

BZL-10B 轴电流继电保护装置

使用手册



哈尔滨华新电力电子设备有限公司

企业简介

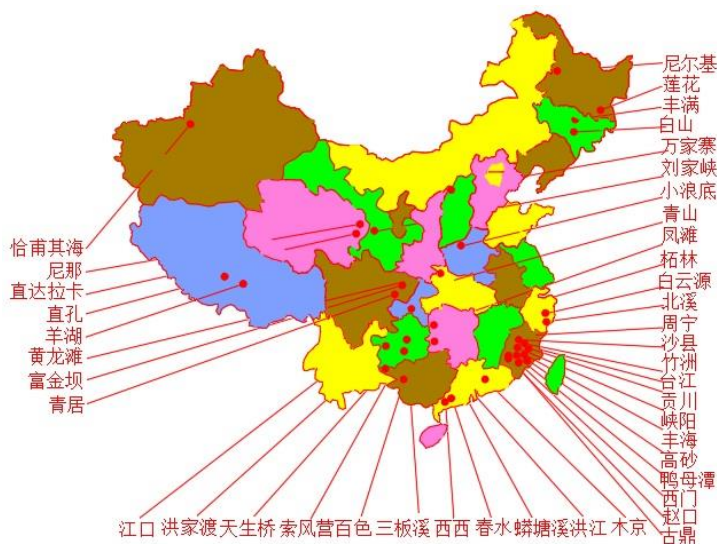
我厂成立于 1986 年，是生产低压配电设备、电源设备和发电机轴电流继电保护装置的专业厂。现有职工 30 人，技术人员 9 人，质管人员 4 人，固定资产 750 万。其产品多年来为国内外大中型水电站所采用并达到其使用性能的要求。如在丰满电站的监控报警，及时避免了重大事故的发生。

由我厂制造生产 BZL-10 系列轴电流继电保护装置正运行于国内外各电站：如尼泊尔的“翠舒里”、马其顿的“科佳”、国内的“丰满”、“莲花”、“天生桥”、“万家寨”、“小浪底”、“刘家峡”、“柘林”、“木京”、“竹洲”、“青居”、“沙县”、“贡川”、“青山”、“蟒塘溪”、“北溪”、“峡阳”、“尼那”、“凤滩”、“黄龙滩”、“江口”、“洪家渡”、“周宁”、“尼尔基”等。

我厂研发的第四代产品（BZL-10C 型）已投入市场，其性能及各项指标均优于国内同类产品。

我厂研发的第五代产品（BZL-10D 型）已进入验收阶段，其性能及各项指标均领先于国内同类产品并替代进口产品。

我厂十分重视产品的质量，建立了严格的管理体系及检验制度，从原材料进厂，生产各过程的检验到出厂检验都有完善的检验标准，做到了检验有依据，问题处理有结果，有措施，并通过了 ISO9001:2000 质量管理体系认证。形成了从产品设计，开发，生产，检验一整套的质量保证体系，深受用户信任，被评为重合同守信用企业。



1 用途

BZL-10B 型轴电流保护装置主要应用于检测发电机大轴中的电流，防止轴承绝缘击穿时损坏轴承和其他部件。本装置由互感器和继电器两部分组成，互感器根据发电机轴径定制。

2 继电器部分

2.1 概述(继电器部分)

- BZL-10B 轴电流继电器是利用轴电流互感器检测出来的轴电流基波或三次谐波电流信号，来检测轴承绝缘状态的。
- 当电机轴绝缘低下或有击穿时，由于电机轴承不对称，机轴将产生轴电流而损坏其绝缘，发生故障。其损坏程度将取决于轴电流的幅值和持续时间，为了使电机能够安全运行，提前发现机轴的绝缘故障，以便采取相应措施，就需要有灵敏的轴电流继电保护设备。
- 本继电器是由放大器、双通道滤波器、A/D 转换、单片机智能分析判断控制及过电流动作等环节组成。轴电流指示仪表采用了先进的数字技术，动作灵敏，控制精确，显示直观，其组成框图请参阅原理方框图。
- BZL-10B 型轴电流继电器采用了两种工作方式，即按电流基波分量或电流的三次谐波分量进行检测动作。
- 当电机内干扰磁场较强，且互感器输出电流中含有三次谐波分量时，仪器可同时测量 50HZ 和 150HZ 信号，电流信号经滤波器滤除 50HZ 或 150Hz 的杂散干扰电流，使继电器能够稳定的检测。
- 当电机内磁场干扰甚小，而轴电流中又无谐波干扰时，仪器即对 50HZ 频率轴电流进行监测。轴电流信号经 50HZ 工作通道，并滤除其它干扰，防止误动作，当前轴电流为 50HZ 和 150HZ 信号轮流显示，面板指示灯显示当前工

作频率。

- 继电器从轴电流互感器 CT 中取出故障电流信号，经 IC1 放大后，送入 50HZ 和 150HZ 双通道滤波器中，双通道滤波器输出经整流合成后，分别送入两路 A/D 模数转换器，再送入 MCU 进行分析、判断、显示轴电流值，经 MCU 与两个故障电流的设定值进行比较后，送出控制信号触发相应的继电器 CZ1, CZ2，以控制报警及跳闸等信号。另外，本机还 RS232 接口，可以把数据上传到上位机，有独立的管理程序，也可与组态软件接口集中管理。

2.2 原理框图

BZL-10B 型轴电流继电器原理方框图

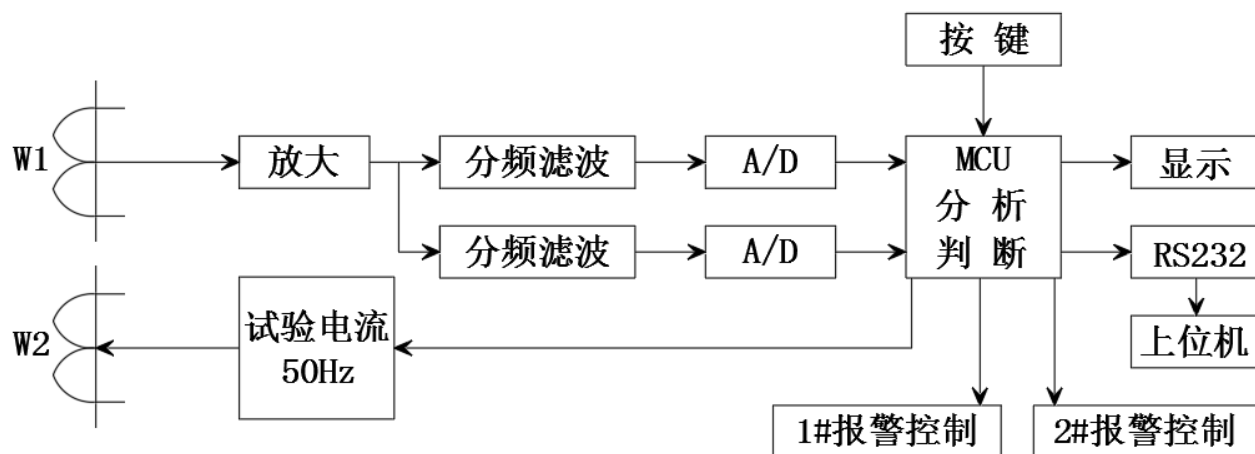


图 1

2.3 技术参数

检测频率	基波 50 Hz 和三次谐波 150Hz
设定动作值(基波或三次谐波)	1~2 段的设定值, 参照表 2。
动作延时	1~255 秒可设定, 参照表 2。
供电电源	AC220 (50 or 60Hz); DC24; DC85-220V
输入阻抗	< 40Ω (阻性)
显示方式	LED
显示分辨力	0.1
测量范围	0.4-量程最大值 注: 1
输出信号方式	两路继电器接点输出
接点容量	AC250V/5A, DC28V/5A
功耗	20W
环境温度	工作温度: -10~+55℃ 存储温度: -25~+70℃
相对湿度	<90%
绝缘强度	AC1KV 1.5mA/1min
外形尺寸	160 X 85 X 345
重量	2kg

表 1

注: 1、0.1-0.4 不能保证测量值精度在误差范围之内。

2、0.4-量程最大值能保证测量值精度在误差范围之内。

2.4 继电器前、后面板图及按键说明

2.4.1 前面板

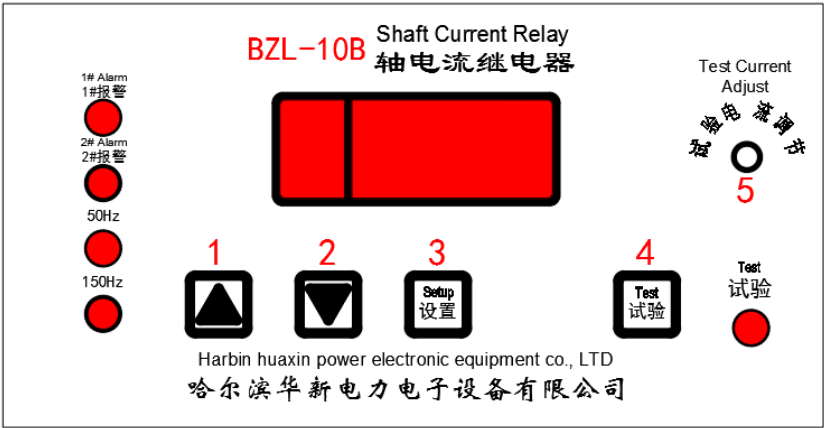


图 2

前面板按键说明:

- 1 加键，按下后数值加 1
- 2 减键，按下后数值减 1
- 3 设置键，按下后进入设置状态
- 4 试验键，按下后进入自检状态
- 5 试验电流调节电位器，试验状态下调节试验电流调节

