

# BENNING

World Class Power Solutions  
世界级电源解决方案



## 整流器

核电站固定式蓄电池系统专用

## Rectifiers

For Stationary Battery Systems  
in Nuclear Power Plants

### 1.1 概述

由于核电站对设备的极高的安全性和可靠性以及运行时间较长的特性的需求，北宁制造的核电站专用充电机系统的设计寿命可达40年以上，并同时满足核电站 1-E级设备的抗震 和其它技术要求，充电机的生产制造和测试以及质量控制程序完全按照 1-E标准来进行。

充电机是核电站中的以下系 统的理想后备电源：

- DCS 系统
- 计算机系 统
- 仪器仪表 系统
- 阀门系统
- 马达系统
- 通信设备
- 遥测及遥 控系统

充电器及其蓄电池使负载免受市电电网的波动及停电的影响。

充电机输出电压为48V，110V或220V，可为铅酸或镍镉电池充电，并 可选配其它电压规格。当市电正常时，充电机直接为负载供电，同时对电池进行浮充电。这样如果市电停电，电池可以按照设计的后备时间继续为负载供电。

作为选项，整流器试验装置也能够随整流器一同供货，以在电站重复进行必要的试验。



### 1.2 输出特性

整流器满足DIN41 773标准的IU充电特性并满足以下值域：

- 市电电压波动范围  $\pm 10\%$
- 市电频率波动范围  $\pm 5\%$
- 负载变化范围0到100%

浮充电压为2.23V/单体 (根据不同电池可以调整)

浮充电压是指交流市电正常工作时整流器为负载供电的同时为蓄电池进行浮充电以保持其额定容量。

### 1.1 General

Due to the very stringent safety requirements for equipment installed in Nuclear Power Plants (NPP) and the long operating periods of such plants, the BENNING rectifier systems for NPP applications have been designed for a life time of more than 40 years. The rectifier systems have been designed and qualified to fulfill seismic and other NPP requirements and are manufactured and tested according to the quality procedures required for 1-E NPP applications.

The rectifiers are ideally suited to provide safe backup power to all loads found in an NPP including for instance:

- DCS systems
- Computers
- Instrumentation and Metering
- Valves
- Motors
- Telecommunications equipment
- Telemetry and telecontrol equipment

The rectifier, together with a battery, isolates the loads from irregularities and power outages on the mains supply.

The rectifiers in general have output voltages of 48 V, 110 V or 220 V and are suitable to charge lead-acid or nickel-cadmium batteries. However other voltages are also available. When the mains supply is operating normally, the rectifier powers the load and also provides power for charging and maintaining the float charging current for the battery. This ensures that, if a mains failure should occur, the battery is ready to supply the full power for the intended backup time.

Optional test equipment can be supplied with the rectifiers, to undertake the repeat measurements necessary in power station applications.

图1: 保养用整流器测试装置 (可选件)

Fig. 1: Optional test simulator for maintenance

### 1.2 Output characteristics

The units operate with an IU charging characteristic to DIN 41 773 and the variations which can be corrected for are as follows:

- Mains voltage variations of  $\pm 10\%$
- Frequency variations of  $\pm 5\%$
- Load variations from 0 to 100 %

**Float charge voltage 2,23 V per cell (Adjustable)**

The float charge voltage is the voltage at which the on line loads are supplied and the battery's nominal charge level is maintained.



**均充电压2.4V/单体 (根据不同的电池可以调整)**

当市电停电, 蓄电池放电之后, 充电机提升到电池能承受的最高输出电压, 从而最快的对蓄电池补充充电。打开柜门, 将选择开关从2.23V调整到所需均充电压值上。

**充电电压调节 (根据不同的电池可以调整)**

为满足蓄电池初充电及均充需要, 整流器还具有W充电特性。(平衡电池内阻)

整流器能够通过平稳变化的电流以最高2.7V电压为蓄电池充电。

整流器设有蓄电池隔离开关, 可使蓄电池与直流负载分离而单独进行充电。

对于镍镉蓄电池, 均充电压为1.4V或1.55V, 最高充电电压可达1.8V。

**Boost charging 2.4 V per cell (Adjustable)**

With this higher level of constant voltage it is possible to recharge the battery more quickly after mains failure. Access can be gained to the selector switch required to change from 2.23 V per cell and to the setting potentiometers by opening the front doors.

