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Industry / Telecom

Modular Rectifier Systems

ADC Range



Rectifier Range ADC

Modular, Compact, Variable

ADC Range

Modular rectifier systems

Electronic equipment for the process and transportation industries as well as for telecommunication, power generation and distribution utilities are using microprocessors and require continuous DC power in the event of mains failure or mains disturbances.

The new BENNING ADC rectifier line with its modular and compact design represents a perfect solution for a wide range of applications in the industrial and telecommunication market.

The following versions of the ADC range are available:

1. Module version (Fig. 3)

The ADC module represents a complete rectifier unit and can operate as a single or parallel operating unit in a wide range of different standard or customized cabinet solutions. Several DIP- switches on the module allow the adjustment of operation modes.

A separate PCB with LCD display push buttons and signal LED's is available as an option for the complete configuration and monitoring of all ADC functions.

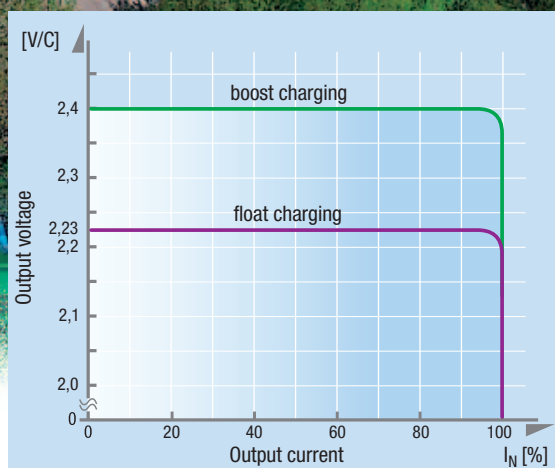


Fig. 1: IU-characteristic, DIN 41773 for lead acid batteries

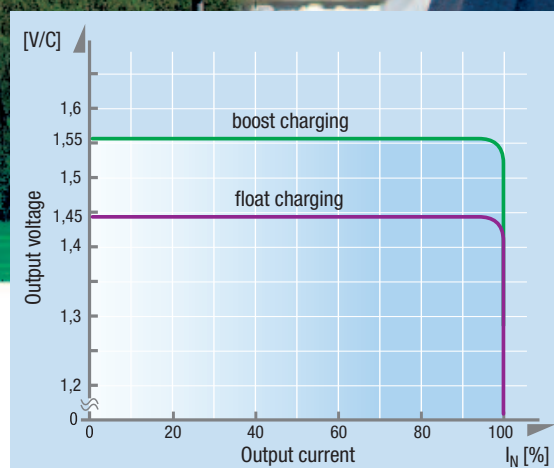


Fig. 2: IU-characteristic, DIN 41773 for NiCd batteries

Together with vented or valve-regulated lead acid batteries as well as with NiCd batteries, ADC rectifier systems provide continuous DC power with high availability for mission critical loads.

The ADC rectifier line consists of 300 W and 600 W power modules with DC output voltages of 12 V, 24 V, 48 V, or 60 V.

The 600 W module is also available with 108 V (110 V) DC output. Two 108 V modules in serial connection allow the design of DC systems with 216 V (220 V).

The output characteristic of the ADC rectifier range follows DIN 41773 (Fig. 1 + 2). The excellent dynamic performance of the ADC range also allows stand-alone operation without batteries.

2. 19 inch version (Fig. 4)

The ADC is also available as a 19- inch plug-in unit. The output power steps are 300 W, 600 W or 1200 W.

For the operation and monitoring of the 19- inch version, the front panel provides push buttons, LCD display and signal LED's.

3. Wall cabinet versions (Fig. 5 + 6)

Two sizes of wall cabinets are available which can accommodate two or four parallel operating modules.

These cabinets also provide space for a limited number of load and battery fuses as well as one LVD.

The doors are equipped with LCD display, push buttons and alarm LED's

Both wall cabinets are designed to meet IEC protection class IP 21.

ADC Rectifier Range

Wide Input Voltage Range, Power Factor >0,98

All ADC rectifiers have the following operation and monitoring functions

High DC output voltage

If the DC output voltage level rises above the legal level, the output of the ADC shuts down.

An alarm signal activates the common internal alarm relay and the red LED lights up.

Low DC output voltage

The ADC will not switch off if the DC output level falls under the adjusted level, but a time delayed alarm signal will be linked to the common internal alarm relay and indicated via the red LED.

