

AEG

POWER
SOLUTIONS

PROTECT 8PLUS 10 – 120KVA

PRODUCT PRESENTATION



AEG is a registered trademark used
under license from AB Electrolux.

PROTECT 8^{PLUS}

Introduction to the range

Benefits:

- CAPEX savings
- JIP 33 Compliance
- OPEX savings

Wrap-up



PROTECT 8PLUS IS DEDICATED TO INDUSTRIES

Sectors and applications



Refining & Petrochemicals

- F&G detection systems
- Process control
- Instrumentation
- Pumps & valves

Transport infrastructures

- Ticketing
- Luggage systems
- Process control
- Subsystem signaling

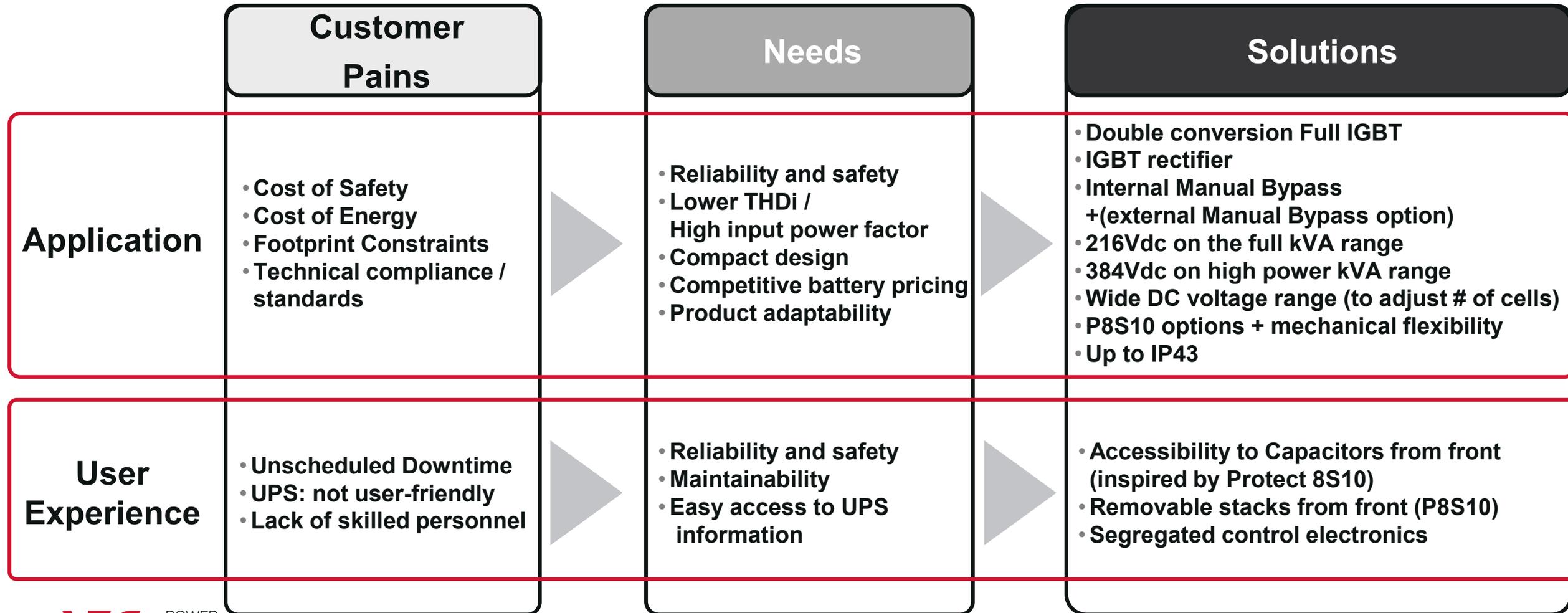
Manufacturing and various industries

- Process control
- PLC's
- Safety systems
- Conveyors

- Control rooms
- Subsystem signaling
- DCS / SCADA
- Telecom systems



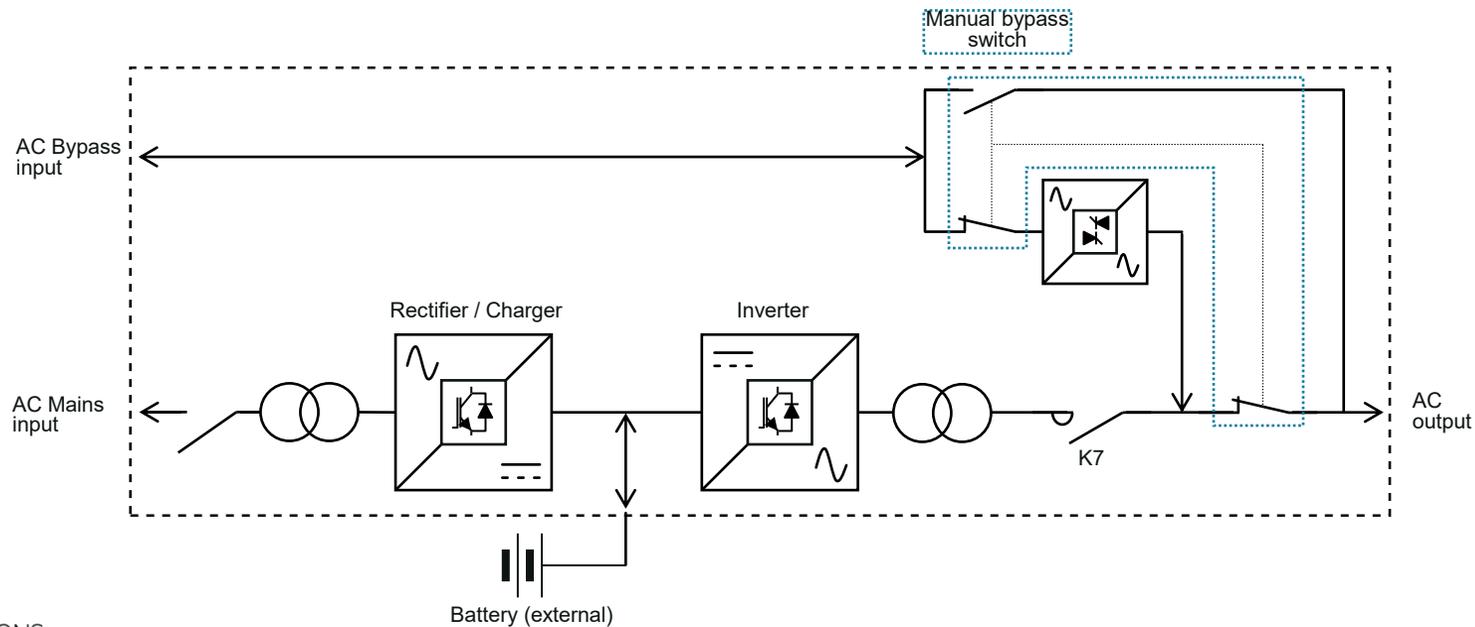
INDUSTRIAL MARKET NEEDS (PROTECT 8PLUS)