**Commissioning charge (adjustable)**

In order to charge the battery for the first time and for any equalising charges, which may be necessary, the power supply unit is also equipped to operate to a supplementary W characteristic. With a smooth variable charging current, the battery voltage goes up to 2.7 V per cell. The change-over of the charging characteristic from charging to commissioning is locked with an auxiliary contact of the distribution feed-in switch. For NiCd batteries the same characteristic is produced with constant voltage values of 1.4 V per cell or 1.55 V per cell. The max. commissioning voltage is 1.8 V per cell.

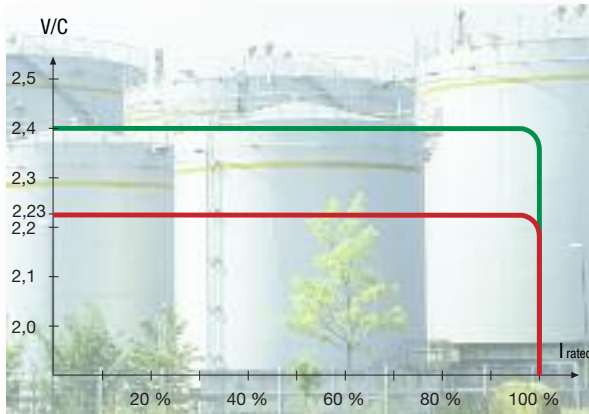


图2: 遵守DIN41773标准有关铅酸蓄电池规范的IU特性曲线

Fig. 2: IU characteristic to DIN 41773 for lead-acid batteries

**1.3 控制**

整流器原理为6脉冲三相整流桥, 晶闸管控制器控制。整流器为自冷方式下, 可以带满负载连续运行, 并配置100A以上的快速熔断器进行短路保护。

**1.3 Regulation**

The units are regulated by a controller with thyristors acting as control devices in the rectifier assembly. The rectifier assembly is in the form of a fully controlled (6-pulse) three-phase bridge circuit. The semi-conductors are sized to ensure that they are able to operate continuously at full load with natural ventilation. The silicon semi-conductors are protected against short circuits by ultra high-speed fuses which are designed to act as cell fuses at rated currents of more than 100 A.

**1.4 滤波**

整流器配置了增强型滤波器, 能够将输出电压纹波系数控制在5%以内 (峰峰值, 在没有电池的情况下)

**1.4 Smoothing**

As ripple sensitive loads could be connected a reinforced smoothing device is fitted in the units, which limits the ripple of the output voltage when operated without batteries to a value of 5 % peak-to-peak.

## 2. 信号和 监视装置

整流器配置了各种标准监视模块，并集成于一个机架内，见图3

### 2.1 DUW III 三相交流市电输入监视模块

DUW III 三相交流市电输入监视模块对交流市电具有三项监视功能

- 市电欠压 ( $-15\%$ )
- 市电过压 ( $+15\%$ )
- 市电平衡

任何扰动都将通过整流器前面板上的黄色LED发出报警信号。报警信号将持续0.1-15秒后，在SME I 上集中显示并关闭充电装置，当故障清除后，系统自动恢复工作，接着按动SEM I上的复位键使其复位。若发生市电过压，在过压期间或200毫秒期间将产生一个干接点信号暂停控制器工作，以时间长者为准。

### 2.2 GKU I 监视模块及整流器和短路监视模块

GKU I 监视模块具有两项监视功能：

- 基于电流的欠压  
(充电特性监视)
- 系统短路

GKU I 监视模块由一个电压和电流继电器组成。若模块输出电压低于2.1V且输出电流低于80%额定值时，将触发报警信号并显示黄色LED指示。短路监视模块也由一个电压和电流继电器组成。

若电池单体电压低于1.6V且仍以额定电流放电时，将触发报警信号并由SME I 及监视模块进行处理（见2.1），不过SME I 必须接收到人工确认后才会使监视模块复位。

