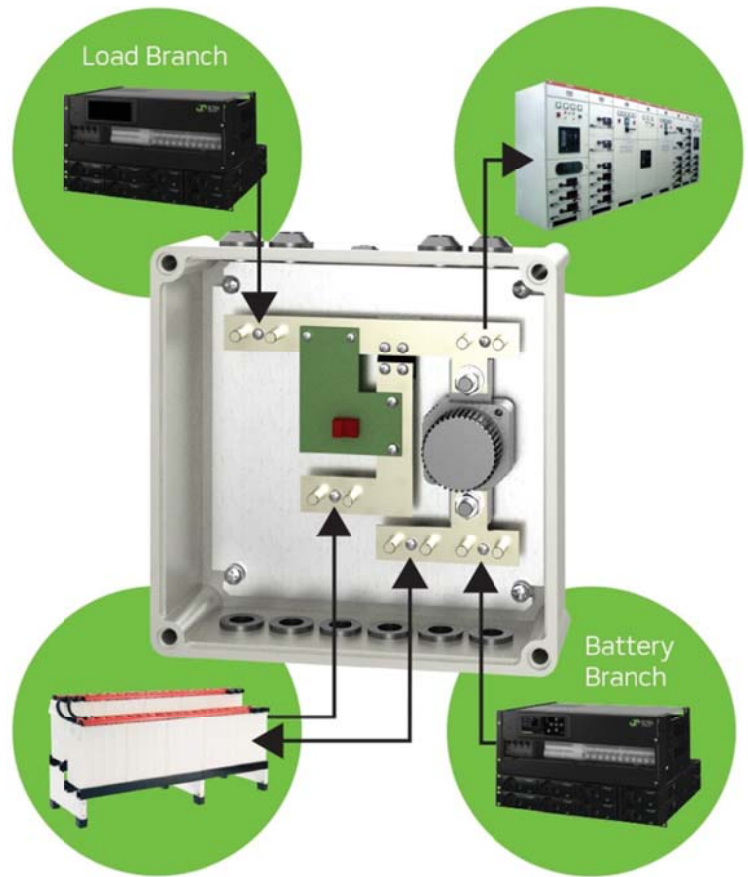


DUAL OUTPUT DC SYSTEM

Our dual output DC system divides the rectifier into two independent branches for battery and load supply.

No drop diodes in series with the load are needed for boost or equalize charge.

Boost or equalize charge can be performed without any impact on the load voltage.



DUAL OUTPUT DC SYSTEM

24V_{DC}, 48 V_{DC}, 60 V_{DC}, 110 V_{DC}, 125 V_{DC}, & 220 V_{DC}

Doc 328721.DS3 – rev1

MODULAR ARCHITECTURE

The modular architecture, industry-leading efficiency, compact size, innovative design and comprehensive monitoring and control features provide significant benefits over the current industry standard.

Our dual output power systems and building blocks are built around our Flatpack2 High Efficiency (HE) rectifiers and designed for a number of power-critical Industrial applications, including Power Generation & Distribution, Rail, Marine Offshore and other demanding industries.



FP2 HE rectifiers

APPLICATIONS

Power Utilities

- Low & High Voltage switchgear
- Transformer & Substations
- Power Generation & Distribution
- Control & protection
- SCADA Communication
- Emergency lighting

Offshore and process industry

- Safety and Automation Systems (SAS)

Marine

- Communication systems onboard ships

Railway & Metro infrastructure

- Control & protection
- Power conversion
- Signaling
- GSM-R
- Safety Systems

KEY FEATURES

- BOOST AND EQUALIZE CHARGE WITH NO IMPACT ON LOAD VOLTAGE
- NO HEAT GENERATED DURING BOOST OR EQUALIZE CHARGE (NO DROP DIODES)
- NO IMPACT ON EFFICIENCY OF POWER SYSTEM (NO HEAT LOSS)
- NO ADDITIONAL POWER FOR HEAT LOSS IN DROP DIODES
- BATTERY POWER AVAILABLE FOR FUSE TRIPPING (NO DC/DC CONVERTER)
- LOWER COST THAN DROP DIODE UNIT
- NO DIODE IN SERIES WITH LOAD DURING EQUALIZE OR BOOST
- SPACE SAVING
- UP TO 300 A LOAD OUTPUT
- UP TO 300 A BATTERY IN/OUTPUT
- GREEN SOLUTION