INTRODUCTION TO THE PROTECT 8PLUS

Protect 8 Plus is an extension to the existing Protect 8 S10 range:

- On-line double conversion full IGBT UPS
- Available in 3-ph and 1-ph output
- Output galvanic isolation
- Input isolation transformer or auto-transformer
- Designed for operation at 100% load at 40°C permanent
- Compatible with existing Protect 8 S10 options



PROTECT 8PLUS: THE RANGE

kVA ⁽¹⁾	10	20	30	40	60	80	100	120
216Vdc	✓	✓	✓	✓	✓	✓	✓	✓
384Vdc	✓	✓	✓	✓	✓	✓	✓	✓

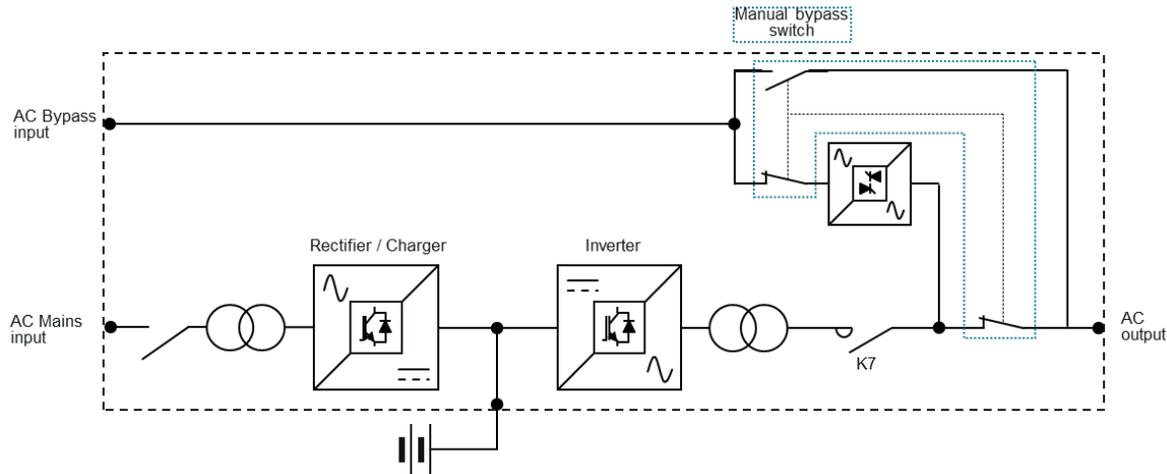
✓ 1ph or 3ph output

Input

3-ph ▼

380 Vac
 400 Vac
 415 Vac

50/60 Hz



Battery voltage window

216 Vdc: 175 – 305 Vdc
 384Vdc: 307 – 505 Vdc

Output

1-ph ▼

3-ph ▼

216Vdc: 10-120 kVA

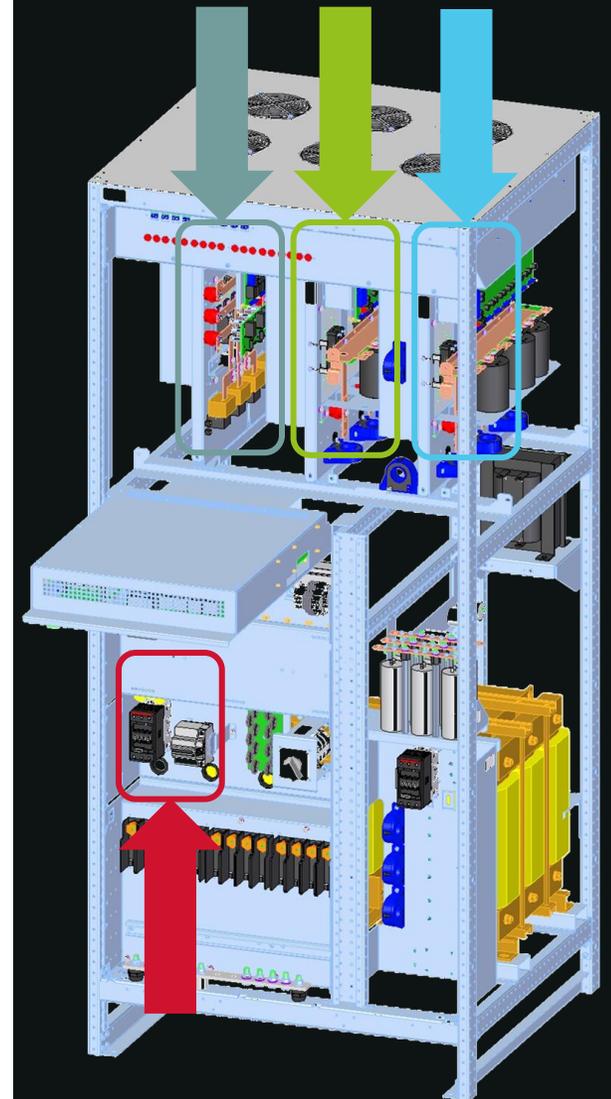
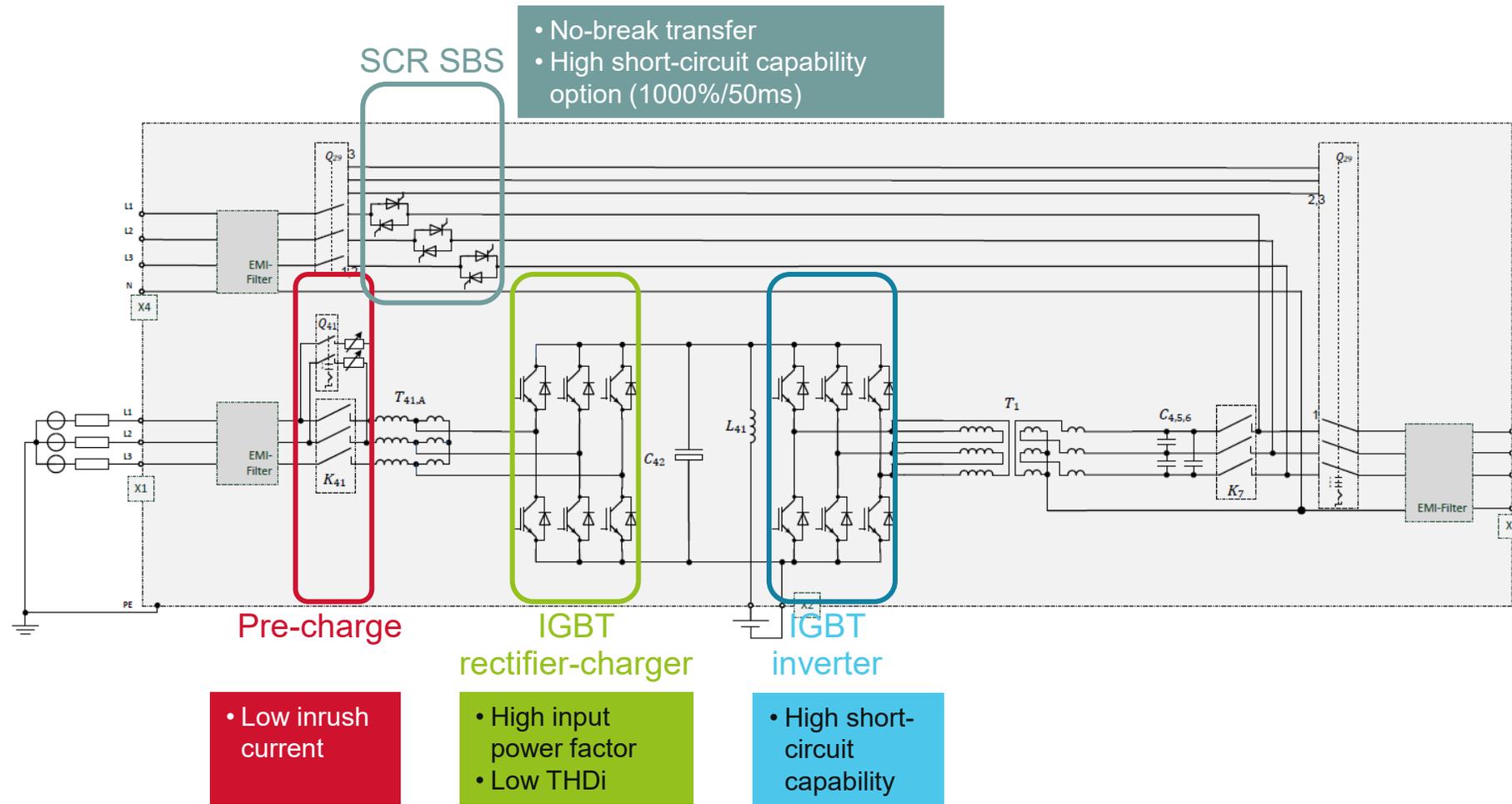
384Vdc: 10-120 kVA

220 Vac
 230 Vac
 240 Vac

380 Vac
 400 Vac
 415 Vac

50/60 Hz

PROTECT 8PLUS PRODUCT ARCHITECTURE



PROTECT 8**PLUS**