### 2.3 GSR VII 直流电压继电器

GSR VII 是一个过压监视继电器，具有两个功能：

- 动态过压监视
- 静态过压监视

动态过压监视装置是一个具有暂停控制器工作功能的瞬时直流电压监视装置。若出现电压峰值，控制器将在10毫秒以内关闭，持续时间200毫秒（黄色LED亮）。若电压峰值在30秒之内出现4次，系统将自动关闭并发送信号至SME I。

静态过压装置是用来监视直流电压有效值。若直流电压超出设定值，装置将发送故障信号并通过黄色LED显示。信号描述详见2.2。

## 2. Signalling and Monitoring Devices

The power supply units are fitted as standard with electronic monitoring modules. These are integrated into a subrack (Fig.3).

### 2.1 DÜW III Three-Phase Current Monitoring

The DÜW III three-phase current monitoring device has three monitoring functions:

- Mains undervoltage ( $V_N - 15\%$ )
- Mains overvoltage ( $V_N + 15\%$ )
- Mains balancing

Any disturbance which arises is signalled on the front panel on a yellow LED display. The signal output terminals are fitted with an operate delay (0.1 - 15 sec.). When the delay period expires, the signal is given on the SME I centralized fault indication module (see section 2.6), which switches off the unit. When the fault is cleared, the unit automatically switches itself on again. The signal memory is reset using a reset button on the SME I. If there is an overvoltage in the mains supply, a pot.-free contact is also operated which inhibits the controller for the duration of the overvoltage or for a period of no less than 200 msec, whichever is the longer.

### 2.2 GKÜ I Unit and Short Circuit Monitoring Device

The GKÜ I has two monitoring functions:

- current dependent undervoltage  
(characteristic monitoring)
- system short circuit

The unit monitoring device consists of a voltage and a current relay. If the unit output voltage falls to a value less than 2.1 V per cell and the current is less than 80 % of the nominal current, a fault signal is sent, which is indicated on a yellow LED. The short circuit monitoring device also consists of a voltage and a current relay.

If the voltage falls below 1.6 V per cell and the current is 100% of the nominal current, a fault signal is given. The signal is processed on the SME I and in the unit as described in 2.1. However the unit only switches itself back on once acknowledgement has been given on the SME I.

### 2.3 GSR VII Direct Voltage Relay

The GSR VII is an overvoltage monitoring relay with two functions:

- Dynamic overvoltage monitoring
- Static overvoltage monitoring

The dynamic overvoltage monitoring device is an instantaneous DC voltage monitor with a controller inhibit. If a voltage peak occurs, the controller is instantaneously ( $t < 10$  msec.) inhibited for a period of about 200 msec. (Yellow LED lights up).

If such a voltage peak occurs four times in succession within 30 seconds, the unit trips out via a signal to the SME I.

The static overvoltage monitoring device measures the effective value of the DC voltage. If the specified value is exceeded, a fault signal is sent and is shown on a yellow LED. The signal is processed as already described under 2.2.



图3: 整流器监视装置集成机架  
Fig. 3: Signal and Monitoring Device Sub-Rack.

### 2.4 GUG III 纹波监视模块

GUG III 纹波监视模块监视加在直流电压上的交流分量。若剩余纹波超出设定值，模块将发送报警信号并通过黄色LED显示并由SME I处理（见2.2）若整流器没有配置增强型滤波器，纹波监视模块也可用来作为一个蓄电池监视装置，在此情形下，模块关闭功能将不能使用。

