is through suitab y rating combini- cle)	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 225x1150x500mm 110 kg 5% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2.	and diagnostics. ve. n all PCBAs. ria PWM. 68 dB 225x1150x500mr 110 kg sing). 1000 m³/h gL/gG 250 A 009/125/EC.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WxHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Max. temperature & humidity Altitude (without derating) Needed airflow for the module Ventilation requirements External fuses (NH00) Cable entry Design standards Compliance directives Certifications ASSEMBLED MODULES Rated voltage RMS current output Power frequency voltage test Impulse withstand voltage	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h gL/gG 63 A	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicle r by easy to servin 60 dB 225x850x500mm 70 kg num ambient ratir 350 m³/h 300mm gL/gG 80 A Electromagnetic c 2014/35/EU, EM	en multilingual gr pabilities including Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg In 225x850x500m 70 kg In 225x850x500m 70 kg In 400 m ³ /h free space below gL/gG 100 A St Electrical safety: I compatibility: Emi /EMC 2014/30/E Mo to sensing). Com rossible. Unlimited Elecal regulations	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutio alvanized steel enclosu controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg mstallation and operati +5°C to +40°C. on: Temperature +50°C Up to 1000 m. 450 m³/h r and above the module gL/gG 125 A Top or bottom. andards and certificati EN 50178, UL 508 and 0 ssions EN/IEC 61000-6: U, RoHS 2011/65/EU, V CE, UL, RoHS. dules installed in cubi Electrical ratings nection to higher voltage d parallel operation of ar ectrical features (cubi 2.5 kV/1 min 6 kV o select the protection le , 16 mm²Cu conductor	ages can be add ages can be add up to 30 days. ossible via Ether in degree 2 with re in black colou as adjusted by m 65 dB 25x850x500mm 70 kg on and humidity 85 500 m ³ /h required for air v gL/gG 160 A ons CSA C22.2 No. 7 -4 and immunity VEEE 2012/19/E cles as through suitab by rating combina cle)	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 225x1150x500mm 110 kg 5% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2.	and diagnostics. ve. n all PCBAs. ria PWM. 68 dB 225x1150x500mi 110 kg sing). 1000 m³/h gL/gG 250 A 009/125/EC.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WxHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Design standards Compliance directives Certifications ASSEMBLED MODULES Rated voltage RMS current output Power frequency voltage test Impulse withstand voltage Power circuit protection Earthing	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h gL/gG 63 A	7" touch scre ote monitoring ca ernet, USB port a e ready for cubick r by easy to servit 60 dB 225x850x500mm 70 kg num ambient ratir 350 m ³ /h 300mm gL/gG 80 A Electromagnetic 2014/35/EU, EM	en multilingual gr pabilities includin, Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg 1 225x850x500m 70 kg 1 400 m³/h free space below gL/gG 100 A St Electrical safety: I compatibility: Emil //EMC 2014/30/E Mo to sensing). Conr iossible. Unlimited al design rule is to local regulations Me	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events. IP. Software update is p Mechanical features on. Designed for pollutic alvanized steel enclosur controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg m225x850x500mm 2 70 kg m225x850x500mm 2 70 kg m3tallation and operatif +5°C to +40°C. on: Temperature +50°C Up to 1000 m. 450 m³/h r and above the module gL/gG 125 A Top or bottom. andards and certificati EN 50178, UL 508 and 0 ssions EN/IEC 61000-6 U, RoHS 2011/65/EU, W CE, UL, RoHS. dules installed in cubi Electrical ratings nection to higher voltage d parallel operation of ar ectrical features (cubi 2.5 kV/1 min 6 kV o select the protection le	ages can be add ages can be add up to 30 days. ossible via Ether on degree 2 with re in black colouins adjusted by m 65 dB 225x850x500mm 70 kg on and humidity 85 500 m ³ /h required for air v gL/gG 160 A ons cSA C22.2 No. 1 4 and immunity VEEE 2012/19/E cles s through suitab y rating combini- cle)	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 225x1150x500mm 110 kg 5% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A 14. EN/IEC 61000-6-2. U and Ecodesign 20 le Yy0 step-up trans ation of modules.	