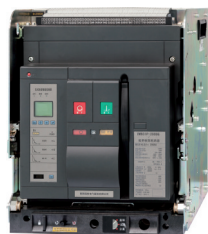


DW931系列 船用框架断路器 Marine air circuit breaker

► 概述

Overview



DW931系列船用框架断路器（以下简称断路器）适用于交流50Hz或60Hz，额定工作电压690V及以下的船舶电力系统中，用作发电机保护、电能分配、用电设备和线路的过载、短路和欠电压保护以及在正常工作条件下不频繁接通和断开电路。断路器具有隔离功能。断路器不带过电流脱扣器，可用作负荷开关。

断路器符合IEC60947-2 2006/GB14048.2 2008、IEC60947-4 2009/GB14048.4 2010、GB/T3783-2008、CCS《钢质海船入级规范》（2015）。

产品已通过中国船级社的型式认可，型式认可证书：NJ16T00113。本系列断路器被认定为江苏省高新技术产品，产品编号：120581G0820N。



DW931 series marine air circuit breaker (hereinafter referred to as circuit breaker) is suitable for marine power systems with AC 50Hz or 60Hz, and rated operational voltage 690V and below, and is used for generator protection, power distribution, electrical equipment and line overload, short circuit and under voltage protection, and to switch on and off circuits infrequently under normal operating conditions. The circuit breaker is suitably used for isolation. The breaker can be used for switches without overload trip unit.

The circuit breaker complies with IEC60947-2/GB14048.2-2008, IEC60947-4/GB14048.4 2010, GB/T3783-2008, CCS Rules for Classification of Sea-going Steel Ships.

The breaker get CCS certificate, the certificate number: NJ16T00113. The breaker was confirmed as High-technology product by Jiangsu province. High-technology product number: 120581G0820N.



► 产品特点

Product features

■ 具有发电机保护、配电保护和电动机保护等多种保护功能；

With generator protection, power distribution protection and motor protection and many other protection functions optional.

■ 具有多种类型的电子脱扣器，电量监测和保护控制一体化，可提供多样化保护控制方案，实现智能电力运行管理；

With various electronic trip unit, integrated power monitoring and protection and control, diversified protection and control programs available, to realize intelligent power operation and management;

- 具有高短路分断能力和短时耐受能力，小体积、高分断和零飞弧，提高电力系统运行的安全性和可靠性，额定运行短路分断能力可达400V120kA以上；

With high short-circuit breaking capacity and short time withstand capacity, small size, high breaking and zero arcing, for raising the security and reliability of power system operation, and the rated service short-circuit breaking capacity of up to 400V120kA or more;

- 具有选择性保护和区域选择性联锁功能，可确保各级保护的完全选择性；

With selective protection and zone-selective interlock function, ensuring fully selective protection at all levels;

- 具有通讯功能，采用Modbus-RTU (代号：M)或CAN (代号T) 等通信协议，可实现智能化网络的监控，实现遥控、遥信、遥调和遥测；

With communication function, using Modbus-RTU (code: M) or CAN (code T) communication protocols to realize intelligent network monitoring, remote control, remote sensing, remote adjustment and remote measuring;

- 主电路接线方便，可采用上进线或下进线，可实现水平连接、垂直连接和混合连接。

Easy main circuit wiring, upper incoming line or lower incoming line can be connected horizontally, vertically and in a mixed manner.

