BENNING

World Class Power Solutions

Excellent Technology, Efficiency and Quality



ADC

- Modular Rectifier System Technology
- Adaptable, Robust, Efficient
- Suitable for Telecom and Industrial Applications

ADC Rectifier Systems
Modular, Compact, Variable

- **Maximum availability**
- **Lowest running costs**

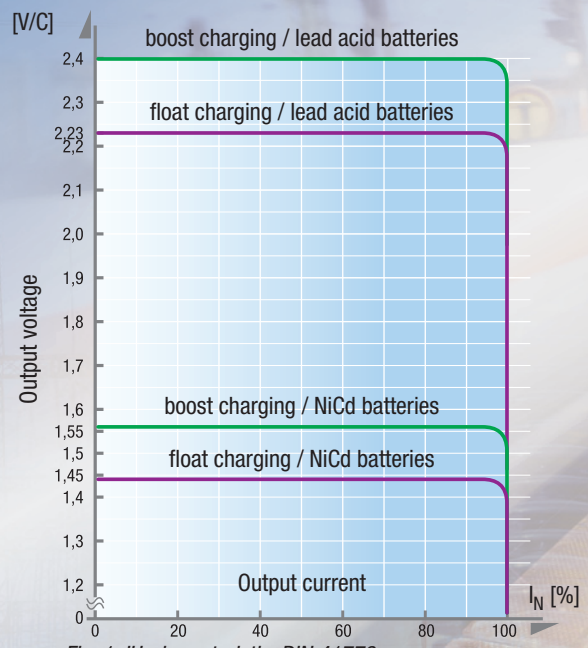


Fig. 1: IU-characteristic, DIN 41773 for lead acid batteries and NiCd batteries

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**
- **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**

A wide Range of System Solutions

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. 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.

Power supply systems based on the ADC rectifier series are very adaptable and configurable and are particularly suited to application areas with specific operating conditions.
This includes:

- **IT and Data Centre**
- **Process & Automation**
- **Infrastructure (inc. Ulilities & Transport)**
- **Telecommunications**
- **Oil & Gas**



Module version (Fig. 2)
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.

19 inch version (Fig. 3)
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.

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.

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.



Wall cabinet versions (Fig. 4 and 5)
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.

Combination-cabinets (Fig. 6)
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.
Within the front door of the enclosure the MCU 2500 remote monitoring system can be installed.

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 kΩ and 1 MΩ), 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.

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 funtion 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.

Technical Data

Type		Module	19 inch module	Wall cabinet
Input voltage	[V]	110 – 230 V ± 15 %		
Input current (at 1 x 230 V)	[A]	see typetable		
Frequency	[Hz]	47 – 63		
Power factor		0.98		
Characteristic		IU		
Output voltage / Float voltage	[V/C]	PB 2.23 / NiCd 1.45		
Output voltage / Boost voltage	[V/C]	PB 2.4 / NiCd 1.55		
Output voltage / Equalise voltage	[V/C]	PB 2.70 / NiCd 1.75		
Output voltage stability / Static	[%]	± 1 (typical ± 0.5)		
Output voltage stability / Dynamic	[%]	± 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	
LED`s - Alarm		LED red	LCD-display and control panel	
Potential-free common alarm		Rectifier / mains failure, 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		