and diagnostics. ve. n all PCBAs. ria PWM. 68 dB 225x1150x500mi 110 kg sing). 1000 m³/h gL/gG 250 A 009/125/EC.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WXHXD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without d	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h gL/gG 63 A	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl r by easy to servit 60 dB 225x850x500mm 70 kg num ambient ratir 350 m ³ /h 300mm gL/gG 80 A Electromagnetic 2014/35/EU, EM	en multilingual gr pabilities including Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ca automatically of 64 dB 225x850x500m 70 kg In ags during operati 400 m³/h free space below gL/gG 100 A St Electrical safety: I compatibility: Emi /EMC 2014/30/E Mo to sensing). Com ossible. Unlimited al design rule is to local regulations Me e-standing cubick indoor installation	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutio alvanized steel enclosur controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg mstallation and operatif +5°C to +40°C. on: Temperature +50°C Up to 1000 m. 450 m³/h r and above the module gL/gG 125 A Top or bottom. andards and certificati EN 50178, UL 508 and 0 ssions EN/IEC 61000-6: U, RoHS 2011/65/EU, W CE, UL, RoHS. dules installed in cubi Electrical ratings nection to higher voltage (parallel operation of ar ectrical features (cubi 2.5 kV/1 min 6 kV o select the protection le , 16 mm²Cu conductor chanical features (cubi 0 (other classes or outdo	ages can be add as from both load up to 30 days. ossible via Ether in degree 2 with re in black colou as adjusted by m 65 dB 25x850x500mm 70 kg on and humidity 85 500 m ³ /h required for air v gL/gG 160 A ons CSA C22.2 No. 1 -4 and immunity VEEE 2012/19/E cles es through suitab by rating combine cle) evel 1.3 times the is the minimum r icle)	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 225x1150x500mm 110 kg 3% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 15. Enominal current of recommended. Iable).	and diagnostics. ve. n all PCBAs. ria PWM. 68 dB 225x1150x500mi 110 kg sing). 1000 m³/h gL/gG 250 A 009/125/EC.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Dimensions (WxHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Max. temperature & humidity Altitude (without derating) Max. temperature & humidity Altitude (without derating) Needed airflow for the module Ventilation requirements External fuses (NH00) Cable entry Design standards Compliance directives Certifications ASSEMBLED MODULES Rated voltage RMS current output Power frequency voltage test Impulse withstand voltage Power circuit protection Earthing Mounting arrangement Enclosure IP class Enclosure material and colour	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h gL/gG 63 A	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl r by easy to servit 60 dB 225x850x500mm 70 kg num ambient ratir 350 m ³ /h 300mm gL/gG 80 A Electromagnetic 2014/35/EU, EM	en multilingual gr pabilities including Reports data nd Modbus TCP/ e or wall installati Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg In 225x850x500m 70 kg In 225x850x500m 70 kg In 400 m ³ /h free space below gL/gG 100 A St Electrical safety: I compatibility: Emi /EMC 2014/30/E Mo to sensing). Com rossible. Unlimited e-standing cubics Me