2.4.2 后面板

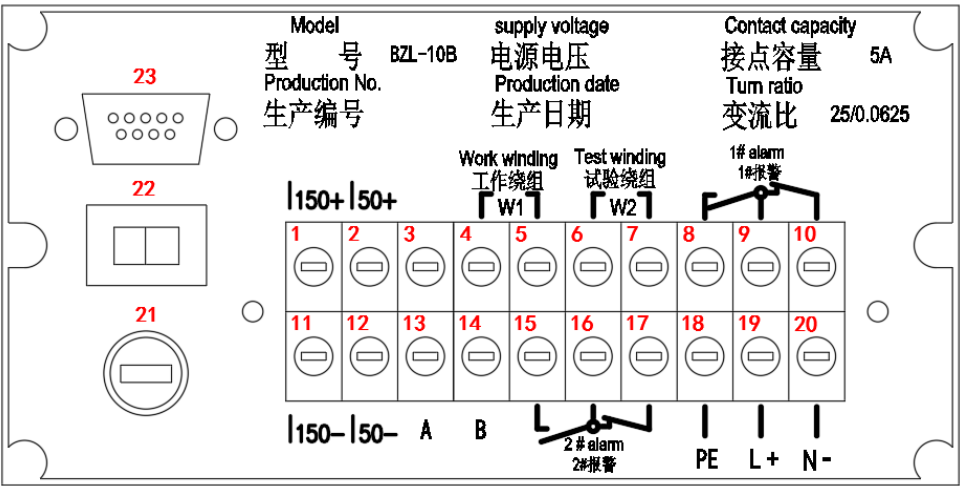


图 3

后面板端子说明:

- 1、 2 150Hz, 50Hz 模拟量输出正极
- 4、 5 工作绕组接入端
- 6、 7 试验绕组接入端
- 8、 9、 10 1#报警继电器接点输出
- 11、 12 150Hz, 50Hz 模拟量输出负极
- 13 、 14 上位机通信端口（同 23）
- 15、 16、 17 2#报警继电器接点输出
- 18 PE
- 19、 20 电源（交流供电时接入 L, N; 直流供电时接入+, -）
- 21 熔断器
- 22 电源开关
- 23 上位机通信端口（DB9）

2.5 操作说明

在继电器面板上有四个按键: « \triangle »键, « ∇ »键, «设置»键及«试验»电流输入键, 在继电器背面可按端子标牌的标注将互感器引出电缆可靠地接于相应的端子上。接通电源后, 50HZ 频率红色指示灯亮, 数码管显示基波轴电流值; 5秒钟后, 150HZ 频率红色指示灯亮, 数码管显示三次谐波轴电流值, 然后 50HZ 和 150HZ 指示灯会交替显示。此时轴电流继电器已进入正常工作状态。当仪表有数字显示时, 小数点前读数的单位为安培, 与电流互感器原边相对应, 例如: 当读数为 1.2 时, 表示机轴电流为 1.2A。

2.5.1 设置:

- 按下设置键，仪表进入设置状态，数码管第一位显示«1»，为设置 1#报警电流；这时按«△»键或«▽»键调整设定值；
- 继续按下设置键，数码管第一位显示«2»，为设置 2#报警电流；这时按«△»键或«▽»键调整设定值；
- 继续按下设置键，数码管第一位显示«3»，为设置报警后继电器接点延时动作时间，这时按«△»键或«▽»键调整设定值；
- 继续按下设置键，保存设置的数据，退出设置状态，恢复为显示状态。
- 继电器在出厂时，告警控制电流整定值和告警后延时值已设定如下表,用户亦可根据现场的实际情况自行设定。

量程	测量范围 (A)	出厂整定值（测量或设定范围内可调）		
		1#告警电流（A）	2#告警电流（A）	告警延时（S）
2A	0.4-2.5	0.5	1.5	30
10A	0.4-11.0	0.5	5.0	30
25A	0.4-27.0	5.0	15.0	30

表 2

2.5.2 运行:

发电机组轴承绝缘良好状态下，轴电流指示仪表指示应接近于零；

当发电机轴上产生的轴电流小于 1#报警设定值时，发电机轴上有较小的轴电流产生，不影响发电机组的正常运行；

当发电机轴上产生的轴电流大于 1#报警设定值而小于 2#报警设定值时，前面板 1#报警指示灯亮，同时 1#报警输出继电器接点动作，提示发电机轴有轴电流产生，但此时产生的轴电流并没有严重危害；

当轴电流大于 2#报警设定值时，前面板 2#报警指示灯亮，2#报警输出继电

器接点在设定的延时时间后动作，此时产生的轴电流已经具有危害性，此接点可以接到发电机停机控制信号，进行停机检测，防止因轴电流过大导致大轴绝缘击穿等故障。

2.5.3 试验电流:

此按键用于仪器的自检，当需要验证新设定动作电流时，按下试验按键，并调节试验电流旋钮，即由继电器送出的 50HZ 模拟轴电流信号加于互感器的试验绕组 W2 上，再经工作绕组 W1 感生等值电流送回继电器。调节此电流至预定值，直到相应的报警信号灯亮，以此验证动作值设定的正确或继电器是否正常工作。

！注意：当按下《试验》按钮时，继电器已将对输出接点的控制断开，即试验状态下无接点输出，因此不会影响整个控制系统的运行。

2.6 上位机监测及 232 接口

2.6.1 上位机监测功能简介

当您使用我厂生产的 BZL-10X 系列轴电流继电保护装置(B 型,C 型)之前,请在您的计算机上安装该装置监测软件(随机配置)。

将 U 盘连接计算机,按照提示安装程序后监测窗口即可显示。

将继电器及计算机 232 接口按照产品说明书正确连接即可使用。

监测窗口功能介绍:以 25A 量程为例,见下图:

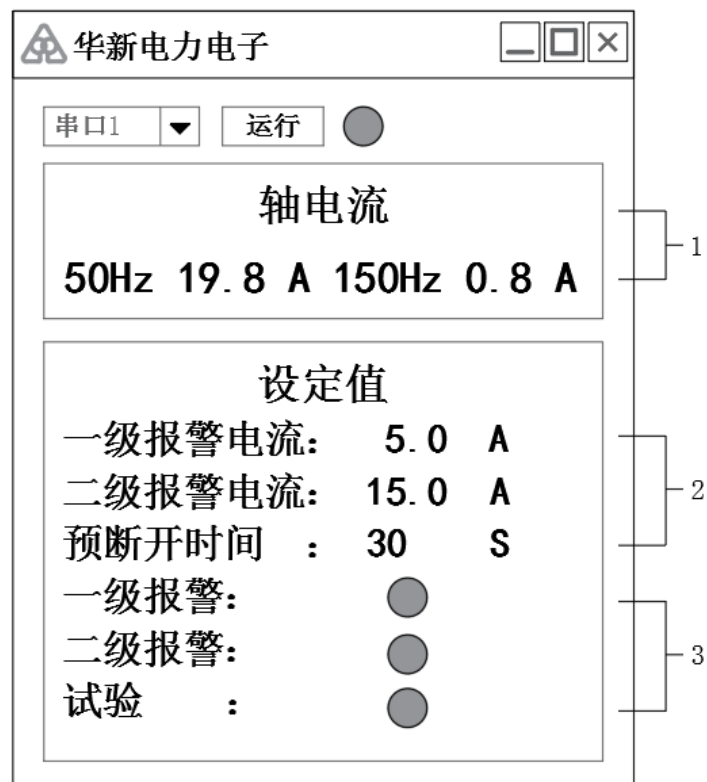


图 4

- 1 50/150HZ 监测通道数据显示窗口
- 2 设定值显示窗口
- 3 报警及试验状态显示窗口

2.6.2 232 串口接线示意图:

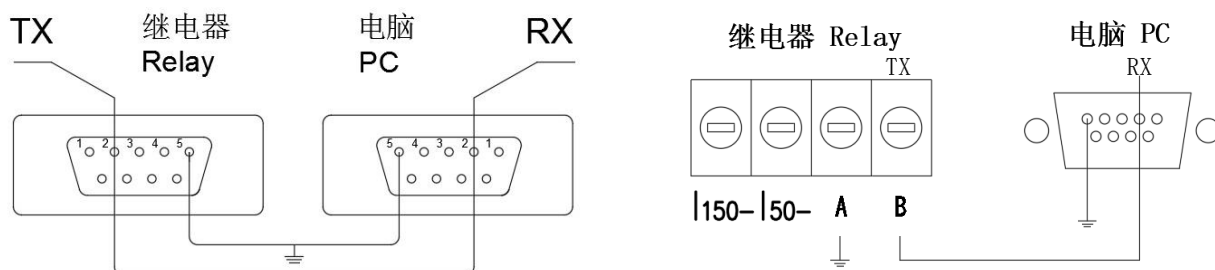


图 5

2.7 外形尺寸及安装方式:

- 外形尺寸: 160 × 85 × 315
- 安装方式: 插入式面板安装

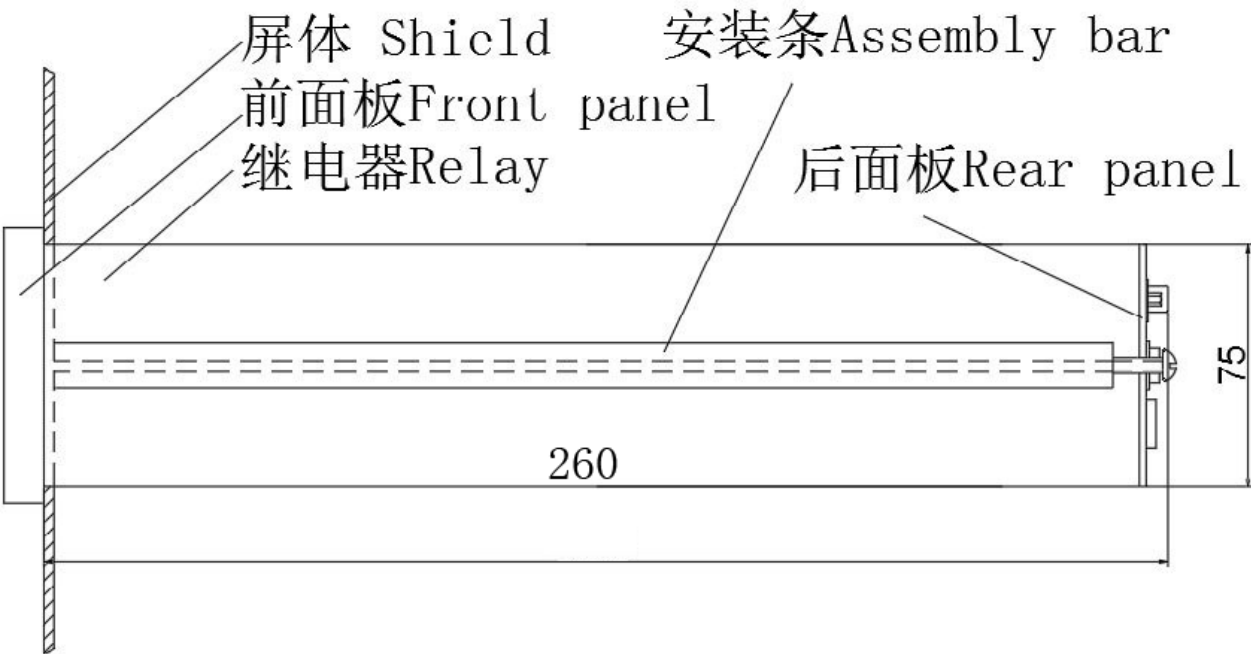
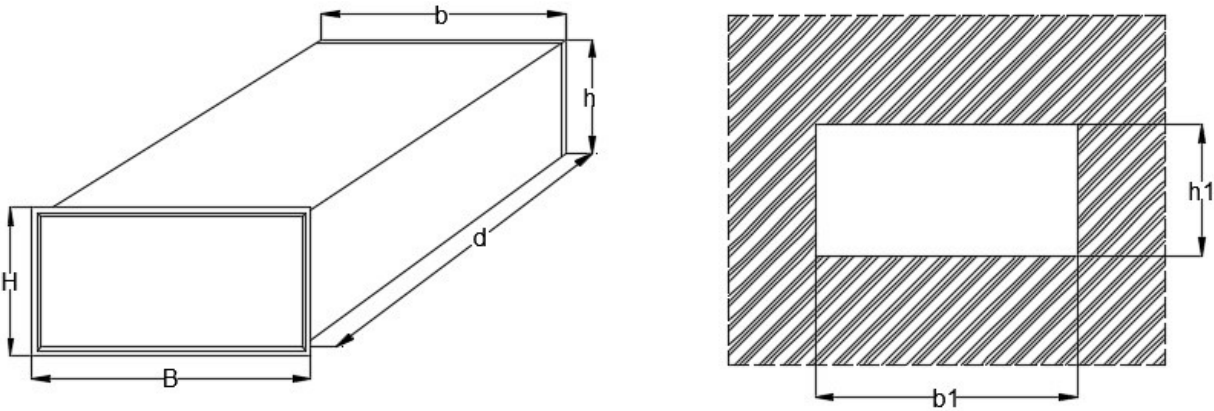


图 6

• 尺寸图表:



外形及开孔尺寸表						单位: mm	
型号及部件	B	H	b	h	d	b1	h1
BZL-10B继电器	160	85	150	75	250	151 ⁺¹ ₀	76 ⁺¹ ₀

3 互感器部分

3.1 概述:

定子铁芯分片和磁极配置不对称等原因,引起磁通不平衡,该不平衡磁通与轴切割产生轴电势,沿转子轴向分布。尽管此轴电势数值不大(一般在十几伏左右),但由于转子轴内阻很小,如果它沿轴承和底板形成闭合回路,轴电流可达很大数值(数百到数千安培),它将导致油质变化,轴承震动增大,轴瓦烧伤等事故。因此一般采用 0.5~2 毫米厚酚醛玻璃板使轴承绝缘。尽管采取了上述措施,但并不等于说轴承的安全就有了保证,从某种意义上讲,轴瓦的破坏程度取决于轴电流的幅值和作用时间;从运行角度来讲,运行人员需要随时或提前知道轴电流的变化或轴承绝缘的损坏程度。轴电流互感器就是为此而设计的一种特殊互感器,可以检测出 1A 以下的轴电流。其铁芯采用特殊矽钢片卷绕而成。其线圈分为两个绕组:试验绕组和工作绕组。工作绕组的负载阻抗为小于 40Ω ,为继电保护装置提供监测信号。

3.2 主要技术指标:

- 互感器型号: BZL-10B- ϕ □ □ □ □ (例: BZL-10B- ϕ 1500)
1500表示安装轴直径 1500mm
- 变流比: 通常为 400: 1, 其他比例可根据客户需求定做
- 互感器一次侧能检测出 0.4A 以上的轴电流 (2A、10A、25A 三种量程,在定货时由用户选定)
- 饱和倍数: 10
- 变化误差: $\leq 10\%$

- 绝缘等级：B 级
- 副边绕组为两组，一为试验绕组，另一为工作绕组。工作绕组按照 400:1 的比例输出轴电流值。试验绕组在试验状态下可输出 50Hz 的模拟互感器的副边电流值，送入工作绕组后，可以实现对设备的自检
- 最小内径：通常主轴直径加 20mm，分两至四瓣，通常经连接板连接而成
- 两绕组间及绕组对外壳绝缘耐压为 2KV
- 绕组与外壳间绝缘电阻 $>100\text{M}\Omega$
- 负载阻抗： $<40\Omega$

3.3 互感器结构：

互感器为穿心式，为便于用户安装分成两半（或四半），配有连接板，经螺栓紧固即可构成环形整体，通过四（或八）个安装支架固定在发电机机体上，如示意图。

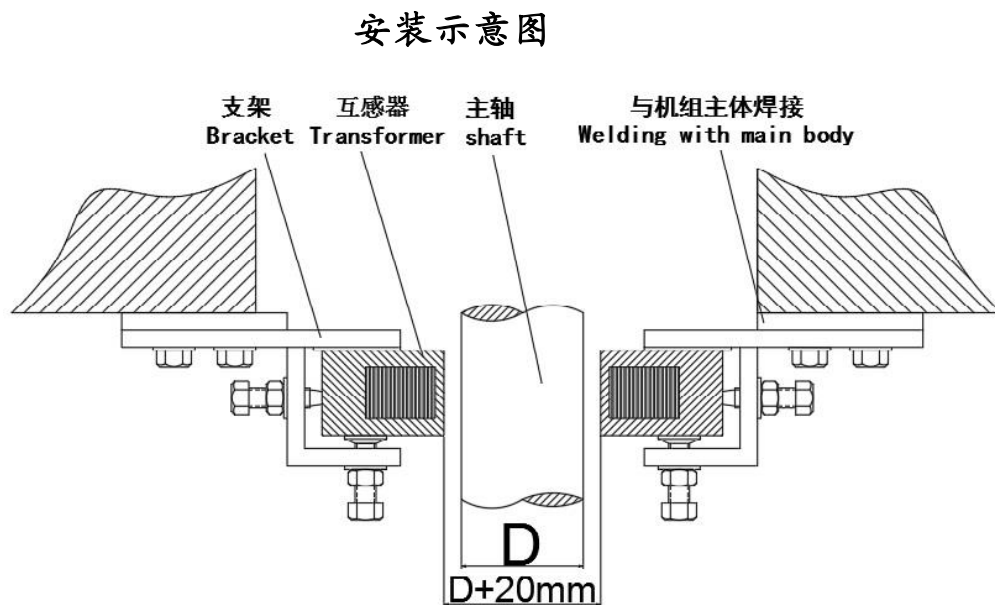


图 7

- D 为发电机轴直径
- D+20mm 为互感器内径

- $D+20\text{mm}+(206\text{mm}\times 2)$ 为互感器最大径向尺寸（含支架）
- 互感器最大轴向尺寸（含支架）为 155mm
- 适用于安装轴径为 300-1500mm 互感器的配套支架（标配）

3.4 安装

3.4.1 安装要求

- 互感器与发电机轴的同心度误差为 $10\pm 1\text{mm}$ ，水平度允差为 2mm。
- 互感器的试验绕组和工作绕组均用 2×1.0 或 2×1.5 屏蔽电缆引出机体外。电缆每 1-1.5 米用一个线夹固定，电缆经过线夹处时应用绝缘纸包紧，线夹固定在机体上。
- 互感器长期存放应水平放置，以避免变形。
- 互感器连接螺栓及支架定位螺栓应以适当力矩扭紧以免损坏互感器。

3.4.2 安装方法

- 互感器解体，旋下连接板螺栓，卸下连接板（图 2A）。
- 将互感器按标识相同的一端对接套在机轴上，用连接板螺栓把相同标识的连接板与互感器连接在一起（图 2B）。
- 请按切口标记安装，安装后切口间隙不大于 0.2 毫米，否则可能会影响性能（图 2C）。
- 按特殊要求，有无连接板连接方式，靠螺丝连接，安装后切口间隙不大于 0.2 毫米（图 2D）。

