

Modular Active Power Filter ESD34



New Generation

- Enersine ESD34
- Modular Design



Power Range

◆ Control Module

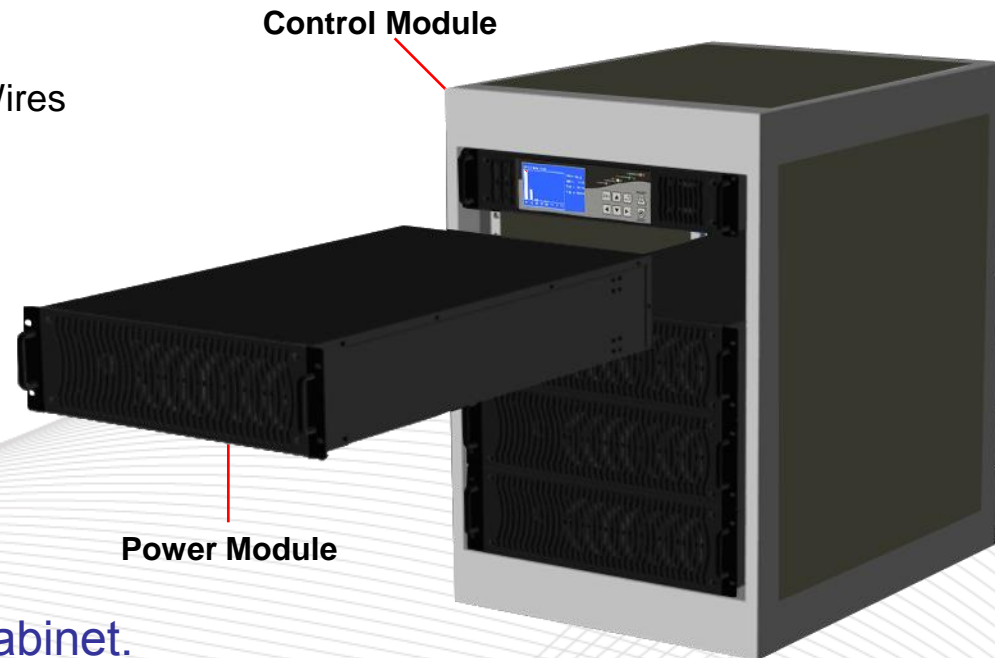
- Each controller can manipulate 4 Power Modules.
- 440mm x 710mm x 85mm (w x d x h)

◆ Power Module

- 400V 35A for 3 Phase 3 Wires and 4 Wires
- 480V 35A for 3 Phase 3 Wires
- 440mm x 710mm x 131mm (w x d x h)

◆ Capacity

- 400V 35A, 60A, 90A, 120A
- 400V 35A, 60A, 90A, 120A
- Up to 960A in parallel



Easy to install in standard 19" rack cabinet.

Effects of Harmonics

- Over voltage/current in the distribution network
- Over heated power cables, transformers & generators
- Overheating in all types of electronics systems causing component failures
- Nuisance tripping in circuit breakers and protection relays

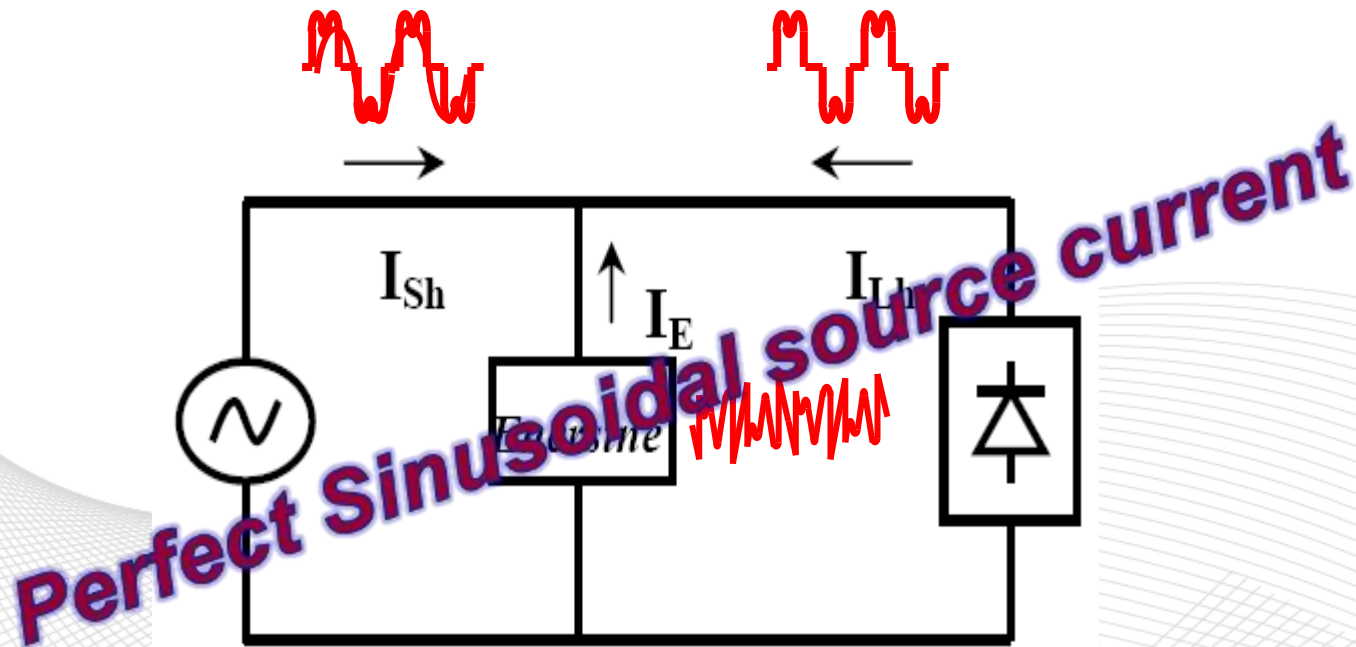
Effects of Harmonics

- Malfunction of automatic control system
- Damage to capacitors due to resonance
- Inaccuracy of instrument measurement
- Interference in telecommunication systems
- Voltage distortion and lagging in power factor

APF Working Principle

Cancel the loads harmonic current and then obtain a sinusoidal current in the utility

Measure the harmonics current generated from the non-linear load
 Generate opposite phase shifted harmonics current of the same amplitude