e-standing cubics Me e-standing cubics	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutio alvanized steel enclosu controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg mstallation and operati +5°C to +40°C. on: Temperature +50°C Up to 1000 m. 450 m³/h r and above the module gL/gG 125 A Top or bottom. andards and certificati EN 50178, UL 508 and 0 ssions EN/IEC 61000-6: U, RoHS 2011/65/EU, Y CE, UL, RoHS. dules installed in cubi Electrical ratings nection to higher voltage d parallel operation of ar ectrical features (cubi 2.5 kV/1 min 6 kV o select the protection le , 16 mm² Cu conductor i chanical features (cubi (other classes or outdo y RAL7035 (other matei	ages can be add ages can be add up to 30 days. ossible via Ether in degree 2 with re in black colouins adjusted by m 65 dB 25x850x500mm 70 kg on and humidity 85 500 m ³ /h required for air v gL/gG 160 A ons CSA C22.2 No. 7 -4 and immunity VEEE 2012/19/E cles es through suitab by rating combina cle) wel 1.3 times the is the minimum n icle) bile options avai or installation curials or colours o	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 225x1150x500mm 110 kg 3% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 15. Enominal current of recommended. Iable).	and diagnostics. ve. n all PCBAs. ria PWM. 68 dB 225x1150x500mi 110 kg sing). 1000 m³/h gL/gG 250 A 009/125/EC.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Noise level (at full load) Dimensions (WxHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Compliance (NH00) Cable entry Design standards Compliance directives Certifications ASSEMBLED MODULES Rated voltage RMS current output Power frequency voltage test Impulse withstand voltage Power circuit protection Earthing Mounting arrangement Enclosure IP class Enclosure material and colour Panel thickness and treatment	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h gL/gG 63 A	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl r by easy to servit 60 dB 225x850x500mm 70 kg num ambient ratir 350 m ³ /h 300mm gL/gG 80 A Electromagnetic 2014/35/EU, EM	en multilingual gr pabilities includin; Reports data nd Modbus TCP/ e or wall installatii Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg 10 400 m³/h free space below gL/gG 100 A St Electrical safety: Icompatibility: Emi //EMC 2014/30/E Mo to sensing). Com ossible. Unlimited al design rule is to local regulations Me e-standing cubicle indoor installatior ed steel, light gre	Interfaces aphical HMI (new langua g waveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutio alvanized steel enclosur controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg nstallation and operatif +5°C to +40°C. on: Temperature +50°C Up to 1000 m. 450 m³/h r and above the module gL/gG 125 A Top or bottom. andards and certificati EN 50178, UL 508 and (ssions EN/IEC 61000-6 U, RoHS 2011/65/EU, W CE, UL, RoHS. dules installed in cubi Electrical ratings nection to higher voltage d parallel operation of ar ectrical features (cubi 2.5 kV/1 min 6 kV o select the protection le , 16 mm²Cu conductor i chanical features (cubi (containerized and mo (other classes or outdo y RAL7035 (other mate; m. Epoxy powder coat	ages can be add ages can be add up to 30 days. ossible via Ether on degree 2 with re in black colouins adjusted by m 65 dB 225x850x500mm 70 kg on and humidity 85 500 m³/h required for air v gL/gG 160 A ons cos cos C22.2 No. 1 4 and immunity VEEE 2012/19/E cles sthrough suitab ny rating combini- cle) bile options avai or installation cu- rials or colours o ing.	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 225x1150x500mm 110 kg 3% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 15. Enominal current of recommended. Iable).	and diagnostics. ve. n all PCBAs. ria PWM. 68 dB 225x1150x500mi 110 kg sing). 1000 m³/h gL/gG 250 A 009/125/EC.