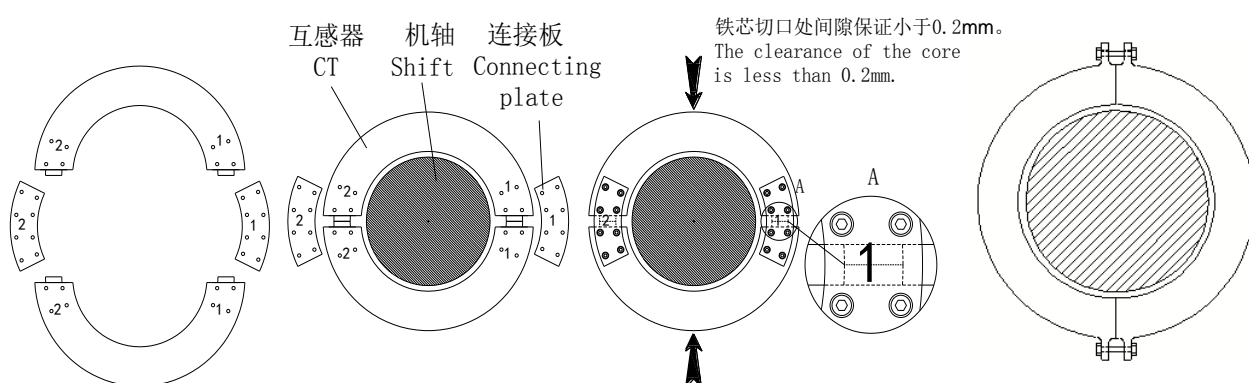


图 2A

图 2B

图 2C

图 2D

3.4.3 接线示意图

- 一侧端子水平方向分别用随机配置的短接线短接（图 8 中背面）。
- 另一侧分别引出接至继电器后面板相应端子（图 8 中正面）。

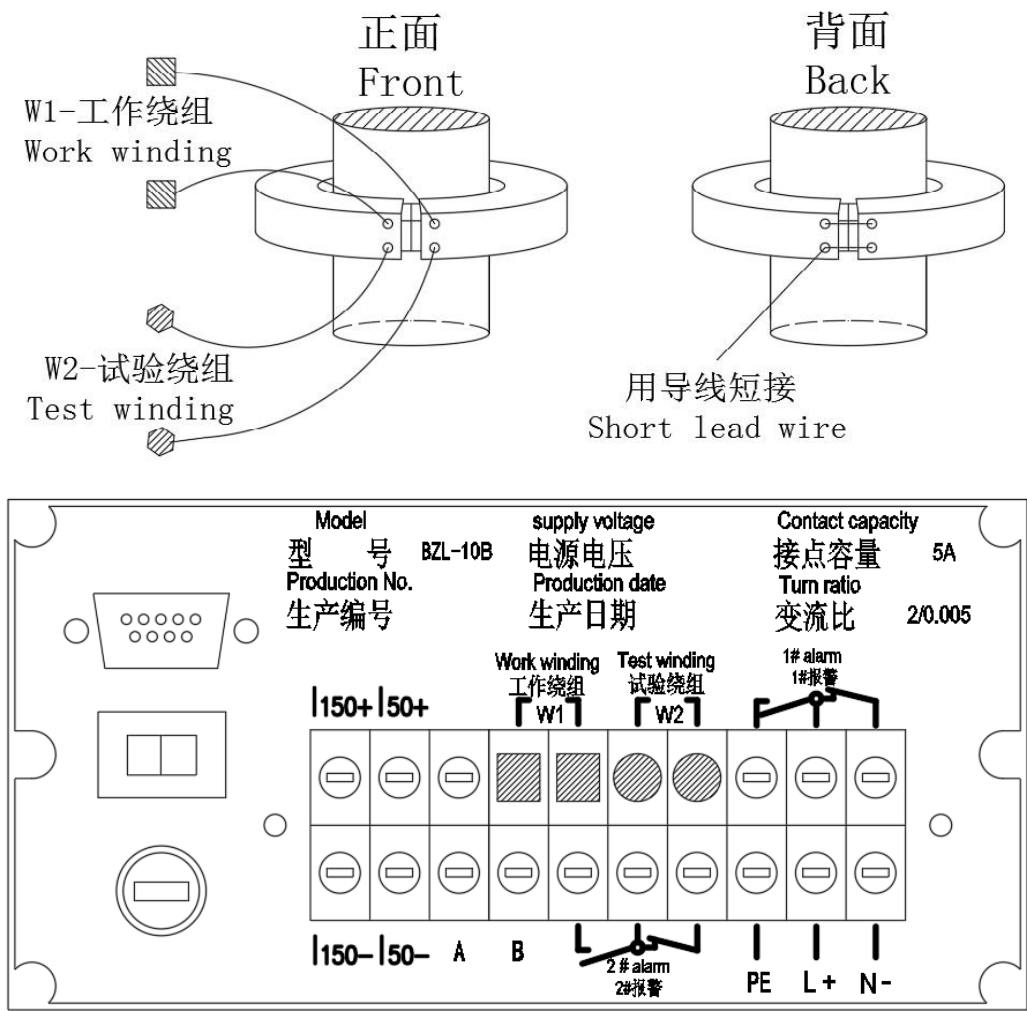
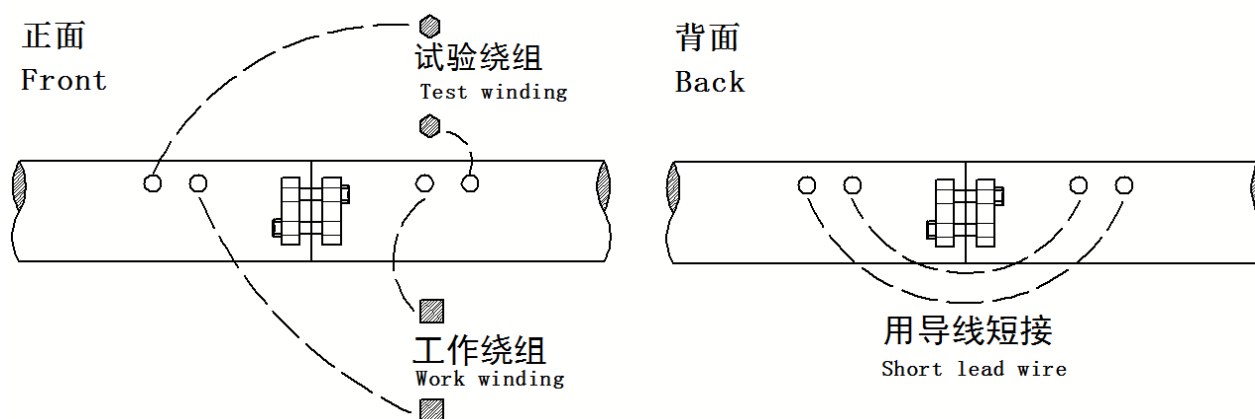


图 8

- 特殊端子接线示意



附图：互感器配套支架外形及参数

1、配套支架为标配尺寸。

2、以下为安装轴径为 300-1500mm 的互感器的配套支架尺寸图：

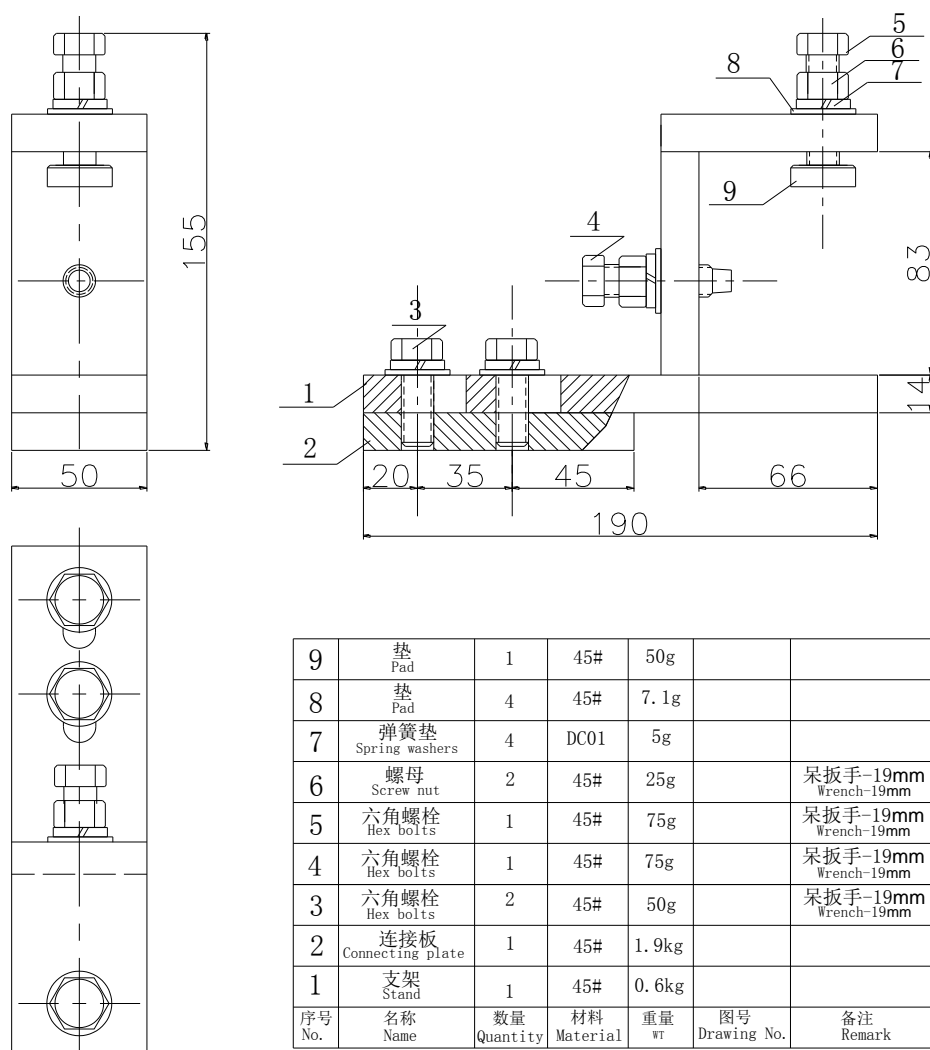
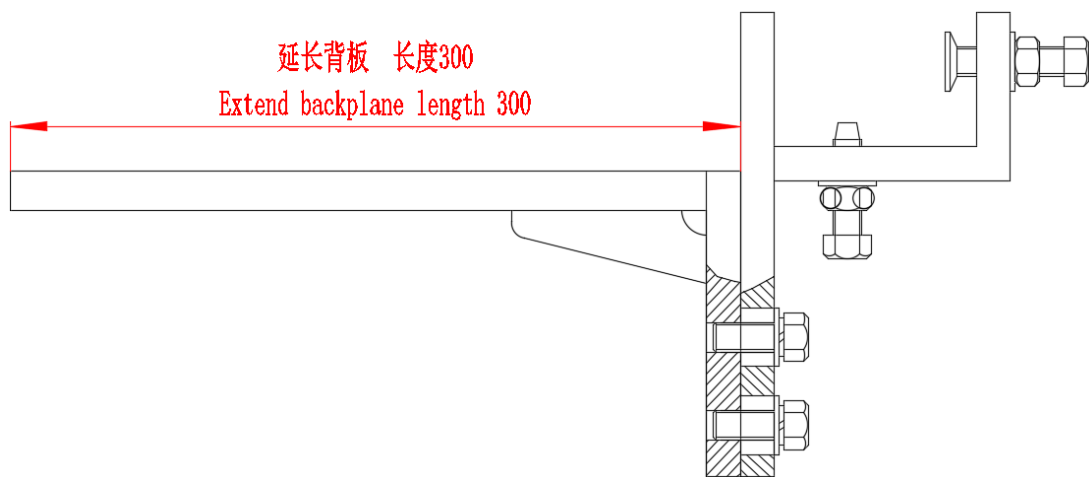


图 9

3、按照用户图纸要求提供延长备板，尺寸如下图。安装互感器时，用户可根据现场实际情况调整备板的长度。



4 常见故障处理方法:

4.1 送入试验电流时, 指示值毫无变化。首先将后面板的 W1、W2 四个端子上的接线卸下。

4.2 将 W1、W2 相邻的两个端子即 2、3 用一个导线相连接, 然后按试验电流调节步骤调试继电器部分, 若指示值依然无变化, 则请与我厂联系。

4.3 若调节过程一切正常, 则说明继电器部分没有问题, 请按下面步骤查找故障点: 用数显万用表 $200\ \Omega$ 档分别测 W I、W II 两组绕组的电阻 (每组绕组在互感器端子处约 $1.5\ \Omega$, 在继电器端子处阻值 $< 40\ \Omega$), 若阻值过大则说明 CT 到继电器的线路有问题, 应按互感器接线图检查 CT 的接线是否有问题。

5 随机文件

- 产品说明书
- 运行调试指南
- 产品合格证
- 产品检验记录
- 可存储设备 (程序、电子版产品说明书、运行调试指南等)

6 订货时请提供:

- 轴电流互感器的内径或发电机大轴的直径。

- 继电器工作电压：AC220V、DC220V、DC110V、DC24V。
- 检测范围：2A，10A，25A。
- 基波频率：50Hz 或 60Hz。
- 输出接点类型：一路常开一路常闭或双路常开。

注：说明书、运行调试指南等技术资料，本公司会因升级或其他原因进行不定期更新，希望随时关注我们的网站，也可以联系我们公司，获取最新版本。

请联系我们：

哈尔滨华新电力电子有限公司

地址：黑龙江省哈尔滨市香坊区文化街副 79 号

电话：0451-86679103 传真：0451-86677645 邮编：150040

开户行：工行哈尔滨市和平支行

帐 号：350 005 010 920 157 7442

税 号：91230 110 672 103 766R

企业网站：www.hxdldz.cn

邮箱：hxdldz@126.com

BZL-10B Shaft Current Relay Protection Equipment User's Manual



Harbin Huaxin Power Electronic Equipment Co., Ltd.

Introduction to our company

Our company founded in 1986, is one of the professional factories producing low-tension distribution equipment, power supply system and shaft current relay protect fixture. Of 30 employees, there are 9 technologists and 4 quality managers. Our permanent assets have reached 7,500,000 RMB. Recently, our products have been used in both domestic and overseas large and medium hydroelectric stations and met the performance requirement. For example, in Xiao Fengman hydroelectric station, a fateful accident was avoided betimes with the supervising alarm.

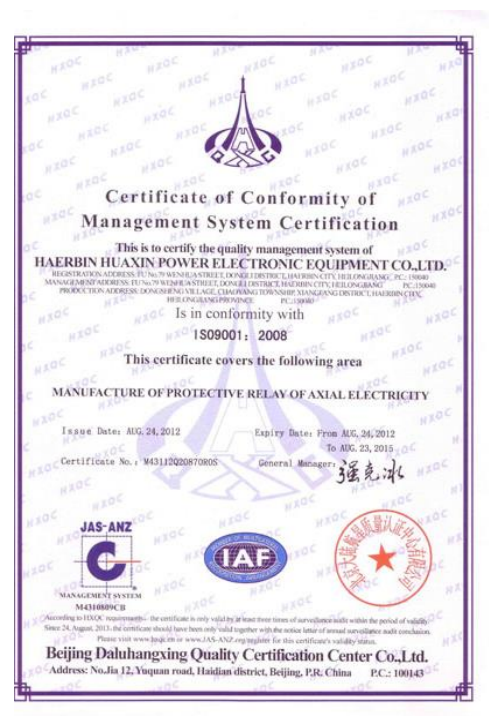
Our BZL-10 series shaft current relay protection fixture is being applied in many domestic and overseas large and medium hydroelectric stations including “Cuishuli” of Nepal, “Kejia” of Macedonian and some domestic stations such as “Fengman”, “lotus flower”, “Tiansheng Bridge”, “Wanjia stockaded village”, “Little Langdi”, “Liuja gorge”, “Tuolin”, “Mujing”, “Zhuzhou”, “Qingju”, “Shan county”, “Gongchuan”, “Qingshan”, “Mangtang brook”, “North brook”, “Xiayang”, “Nina”, “Fengtan”, “Huanglongtan”, “Jiangkou”, “Hongjia ferry”, “Zhouning”, “Nierji” etc.

I plant research and development of fourth generation (BZL-10C model) has been put into the market, its performance and the indicators are better than similar domestic products.

I plant research and development of fifth generation (BZL-10D model)

has entered the acceptance stage, its performance and the indicators are ahead of similar products in the domestic and import substitution products.

Our company attaching importance to the product quality has found a set of strict quality control and proof-test system. Now our company has possessed perfect proof-test standard from material stock, each produce process to products leaving factory, and achieved the authentication from ISO9000 quality control system. At present, our company has gained customers' reliance and trust with the enterprise recognizing contract and keeping faith because a complete set of quality control system applied in every tache including product design, development, exploiting, manufacture and proof-test have been formed.



1 Utility

BZL-10B Model Shaft Current Relay Protection Fixtures are mainly used to test the current in main shaft of generator, and to avoid the axletree and other components from damaging when the insulation in axletree is invalid. This device consists of two parts, transformer and relay, customize transformers according to the generator.

2 Relay part

2.1 Overview

- BZL-10B shaft relay is used to monitor the condition of bearing insulation, using the instrument transformer by detecting the base wave on the 3rd order harmonic wave of the shaft current signal.
- Because of the unsymmetrical bearing of a generator, the shaft will generate shaft current when the shaft insulation is lower or broken down. This current will break the shaft insulation and result in malfunction. The damage degree depends on the amplitude and duration of shaft current, therefore the sensitive shaft current protection is required to find the insulation trouble in advanced and adopt corresponding measure to guarantee the safety of the generator.
- The relay is an amplifier, dual filters, A / D conversion, the MCU intelligent analysis to determine control and over-current operation and other aspects of the composition. Axis current indicating instrument uses advanced digital technology, sensitive, precise control and intuitive display, a block diagram of a schematic block diagram refer

to its composition.

- The BZL-10B Shaft Current Relay has two operating modes: base wave actuation and 3rd order harmonic wave actuation.

- When the disturbing magnetic field in generator is strong and the transformer' s output includes the 3rd order harmonic component, the meter can monitor signal in both 50Hz and 150Hz. The 50Hz and 150Hz-disturbing components in current signal will be filtered, so that the relay can detect and actuate steadily.

- When the disturbing magnetic field is weak with no disturbing harmonic components in shaft current, the meter detects shaft current at 50Hz. The shaft current passed through 50Hz filter channel and other disturbing signal was eliminated so that error actuation can be avoided, while 50Hz and 150Hz front shaft current is displayed alternately, the present working frequency is displayed with indicator light on the panel.

- The fault current signal sampled from the shaft current transformer CT of the relay would be amplified by IC1 and sent to a dual-channel filter, in which one' s cut-off frequency is set to 50Hz and other is set to 150Hz. The output were rectified and sent to two A/D channels, its ADC result is feed to MCU to analysis, judge and display the shaft current value. On the other hand, the ADC result would be compared with two preset malfunction reference value, corresponding control signal can be achieved to trigger CZ1 and CZ2 in order to implement

corresponding protection function such as alarm and shutdown the power switch. The series interface RS232 in our equipment can send the data to Superior computer to disposal through our supervise software and other configuration software.

2.2 Schematic block diagram

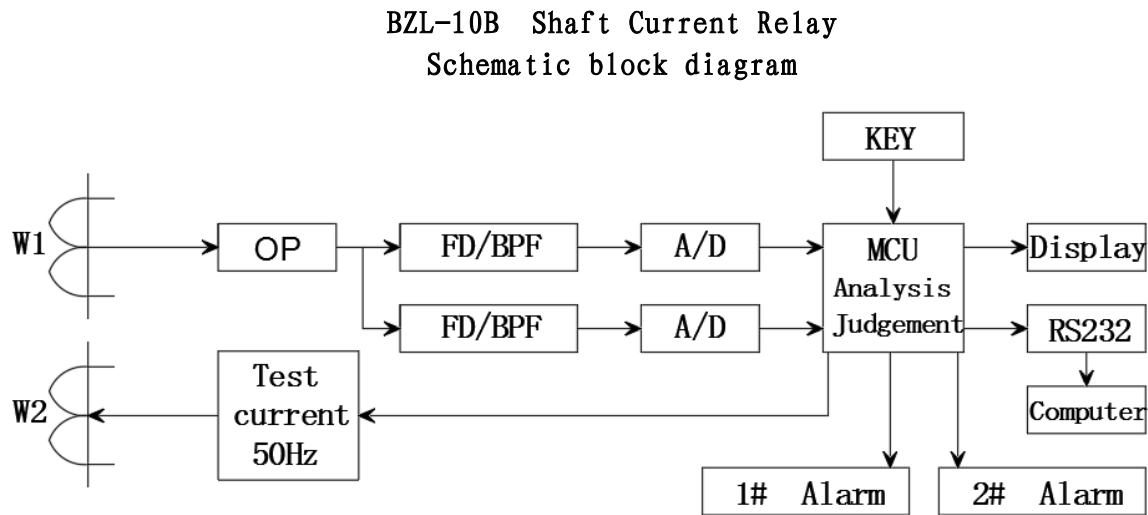


Figure 1

2.3 Technical parameters

Detection Frequency	Fundamental 50Hz and Three Harmonic 150Hz
Set the action value (fundamental or three harmonic)	both 1 and 2 stage 0.4 ~ 2.5A preset refer to table 2
Actuation delay	1 ~ 255S preset refer to table 2
Working power	AC220V (50 or 60Hz); DC24V; DC85~220V
Input impendence	<40Ω (Resistance characteristic)
Display	LED
Display resolution	0.1
Measuring range	0.4–Maximum range Note: 1.
Output signal mode	2 way relay contact output
Contact capacity	AC250V/5A, DC28V/5A
Power	20W
Ambient temperature	Operating Temperature: -10 ~ +55℃ Storage Temperature: -25 ~ +70℃
Relative humidity	<90%
Dielectric strength of insulation	AC500V 1mA/1min
Dimensions	160 × 85 × 345
Weight	2kg