DUAL OUTPUT DC SYSTEM

24V_{DC}, 48 V_{DC}, 60 V_{DC}, 110 V_{DC}, 125 V_{DC}, & 220 V_{DC} systems

DROP DIODE DESIGN & FUNCTION

Design and engineering of drop diodes in DC system

Normal operation

In normal operation when batteries are in float, the contactor is closed and output drop diodes are shorted.

Boost or equalize operation

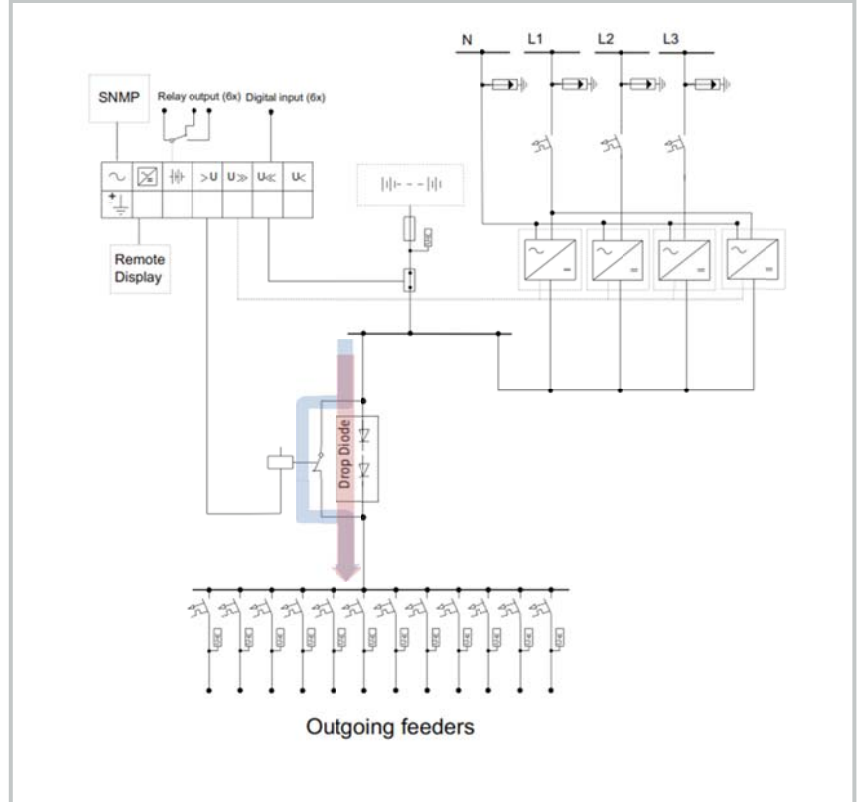
During boost or equalize charge the contactor is open and a voltage drop over the diodes is maintained according to the customers specification.

During boost or equalize charge all load current is flowing through the drop diodes and creates a power loss which will generate heat. Depending on load output and design of voltage drop over the diodes, this power loss can exceed several kW.

Designing such a system includes heat dissipation, additional power from rectifier for power loss over drop diodes and bulky drop diodes mounted on cooling plates.

Many drop diodes in series also increases the number of single points of failure.

SINGLE LINE WITH DROP DIODES ON OUTPUT



DUAL OUTPUT DESIGN & FUNCTION

Normal operation (float, boost or equalize)

The battery branch can operate independently for float, boost or equalize charge, while the load branch is supplying the load at a stabilized output voltage independent of the battery branch.