Applications

- Utilities Industry
- Steel, Chemical, Automotive Industry
- Printing, Pulp and Paper Industry
- Office, Building and Data Center
- UPS and MCC (Motor Control Centers)
- Elevator and HVAC System

HVAC : Heating, Ventilation and Air Conditioning

Feature

- Modular and easy to extend
- Apply to 3 Phase 3 Wires/4 Wires System
- Advanced DSP technology, programmable
- Close/Open Loop Control
- Compensate up to 51st harmonics
- Compensate up to 12 different harmonics simultaneously
- Power Factor Correction
- Correct unbalance three phase utility
- No problem of overload
- Shunt connection, easy for maintenance
- User-friendly control panel
- Operate in parallel up to 8 control units

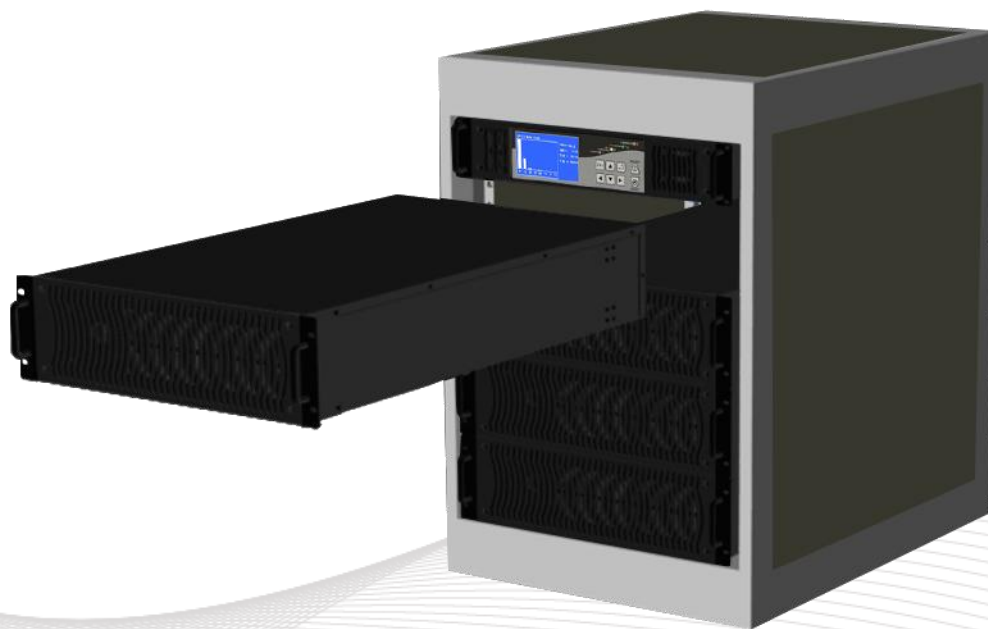
Advantages of ESD 34

- Eliminate harmonic current
- Improve power factor
- Correct unbalance three Phase Utility
- Eliminate Neutral Line Current
- Significantly reduce the voltage waveform distortion
- Reduce voltages drop on transformers & cables
- Reduce temperatures rise on transformers & cables
- Reduce Voltage Difference between Neutral and Grounding
- Save Money