Cabinet version / Type	Enclosure type	Output voltage	Output current	Input voltage	Input current
		[V]	[A]	[V]	[A]
E 110/230 G 12/ 20 BWru - PDG	PDE19" PDM	12	20	110 / 230	1.8 / 0.9
E 110/230 G 12/ 40 BWru - PDG	PDE19"	12	40	110 / 230	3.6 / 1.8
E 110/230 G 24/ 12 BWru - PDG	PDE19" PDM	24	12	110 / 230	3.2 / 1.6
E 110/230 G 24/ 20 BWru - PDG	PDE19" PDM	24	20	110 / 230	6.4 / 3.2
E 110/230 G 24/ 40 BWru - PDG	PDE19"	24	40	110 / 230	12.8 / 6.4
E 110/230 G 24/ 60 BWru - PDG II		24	60	110 / 230	19.2 / 9.6
E 110/230 G 24/ 80 BWru - PDG II		24	80	110 / 230	25.6 / 12.8
E 110/230 G 48/ 6 BWru - PDG	PDE19" PDM*5	48	6	110 / 230	3.2 / 1.6
E 110/230 G 48/ 12 BWru - PDG*5	PDE19" PDM	48	12	110 / 230	6.4 / 3.2
E 110/230 G 48/ 24 BWru - PDG*5	PDE19"	48	24	110 / 230	12.8 / 6.4
E 110/230 G 48/ 36 BWru - PDG II*5		48	36	110 / 230	19.2 / 9.6
E 110/230 G 48/ 48 BWru - PDG II*5		48	48	110 / 230	25.6 / 12.8
E 110/230 G 60/ 4.5 BWru - PDG	PDE19" PDM	60	4.5	110 / 230	3.2 / 1.6
E 110/230 G 60/ 9.5 BWru - PDG	PDE19" PDM	60	9.5	110 / 230	6.4 / 3.2
E 110/230 G 60/ 19 BWru - PDG	PDE19"	60	19	110 / 230	12.8 / 6.4
E 110/230 G 60/ 28.5 BWru - PDG II		60	28.5	110 / 230	19.2 / 9.6
E 110/230 G 60/ 38 BWru - PDG II		60	38	110 / 230	25.6 / 12.8
E 110/230 G 108/ 5 BWru - PDG	PDE19" PDM	108	5	110 / 230	6.4 / 3.2
E 110/230 G 108/ 10 BWru - PDG	PDE19"	108	10	110 / 230	12.8 / 6.4
E 110/230 G 108/ 15 BWru - PDG II		108	15	110 / 230	19.2 / 9.6
E 110/230 G 108/ 20 BWru - PDG II		108	20	110 / 230	25.6 / 12.8
E 110/230 G 216/ 5 BWru - PDG	PDE19"	216	5	110 / 230	12.8 / 6.4
E 110/230 G 216/ 10 BWru - PDG II		216	10	110 / 230	25.6 / 12.8

**1) Mains voltage 230 V, *2) non-condensing, *3) wall cabinet I, *4) wall cabinet II,*
**5) 48 V as SELV version optionally available*

Specifications are subject to change without notice.

www.benninguk.com • www.benning.us

www.benning.de

BENNING worldwide

Austria
Benning GmbH
Elektrotechnik und Elektronik
Eduard-Klinger-Str. 9
3423 ST. ANDRÄ-WÖRDERN
Tel.: +43 (0) 22 42 / 3 24 16-0
Fax: +43 (0) 22 42 / 3 24 23
E-mail: info@benning.at

Belgium
Benning Belgium
branch of Benning Vertriebsges. mbH
Assesteenweg 65
1740 TERNAT
Tel.: +32 (0) 2 / 5 82 87 85
Fax: +32 (0) 2 / 5 82 87 69
E-mail: info@benning.be

Croatia
Benning Zagreb d.o.o.
Trnjanska 61
10000 ZAGREB
Tel.: +385 (0) 1 / 6 31 22 80
Fax: +385 (0) 1 / 6 31 22 89
E-mail: info@benning.hr

Czech Republic
Benning CR, s.r.o.
Zahradní ul. 894
293 06 KOSMONOSY
Tel.: +420 / 3 26 72 10 03
Fax: +420 / 3 26 74 12 99
E-mail: odbyt@benning.cz

France
Benning
conversion d'énergie
43, avenue Winston Churchill
B.P. 418
27404 LOUVIERS CEDEX
Tel.: +33 (0) / 2 32 25 23 94
Fax: +33 (0) / 2 32 25 13 95
E-mail: info@benning.fr

Germany
Benning Elektrotechnik und Elektronik
GmbH & Co. KG
Factory I: Münsterstr. 135-137
Factory II: Robert-Bosch-Str. 20
46397 BOCHOLT
Tel.: +49 (0) 28 71 / 93-0
Fax: +49 (0) 28 71 / 9 32 97
E-mail: info@benning.de

Great-Britain
Benning Power Electronics (UK) Ltd.
Oakley House, Hogwood Lane
Finchampstead
BERKSHIRE
RG 40 4QW
Tel.: +44 (0) 1 18 / 9 73 15 06
Fax: +44 (0) 1 18 / 9 73 15 08
E-mail: info@benninguk.com