Earth fault monitoring

The earth fault monitoring measures the resistance of the DC output to earth.

If the insulation value falls under the adjusted limit (adjustable between 100 kOhm and 1 MOhm), the common internal alarm relay will activate and the red LED indicates earth fault.

This earth fault monitoring version is not in line with standard EN 61557-8.

ADC rectifier features

- Universal modular rectifier range for DC systems from 300 W up to 2400 W output power
- Output voltages:
12 V, 24 V, 48 V, 60 V, 110 V, 220 V (216 V)
- Operation with or without batteries
- Wide input voltage range (93 V -264 V)
- Power factor 0,98
- Temperature compensated charge characteristic for Lead acid or NiCd batteries
- Battery-circuit and battery test with manual or automatic operation
- Comprehensive alarm and monitoring functions

Mains failure

In case of mains failure the alarm signal activates the common alarm relay and the green LED will flash. If the mains voltage returns, the ADC rectifier restarts after the adjusted time delay and the alarm signal will reset. During mains fault, only battery- assisted systems continue to supply DC output voltage.

Battery circuit test

The battery circuit test starts automatically every 24 hours. During the test time of 60 sec., the ADC reduces the output voltage and as the result, the battery feeds the load. If the battery voltage falls under the adjusted level, the common internal alarm relay will activate and the red LED lights up. A manual start of the battery circuit test is also possible.

Battery availability test

During the battery availability test, the output voltage of the ADC will be dropped and the battery will be discharged as in the battery circuit test. If during the discharge process, the battery voltage level falls under the selected level, the common alarm relay operates and the red LED indicates " negative battery test ". The battery availability test can be set to automatic start at any given date and time.

Further tests are possible with intervals between 30 days and maximum 365 days. All ADC rectifiers are supplied with the factory interval adjustment of 180 days and test duration of 30 minutes.

Battery temperature-compensated charging

To compensate for low and high temperature conditions, the ADC will adjust the float charge voltage according to the battery temperature, using a temperature sensor.

The maximum temperature range for the compensation should not exceed -20 °C and 70 °C.

The standard slope used is 4 mV/°C.

Programmable float/boost change over

If the automatic float/boost function is activated the ADC will switch to boost voltage when the mains returns following a mains failure, and will operate in current limit mode for 30 seconds. The duration of the boost mode is adjustable.

Equalize charge

If the equalize mode is switched on (DIP switch) the charge current is limited to 20 % of nominal current .The duration of the equalize current is adjustable. The factory set value for the duration is 8 hours.

Option

A separate relay card is available for monitoring of individual alarms.

ADC Rectifier Systems

A wide Range of System Solutions

ADC Rectifier Systems

User friendly Monitoring and Control Panel

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Fig. 3: Floor cabinet with built-in ADC module



Fig. 5: ADC wall cabinet I with LCD monitoring and control panel (max. output power 1200 W)



Fig. 6: ADC wall cabinet II with LCD monitoring and control panel (max. output power 2400 W)



Fig. 4: 19 inch version with LCD monitoring and control panel

ADC systems with floor or combination-cabinets (Fig. 7)

ADC 19 inch versions are the perfect choice to build up complete DC power systems in floor cabinets or together with valve regulated batteries, in combination-cabinets.



Fig. 7: Combination cabinet with two 19 inch ADC rectifiers and monitoring system MCU 2500

ADC Rectifier Systems

Typetable



| module version | | | | | |
|----------------------------------|-----------------------|-----------------------|----------------------|----------------------|---------|
| Type | Output voltage [V] | Output current [A] | Input voltage [V] | Input current [A] | cabinet |
| E 110/230 G 12/ 20 BWru - PDM | 12 | 20 | 110 / 230 | 1,8 / 0,9 | - |
| E 110/230 G 24/ 12 BWru - PDM | 24 | 12 | 110 / 230 | 3,2 / 1,6 | - |
| E 110/230 G 24/ 20 BWru - PDM | 24 | 20 | 110 / 230 | 6,4 / 3,2 | - |
| E 110/230 G 48/ 6 BWru - PDM *) | 48 | 6 | 110 / 230 | 3,2 / 1,6 | - |
| E 110/230 G 48/ 12 BWru - PDM *) | 48 | 12 | 110 / 230 | 6,4 / 3,2 | - |
| E 110/230 G 60/ 4,5 BWru - PDM | 60 | 4,5 | 110 / 230 | 3,2 / 1,6 | - |
| E 110/230 G 60/ 9,5 BWru - PDM | 60 | 9,5 | 110 / 230 | 6,4 / 3,2 | - |
| E 110/230 G 108/ 5 BWru - PDM | 108 | 5 | 110 / 230 | 6,4 / 3,2 | - |