Overall view

2 Models ...

- Rack type

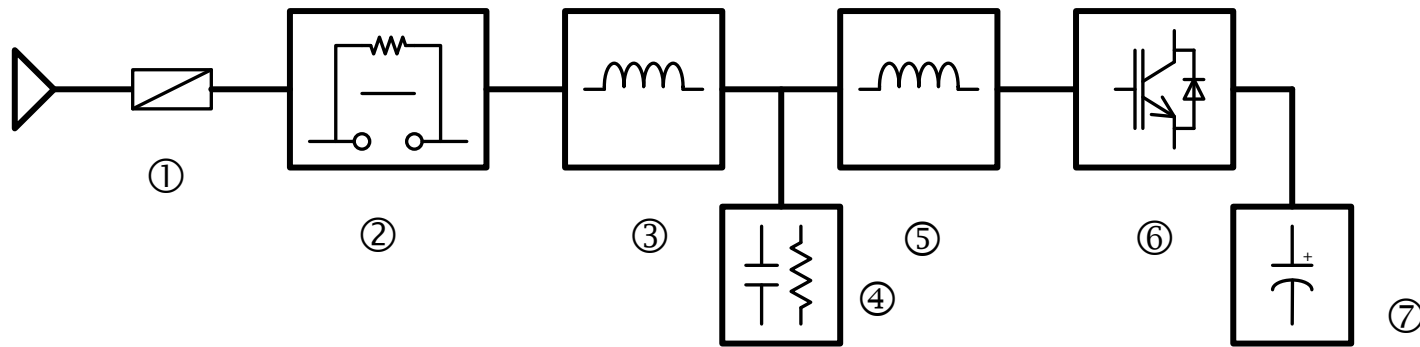


Overall view

- Wall Mount type



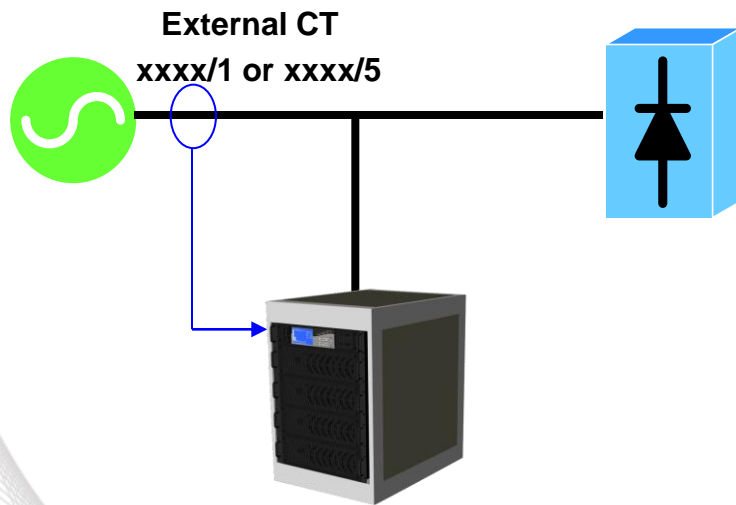
Configuration



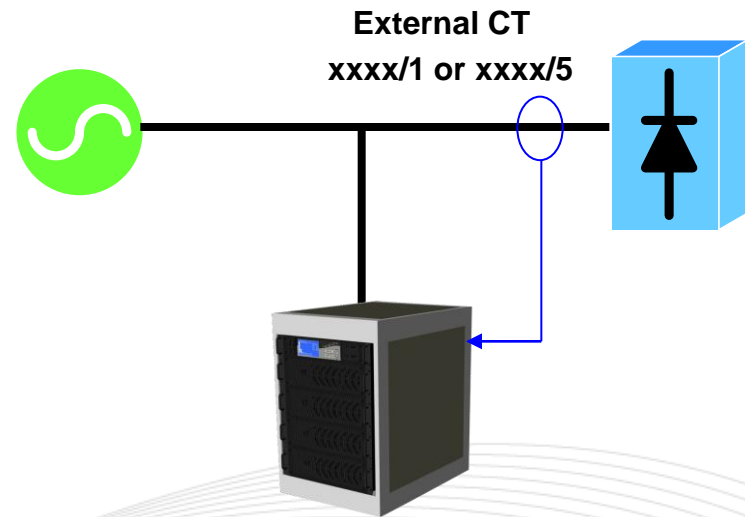
- ① Main Fuse
- ② Soft-start Electromagnetic Contactor Module
- ③ Link Inductor
- ④ Ripple Current Filter Module
- ⑤ High Frequency Inductor
- ⑥ IGBT Power Converter Module
- ⑦ DC Capacitor Module



Closed/Open Loop Control



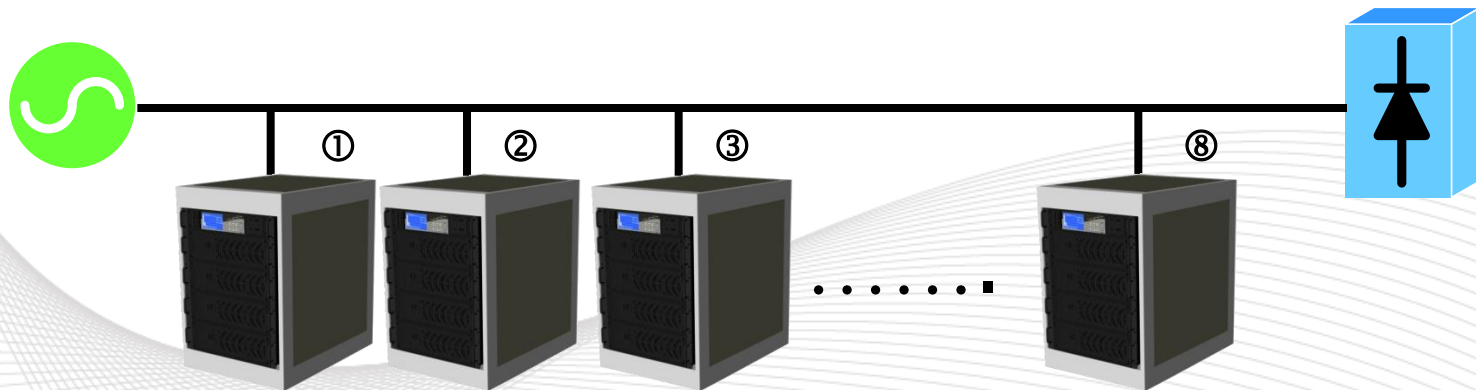
Closed Loop Control



Open Loop Control

Parallel

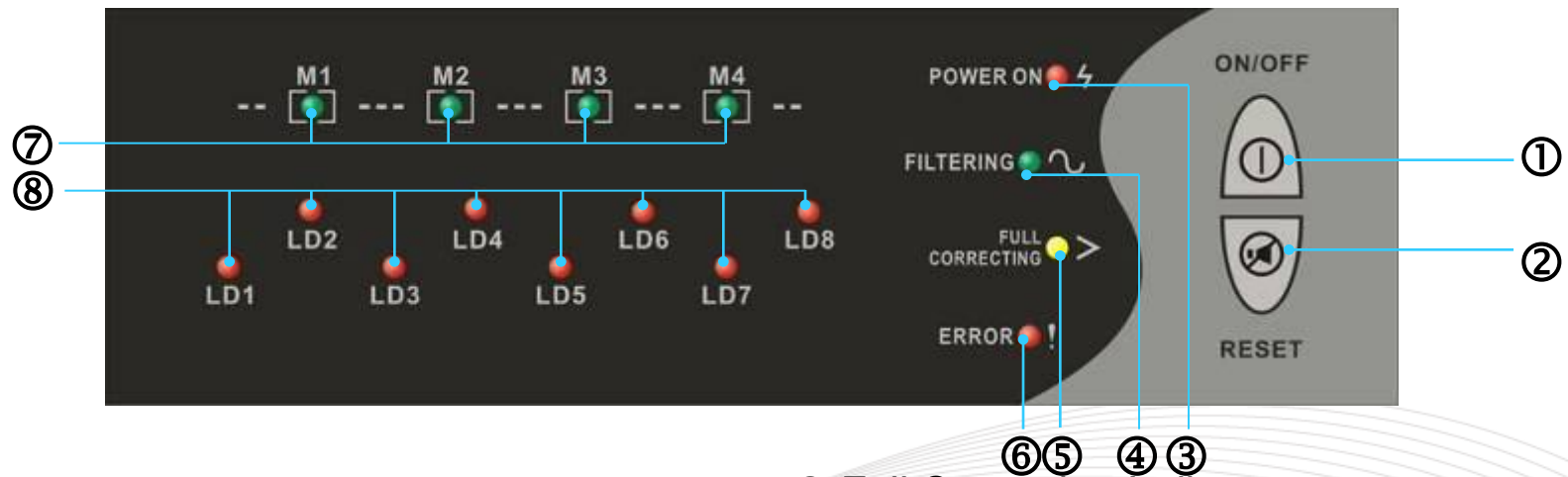
- Different current rating can operate in parallel
- Up to 8 control modules in parallel
- Maximum rating
- Up to 960A