### 2.4 GUG III Ripple Monitor

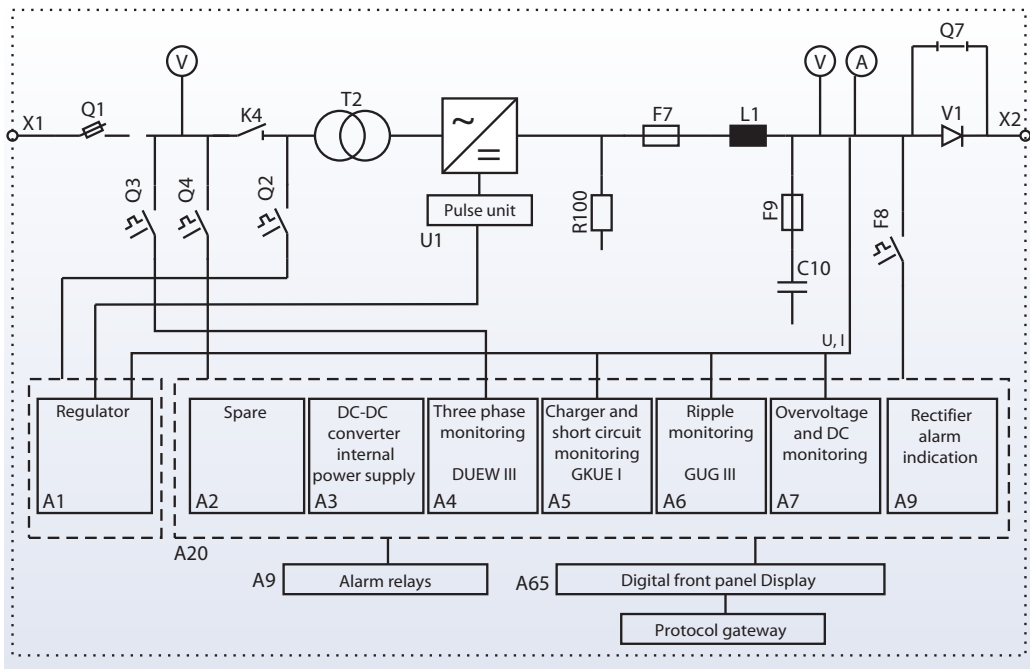
The GUG III ripple monitor measures the alternating component of the rectifier units superimposed on the DC voltage. If the residual ripple content exceeds a set value, a signal is given via a yellow LED. The signal is processed by the SME I as already described in 2.2. In rectifier units without reinforcing smoothing, the GUG III can also be used as a battery circuit monitor. In this case the unit tripping and locking function does not apply.

### 2.5 熔断器监视

可控硅输入及辅助或控制电路的保护熔断器都受到监视。若熔断器故障，将触发报警信号至SME I，同时整流器市电电源将中断。必须接收到人工确认后市电才会恢复供电。

### 2.5 Fuse Monitoring

The fuses connected ahead of the power semiconductors and the auxiliary circuit and control circuit fuses are monitored for failure. If a fault occurs, a signal is given via the SME I. At the same time the unit is disconnected on the supply side. The disconnection remains locked in and acknowledgement is required.



单线图 / Single Line Diagram



## 2.6 带重要故障信号记录的SME I 故障集中指示模块

整流器的所有故障报警信号都显示于SME I故障集中指示模块

SME I具有两种单独的输出信号：

- 故障信号
- 故障存储信号

故障信号在故障排除之后自动复位，而故障存储信号则需要人工确认才可复位。

SME I具有三个功能：

- 重要故障信号记录功能，即存储重要故障并以红色LED显示。
- 具有‘监视模块抽出’信号，即当一个监视模块被抽出时，发出报警信号并同时关闭系统。若为试验目的，则可关闭。
- ‘功能测试’键  
‘功能测试’键可用来测试所有的监视模块。即触发所有的监视功能及维修信号进行测试。测试将持续20秒，之后自动发送复位信号至各监视模块。

在第2.2至2.6（2.5除外）的监视模块都是插拔式模块（高为3U，深为7U，欧洲标准），其电源来自220V（50Hz）交流市电或带二极管隔离的24V直流电源（若220V系统配置有24V DC-DC变换器）。

### 26V, 110V及220V 监视模块配件可选 (非标准配置)

除了上述监视模块之外，还有以下选件：



图4：SME I 故障集中指示器  
Fig. 4: SME I

## 2.6 SME I Centralized Fault Indicator with First Up Value Recording

In the SME I “Centralized Fault Indicator with First Up Value Recording”, all signals are shown as a centralized fault signal.