KEY FEATURES

- IGBT rectifier

- Full current battery test through the grid / mains

- New pre-charge circuit (filled-in patent)

- No additional converter on the DC side (as compared to most competitors)

- New cabinet design 2m high (harmonized with TPRE)

- SBS up to 1000% / 50ms short-circuit capability

- High inverter short circuit clearance capability

BENEFITS

- Lower THDi rejection and higher input power factor

- No need of load bank to perform a full battery autonomy test

- Very limited inrush current ($<2I_n$), despite input transformer, thus allowing the optimization of upstream protection

- Higher efficiency and higher reliability

- Homogeneous mechanical frame with TPRE range, offering more flexibility

- Best-in-class short-circuit clearance capability



PROTECT 8^{PLUS}

Introduction to the range

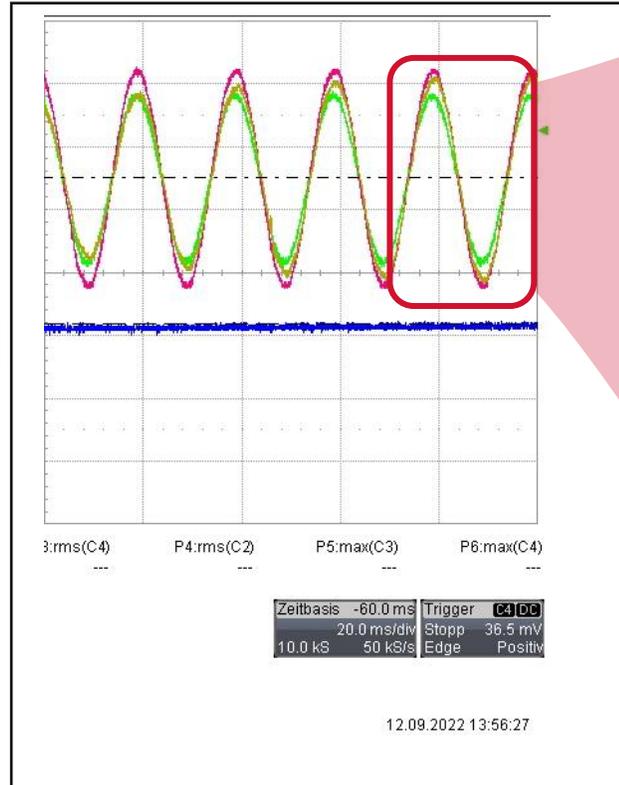
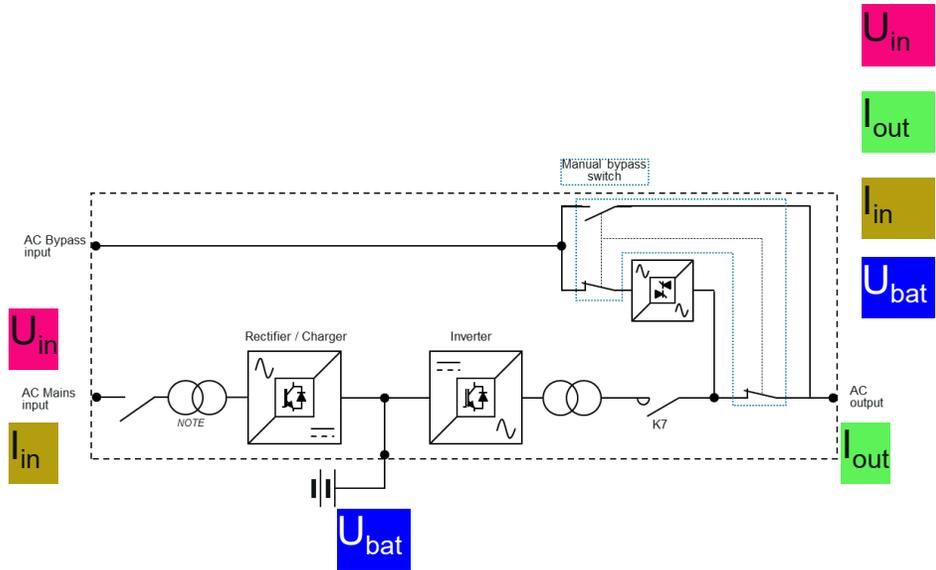
Benefits:

- **CAPEX savings**
- JIP 33 Compliance
- OPEX savings

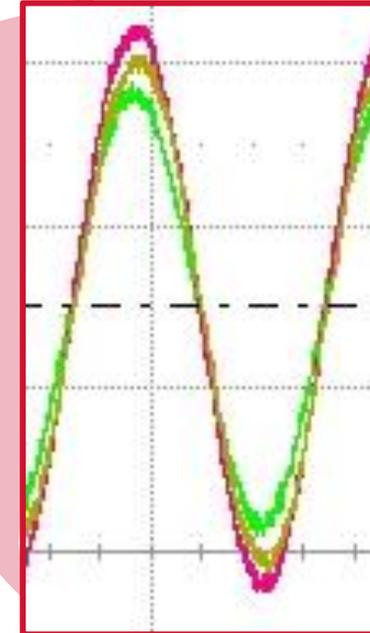
Wrap-up



PROTECT 8PLUS: GREAT INPUT PERFORMANCES

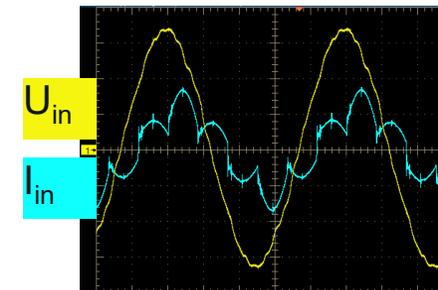


Measured values on Protect 8PLUS



BENEFITS

- High input PF
- Low THDi



Example of current waveform on a 6-pulses rectifier (~30% THDi)

PROTECT 8PLUS: CAPEX SAVINGS THANKS TO GREAT INPUT PERFORMANCES

IGBT rectifier performances

- High input power factor, **>0.99**
- Low THDi **<5%**

Impact on the installation

- Input current through the upstream supply transformer is reduced
- Upstream line current is reduced
- I²R losses are reduced (less heating in the upstream generators, transformers and cables)
- Limited disturbances for other loads connected to the same upstream installation
- Very limited interferences back to the mains for sensitive équipements (gen-sets)

BENEFITS

- **Optimized installation:** possibility to get more loads connected to the upstream supply transformer
- **Improved efficiency of the installation** (reduction of the losses in the upstream cables)
- **Substantial savings:**
 - Reduction of the **cable size** (approx. -20% from PF0.8 to PF0.99)
 - Reduction of the upstream **transformer** and upstream **switchgear**
 - No external PFC needed
 - Upstream **gen-set** does not need to be oversized
 - Reduced stress on neutral wires

PROTECT 8PLUS: BATTERY SIZING OPTIMIZATION THANKS TO THE WIDE DC VOLTAGE WINDOW

Lead Acid		216 Vdc			384 Vdc			
Input voltage	Udc (EoD)	Udc (Max)	Cell voltage range	Cell quantity	Udc (EoD)	Udc (Max)	Cell voltage range	Cell quantity
340V – 440V 380V (-10% + 15%) 400V (-15% + 10%)	175	305	1.7 – 2.65 V/cell	108 – 114 cells	307	505	1.7 – 2.65 V/cell	181 – 200 cells
323V – 400V 380V (-15% + 10%)	175	305			307	505		
360V – 460V 415V (-10% + 10%)	175	305			307	505		

Nickel Cadmium		216 Vdc			384 Vdc			
Input voltage	Udc (EoD)	Udc (Max)	Cell voltage range	Cell quantity	Udc (EoD)	Udc (Max)	Cell voltage range	Cell quantity
340V – 440V 380V (-10% + 15%) 400V (-15% + 10%)	175	305	1.05 – 1.7 V/cell	170 – 179 cells	307	505	1.05 – 1.7 V/cell	292 – 297 cells
323V – 400V 380V (-15% + 10%)	175	305			307	505		
360V – 460V 415V (-10% + 10%)	175	305			307	505		

- The minimum quantity of cells is limited by the end of discharge voltage
- The maximum number of cells is given by the rectifier capability to recharge the quantity of cells with the right voltage value **AND** with the input voltage network at -10% (minus 10%), which is the worst case scenario

PROTECT 8^{PLUS}

Introduction to the range

Benefits:

- CAPEX savings
- **JIP 33 Compliance**
- OPEX savings

Wrap-up



PROTECT 8PLUS: COMPLIANT TO JIP 33 REQUIREMENTS



SPECIFICATION
S-701

August
2020

Specified Feature

- Input galvanic isolation
- Output galvanic isolation
- N+1 fan redundancy
- Possibility to specify a bi-directional rectifier