$$120A \times 8 = 960A$$

User Friendly

- LED Control Panel



① ON/OFF Keypad

② Reset (& Alarm Silence) Keypad

③ Power On Indicator

④ Filtering Indicator

⑤ Full Correcting Indicator

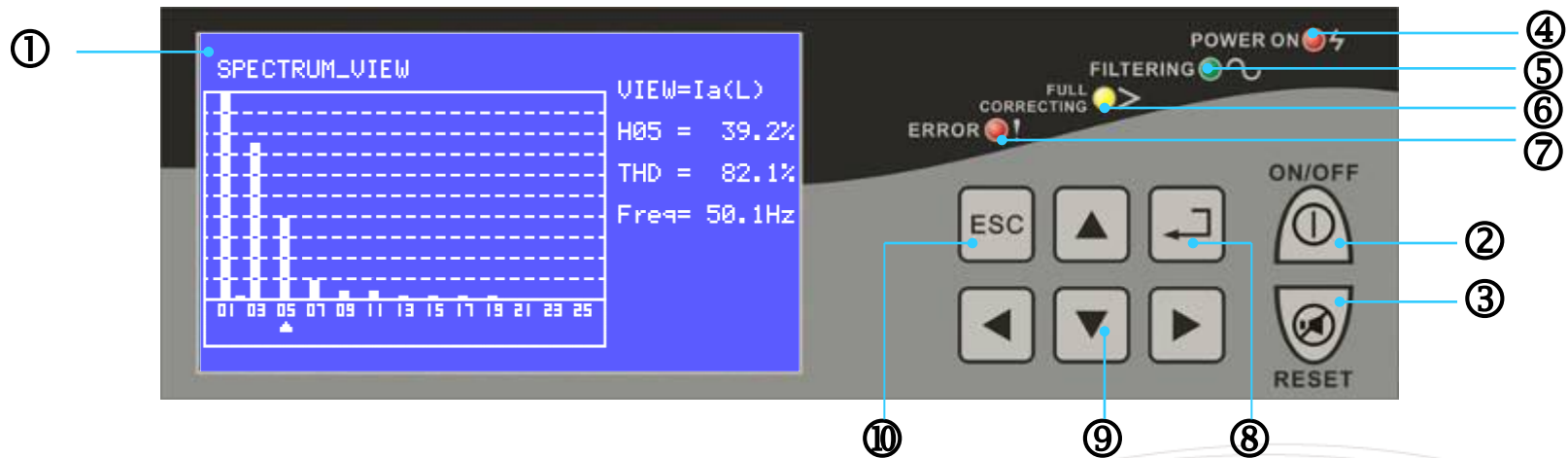
⑥ Error Indicator

⑦ Power Module Status Indicators

⑧ Alarm Indicators

User Friendly

- LCD Control & Display Panel (Optional)

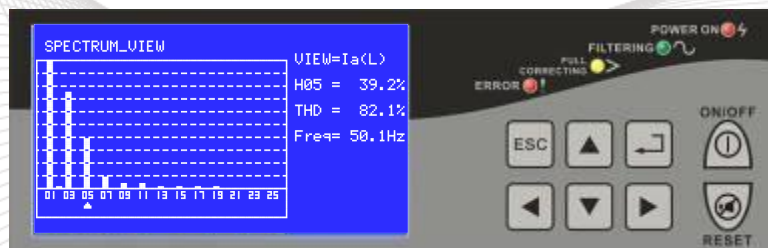


- ① Display Screen
- ② ON/OFF Keypad
- ③ Reset (& Alarm Silence) Keypad
- ④ Power On Indicator
- ⑤ Filtering Indicator

- ⑥ Full Correcting Indicator
- ⑦ Error Indicator
- ⑧ Confirmation/Enter Key
- ⑨ Directional Scrolling Key
- ⑩ Escape/Cancel Key

User Friendly

- LCD Control & Display Panel (Optional)
- Meter
Parameter
Waveform
Spectrum (Up to 51st order)
- Configuration
- Event Log (Up to 300 records)
- Multiple Languages (Up to 10 Languages)



User Friendly

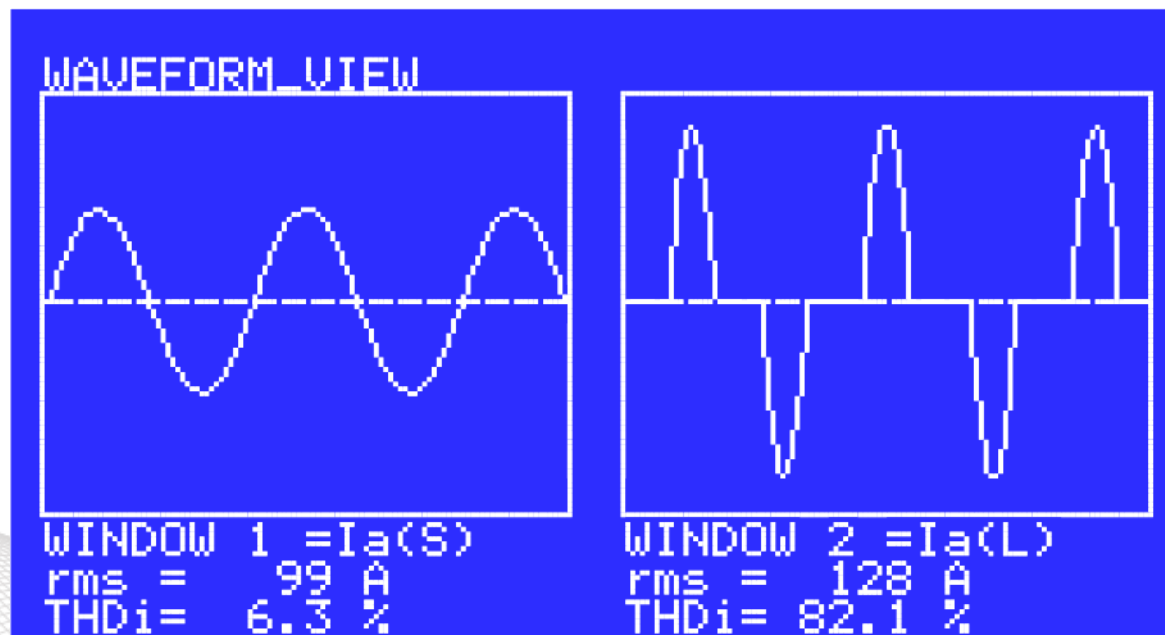
- LCD Control & Display Panel (Optional)
Parameters -

LOAD_SIDE

KVA = 89.3	Freq= 50.1Hz	PF = 0.76
Uab = 401 U	Ubc = 400 U	Uca = 403 U
THDv= 1.3%	THDv= 1.6%	THDv= 1.8%
Ia = 128 A	Ib = 125 A	Ic = 128 A
THDi= 82.1%	THDi= 84.2%	THDi= 81.7%
In = 216 A		