The SME I has two separate output signals:

- Fault
- Fault Stored

The signal “Fault” is automatically reset when the fault is removed. The signal “Fault Stored” continues to be applied and has to be acknowledged.

The SME I has three functions:

- recording of the first up value, which stores the first fault arising and is signalled by a red LED.
- a “Card Withdrawn” signal, which responds when a monitoring card is taken out from the magazine. The units simultaneously trip out when the signal is given. The tripping out can be blocked for testing purposes.
- a “Function Test” key.  
This key can be used to test all the monitoring cards. All monitoring functions together with the maintenance signal are activated and tested.  
This test lasts about 20 seconds. After this a resetting signal is automatically sent to the monitoring cards.

The monitoring and signalling devices described in 2.2 to 2.6 (with the exception of 2.5) are in the form of plug-in cards (European standard format 3 units high - 7 units deep).

The power is supplied from the alternating current mains at 220 V 50 Hz and diode decoupled from the DC system at 24 V (for 220 V system via a DC - DC converter).

### Accessories for 26 V, 110 V and 220 V Units (not provided as standard)

In addition to the standard monitoring relays, the following modules can also be fitted if required.



## 2.7 蓄电池监视装置

蓄电池持续如果市电故障,供电时,可能会产生蓄电池或其回路的故障而不被察觉,这将给系统带来严重隐患。因此我们强烈建议应配置蓄电池监视装置。

蓄电池监视装置有两种型式:

- 蓄电池回路监视 (充电电流调节)
- 蓄电池对称监视 (要求一个蓄电池中心点)

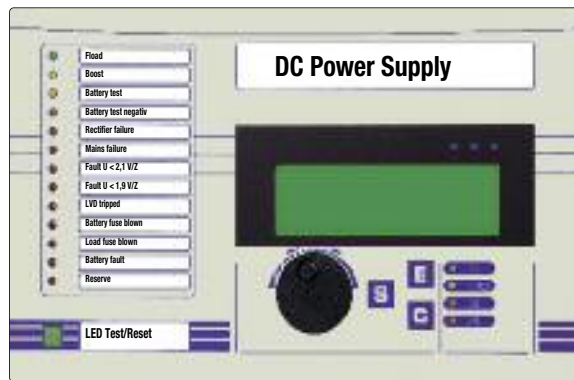


## 2.7 Battery monitoring

With continuous battery power supply, there is the danger that a failure of the battery or that an interruption in the battery circuit will go unnoticed. This can result in serious disruption to the system, if there is a mains power supply failure. Therefore battery monitoring is strongly recommend.

Two different systems are available:

- Battery circuit monitoring (current control)
- Battery symmetric monitoring (battery center point required)

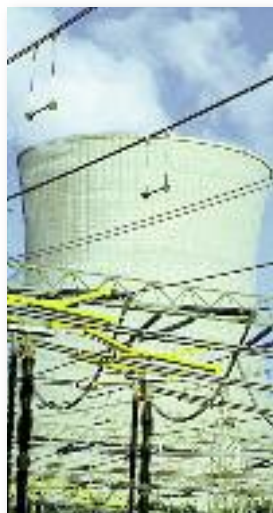


## 告警和状态接口

除了标准的干接点报警节点外,整流器可以配置通信接口,可以通过串口 (RS232, RS485) 和远程控制系统如DCS或以太网进行通信。可选配多种通信协议,如MODBUS,PROFIBUS等。为了安全通信接口仅供监视,不能控制整流器。

## Alarm and Status Interface

Besides the standard potential free alarm contacts, the rectifier can be equipped with an interface unit (protocol gateway) which allows communication with a remote control system such as a DCS via a serial (RS-485, RS-232) or Ethernet connection. Multiple protocols such as MODBUS, PROFIBUS and others are available. For safety reasons this interface only allows monitoring, but no control of the rectifier.