Operation in case of mains or rectifier failure

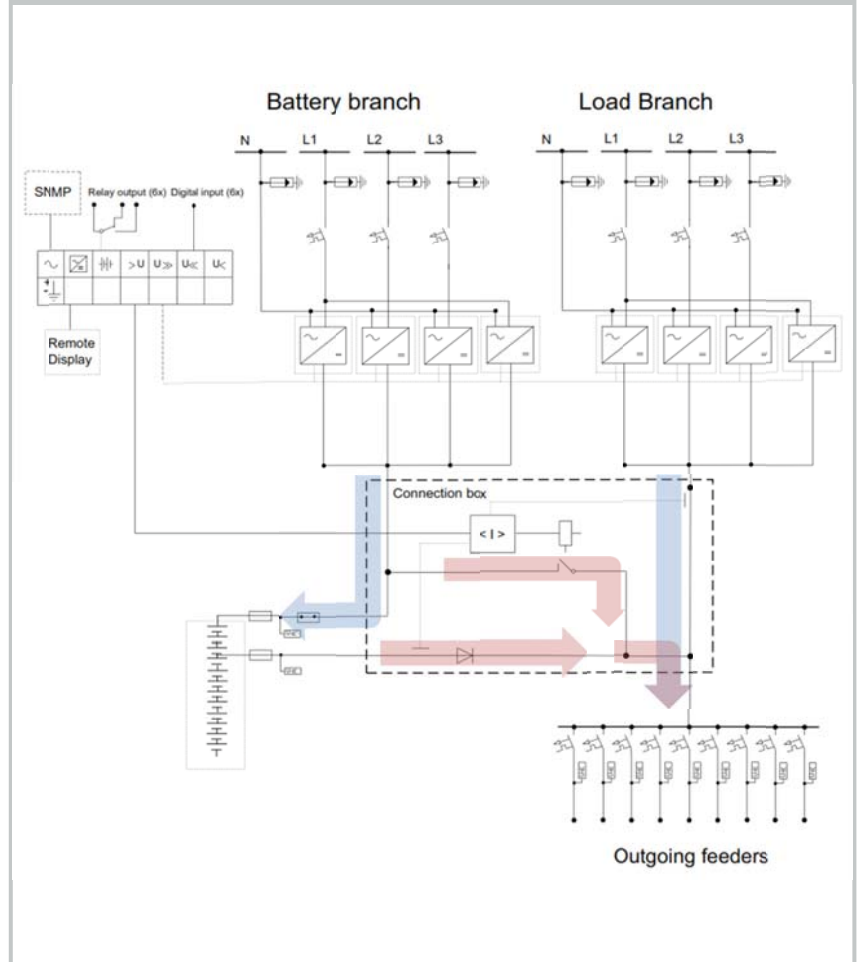
In case of mains or rectifier failure in the load branch, a sequence is triggered to connect the battery to the load with no interruption. An inter cell tap connection avoids any drop of output voltage, until the contactor to the full battery voltage is closed.

If the battery branch is in boost or equalize charge during a black out of the load branch, the boost or equalize charge will be inhibited before the contactor is closed, to avoid high voltage on the output. Any current flow through the diode will activate this operation.

Total rectifier capacity

No additional power for heat loss in drop diode needs to be added to the rectifier capacity. The load branch capacity is calculated according to the needed load, and battery branch according to the recharge time of the batteries. In total the capacity of the two branches will be less than a system with drop diodes where additional power for voltage drop over the drop diodes needs to be included into the total rectifier capacity.