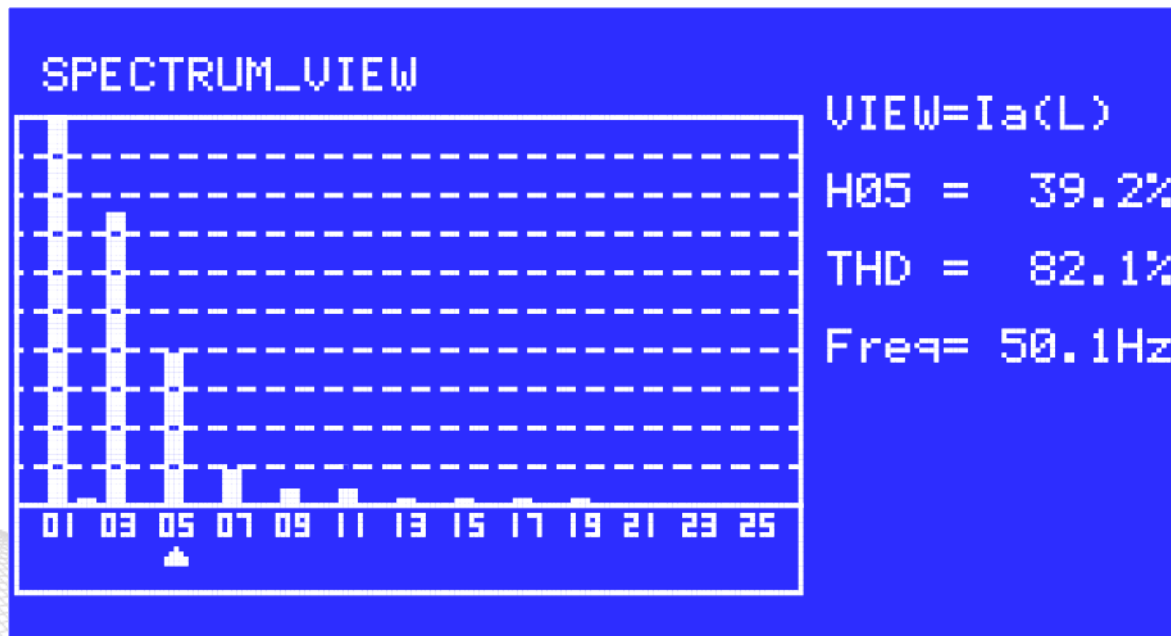
User Friendly

- LCD Control & Display Panel (Optional)
Waveform -



User Friendly

- LCD Control & Display Panel (Optional)
Spectrum -



Communication

- 2 Communication Slots
Standard –
 - RS232 and USB in slot 1
 - 5 Output Dry Contacts
 - 1 Input Dry Contact
 - EPO

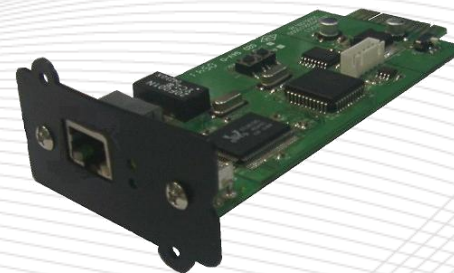
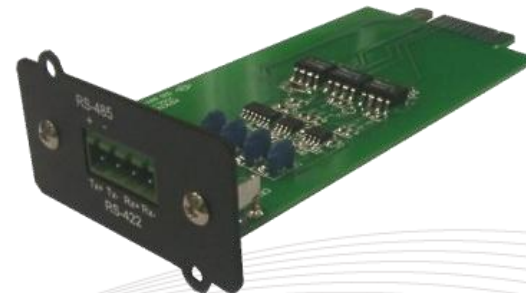
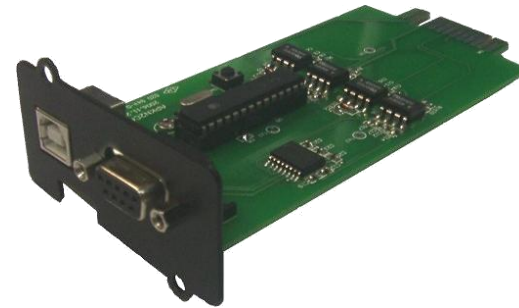


Communication
Slot 2

Communication
Slot 1

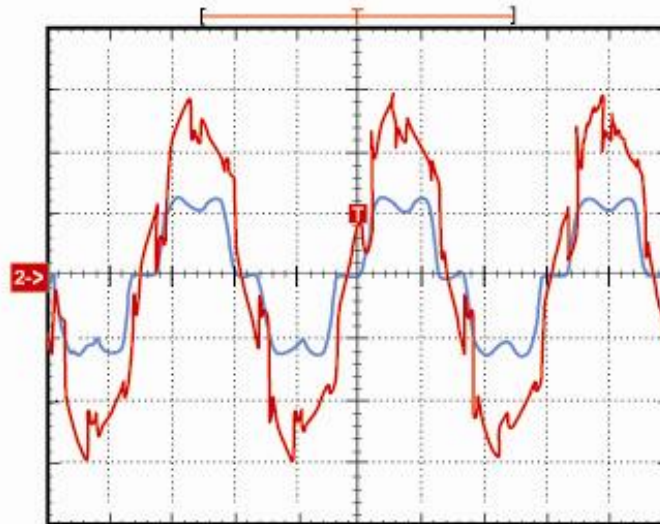
Communication

- 2 Communication Slots
Optional in slot 2
 - RS485/422 (JBUS/MOD BUS)
 - Ethernet Card



Eliminate Harmonic

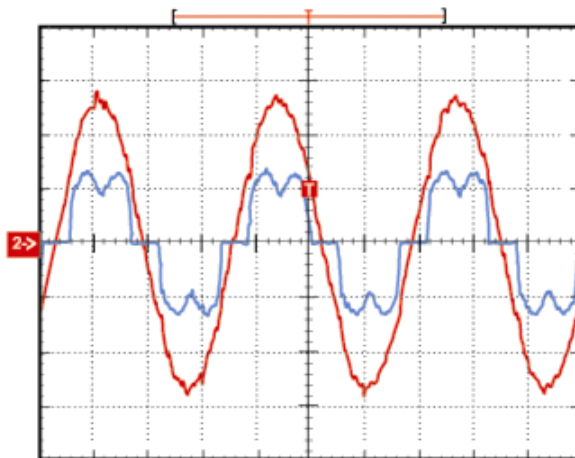
- Before Enersine turn on
- The system voltage has serious distortion due to harmonic current.