| 19 inch version | | | | | |
|----------------------------------|-----------------------|-----------------------|----------------------|----------------------|---------|
| Type | Output voltage [V] | Output current [A] | Input voltage [V] | Input current [A] | cabinet |
| E 110/230 G 12/ 20 BWru - PDE | 12 | 20 | 110 / 230 | 1,8 / 0,9 | - |
| E 110/230 G 12/ 40 BWru - PDE | 12 | 40 | 110 / 230 | 3,6 / 1,8 | - |
| E 110/230 G 24/ 12 BWru - PDE | 24 | 12 | 110 / 230 | 3,2 / 1,6 | - |
| E 110/230 G 24/ 20 BWru - PDE | 24 | 20 | 110 / 230 | 6,4 / 3,2 | - |
| E 110/230 G 24/ 40 BWru - PDE | 24 | 40 | 110 / 230 | 12,8 / 6,4 | - |
| E 110/230 G 48/ 6 BWru - PDE *) | 48 | 6 | 110 / 230 | 3,2 / 1,6 | - |
| E 110/230 G 48/ 12 BWru - PDE *) | 48 | 12 | 110 / 230 | 6,4 / 3,2 | - |
| E 110/230 G 48/ 24 BWru - PDE *) | 48 | 24 | 110 / 230 | 12,8 / 6,4 | - |
| E 110/230 G 60/ 4,5 BWru - PDE | 60 | 4,5 | 110 / 230 | 3,2 / 1,6 | - |
| E 110/230 G 60/ 9,5 BWru - PDE | 60 | 9,5 | 110 / 230 | 6,4 / 3,2 | - |
| E 110/230 G 60/ 19 BWru - PDE | 60 | 19 | 110 / 230 | 12,8 / 6,4 | - |
| E 110/230 G 108/ 5 BWru - PDE | 108 | 5 | 110 / 230 | 6,4 / 3,2 | - |
| E 110/230 G 108/ 10 BWru - PDE | 108 | 10 | 110 / 230 | 12,8 / 6,4 | - |
| E 110/230 G 216/ 5 BWru - PDE | 216 | 5 | 110 / 230 | 12,8 / 6,4 | - |

| cabinet version | | | | | |
|----------------------------------|-----------------------|-----------------------|----------------------|----------------------|---------|
| Type | Output voltage [V] | Output current [A] | Input voltage [V] | Input current [A] | cabinet |
| E 110/230 G 12/ 20 BWru - PDG | 12 | 20 | 110 / 230 | 1,8 / 0,9 | I |
| E 110/230 G 12/ 40 BWru - PDG | 12 | 40 | 110 / 230 | 3,6 / 1,8 | I |
| E 110/230 G 24/ 12 BWru - PDG | 24 | 12 | 110 / 230 | 3,2 / 1,6 | I |
| E 110/230 G 24/ 20 BWru - PDG | 24 | 20 | 110 / 230 | 6,4 / 3,2 | I |
| E 110/230 G 24/ 40 BWru - PDG | 24 | 40 | 110 / 230 | 12,8 / 6,4 | I |
| E 110/230 G 24/ 60 BWru - PDG | 24 | 60 | 110 / 230 | 19,2 / 9,6 | II |
| E 110/230 G 24/ 80 BWru - PDG | 24 | 80 | 110 / 230 | 25,6 / 12,8 | II |
| E 110/230 G 48/ 6 BWru - PDG *) | 48 | 6 | 110 / 230 | 3,2 / 1,6 | I |
| E 110/230 G 48/ 12 BWru - PDG *) | 48 | 12 | 110 / 230 | 6,4 / 3,2 | I |
| E 110/230 G 48/ 24 BWru - PDG *) | 48 | 24 | 110 / 230 | 12,8 / 6,4 | I |
| E 110/230 G 48/ 36 BWru - PDG *) | 48 | 36 | 110 / 230 | 19,2 / 9,6 | II |
| E 110/230 G 48/ 48 BWru - PDG *) | 48 | 48 | 110 / 230 | 25,6 / 12,8 | II |
| E 110/230 G 60/ 4,5 BWru - PDG | 60 | 4,5 | 110 / 230 | 3,2 / 1,6 | I |
| E 110/230 G 60/ 9,5 BWru - PDG | 60 | 9,5 | 110 / 230 | 6,4 / 3,2 | I |
| E 110/230 G 60/ 19 BWru - PDG | 60 | 19 | 110 / 230 | 12,8 / 6,4 | I |
| E 110/230 G 60/ 28,5 BWru - PDG | 60 | 28,5 | 110 / 230 | 19,2 / 9,6 | II |
| E 110/230 G 60/ 38 BWru - PDG | 60 | 38 | 110 / 230 | 25,6 / 12,8 | II |
| E 110/230 G 108/ 5 BWru - PDG | 108 | 5 | 110 / 230 | 6,4 / 3,2 | I |
| E 110/230 G 108/ 10 BWru - PDG | 108 | 10 | 110 / 230 | 12,8 / 6,4 | I |
| E 110/230 G 108/ 15 BWru - PDG | 108 | 15 | 110 / 230 | 19,2 / 9,6 | II |
| E 110/230 G 108/ 20 BWru - PDG | 108 | 20 | 110 / 230 | 25,6 / 12,8 | II |
| E 110/230 G 216/ 5 BWru - PDG | 216 | 5 | 110 / 230 | 12,8 / 6,4 | I |
| E 110/230 G 216/ 10 BWru - PDG | 216 | 10 | 110 / 230 | 25,6 / 12,8 | II |