► 型号命名

Model naming



► 技术指标

Technical index

产品型号 Breaker type		DW931□-1250		DW931□-2000	DW931□-3200	DW931□-5500
壳架等级额定电流 (A) Frame size		1250		2000	3200	5500
分断能力代号 Breaking capacity level		B	G	G	G	G
脱扣器额定电流 I_n (A) Trip unit rated current		200, 400, 630, 800, 1000, 1250		630, 800, 1000, 1250, 1600, 2000	1600, 2000, 2500, 3200	3200, 3600, 4000, 5000, 5500
额定绝缘电压 U_i (V) Rated insulation voltage		1000				
额定工作电压 U_e (V) Rated operational voltage		690, 400				
额定频率 (Hz) Rated frequency		50, 60				
极数 Number of pole		3				
额定短路接通能力 Short-circuit making capacity I_{cm} (kA), $\cos\Phi=0.2$	AC400V	121	264	264	264	297
	AC690V	—	187	187	209	297
额定极限短路分断能力 Ultimate short-circuit breaking capacity I_{cu} (kA), $\cos\Phi=0.2$	AC400V	65	120	120	120	135
	AC690V	—	85	85	95	135
额定运行短路分断能力 Service short-circuit breaking capacity I_{cs} (kA), $\cos\Phi=0.2$	AC400V	55	105	120	120	135
	AC690V	—	85	85	95	135
额定短时耐受电流 I_{cw} (kA) Short-time withstand current AC690V, 耐受时间1s		55/0.5s, 45/1s		85	95	135
飞弧距离 (mm) Arc distance		0				
操作循环 次数 (次) Durability (C-O cycles)	有载 Electrical	AC400V	3000	3000	1500	1000
		AC690V	2000	1500	1000	1000
	无载 Mechanical		8000	6000	6000	4000
	总次数 Total		11000	9000	7500	5000

续

产品型号 Breaker type		DW931□-1250		DW931□-2000	DW931□-3200	DW931□-5500
脱扣器形式 Trip unit type		电子式 electronic				
机 内 外 附 件 Accessories	电动储能机构 Motor mechanism	标配附件, Us: AC400V、AC230V Contain				
	合闸电磁铁 Closing electromagnet	标配附件, Us: AC400V、AC230V Contain				
	分励脱扣器 Shunt release	标配附件, Us: AC400V、AC230V Contain				
	辅助触头数量 Auxiliary	标配附件, 四对常闭和常开触头,lth: 5A Contain				
	欠电压脱扣器 Under voltage release	选配附件, Us: AC400V、AC230V Optional				
	过载预报警及电流卸载 Overload pre-alarm module	选配附件, 对次要负载进行卸载 Optional, Current shedding				
	通信模块 Communication module	选配附件, Us: DC24V Optional				
	扩展辅助触头 Extra auxiliary	选配附件, 二对常闭和常开触头,lth: 5A Optional, two group normal open and close contacts				
外形尺寸 (固定式/抽屉式) Dimensions (Fixed/Draw-out)	宽 (mm) Wide	259/282		362/385	414/440	769/790
	高 (mm) High	320/355	357/392	395/438	395/438	395/438
	深 (mm) Deep	247/358		350/474	372/514	424/514
重量(kg) (固定式/抽屉式) Weight (Fixed/Draw-out)		21/47	25/51	56/102	60/124	150/255

► 保护特性

Protection characteristics

■ 发电机保护特性

Protection characteristics of generator

发电机保护断路器采用EG型脱扣器（F特性），其过电流保护特性符合CCS《钢质海船入级规范》(2015)第四篇2.5.6.1的要求。断路器可选过载预报警及电流卸载功能。断路器还具有过电压和欠电压保护、过频和欠频保护、逆功率保护等可选功能。

EG trip unit (F characteristics) is used as generator protection circuit breaker, and the over current protection characteristics meet the requirements of Section 2.5.6.1, in the fourth chapter of CCS Rules for Classification of Sea-going Steel Ships (2012). Overload alarm and optional current unloading are optional for the circuit breaker. The circuit breaker also has over voltage and under voltage protection, over frequency and under-frequency protection, reverse power protection and other optional functions.

项 目 Item	过载长延时 Long overload delay	短路短延时 Short short-circuit delay	短路瞬时 Short circuit instantaneous
电流整定范围 Current setting range	$I_R = (0.4 \sim 1.15)I_o$	$I_{sd} = (0.4 \sim 5)I_o$	$I_i = (1 \sim 20)I_o$
电流整定级差 Current setting gradient	10A	10A	50A
延时时间整定范围(s) Delay time setting range (s)	$t_R = 15, 20, 30, 40, 50, 60$ (在 $I = 1.30I_R$ 时) (At $I = 1.30I_R$)	$t_{sd} = 0.1, 0.2, 0.3, 0.4$	—
注: I_o 为发电机额定电流。 Note: I_o Rated current of Generator			

■ 配电保护特性

Power distribution protection

配电保护用断路器采用EP型脱扣器或EA型脱扣器, 其过电流保护特性符合GB14048.2-2008中7.2.1.2.4条的要求。

The circuit breaker for distribution protection is EP trip unit (PA characteristics) or EA trip unit (PB) and the over current protection characteristics meet the requirements of 7.2.1.2.4 in GB14048.2-2008.