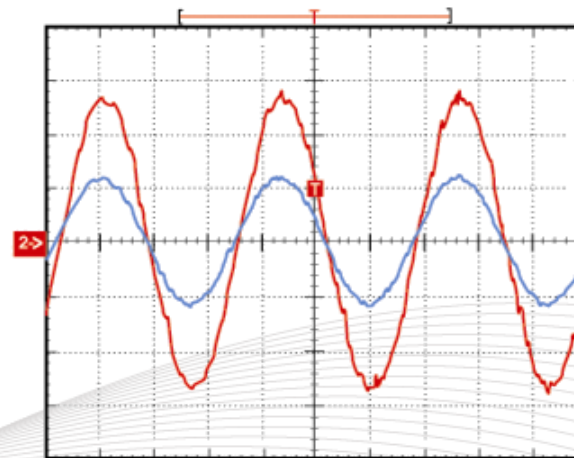
V & Is/Ir while Enersine off
THDV=17.4%

Eliminate Harmonic

- After Enersine turn on
- Enersine APF not only eliminate harmonic current but also improve voltage distortion.



V & Ir while Enersine on
THDV=3.1%, THDIr=30.0%



V & Is while Enersine on
THDI_s=2.5%

Improve Power Factor

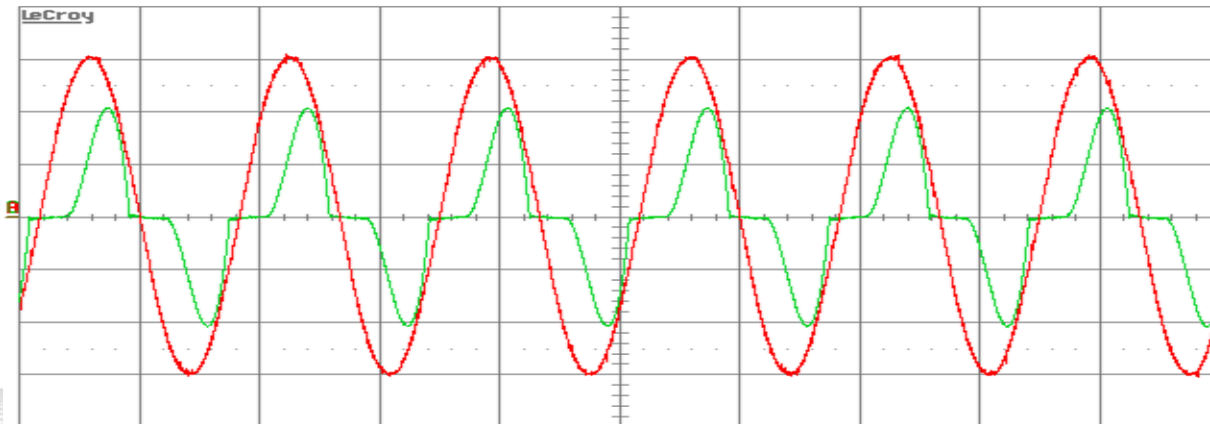
- Single-phase Rectifier Application

Enersine ESD34 not only eliminate harmonic current but also improve power factor.

Before Enersine on

Voltage
VS
Load Current

THDi=51.89%
PF=0.77



Improve Power Factor

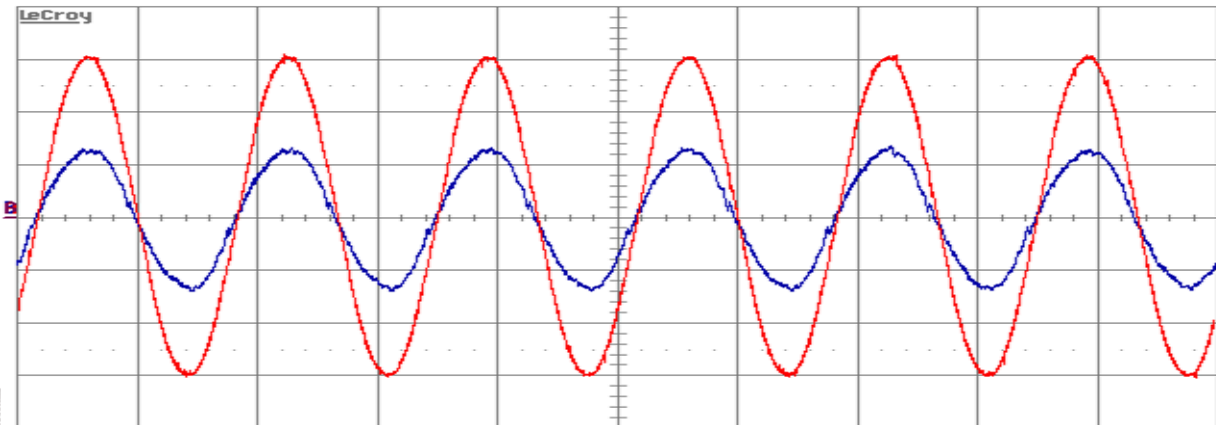
- Single-phase Rectifier Application

Enersine ESD34 not only eliminate harmonic current but also improve power factor.