SINGLE LINE DUAL OUTPUT DC CONNECTIONS



DUAL OUTPUT DC SYSTEM

24V_{DC}, 48 V_{DC}, 60 V_{DC}, 110 V_{DC}, 125 V_{DC}, & 220 V_{DC} systems

Model	2-16 kW
IBF AC/DC	Battery Branch

INPUT DATA

Voltage range	115 - 400 V _{AC} Δ or Y
Surge protection	OVP Class 2
Input protection rectifiers	Individual fuse
AC Input protection	MCB

OUTPUT DATA

Nominal voltage range	24-220 V _{DC}
Maximum current	300 A
Maximum power	16 kW
Output protection rectifiers	Blocking OR-ing FET or fuse

OTHER SPECIFICATIONS

Monitoring unit	Smartpack 2
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Model	2-16 kW
IBF AC/DC	Load Branch

INPUT DATA

Voltage range	115 - 400 V _{AC} Δ or Y
Surge protection	OVP Class 2
Input protection rectifiers	Individual fuse
AC Input protection	MCB

OUTPUT DATA

Nominal voltage range	24-220 V _{DC}
Maximum current	300 A
Maximum power	16 kW
Output protection rectifiers	Blocking OR-ing FET or fuse

OTHER SPECIFICATIONS

Monitoring unit	Industrial basic
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Model	2000 W
Flatpack2 HE	

INPUT DATA

Voltage range	85-300 V _{AC}
Frequency	0-66 Hz
Maximum current	11,9 A _{RMS}
Power factor	0,99, 50-100% load

OUTPUT DATA

Nominal voltage range	24-220 V _{DC}
Maximum current	9,2-84 A
Maximum power	2000 W
Output protection	Blocking OR-ing FET or fuse

OTHER SPECIFICATIONS

Efficiency	>94 %
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BUILDING BLOCK: IBF AC/DC, BATTERY BRANCH



BUILDING BLOCK: IBF AC/DC LOAD BRANCH



FLATPACK2 HE RECTIFIER



DUAL OUTPUT DC SYSTEM

24V_{DC}, 48 V_{DC}, 60 V_{DC}, 110 V_{DC}, 125 V_{DC}, & 220 V_{DC} systems

Model	Controller
Smartpack2	

INPUT DATA

Voltage sense input	0-430 V _{DC}
Current sense input	20-60 mV shunts
Battery/load fuse sense	NO/NC
Earth fault detection	1* isolation input

OUTPUT DATA

LVD contactor outputs	10-420 V, 1A
Relay outputs	NO-C-NC, 0-220 V
Web	Web interface
Networking	SNMP

OTHER SPECIFICATIONS

Display	32k colour TFT
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Specifications are subject to change without notice

Model	Connection box
Dual output	328721

INPUT DATA

Voltage	24-300 V _{DC}
Max load current	300 A
Max battery current	300 A
Connections	M8 bolt ,2*50mm2
Input voltage control board:	24 V _{DC}

OUTPUT DATA

Voltage	24-300 V _{DC}
Max load current	300 A
Max battery current	300 A
Connections	M8 bolt ,2*50mm2

OTHER SPECIFICATIONS

Dimensions l*w*h (mm):	300*300*130
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Specifications are subject to change without notice

Model	CAN node
Fleximonitor	

INPUT DATA

Quantity	16 multipurpose
Voltage range	-280 V _{DC} to 280V _{DC}
Current sense range	-100mV to 100 mV
Temperature range	-20 to +70°C

OUTPUT DATA

Quantity	16
Relay outputs (with relay extension)	4 or 8
Voltage rating (with relay extension)	0-220 V _{DC}
Current rating (with relay extension)	0,1-2,0 A

OTHER SPECIFICATIONS

CAN bus connection	
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Specifications are subject to change without notice

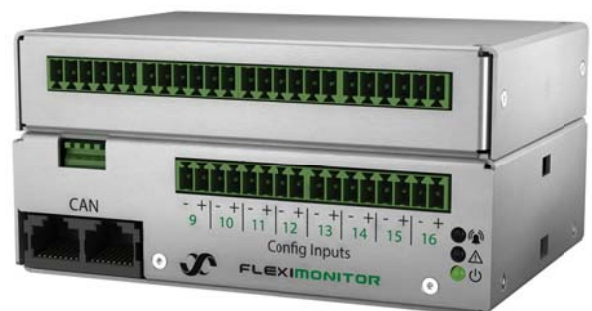
FRONTPANEL SMARTPACK2 MASTER CONT.