Table 1

- Note: 1. We can not guarantee the accuracy of the measured values between 0.1 and 0.4 within the error range.**
- 2. Between 0.4 and maximum range to ensure the accuracy of the measured values within the tolerance range.**

2.4 Front and Rear panel Figure and Key Explanation

2.4.1 Front panel

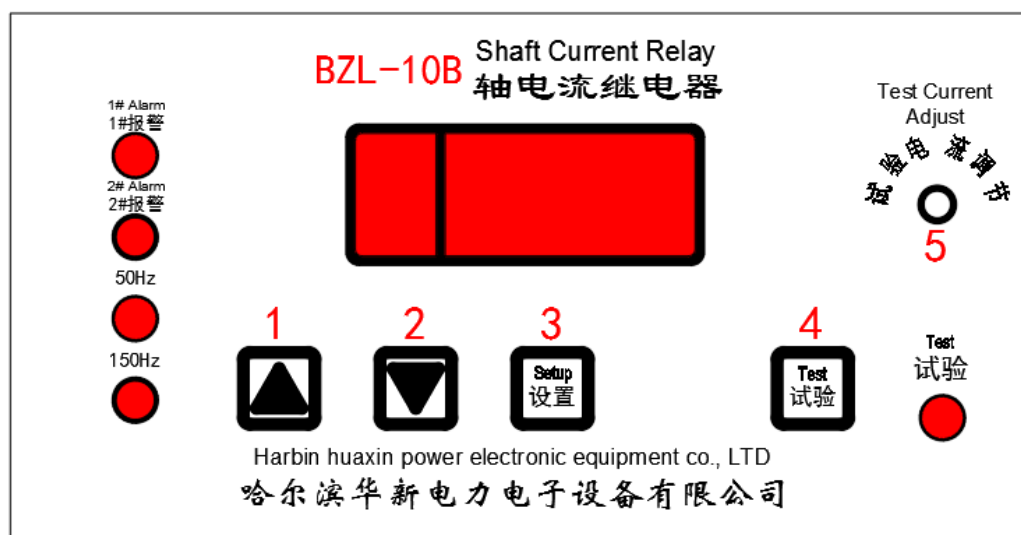


Figure 2

Key of front panel explanation:

- 1-add, value increase 1;
- 2-sub, value subtrahend 1;
- 3-set, enter set state;
- 4-test, enter self-test state;
- 5-test current adjustment knob, adjust test current of self-test state.

2.4.2 Rear panel

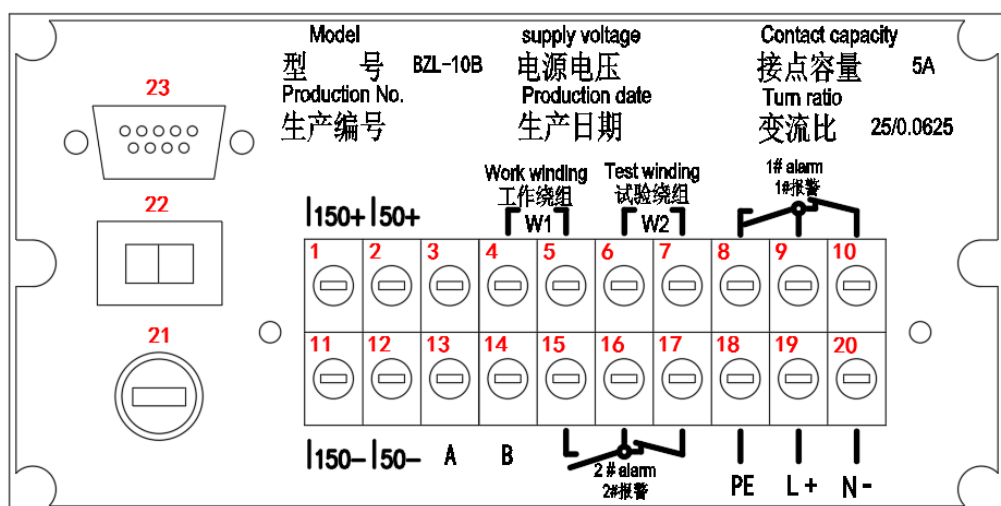


Figure 3

Rear panel explanation:

- 1、 2 -150 Hz, 50 Hz analog output positive
- 4、 5 -Work winding access terminal
- 6、 7 -Test winding access terminal
- 8、 9、 10 -1# Alarm relay contact output;
- 11、 12 -150 Hz, 50 Hz analog output negative
- 13、 14 -Upper Computer Communication Port(with 23)
- 15、 16、 17-2 # Alarm relay contact output
- 18 -PE
- 19、 20 - Power supply (access L, N when AC power supply; Access +, -when DC is powered
- 21、 - fuse
- 22、 - switch
- 23、 - Upper Computer Communication Port (DB9)

2.5 Operating Instruction

On the panel, there are four keys including “ Δ ” key, “ ∇ ” key, “Setup” key and “Test” key. In the real of the relay, users can connect lead to corresponding terminates according to the marks shown on the terminals labels. After the power is switched on, the frequency of 50HZ red light, digital tube display the fundamental axis current value; after 5 seconds, the frequency of 150HZ red light, digital tube display three harmonic axial current value, then 50HZ and 150HZ indicator lights alternate. At this point, the shaft current relay has entered the normal working state. When the meter has digital display, the unit of reading before the decimal point is ampere, corresponding to the original side of the current transformer. For example, when the reading is 1.2, the current of the crankshaft is 1.2A.

2.5.1 Set

- Press the keys, enter the instrument settings, digital tube display the first "1", set 1# alarm current; then press " Δ " or " ∇ " key at the key to adjust the setting value;
- Continue to press the keys, digital tube display the first "2", set 2# alarm current; then press " Δ " or " ∇ " key at the key to adjust the setting value;
- Continue to press the keys, digital tube display the first "3", set the alarm relay contact time delay action, then press " Δ " or " ∇ " key at the key to adjust the setting value;

- Continue to press the settings key, save the set data, exit the settings, and revert to the display state.
- When the relay is out of the factory, the alarm control current setting value and the alarm delay value have been set as follows. The user can also set up according to the actual situation at the scene.

Measure range	Measure value (A)	Set value (May be regulate in range)		
		1# alarm (A)	2# alarm (A)	Delay time (S)
2A	0.4-2.5	0.5	1.5	30
10A	0.4-11.0	0.5	5.0	30
25A	0.4-27.0	5.0	15.0	30

table 2

2.5.2 Function:

When the generator bearings are in good insulation, the axle current indicating instrument should be close to zero;

When the shaft current generated on the generator shaft is less than the setting value of the 1# alarm, the shaft of the generator shaft is provided with smaller shaft current, and the normal operation of the generator set is not affected;

When the shaft current generated by the generator shaft is larger than that on the 1# alarm set value is less than 2# the alarm settings, the front panel 1# alarm indicator lights and alarm output 1# relay contact action, suggesting that the generator shaft shaft current

generated, but the shaft current generated at this time and no serious harm;

When the current is greater than 2# the alarm settings, the front panel 2# alarm indicator, 2# alarm relay contact output in the set delay time after the action, the shaft current generated at this time have harm, the contact can receive control signal generator shutdown, shutdown of detection, to prevent excessive shaft current shaft insulation breakdown fault.

2.5.3 Test current key

This key for instruments, when you need to verify that the new set of action current, press the test key, and adjust the current test knob, W2 sent by relay test winding 50HZ analog current signal transformer on the shaft, the working winding W1 induced equivalent current back to the relay. The current is adjusted to a predetermined value until the corresponding warning signal light is on to verify whether the action value setting is correct or whether the relay is functioning properly.

! Note: when you press the "test" button, the relay has control on the output contacts are disconnected, the test under the condition of contact output, it will not affect the operation of the whole control system.

2.6 PC monitor and RS-232 serial port

2.6.1 PC Monitoring Features

Before you use the BZL-10X series axial current relay protection

device (type B, C type) produced by our factory, please install the device monitoring software on your computer (random configuration).

Connect the U disk to the computer and follow the prompts to install the program, then the monitor window can display.

Relay and computer 232 interface according to the product manual can be correctly connected to use.

Monitoring window features: 2A range as an example, see the following picture:

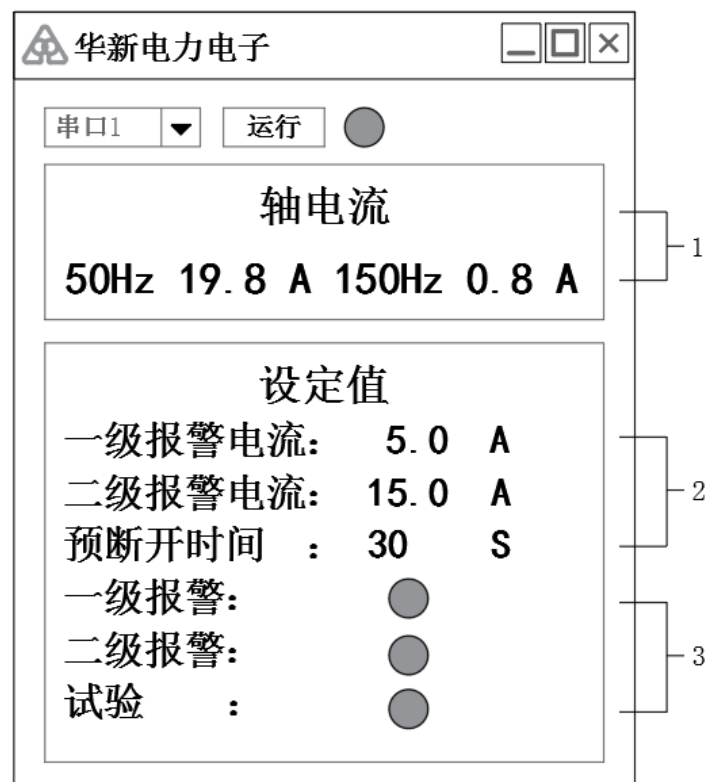


Figure 4

- 1 50/150HZ Monitoring Channel Data Display Window
- 2 Set Value Display Window
- 3 Alarm and Test Status Display Window