After Enersine on

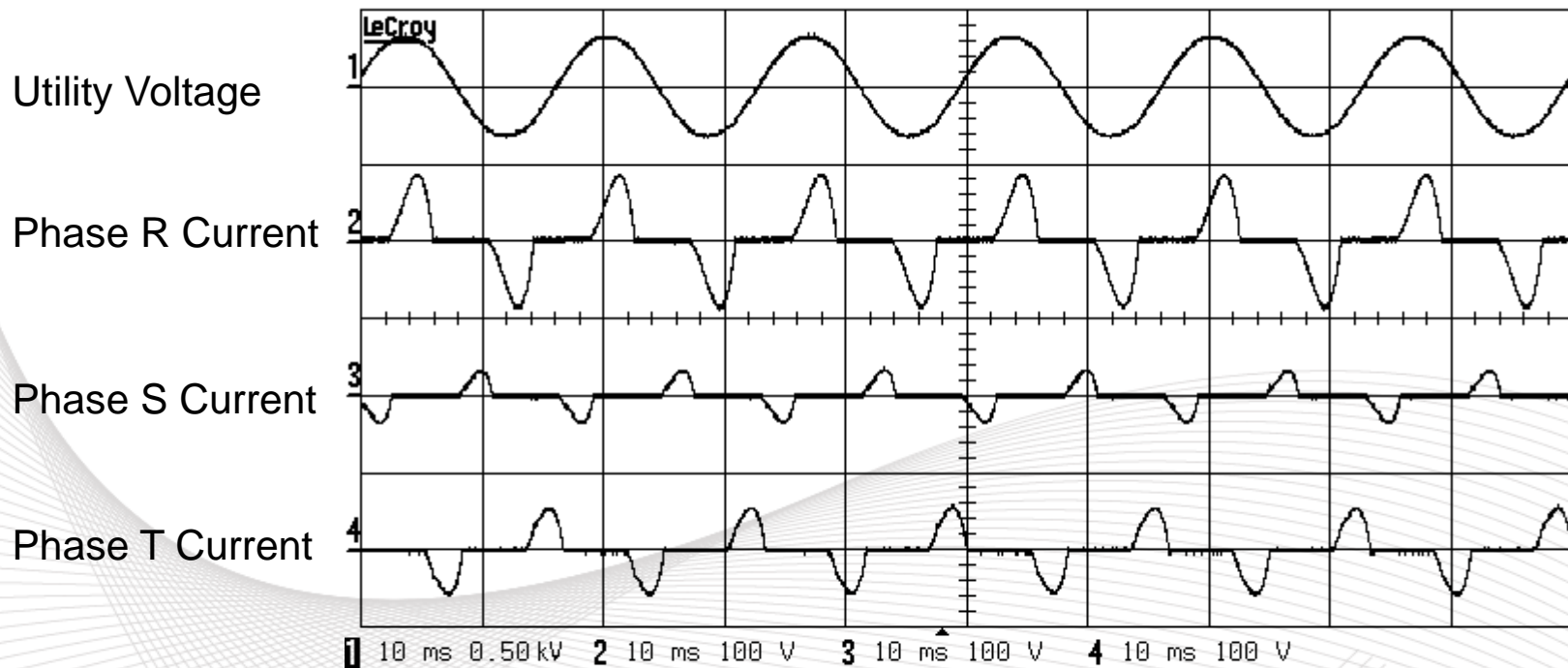
Voltage
VS
Source Current

THDi=4.31%
PF=1.0



Balance 3 phase

- Three Phase Unbalance System Before Enersine Trun On

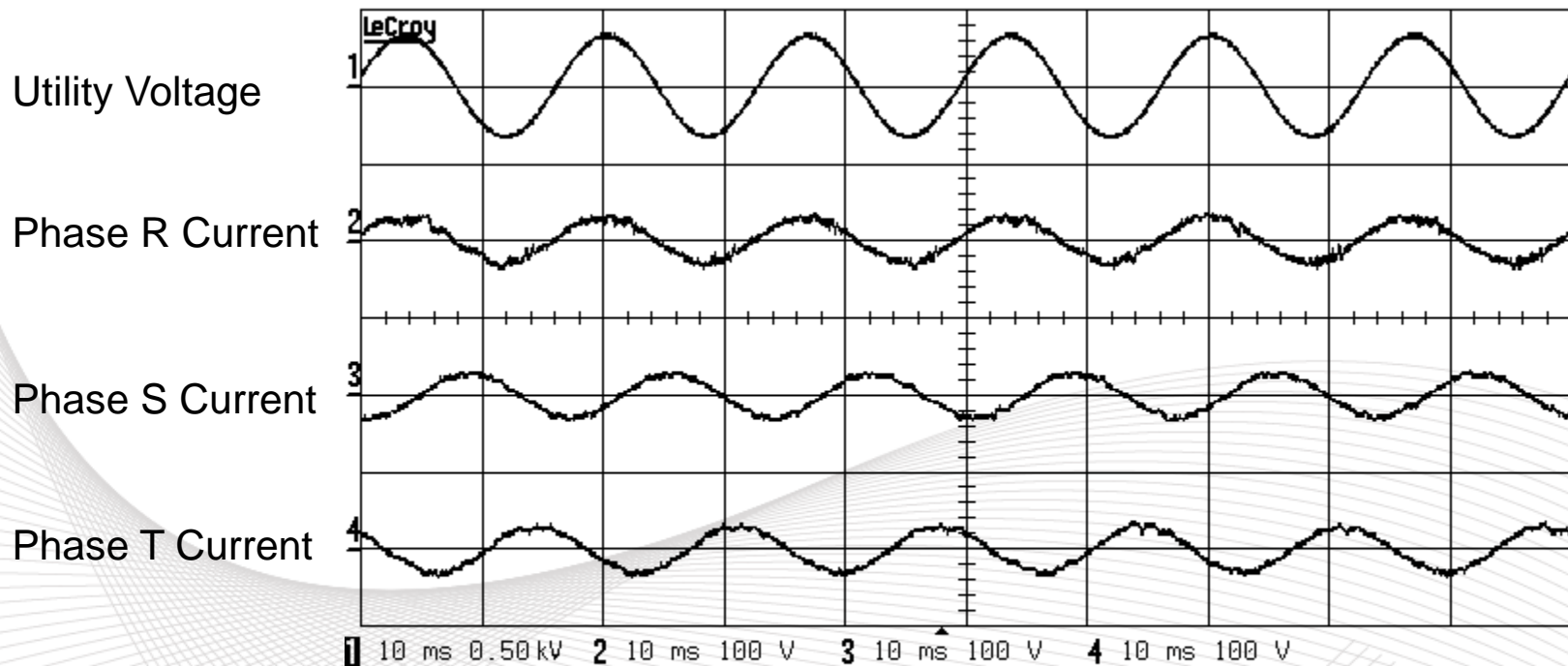


rms (1)	230.0 V
rms (2)	38.2 V
rms (3)	13.6 V
rms (4)	24.3 V

Balance 3 phase

- Three Phase Unbalance System

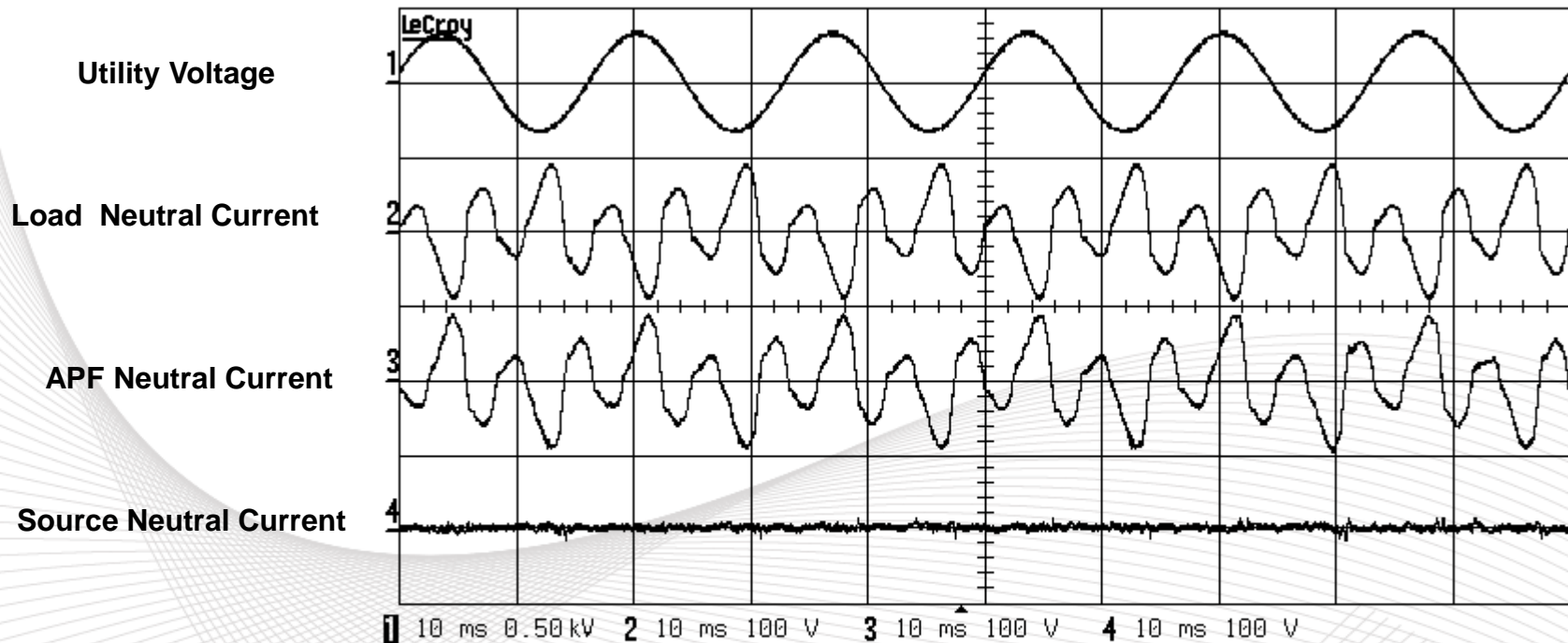
After Enersine Turn On, three phase current is balanced.



rms(1)	230.9 V
rms(2)	20.9 V
rms(3)	20.2 V
rms(4)	21.1 V

Eliminate N – line Current

- Three Phase Unbalance System
After Enersine Turn On, Neutral Line Current is canceled.



rms (1)	230.9 V
rms (2)	47.3 V
rms (3)	3.5 V
rms (4)	46.6 V

Specifications

- General Characteristics

Equipment Storage Temperature	-20°C to + 70°C
Operating Temperature	+0°C to +40°C
Relative Humidity	<95%
Operating Altitude	<1000 m
Reference Harmonic Standard	EN61000-3-4, IEEE 519-1992
Reference Design Standard	EN60146
Safety Standard	EN50178; UL508
Electromagnetic Compatibility	IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6



Specifications

- Power Module

Input Voltage	400V +15%,-20%	480V +10%,-20%
Phase/Wires	3 phase 4 wires/3wires	3 phase 3 wires
Frequency	50/60±3 Hz	
Maximum Compensation Current/Phase	35 Arms	
De-rating Compensation Current/Phase ⁽¹⁾	30 Arms	
Maximum Compensation Current of Neutral	105 Arms	N/A
Inrush Current	Less than rated current	
Current Limitation	Yes, at full correcting	
Maximum Heat losses	650 Watt	
Color	RAL9011(PANTONE Process Black C)	
Protection Index	IP20	