### 3.1 柜体外结构焊接的

整流器装于一个钢结构的柜体，接合点处有通风口，防护等级为IP20。侧板和后板可现场安装。整流柜装设吊环以便装卸。柜体为增强型结构，满足抗震要求（见图6）。

前面板装设下列显示及控制元件（见图5）：

- 指针整流器开关
- 指针电流表，1.5级，96\*96规格
- 电压表，1.5级，96\*96规格
- 故障报警灯
- 故障存储报警灯
- 试验按钮
- 手动充电电位计

### 3.2 柜体内结构

市电变压器及滤波器装于柜体下方。可控硅组件装于柜体上方，散热方便。

可控硅装设特殊半导体熔断器保护并带监视。辅助及控制电路设断路器或电机保护开关。

控制器及各监视模块按照欧洲标准做成插拔式并集成于一个机架内。

若系统额定电流超过400A，功率电路导线将使用铜母线。整流器输出端配置带熔断器的隔离开关。交直流接线端子都装于柜体下方并方便接线。



图5：整流器外形图  
Fig. 5: External view

### 3.1 External Construction

The units are built into a welded steel section framed housing to IP 20 protection standards and are designed with vents at the joints. The side and rear panels can be prepared. For transportation (loading and unloading) the housing is fitted with crane lifting eyes. At seismic requirements, additional mechanical reinforcements are implemented (see figure 6).

The following display and control elements are positioned on the front door of the housing (see Fig. 5).



图6：整流器内部结构  
Fig. 6: Internal view

- Unit ON/OFF switch
- Moving coil ammeter, class 1,5, format 96 x 96
- Moving coil voltmeter, class 1,5, format 96 x 96
- "Fault" warning light
- "Fault Stored" warning light
- Lamp Testing key
- Manual charging potentiometer

### 3.2 Internal Construction

The mains transformer and the smoothing reactor are positioned at the base of the housing on the base frame and bolted on. The thyristor assembly is placed in the upper part of the housing so that the heat given off can be easily dissipated and does not build up.

The thyristors are fitted with special semiconductor fuses with fuse monitors. Auxiliary and control circuits are protected by automatic circuit breakers or motor protection switches.

Controller and monitoring modules are designed in the form of standard European format plug-in cards and built into a sub-rack.

Where the nominal current of the units is greater than approx 400 A, the wiring in the power circuit uses copper bus bar. At the rectifier output terminal there are fuse switch disconnectors to disconnect the unit from the supply. The connection terminals for the direct and alternating voltage are placed at the base of the unit and are easily accessible when the doors are open.





型号	见型号表
充电特性	符合DIN 41 773标准关于IU充电特性的规范。 若转为手动控制，则为W充电特性
运行模式	通过选择开关选择： 浮充模式：2.23V/单体，按照IU特性并联备份运行 均充模式：2.4V/单体，按照IU特性并联备份运行 初/强充模式：可达2.7V/单体，W特性，电流可平滑调节
电压调节范围	浮充 1 到 1.15 U <sub>额定</sub> 可调 强充 1 到 1.25 U <sub>额定</sub> 可调 手动模式 0 到 1.35 U <sub>额定</sub> 可调
输出精度	电压：±1%，电流：±2%
根据DIN 41 773标准的值域	市电电压：±10%（均充条件下），-15到+10%（浮充条件下）， 市电频率：±5%，负载：0到100%
整流电路	全控三相整流桥
控制方式	可控硅（晶闸管）控制
保护	可控硅受快速熔断器保护，根据整流器功率大小，配置蓄电池输出熔断器或负载熔断器。
动态特性 (蓄电池断开)	当负载变化为50%到100%，整流器输出电压不低于20V/90V/180V*1(200毫秒)；当市电电压下降30%，整流器输出电压不低于20V/90V/180V(200毫秒)；当负载变化从100%降至50%，整流器输出电压不高于33V/135V/270V；当负载重新从70%升至100%，整流器输出电压不高于33V/135V/270V*1.
纹波系数	增强型滤波器使得在0到100%负载变化条件下，峰峰值测量的纹波系数为约5%（不连接蓄电池）
软启动模块	系统设置软启动功能.
表计	电流表，1.5级，96*96规格 电压表，1.5级，96*96规格
监视模块	市电欠压监视，可控硅熔断器监视，辅助及控制熔断器监视，直流过压，监视电流的欠压和短路
内显示	‘市电不平衡’ ‘市电过压’ ‘市电欠压’ ‘整流器故障’ ‘短路’ ‘蓄电池过压（静态）’ ‘蓄电池过压（动态）’ ‘熔断器故障’ ‘拔出模块（电路板）’
外显示及干接点信号	总故障信号，故障存储信号
结构	柜体为钢结构，前开门，侧板及后板可拆卸。体柜尺寸见型号表。 标准防护等级：IP20 柜漆：RAL7035
允许环境温度	(100%负载) -5°C 到40°C (可选-10°C 到+55°C )
允许存储温度	-20°C 到70°C (执行DIN 40040标准 HS级)
EMC	EN 50081-2, EN 50082-2, 和IEC/EN 61000-6-2 and IEC/EN 61000-6-4标准
湿度等级	执行DIN 40040标准F级
冷却	自冷，底部进气
市电	3*400V, 50Hz, 带零线，其他要求可选