2.6.2 Connect line of 232 series port

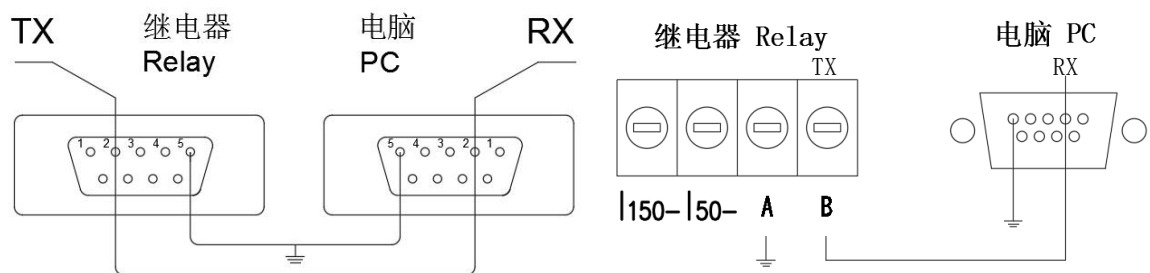


Figure 5

2.7 Exterior size and Hole size

- Dimensions: 160 × 85 × 315 (Length × Width × Depth)
- Installation: plug-in panel mounting

Hole size: 151 × 76 (Length × Width)

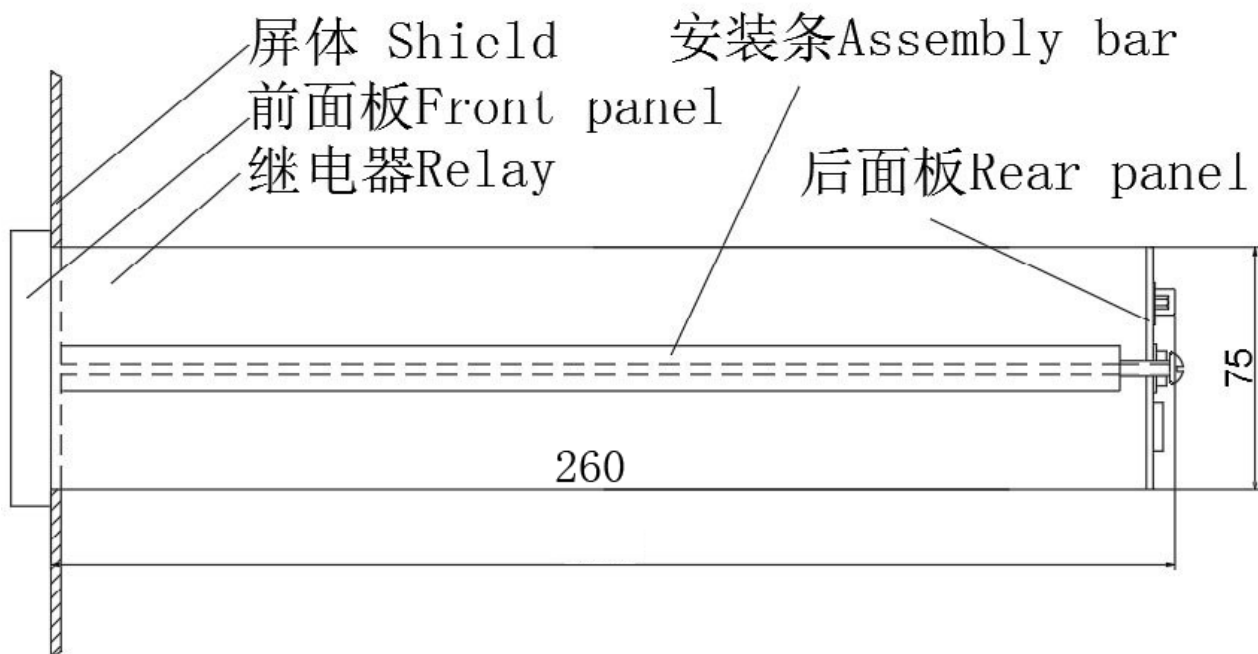
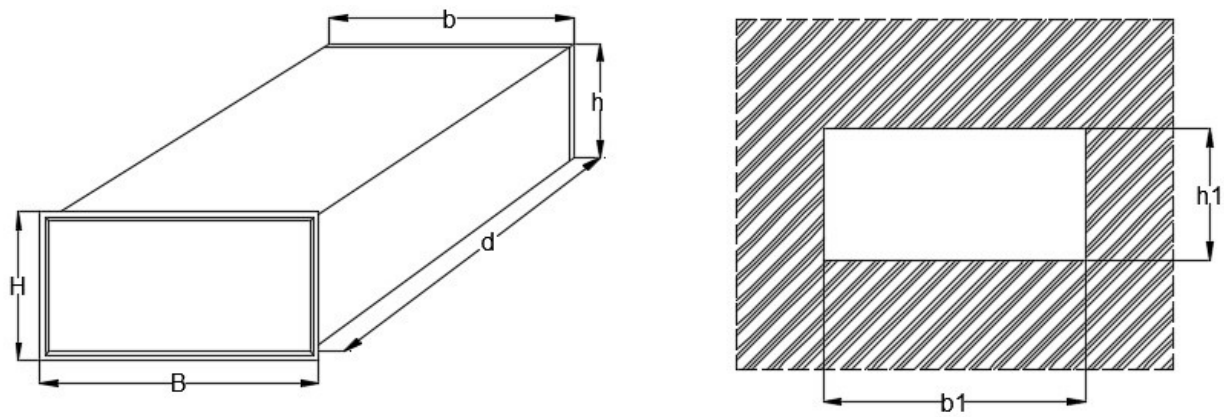


Figure 6

●Dimensional chart:



外形及开孔尺寸表						单位: mm	
型号及部件	B	H	b	h	d	b1	h1
BZL-10B继电器	160	85	150	75	250	151 ⁺¹ ₀	76 ⁺¹ ₀

3 Transformer part

3.1 Overview

The stator core of the stator and the magnetic pole of the configuration of the asymmetry and other reasons, causing the magnetic flux imbalance, the imbalance between the magnetic flux axis and axis of the shaft potential, along the axial distribution of the rotor. Although this axis has a potential value of small (general in about a dozen volts), but due to the rotor shaft resistance is very small, if it along the bearing and a bottom plate to form a closed loop, shaft currents up to large numerical (hundreds to thousands of Amperes), it will lead to oil changes, bearing vibration increases, bearing burns and other accidents. Therefore, the general use of 0.5 ~ 2 mm thick phenolic glass panels so that bearing insulation. Despite these measures, but this does not mean that said bearing safety is guaranteed, in a sense, bearing damage depends on the shaft of the current amplitude and duration of action; from the perspective of the operation, operation personnel needs at any time or know in advance the current axis changes or bearing insulation damage degree. The axial current transformer is a special transformer designed for this purpose, and can detect the axial current of 1A. Its core is made of a special silicon steel sheet and wound. The winding is divided into two windings: Test windings and working windings. The load impedance of the working winding is $<40\Omega$, and the signal is

provided for relay protection.

3.2 Main Technical parameters

- Transformer type: BZL-10B- ϕ □ □ □ □ (Example: BZL-10B- ϕ 1500)
1500 indicates a mounting shaft diameter of 1500mm
- Flow ratio: usually 400:1, the other proportion can be customized according to customer demand
- The primary side of transformer can detect the shaft current of 0.4A above (2A, 10A, 25A three range, in the order specified by the user)
- Saturation multiple: 10
- Current ration error: $\leq 10\%$
- Insulation class: B
- The secondary windings include test winding and working winding
Working winding output shaft current according to 400:1. Test winding substitute transformer output 50HZ secondary current. When the current into working winding , relay self-inspection
- Usually the minimum inner diameter is the spindle diameter plus 20mm,
Usually the transformers are linked by a connecting plate, with two or four separate sections connected.
- The insulation voltage endurance between two winding is 2KV, and that between windings and outside shell is the same value
- The insulation impendence between windings and outside shell $>100M\Omega$
- Load impedance is $<40\Omega$

3.3 Transformer structure

Transformer bushing type, as is convenient for the users to install into two halves (or four halves), with a connecting plate and the fastening bolt can be constitute a whole ring, through four mounting bracket fixed on the generator body, such as the diagram.

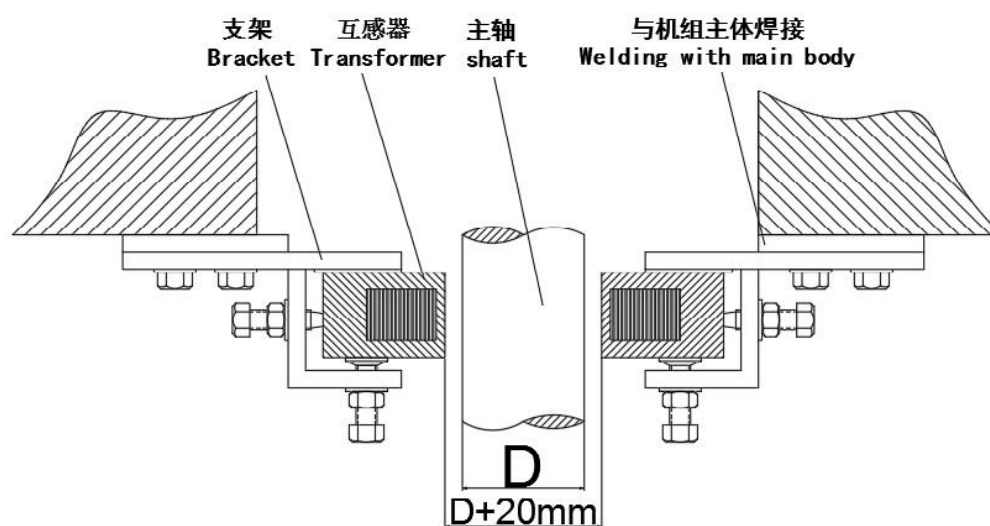


Figure 7

- D generator shaft diameter
 - D+20mm is the inner diameter of transformer.
 - D+20mm+ (206mm x 2) is the radial dimension of the transformer (including the stent)
 - The maximum axial size of the transformer is 155mm
 - Suitable for mounting shaft diameter for supporting bracket
- 300-1500mm transformer (standard)

3.4 Installation

3.4.1 Installation requirements

- The transformer and generator shaft of the concentric degree tolerance are $10 \pm 1\text{mm}$, the level tolerance are 2mm.
- The test windings and the working windings of the transformer are made

of 2 * 1 or 2 * 1.5 shielded cable drawn out machines.. Wire each 1–1.5 meter with a wire clip is fixed, cable through the wire clip when the application of the insulation paper package is tight, wire clip is fixed on the body.