Impact on Protect 8PLUS

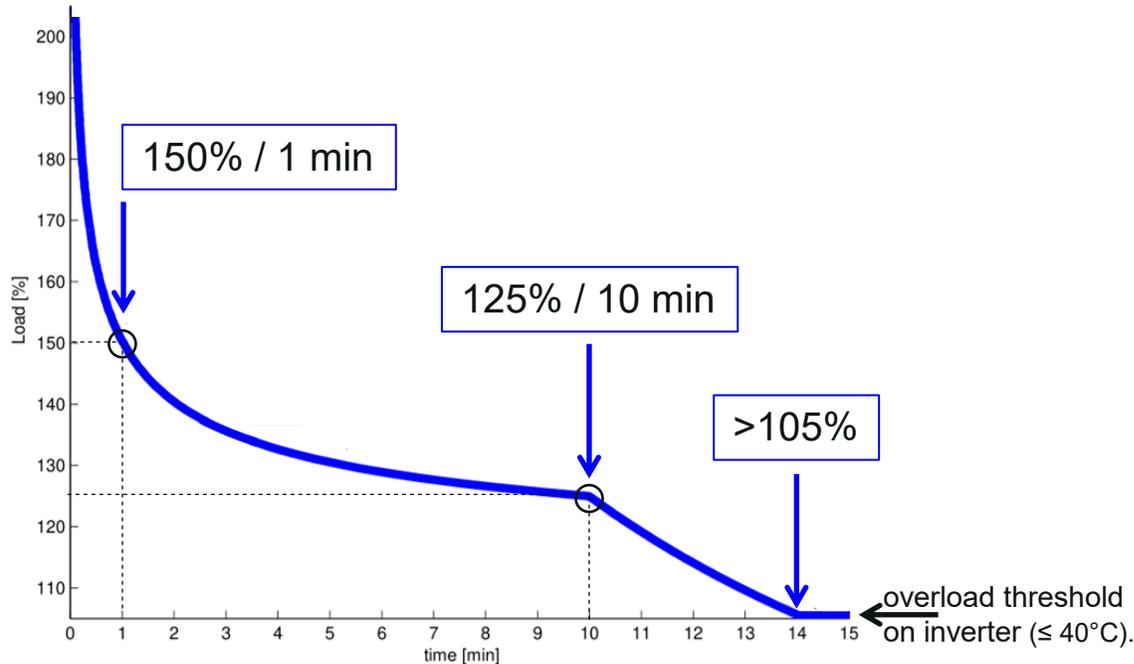
- Comply in 216Vdc, comply with option in 384Vdc
- Comply
- N+1 fan redundancy option available
- Battery discharge-to-the-mains feature available

BENEFITS

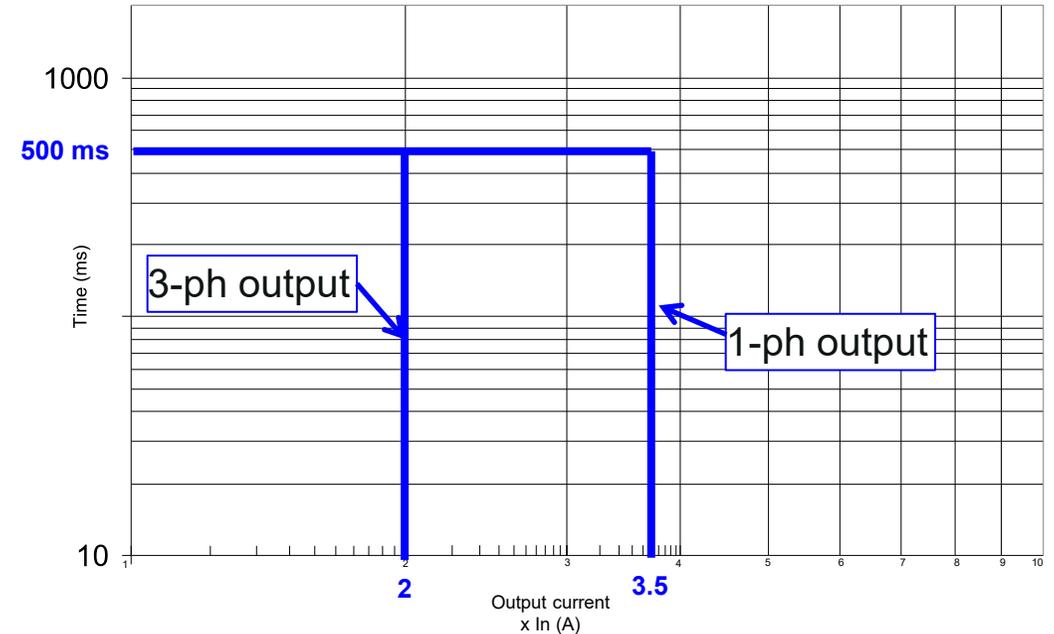
- Protect 8PLUS can easily **meet the needs of the major Oil & Gas specification**
- As standard, **Protect 8PLUS surpasses JIP33 requirements** in:
 - short-circuit clearance
 - input PF
 - THDi rejection
 - Inrush current