项 目 Item	过载长延时 Long overload delay	短路短延时 Short short-circuit delay	短路瞬时 Short circuit instantaneous
电流整定范围 Current setting range	$I_R = (0.4 \sim 1.0)I_n$	$I_{sd} = (0.4 \sim 15)I_n$	$I_i = (1 \sim 20)I_n$
电流整定级差 Current setting gradient	10A	10A	50A
延时时间整定范围(s) Delay time setting range (s)	$I^2t: t_R = 15, 30, 60, 120, 240, 480$	$t_{sd} = 0.1, 0.2, 0.3, 0.4$	—
	$I^2t: t_R = 10, 15, 30, 60, 90, 120$		
	$I^4t: t_R = 60, 120, 240, 480, 960, 1440$		

■ 电动机保护特性

Protection characteristics of motor

配电保护断路器采用EP型脱扣器还可设置为电动机保护特性, 其过电流保护特性符合CCS《钢质海船入级规范》(2015)第四篇2.5.10和GB14048.4-2010中8.2.1.5条的要求。

电动机保护断路器还可选择断相保护、相序保护等功能。

The circuit breaker for distribution protection is EP trip unit, and motor protection characteristics can also be set; its over current protection characteristics meet the requirements of Section 2.5.10 in the fourth chapter of CCS Rules for Classification of Sea-going Steel Ships(2012) and Section 8.2.1.5 in GB14048.4-2010.

Phase-loss protection, phase-sequence protection and other functions can also be optional for motor protection circuit breaker.

项 目 Item	过载长延时 Long overload delay	短路短延时 Short short-circuit delay	短路瞬时 Short circuit instantaneous
电流整定范围 Current setting range	$I_R = (0.4 \sim 1.0)I_n$	$I_{sd} = (0.4 \sim 15)I_n$	$I_i = (1 \sim 20)I_n$
电流整定级差 Current setting gradient	10A	10A	50A
延时时间整定范围(s) Delay time setting range (s)	$I^2t: t_R = 60, 120, 240, 480$ (在 $I = 1.5I_R$ 时) (At $I = 1.5I_R$)	$t_{sd} = 0.1, 0.2, 0.3, 0.4$	—

► 扩展功能

Configuration of accessories

断路器根据所配置的电子式脱扣器的不同形式，可实现多种附加保护功能。发电机保护断路器的附加保护功能包括：欠电压保护(瞬时动作或延时动作)、过载预报警、电流卸载、低电压保护、过电压保护、欠频保护、过频保护、逆功率保护、相序保护和断相保护等；配电保护断路器的附加保护功能包括：欠电压保护、过载预报警、电流卸载、低电

The breaker not only have the protection functions but also have lots of expansion functions. The expansion functions contain: Under-voltage protection, Overload pre-alarm, Current shedding, Over-voltage protection, Under-frequency protection,

压保护、过电压保护、相序保护和断相保护；配电保护断路器电动机保护特性的附加保护功能包括：欠电压保护、过载预报警、低电压保护、过电压保护、相序保护和断相保护。此外还有：区域选择性联锁(ZSI)功能、接通电流保护(MCR)功能和热记忆功能等。

Over-frequency protection, Inverse power protection, Phase sequence protection, Open-phase protection, Zone selective interlocking, MCR function and so on.