Greece
Benning Hellas
Chanion 1, Lykovrisi 141 23
ATHENS
Tel.: +30 (0) 2 10 / 5 74 11 37
Fax: +30 (0) 2 10 / 5 78 25 54
E-mail: info@benning.gr

Hungary
Benning Kft.
Power Electronics
Rákóczi út 145
2541 LÁBATLAN
Tel.: +36 (0) 33 / 50 76 00
Fax: +36 (0) 33 / 50 76 01
E-mail: benning@benning.hu

Italy
Benning Conversione di Energia S.r.L
Via Cimarosa, 81
40033 CASALECCHIO DI RENO (BO)
Tel.: +39 0 51 / 75 88 00
Fax: +39 0 51 / 6 16 76 55
E-mail: info@benningitalia.com

Netherlands
Benning NL
branch of Benning Vertriebsges. mbH
Peppelkade 42
3992 AK HOUTEN
Tel.: +31 (0) 30 / 6 34 60 10
Fax: +31 (0) 30 / 6 34 60 20
E-mail: info@benning.nl

Poland
Benning Power Electronics Sp. z o.o.
Korczunkowa 30
05-503 GLOSKÓW
Tel.: +48 (0) 22 / 7 57 84 53
Fax: +48 (0) 22 / 7 57 84 52
E-mail: biuro@benning.biz

P. R. China
Benning Power Electronics (Beijing) Co.,
Ltd. No. 6 Guangyuan Dongjie
Tongzhou Industrial Development Zone
101113 BEIJING
Tel.: +86 (0) 10 / 61 56 85 88
Fax: +86 (0) 10 / 61 50 62 00
E-mail: info@benning.cn

Slovakia
Benning Slovensko, s.r.o.
Šenkvická 3610/14W
902 01 PEZINOK
Tel.: +421 (0) 2 / 44 45 99 42
Fax: +421 (0) 2 / 44 45 50 05
E-mail: benning@benning.sk

South East Asia
Benning Power Electronics Pte Ltd
85, Defu Lane 10
#05-00
SINGAPORE 539218
Tel.: +65 / 68 44 31 33
Fax: +65 / 68 44 32 79
E-mail: sales@benning.com.sg

Spain
Benning Conversión de Energía S.A.
C/Pico de Santa Catalina 2
Pol. Ind. Los Linares
28970 HUMANES, MADRID
Tel.: +34 91 / 6 04 81 10
Fax: +34 91 / 6 04 84 02
E-mail: benning@benning.es

Sweden
Benning Sweden AB
Box 990, Hovslagarev. 3B
19129 SOLLENTUNA
Tel.: +46 (0) 8 / 6 23 95 00
Fax: +46 (0) 8 / 96 97 72
E-mail: power@benning.se

Switzerland
Benning Power Electronics GmbH
Industriestrasse 6
8305 DIETLIKON
Tel.: +41 (0) 44 / 8 05 75 75
Fax: +41 (0) 44 / 8 05 75 80
E-mail: info@benning.ch

Turkey
Benning GmbH Turkey Liaison Office
19 Mayıs Mah. Kürkçü Sokak No:16/A
34736 KOZYATAGI
KADIKÖY / ISTANBUL
Tel.: +90 (0) 2 16 / 4 45 71 46
Fax: +90 (0) 2 16 / 4 45 71 47
E-mail: info@benning.com.tr

UAE
Benning Power Systems
Middle East / Office: 918,
9th Floor, AYA Business Center
ADNIC Building, Khalifa Street
ABU DHABI
Tel.: +971 (0) 2 / 4 18 91 50
E-mail: benningme@benning.fr

Ukraine
Benning Power Electronics
3 Sim'yi Sosninykh str.
03148 KYIV
Tel.: 0038 044 501 40 45
Fax: 0038 044 273 57 49
E-mail: info@benning.ua

U.S.A.
Benning Power Electronics, Inc.
1220 Presidential Drive
RICHARDSON, TEXAS 75081
Tel.: +1 2 14 / 5 53 14 44
Fax: +1 2 14 / 5 53 13 55
E-mail: sales@benning.us

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