PROTECT 8PLUS: OUTSTANDING INVERTER OUTPUT PERFORMANCES

Overload capability



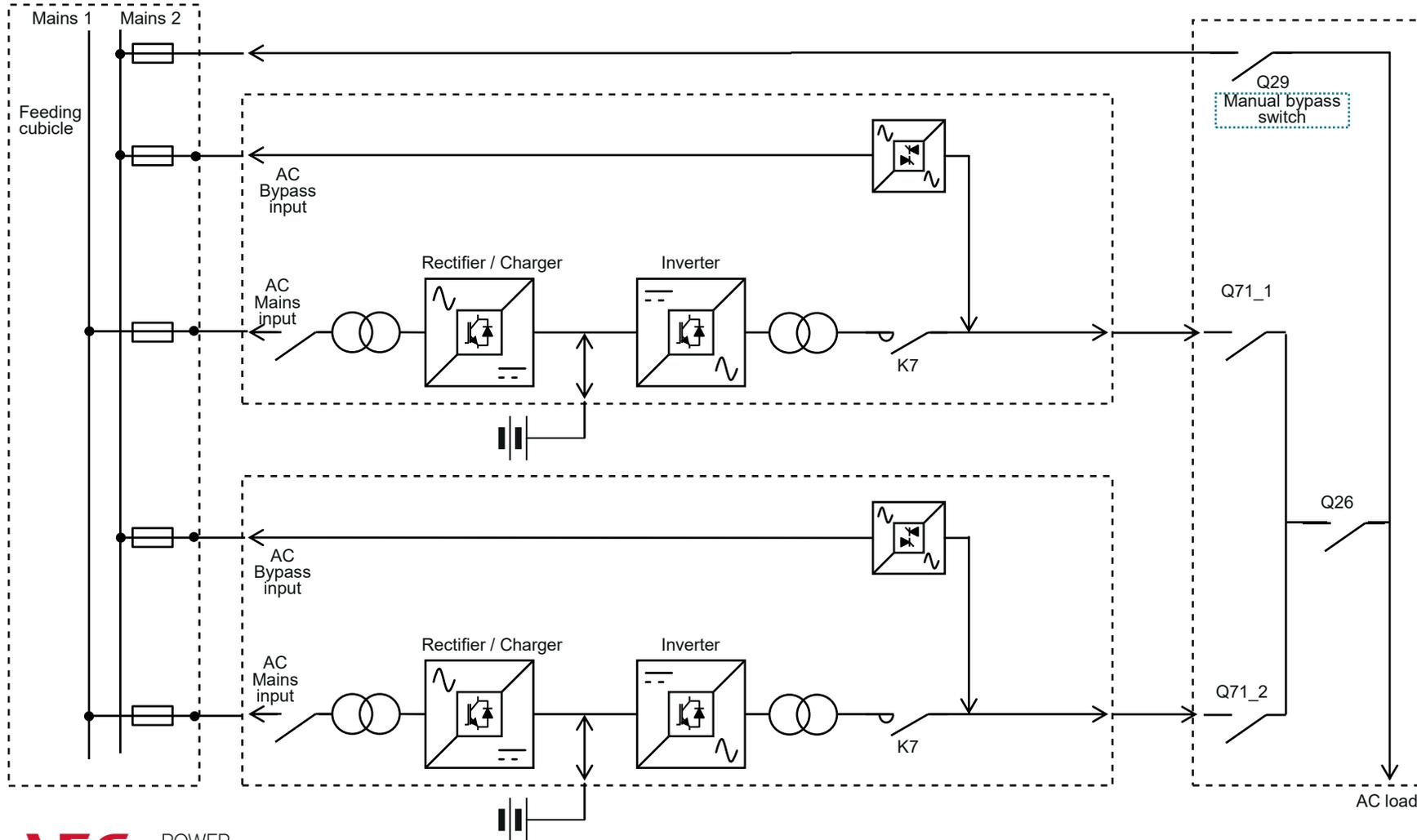
Short circuit clearance on inverter



BENEFITS

- Very strong capability to clear downstream faults when the bypass supply is not available
- Best short-circuit clearance capability of the industrial UPS market
- Improved selectivity to efficiently trip the relevant protection downstream

PARALLEL OPERATION



BENEFITS

- Protect 8PLUS can operate in parallel for redundancy, load sharing, or increase of power
- Protect 8PLUS can operate in parallel in distributed parallel configuration only, to avoid one common point of failure on the bypass static switch

PROTECT 8^{PLUS}

Introduction to the range

Benefits:

- CAPEX savings
- JIP 33 Compliance
- **OPEX savings**

Wrap-up



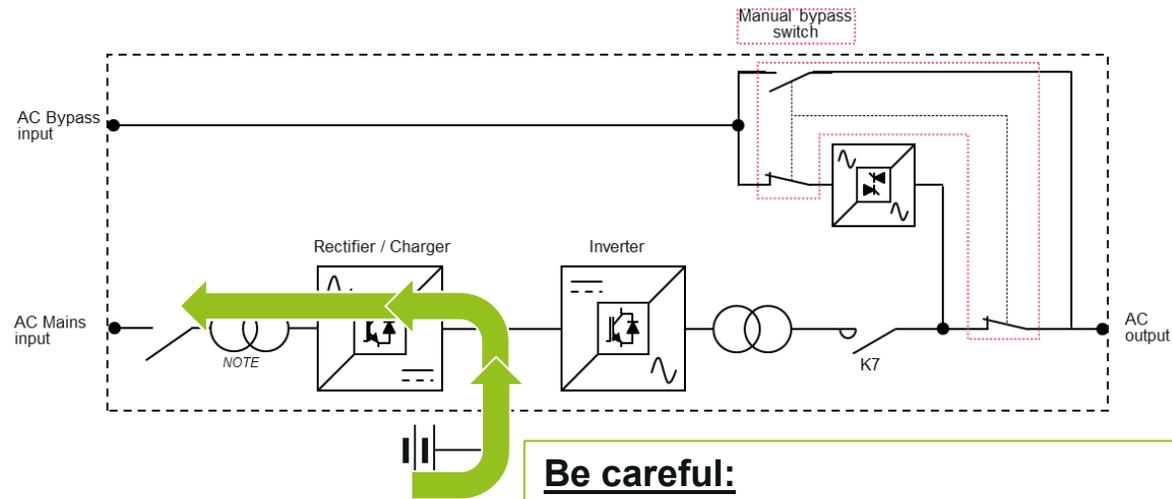
PROTECT 8PLUS: BI-DIRECTIONAL RECTIFIER TO PERFORM BATTERY CAPACITY TESTS

The bi-directional IGBT rectifier allows to perform full battery discharge test:



Via the service Menu:

- Discharge initiated from the UPS HMI
- **Several discharge tests are possible:**
 - Final discharge voltage (V/Cell)
 - Discharge time (min)
 - Nominal discharge current value (A) (@ constant current)
- **Displayed values:**
 - Battery voltage and current
 - Test duration
 - Capacity drawn from battery



Be careful:

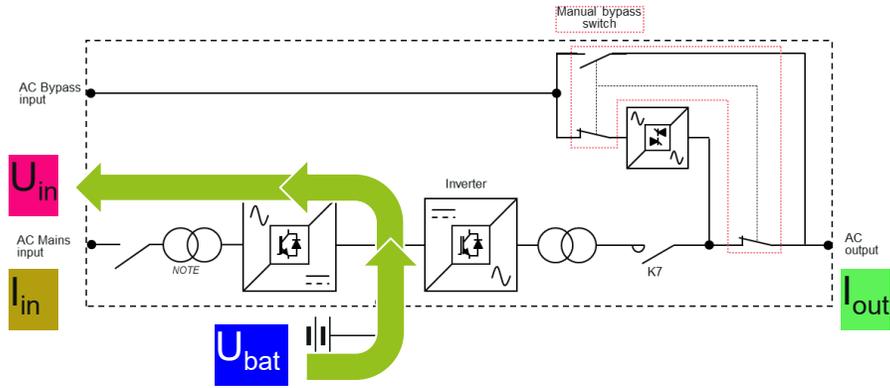
You need to make sure that your counter and your contract allows to push energy back to the grid