DUAL OUTPUT CONNECTION BOX



MULTIPURPOSE CAN NODE WITH RELAY EXTENSION BOX



DUAL OUTPUT DC SYSTEM



24V_{DC}, 48 V_{DC}, 60 V_{DC}, 110 V_{DC}, 125 V_{DC}, & 220 V_{DC} systems

GENERAL TECHNICAL SPECIFICATIONS

Model	Industrial DC Systems Dual output 24-220V _{DC}
Part number	Depending on configuration
INPUT DATA	
Voltage (range)	115 - 400 V _{AC} (Δ) or (Y), Derating <185V _{AC} , 45-66Hz
Input protection	MCBs and SPD (OVP Class 2)
Rectifier protection	Individual fuse in rectifier modules
Connection	Terminals 10mm ²
OUTPUT DATA	
Voltage (nominal)	24V _{DC} , 30V _{DC} , 48V _{DC} , 60V _{DC} , 110V _{DC} , 125V _{DC} , & 220V _{DC}
Power (maximum) @ nominal input	2*16kW DC for load & battery branch
Current (maximum) @ nominal input	See previous page or applicable Flatpack2
Protected battery output	1 x 2 pole NH00/NH1 Fuses (63 - 250A) or MCCB Circuit Breaker(63 - 250A) with or without fuse trip alarm
Protected load outputs	1-24 x 2 pole (6 - 40A) MCB:s with or without fuse trip alarm
Integrated battery shunt	100/300A
Load connection	Terminal, max 16mm ²
Output Protection in rectifiers	Blocking OR-ing FET or fuse, Short circuit proof & High temperature protection
CONTROL AND MONITORING	
Monitoring Unit	Smartpack2
Local Operation	Display and keys, WEB interface via standard browser using WebPower
Remote Operation	WebPower (WEB Interface, SNMP protocol and email)
Alarm Relays (Connection: clamp ≤ 1.5 mm ²)	6 x Potential free change over contacts (NO, NC, C) [Max 75V/2A/60W] Optional; 3 x Potential free change over contacts (NO, NC, C) [Max 280V _{DC} /0,1A]
Inputs	6 x Configurable (digital, analog max 75V) and 3 temperature
Current measurements	Rectifier current and, if battery shunt is used, battery current and load current
Alarms	Low & high output voltage alarms (Minor and major levels), Earth fault alarm, Temperature alarm, Mains outage alarm, Battery remaining capacity/low quality alarms, Battery/load breaker tripped alarm and much more
OTHER SPECIFICATIONS	
Isolation	3.0 kV _{AC} - input to output 1.5 kV _{AC} - input to earth 0.5 kV _{DC} - output to earth ¹⁾
Operating temperature	-40 to +45°C (-40 to +113°F), humidity 5 - 95% RH non-condensing Output power de-rates at high temperature, see datasheet for applicable rectifier
Storage temperature	-40 to +85°C (-40 to +185°F), humidity 0 - 99% RH non-condensing
Dimensions[WxHxD]	600 x 2100 x 600mm
DESIGN STANDARDS	
Electrical safety	RECTIFIERS UL 60950-1-3 rd edition, EN 60950-1-3 rd edition
EMC	ETSI EN 300 386 V.1.4.1 EN 61000-4 T2-5" EN 61000-6-1 / -2 / -3 / -4 / -5
Environment	ETSI EN 300 019, ETSI EN 300 132 - 2

1) 1.5kV_{AC} for dual output with 110V & 220V Flatpack2 rectifiers

Specifications are subject to change without notice