

Excellent Technology, Efficiency and Quality



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.

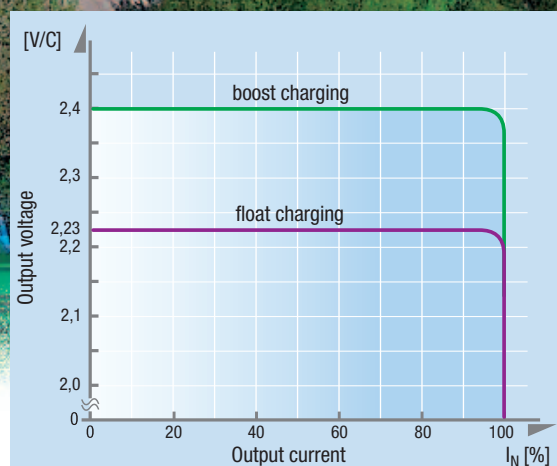


Fig. 1: IU-characteristic, DIN 41773 for lead acid batteries

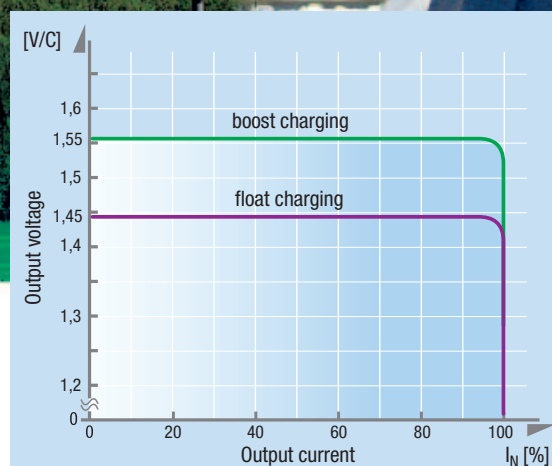


Fig. 2: IU-characteristic, DIN 41773 for NiCd batteries

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



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 Rectifier Systems

User friendly 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



*1) 48 V as SELV version optionally available

Rectifier Systems ADC

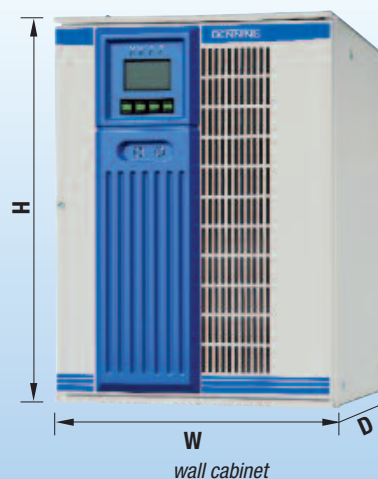
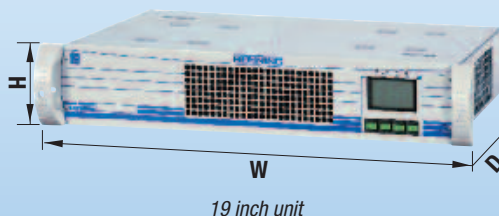
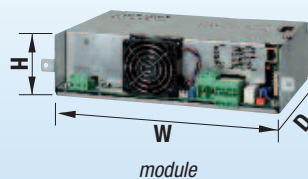
Technical Data

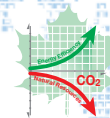
Type		Module	19 inch module	Wall cabinet
Input voltage	[V]		110 – 230 V $\pm$ 15 %	
Input current (at 1 x 230 V)	[A]		see typetable	
Frequency	[Hz]		47 – 63	
Power factor			0,98	
Output current	[A]		see typetable	
Characteristic			IU	
Output voltage				
Float voltage	[V/C]		PB 2,23 V/Cell / NiCd 1,45 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



BENNING worldwide**ISO
9001****ISO
14001****ISO
50001****SCC®****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

Belarus

1000 BENNING
ul. Belorusskaya, 51-25
224025 BREST
Tel.: +375 162 / 97 47 82
Fax: +375 162 / 29 33 77
E-mail: info@benning.by

Belgium

Benning Belgium
branch of Benning Vertriebsges. mbH
Essenestraat 16
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.
Trnajska 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 / 93 297
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

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 2 Giugno 1946, 8/B
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.
Korcunkowa 30
05-503 GŁOSKÓW
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

Russian Federation

000 Benning Power Electronics
Domodedovo town,
microdistrict Severny,
"Benning" estate, bldg.1
142000 MOSCOW REGION
Tel.: +7 4 95 / 9 67 68 50
Fax: +7 4 95 / 9 67 68 51
E-mail: benning@benning.ru

Serbia

Benning Power Electronics doo
Kornelija Stankovića 19
11000 BEOGRAD
Tel.: +381 (0) 11 / 3 44 20 73
Fax: +381 (0) 11 / 3 44 20 73
E-mail: info@benning.co.rs

Slovakia

Benning Slovensko, s.r.o.
Kukuričná 17
83103 BRATISLAVA
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 Kozyatağı
Kadıköy / 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

Ukraine

Benning Power Electronics
3 Sim'yi Sosninykh str.
03148 KYIV
Tel.: +380 (0) 44 / 5 01 40 45
Fax: +380 (0) 44 / 2 73 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

BENNING