BENEFITS

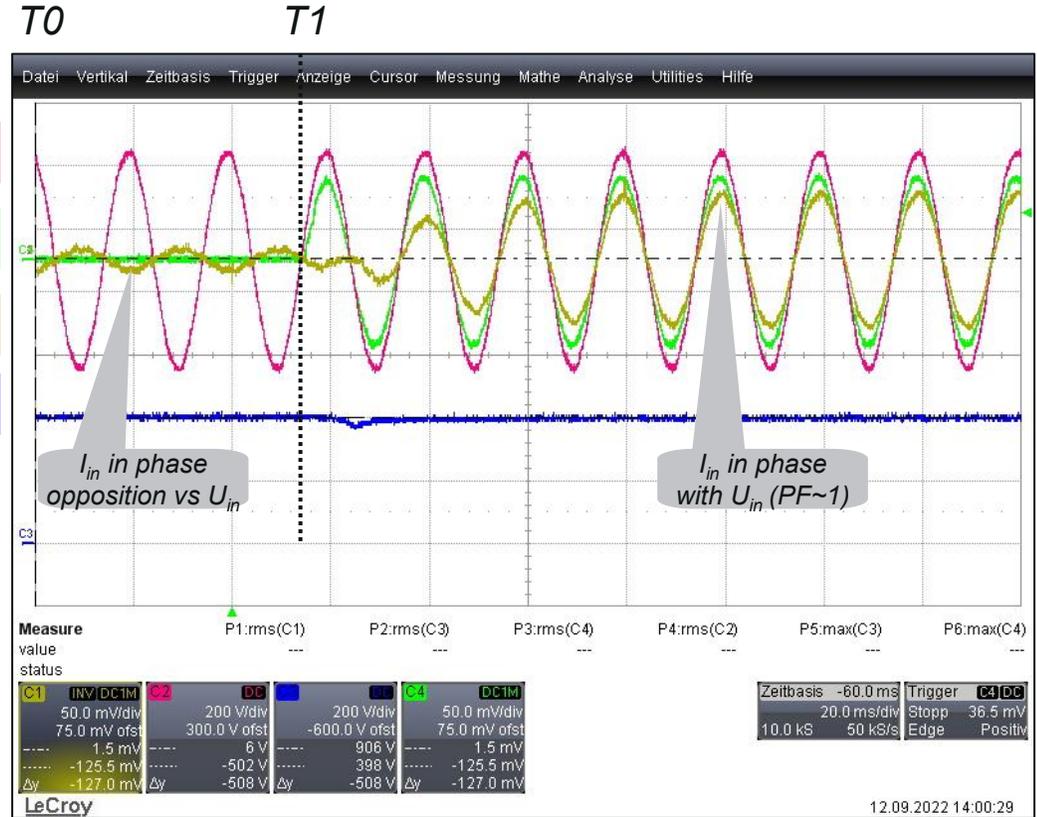
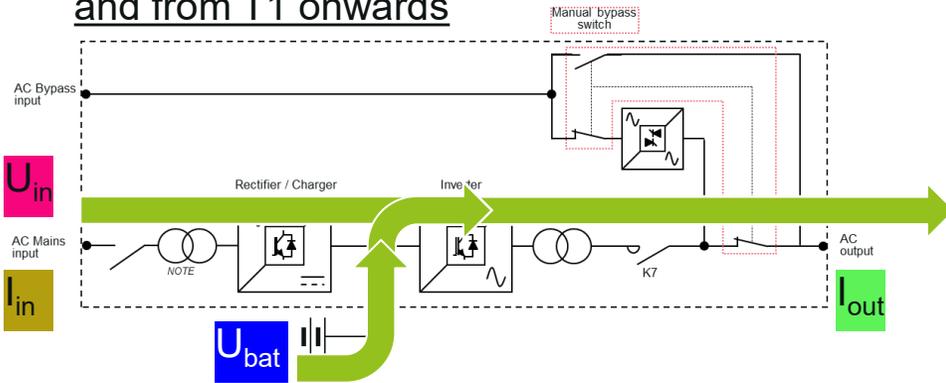
- **No additional load bank** required
- **Less wasted time** to perform battery capacity tests (connection and disconnection of load bank)
- **No heat dissipation** from load bank, leading to technical room overtemperature
- **Safe load at all time:** in case of Mains failure, the system automatically reverts to supply the load

PROTECT 8PLUS: BATTERY DISCHARGE FEATURE EXPLAINED

T0: Battery test



T1: 100% Inverter Load Impact and from T1 onwards



Operation principle:

The IGBT rectifier is controlled to enable power flow in both directions.

It can be operated at any desired input power factor, and hence, can even act as a reactive power source (from the grid standpoint).

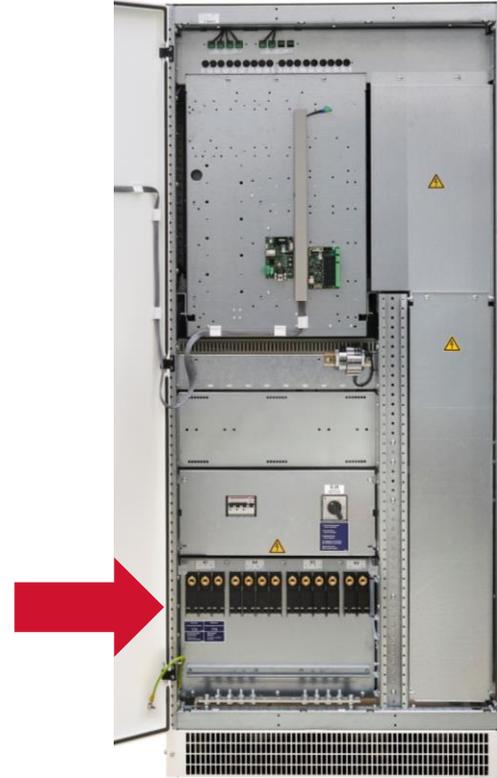
The rectifier electronic controls both dc bus voltage and ac input current.