保护功能 Protection function		动作阈值 Operating threshold	返回阈值 Return threshold	动作延时 Operating delay	返回延时 Return delay	可否关闭 Can off or not
过载预报警 Overload pre-alarm	参数范围 Adjusted range	0.75I _R ~1.05I _R	--	1/2t _R	--	可关闭 Can off
	递变级差 Successive grade	0.05 I _R	--	--	--	
	动作允差 Operating tolerance	--	--	± 10%	--	
电流卸载 Current shedding	参数范围 Adjusted range	0.2I _R ~1.0I _R	0.2I _R ~动作阈值 0.2I _R ~ Operating threshold	(20%~80%) t _R	10s~600s	可关闭 Can off
	递变级差 Successive grade	10A	10A	10%t _R	1s	
	动作允差 Operating tolerance	--	--	± 10%	± 10%	
低电压保护 Under-voltage protection	参数范围 Adjusted range	50V~690V	动作阈值~690V Operating threshold~690V	1s~30s	1s~100s	可关闭 Can off
	递变级差 Successive grade	5V	5V	0.2s	0.2s	
	动作允差 Operating tolerance	± 5%	± 5%	± 5%	± 5%	
过电压保护 Over-voltage protection	参数范围 Adjusted range	200V~1000V	200V~动作阈值 200V~ Operating threshold	1s~5s	1s~36s	可关闭 Can off
	递变级差 Successive grade	5V	5V	0.2s	0.2s	
	动作允差 Operating tolerance	± 5%	± 5%	± 5%	± 5%	
欠频保护 Under-frequency protection	参数范围 Adjusted range	45Hz~60Hz	动作阈值~60Hz Operating threshold~60Hz	0.2s~5s	1s~360s	可关闭 Can off
	递变级差 Successive grade	0.05Hz	0.05Hz	0.1s	0.1s	
	动作允差 Operating tolerance	± 0.05Hz	± 0.05Hz	± 10%	± 10%	
过频保护 Over-frequency protection	参数范围 Adjusted range	50Hz~65Hz	45Hz~动作阈值 45Hz~ Operating threshold	0.2s~5s	1s~360s	可关闭 Can off
	递变级差 Successive grade	0.05Hz	0.05Hz	0.1s	0.1s	
	动作允差 Operating tolerance	± 0.05Hz	± 0.05Hz	± 10%	± 10%	

续

保护功能 Protection function		动作阈值 Operating threshold	返回阈值 Return threshold	动作延时 Operating delay	返回延时 Return delay	可否关闭 Can off or not
逆功率保护 Inverse power protection	参数范围 Adjusted range	20kW~500kW	20kW~动作阈值 20kW~Operating threshold	0.2s~20s	1s~360s	可关闭 Can off
	递变级差 Successive grade	5kW	5kW	0.1s	0.1s	
	动作允差 Operating tolerance	± 5%	± 5%	± 10%	± 10%	
断相保护 Open-phase protection	参数范围 Adjusted range	90%~99%	20%~动作阈值 20%~Operating threshold	0.1s~3s	10s~360s	可关闭 Can off
	递变级差 Successive grade	1%	1%	0.1s	1s	
	动作允差 Operating tolerance	± 10%	± 10%	± 10%	± 10%	
相序保护 Phase sequence protection	参数范围 Adjusted range	1, 2, 3或1, 3, 2	--	0.3s	--	可关闭 Can off
	动作允差 Operating tolerance	--	--	± 10%	--	

► 附件配置

Configuration of accessories

- 电子脱扣器: DW931F: EG型(发电机保护型), U_e : AC400V、AC230V、DC24V;
DW931PA: EP型(功率测量型), U_e : AC400V、AC230V、DC24V;
DW931PB: EA型(电流测量型), U_e : AC400V、AC230V、DC24V。
- 合闸电磁铁: 标配, U_s : AC400V、AC230V;
- 分励脱扣器: 标配, U_s : AC400V、AC230V;
- 电动储能机构: 标配, U_s : AC400V、AC230V;
- 欠电压脱扣器: 选配: 瞬动型, U_e : AC400V、AC230V; 选配: 延时型, (延时时间: 0.5s, 1s, 2s, 3s 可设置);
- 辅助触头: 标配: 四常开四常闭, I_{th} : 5A, U_e : AC400V; 可选配: 六常开六常闭;
- Electronic trip unit:
DW931F: EG (generator protection), U_e : AC400V、AC230V、DC24V;
DW931PA: EP (power measuring), U_e : AC400V、AC230V、DC24V;
DW931PB: EA (current measuring), U_e : AC400V、AC230V、DC24V。
- Switching electromagnet: standard configuration, U_s : AC400V、AC230V;
- Shunt release: standard configuration, U_s : AC400V、AC230V;
- Electric energy storage mechanism: standard configuration, U_s : AC400V、AC230V;
- Under voltage release: optional: instantaneous, U_e : AC400V、AC230V; optional: delay, (delay time: 0.5s, 1s, 2s and 3s can be set);
- Auxiliary contact: standard configuration: four normally open and four normally closed; I_{th} : 5A, U_e : AC400V; optional: six normally open and six normally closed;

注: 断路器产品的详细信息见船用断路器样本

Note: Please find detail information of breakers in marine circuit breaker catalogue