*) 48 V as SELV version optionally available

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Rectifier Systems ADC

Technical Data

| Type | | Module | 19 inch module | Wall cabinet |
|--------------------------------|-------|-----------|--|--|
| Input voltage | [V] | | 110 – 230 V \pm 15 % | |
| Input current (at 1 x 230 V) | [A] | | see typetable | |
| Frequency | [Hz] | | 47 – 63 | |
| Power factor | | | 0,98 | |
| Output current | [A] | | see typetable | |
| Characteristic | | | IU | |
| Output voltage | | | | |
| Float voltage | [V/C] | | PB 2,23 V/Cell / NiCd 1,45 V/Cell | |
| Boost voltage | [V/C] | | PB 2,4 V/Cell / NiCd 1,55 V/Cell | |
| Equalise voltage | [V/C] | | PB 2,70 V/Cell / NiCd 1,75 V/Cell | |
| Output voltage stability | | | | |
| Static | [%] | | \pm 1 (typical \pm 0,5) | |
| Dynamic | [%] | | \pm 5 (load Δ 10 % - 90 % - 10 %) | |
| Response time | [ms] | | < 10 (load Δ 10 % - 90 % - 10 %) | |
| Efficiency*1 | [%] | | typ >90 | |
| Ripple | [%] | | < 1 | |
| Noise voltage 12 V, 24 V units | [mV] | | < 1 (Filter 1, CCITT 0,41) | |
| Noise voltage 48 V, 60 V units | [mV] | | < 2 (Filter 1, CCITT 0,41) | |
| Radio interference | | | EN 55022 class B | |
| Protection class | | | 1, VDE 0804 and IEC 60950 | |
| Protection | | IP 20 | IP 20 | IP 21 |
| Ambient temperature*2 | [°C] | | -5 – 50 | -5 – 45 |
| Operating altitude | [m] | | up to 2000 above sea level | |
| Moisture class | | | F DIN 40040 | |
| Cooling | | | fan controlled and monitored | |
| Voltage/Current measurement | | – | LCD-display and control panel | |
| LED's | | | | |
| Mains | | LED green | LCD-display and control panel | |
| Alarm | | LED red | LCD-display and control panel | |
| Potential-free common alarm | | | | |
| Rectifier / mains failure | | | yes, two potential free contacts | |
| Dimensions | | | | |
| Hight | [mm] | 70 | 89 (2 U's) | 432 ^{*3} (578 ^{*4}) |
| Width | [mm] | 280 | 483 | 350 |
| Depth | [mm] | 170 | 340 | 260 |
| Weight | [kg] | 2,3 | 9 | 19 ^{*3} (28 ^{*4}) |
| Standards | | | | |
| EMC | | | EN 61000-3-2, EN 61000-3-3, EN 61000-6-2, 61000-6-3 | |
| Environment | | | Storage ETS 300019-1-1 class 1.3, Transport ETS 300019-1-2 class 2.3, Operation ETS 300019-1-4 class 4.1 | |

*1) Mains voltage 230 V, *2) non-condensing, *3) wall cabinet I, *4) wall cabinet II,

Specifications are subject to change without notice.

Dimensions