Connection of parallel modules HMI / display Monitoring and reporting Communications Mounting arrangement Enclosure features Cooling method Losses (at full load) Dimensions (WxHxD) Weight Temperature (without derating) Max. temperature & humidity Altitude (without derating) Max. temperature & humidity Altitude (without derating) Max. temperature & humidity Altitude (without derating) Needed airflow for the module Ventilation requirements External fuses (NH00) Cable entry Design standards Compliance directives Certifications ASSEMBLED MODULES Rated voltage RMS current output Power frequency voltage test Impulse withstand voltage Power circuit protection Earthing Mounting arrangement Enclosure IP class Enclosure material and colour	On-site and remo Ethe Loose module Forced air 60 dB 225x850x500mm 70 kg Maxim 350 m³/h gL/gG 63 A	7" touch scre ote monitoring ca ernet, USB port a e ready for cubicl r by easy to servit 60 dB 225x850x500mm 70 kg num ambient ratir 350 m ³ /h 300mm gL/gG 80 A Electromagnetic 2014/35/EU, EM	en multilingual gr pabilities includin; Reports data nd Modbus TCP/ e or wall installatii Compact IP20 g ce automatically of 64 dB 225x850x500m 70 kg 10 400 m³/h free space below gL/gG 100 A St Electrical safety: Icompatibility: Emi //EMC 2014/30/E Mo to sensing). Com ossible. Unlimited al design rule is to local regulations Me e-standing cubicle indoor installatior ed steel, light gre	Interfaces aphical HMI (new langua gwaveforms & spectrum of power quality events IP. Software update is p Mechanical features on. Designed for pollutio alvanized steel enclosu controlled DC cooling far <2.3% 64 dB m 225x850x500mm 2 70 kg mstallation and operati +5°C to +40°C. on: Temperature +50°C Up to 1000 m. 450 m³/h r and above the module gL/gG 125 A Top or bottom. andards and certificati EN 50178, UL 508 and 0 ssions EN/IEC 61000-6: U, RoHS 2011/65/EU, Y CE, UL, RoHS. dules installed in cubi Electrical ratings nection to higher voltage d parallel operation of ar ectrical features (cubi 2.5 kV/1 min 6 kV o select the protection le , 16 mm² Cu conductor i chanical features (cubi (other classes or outdo y RAL7035 (other matei	ages can be add ages can be add up to 30 days. ossible via Ether on degree 2 with re in black colouins adjusted by m 65 dB 225x850x500mm 70 kg on and humidity 85 500 m³/h required for air v gL/gG 160 A ons cos cos C22.2 No. 1 4 and immunity VEEE 2012/19/E cles sthrough suitab ny rating combini- cle) bile options avai or installation cu- rials or colours o ing.	led on request). d and supply sides, a rnet or USB flash dri conformal coating o r. nodule temperature v 67 dB 225x1150x500mm 110 kg 3% RH (non-conden: 750 m³/h rentilation. gL/gG 200 A 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 14. EN/IEC 61000-6-2. U and Ecodesign 20 15. Enominal current of recommended. Iable).	and diagnostics. ve. n all PCBAs. ria PWM. 68 dB 225x1150x500mr 110 kg sing). 1000 m³/h gL/gG 250 A 009/125/EC.



Technical specifications – 480-690 VAC devices

OOSE MODULES	A2-50-E	A2-60-E	A2-75-E	A2-100-E	A2-120-E
Rated voltage	480-690 VAC	+/-10% (auto sensina). Co	Electrical ratings Innection to higher voltages	through suitable Yv0 step-	up transformer.
Rated frequency			50/60 Hz (auto sensing).		
hase RMS current output	50 A	60 A	75 A	100 A	120 A
eutral RMS current output	150 A	180 A	225 A Electrical features	300 A	360 A
eaction / response time	Reaction time <50 mid	croseconds / Overall respo	onse time <100 microsecond	ls (1 network cycle if worki	ng in selectable mode)
lectrical system compatibility			0-690 VAC) and 3-phase 4-		ng in colociable mode).
arthing systems			C-S, corner ground, centre-		
verter features			n voltage link (DC electrolyti		
ontroller / redundancy rotection functions			ter/master arrangement). If		
tand-by & AutoStart			ndervoltage, overtemperatu n current is below a limit. Au		
emote discrete control			emote stand-by, start and si		
			Functions		
peration modes			monics but not fundamental		
armonic filtering	THDi ·	<5% typically achievable e luction with load harmonic	rmonics). Fully selectable a ven on most complex mixed above 50% of module rating	l loads and changing load & the nonlinear load has	profiles.