其他数据详见型号表

数据可能发生变更

\*1 适用于24V, 110V, 220V系统

<b>Type:</b>	see Type table
<b>Charging characteristic:</b>	IU to DIN 41 773, can be switched to manually controlled W characteristic
<b>Operating modes:</b>	The mode required can be selected with a selector switch. Float charging: Parallel standby operation with IU characteristic, 2.23 V per cell Boost charging: Parallel standby operation with IU characteristic, 2.4 V per cell Commissioning charging: W characteristic at up to 2.7 V per cell. The charging current is smoothly adjustable.
<b>Voltage adjustment range</b>	Float charge adjustable from 1 to 1.15 $U_{nom}$ Boost charge adjustable from 1 to 1.25 $U_{nom}$ Manual mode adjustable from 0 to 1.35 $U_{nom}$
<b>Stability of output values:</b>	Voltage $\pm 1 \%$ , Current $\pm 2 \%$
<b>Permitted variations under DIN 41 773:</b>	Mains voltage $\pm 10 \%$ at 2.4 V/Z, + 10 - 15 % at 2.23 V/c Mains frequency variations $\pm 5 \%$ , Load variations 0 - 100 %
<b>Rectifier circuitry:</b>	Fully controlled three-phase bridge circuit
<b>Control and regulation:</b>	Transistorised controller with thyristors as regulating devices
<b>Protection:</b>	The semiconductors are protected by ultra high-speed fuses. Depending upon the power rating of the unit it is protected either by cell fuses or by a fuse in the output.
<b>Dynamic characteristics:</b> (battery disconnected)	If the load increases from 50 % to 100 %, the output voltage does not drop below 20 V / 90 V / 180 V* <sup>1</sup> (t=200ms). If the mains voltage drops by 30 %, the output voltage does not drop below 20 V / 90 V / 180 V (t=200ms). If the load drops from 100 % to 50 % the output voltage does not rise above 33 V / 135 V / 270 V. If the mains voltage rises again from 70 % to 100 %, the output voltage does not exceed 33 V / 135 V / 270 V * <sup>1</sup> .
<b>Ripple:</b>	Smoothing facility, which reduces the ripple of the stated DC-voltage to approx. 5 % peak to peak over the entire load range from 0 to 100 % (battery disconnected).
<b>Ramp-Up Module:</b>	Delayed voltage increase when connecting the rectifier unit. The voltage increases following an exponential function.
<b>Meters:</b>	Moving coil ammeter, class 1,5, size 96 x 96 mm Moving coil voltmeter, class 1,5, size 96 x 96 mm
<b>Monitoring facilities:</b>	Undervoltage monitoring facility for mains supply, monitoring facility for semiconductor fuses, facility for monitoring auxiliary and control circuit fuses, overvoltage monitoring facility on DC side, monitoring facility for current-related undervoltage, short-circuit monitoring facility.
<b>Indications: visual inside the unit</b>	“Mains asymmetry” “High mains voltage” “Low mains voltage” “Unit fault” “Short-circuit” “High battery voltage (stat.)” “High battery voltage (dyn.)” “Fuse fault” „Card withdrawn“
<b>visual on unit and pot.-free on terminals:</b>	General “fault” signal “Fault stored“
<b>Construction:</b>	Free-standing sheet-steel cabinet with doors at front. The side and rear panels can be removed. For dimensions see type table. Standard of enclosure provided by cabinet: IP 20 Painting: RAL 7035
<b>Permitted ambient temp.:</b>	(100% Load) 0 to 40 °C (Optional -10 °C to +55 °C)
<b>Permitted ambient storage temp.:</b>	-20...+70 °C (class HS, according to DIN 40040)
<b>EMC:</b>	EN 50081-2, EN 50082-2, IEC/EN 61000-6-2 and IEC/EN 61000-6-4
<b>Humidity classification:</b>	humidity classification F under DIN 40040
<b>Type of cooling:</b>	Natural air cooling, air enters from below.
<b>Mains supply:</b>	3 x 400 V, 50 Hz, with neutral, other mains voltages if desired.
For other technical data see type table	Data subject to change