During battery test, input current is 180° phase shift vs ac input voltage, thus, allowing battery discharge into the grid.

PROTECT 8PLUS: SAFETY FOR OPERATORS



- No live parts accessible door open



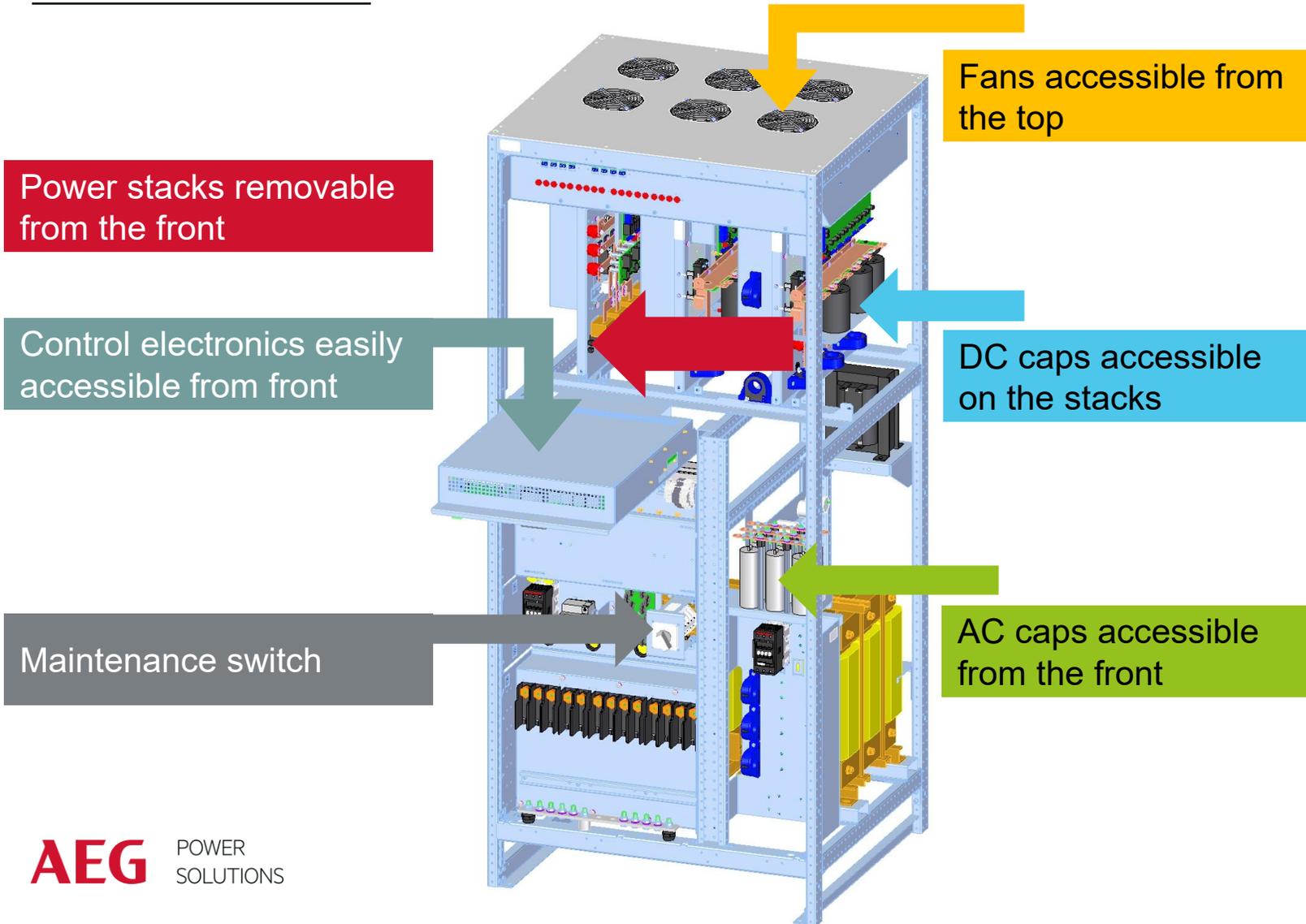
- Terminals segregated (accessible without removing the complete protection)



- Power stacks and control electronics segregated (accessible without removing the complete protection)

BENEFITS

PROTECT 8PLUS: FRONT ACCESSIBILITY FOR MAINTENANCE



BENEFITS

- All replaceable components are accessible from the front of the unit
- Reduced MTTR
- Optimized time for maintenance operations

PROTECT 8PLUS: HOT SWAPPABLE FANS

BENEFITS

- If needed, fan replacement can be performed without switching off the unit (according to specification)
- Limited risk of a part falling inside the unit



PROTECT 8^{PLUS}

Introduction to the range

Benefits:

- CAPEX savings
- JIP 33 Compliance
- OPEX savings

Wrap-up



PROTECT 8PLUS: WRAP-UP

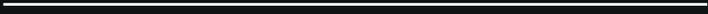
Product Features:

- Available from 10 to 120kVA (cos ϕ 0.8)
- 3-ph input on the complete range
- 1-ph or 3-ph output
- Double conversion efficiency up to 90%⁽¹⁾
- THDi < 5% & Input PF up to 0.99
- Low inrush current $\leq 2I_n$
- 216Vdc or 384Vdc battery voltage
- Integrated manual bypass
- Full galvanic isolation (input and output)
- Optional input autotransformer
- Ingress protection up to IP43
- Bi-directional rectifier
- Outstanding inverter output performances
- Same options as Protect 8 S10 (where applicable)
- Full set of communication capabilities

BENEFITS

- **CAPEX savings** thanks to the low THDi, high input PF, and limited inrush current
- **OPEX savings** thanks to the battery discharge feature (no need of load bank), to the easy front-access maintenance, and to the high efficiency
- **High reliability** for the load thanks to the outstanding short-circuit clearance capability, the paralleling capability
- **Compliance** to the JIP33 specification, thanks to its embedded bi-directional rectifier and to the appropriate set of options





THANK YOU