nterharmonic filtering ower factor correction	Ontimized steple		the 50th harmonic order (2 table power factor correction		lagging (inductive)
oltage support			s) and mitigation of voltage f		
oad balancing	Load balancing betwe	en phases and between pl	hases & neutral (programma ce fundamental system curr	able from 0% to 100% of m	nodule's output current).
armonic generation function	Controlled & selectable h		sed for validating the perform		ents of the electric syst
noration	Dediested distants		bank steps control (HPQ f		
peration umber of steps and size			or thyristor switch modules on e digital output can switch a		
aniser of steps and size			Connections		
igital inputs			77 VAC. 3 inputs can be pro		
gital outputs			an be used for trip, alarm, ru		
urrent transformers (CT) T location			condary (5 A preferred). Clas		
F polarity			and closed loop (CTs in the rsed polarity, it is possible to		
umber of CTs required			ection of 1 module: 3 CTs. C		
onnection of parallel modules			ating combinations up to 7 r		
			Interfaces		
MI / display			graphical HMI (new languag		
onitoring and reporting	On-site and remote mo		ling waveforms & spectrums ta of power quality events u		y sides, and diagnostics
		itepoits ua			
ommunications	Ethernet,	USB port and Modbus TC	P/IP. Software update is pos		flash drive.
		•	P/IP. Software update is po Mechanical features	ssible via Ethernet or USB	
ounting arrangement		ly for cubicle or wall install	P/IP. Software update is pos Mechanical features ation. Designed for pollution	ssible via Ethernet or USB degree 2 with conformal c	
ounting arrangement nclosure features	Loose module read	ly for cubicle or wall install Compact IP20	P/IP. Software update is pos Mechanical features ation. Designed for pollution galvanized steel enclosure	ssible via Ethernet or USB degree 2 with conformal c in black colour.	coating on all PCBAs
lounting arrangement nclosure features ooling method	Loose module read	ly for cubicle or wall install Compact IP20	P/IP. Software update is pos Mechanical features ation. Designed for pollution	ssible via Ethernet or USB degree 2 with conformal c in black colour.	coating on all PCBAs
ounting arrangement nclosure features pooling method psses (at full load) pise level (at full load)	Loose module read Forced air by ea 67 dB	dy for cubicle or wall install Compact IP20 asy to service automatically 67 dB	P/IP. Software update is pos Mechanical features ation. Designed for pollution 0 galvanized steel enclosure y controlled DC cooling fans <2.8% 67 dB	ssible via Éthernet or USB degree 2 with conformal c in black colour. adjusted by module tempo 67 dB	coating on all PCBAs erature via PWM. 68 dB
ounting arrangement nclosure features poling method posses (at full load) pise level (at full load) imensions (WxHxD)	Loose module read Forced air by ea 67 dB 225x1150x500mm	ty for cubicle or wall install Compact IP20 asy to service automatically 67 dB 225x1150x500mm	P/IP. Software update is pos Mechanical features ation. Designed for pollution galvanized steel enclosure y controlled DC cooling fans <2.8% 67 dB 225x1150x500mm	ssible via Éthernet or USB degree 2 with conformal c in black colour. adjusted by module tempo 67 dB 225x1150x500mm	coating on all PCBAs erature via PWM. 68 dB 225x1150x500mm
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ounting arrangement nclosure features ooling method osses (at full load) oise level (at full load) imensions (WxHxD) feight	Loose module read Forced air by ea 67 dB 225x1150x500mm	ty for cubicle or wall install Compact IP20 asy to service automatically 67 dB 225x1150x500mm	P/IP. Software update is pos Mechanical features ation. Designed for pollution) galvanized steel enclosure y controlled DC cooling fans <2.8% 67 dB 225x1150x500mm 120 kg Installation and operation	ssible via Éthernet or USB degree 2 with conformal c in black colour. adjusted by module tempo 67 dB 225x1150x500mm 120 kg	coating on all PCBAs erature via PWM. 68 dB 225x1150x500mm
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