\*<sup>1</sup> Values for 24 V, 110 V and 220 V units



### 概述

蓄电池在整流器输出故障条件下为直流负载提供不间断电源，一般装于电池柜，与整流柜并排放置并通过并联单股电缆或铜母线连接（上下进线皆可），同时具有KKS标识。蓄电池柜满足UVV BGV A2标准，尤其是意外接触保护。



### General

The battery supply unit connects the power supply to the battery, and is designed as a floor standing sheet steel cabinet, with hinged front door and corresponding KKS marking.

The unit should stand adjacent to the power supply, and is connected via copper bus bar.

The connection to the battery can be via parallel single core cable or copper bus bar. The unit can be provided with top or bottom cable entry.

The requirements of the UVV BGV A2 are met, especially with regard to protection against accidental contact.



蓄电池单元  
Battery  
Supply Units

### 蓄电池柜配置

标准蓄电池柜配置如下：

- NH型熔断器负荷隔离开关与蓄电池回路熔断器配套装备，并具有熔断器监视功能。
- 蓄电池监视装置（BKU），既可用测量充电电流原理（BKU），还可用蓄电池对称监视原理（BSU，要求一个蓄电池中心点）
- 蓄电池熔断器投切之前用以为滤波电容充电的2级按钮及相应熔断器及电阻器
- 用以测量蓄电池电流的电流表（中零）
- 用以测量蓄电池电压的电压表（带熔断器保护）
- 故障指示灯
- 母线及连接电缆
- KKS标识，塑料铭牌

### Equipment

The standard battery supply units are equipped as follows:

- NH-fused load disconnection switch equipped with the corresponding battery fuses with fuse monitoring.
- battery circuit monitoring (BKU), either as BKU with charging current measuring or as BSU (battery symmetry monitoring) with centre tap of the battery
- 2-pole push-button and the corresponding fuses and resistors for charging the smoothing capacitors in the power supply units before putting in the battery fuses
- ammeter with middle zero point for the measurement of the battery current
- voltmeter for the battery voltage with the corresponding fusing
- lamp "fault"
- copper bars and connection plates for the battery and load cables as well as the cross bar to the rectifier
- KKS-marking as engraved plastic label

### 蓄电池电压及电流等级

蓄电池电压等级有24V，110V，200V。额定电流见蓄电池柜型号表。

### Rating

The battery supply units can optionally be delivered for 24 V, 110 V and for 220 V in different current sizes. The standard current allocations can be taken from the type table.

### 整流器等级 / Rectifier Rating

直流电压 (U <sub>额定</sub> ) / DC Voltage (U <sub>nom</sub> )	24	48	110	125	220	240
整流器输出电流 Rectifier output current [A]	50	50	50	50	50	50
	100	100	100	100	100	100
	200	200	200	200	200	200
	300	300	300	300	300	300
	400	400	400	400	400	400
	600	600	600	600	600	600
	800	800	800	800	800	800
	1000	1000	1000	1000	1000	1000
	1200	1200	1200	1200	1200	1200
	1600	1600	1600	1600	1600	1600
	2000	2000	-	-	-	-
	2500	2500	-	-	-	-
	3000	3000	-	-	-	-

选配其它容量 / Other ratings on request





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