Dimensions (WxDxH)	440 x 710 x 131mm	
Weight	31 Kg	

(1) When 2 and above Power Modules work in power scalable configuration, the power module will downgrade automatically from 35A to 30A. It means 60A/90A/120A, while 2/3/4 power modules connecting in parallel.

Specifications

● Control Module

Input Voltage	400V +15%,-20%	480V +10%,-20%
Phase/Wires	3 phase 4 wires/3wires	3 phase 3 wires
Frequency	50/60±3 Hz (Auto Sensing)	
Compensated Harmonic Orders	From 2 nd to 51 st order. Up to 12 orders actives simultaneously (2 nd ~31 st). Higher Order Compensation (32 nd ~51 st) Disable/Enable operation.	
Power Factor Correction	Compensate both lagging and leading reactive power.	
	Power factor can be programmed from 0.7 lagging to 0.7 leading	
CT Ratio	Primary Current: 100A~10000A	Can be set. Secondary Current: 1A(Standard)/5A (Optional)
CT Location	Source Side: Close Loop Control	Load Side: Open Loop Control
Response Time	< 20 ms	
Number of controllable Power Module	Up to 4 Power Modules.	
Parallel	Up to 8 Control Modules.	
Maximum Heat losses	50 Watt	
Color	RAL9011(PANTONE Process Black C)	
Protection Index	IP20	
Dimensions (WxDxH)	440 x 710 x 86mm	
Weight	14 Kg	

Specifications

- Communication

Dry Contact (Standard)	5 Output Dry Contacts 1 Input Dry Contact 1 EPO
Communication	Standards:RS232/USB Options: RS485/422 Ethernet Card
Programming	Setting by LCD Panel, Software
Software	<i>ESD-Link34</i> Monitoring Software (Option) <i>Enersine ESD34 Expert Service Program</i>
Communication Protocol	J-Bus / Mod Bus

Let's Create a Powerful Future