- The transformer should be stored for a long time to avoid deformation.
- Transformer connecting bolts and bracket positioning bolt should be inaproper torque tightening so as not to damage the transformer.

3.4.2 Installation method

- The transformer disintegrated, unscrew the connecting plate by bolts, remove the connecting plate (Figure 2A).
- The two part according to the identification of transformer set in the shaft and butt bolt connecting plate and transformer connected together (Figure 2B).
- Please label the installation of the cut. After the installation of the cut gap is not greater than 0.2 mm, or may affect the performance (Figure 2C).
- According to special requirements, there is no connection plate connection mode, by screw connection, after installation the incision gap is not more than 0.2 mm(Figure 2D).

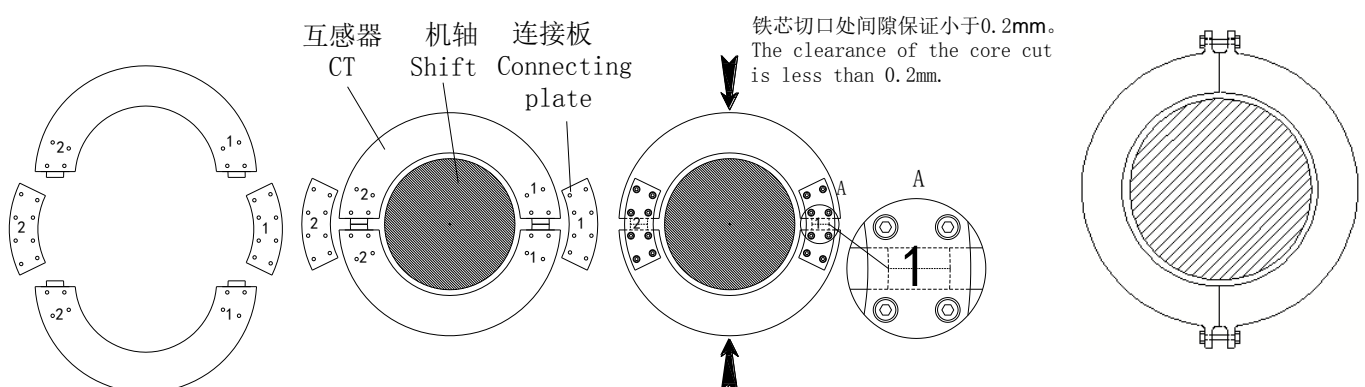


Figure 2 A

Figure 2B

Figure 2C

Figure 2D

3.4.3 Schematic diagram of connection

- The horizontal direction of one terminal is respectively short of the short terminal of the random configuration (Figure 8).
- The other side lead to the relay terminal (Figure 8) respectively.

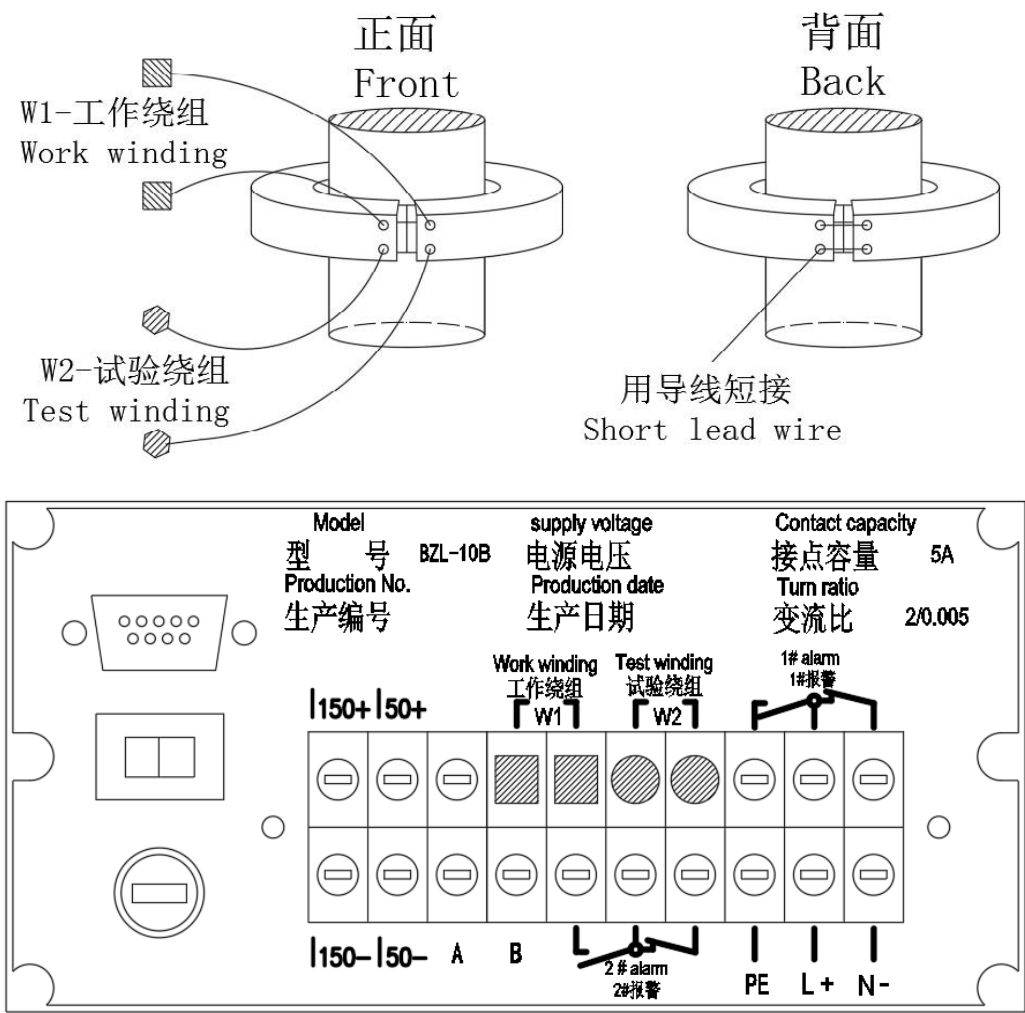
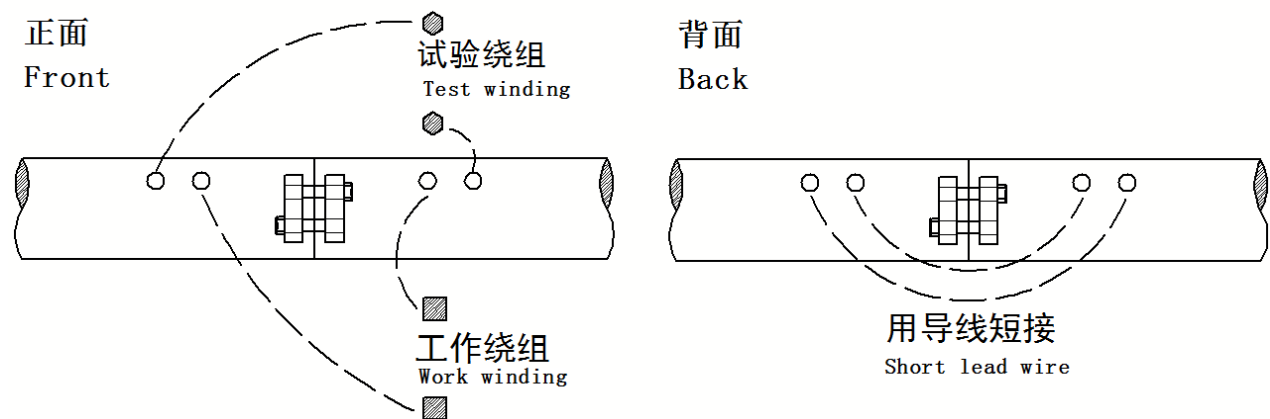


Figure 8

- Special terminal wiring indicatio



Figures : Transformer supporting bracket and the shape parameters

1, support bracket for standard size.

2, the following is the installation of the shaft diameter of 300-1500mm transformer support bracket size map:

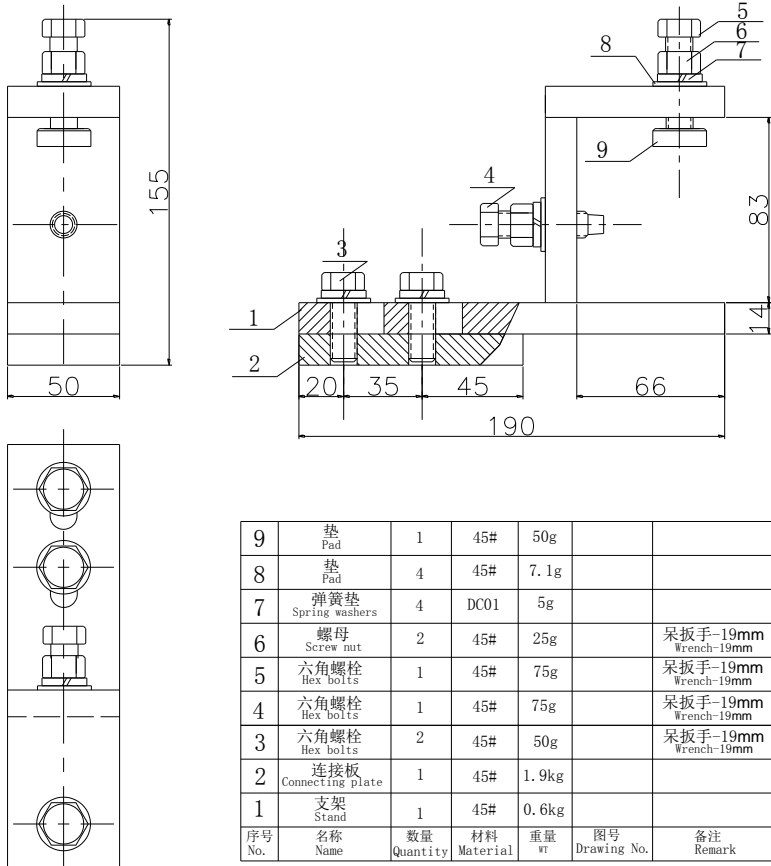
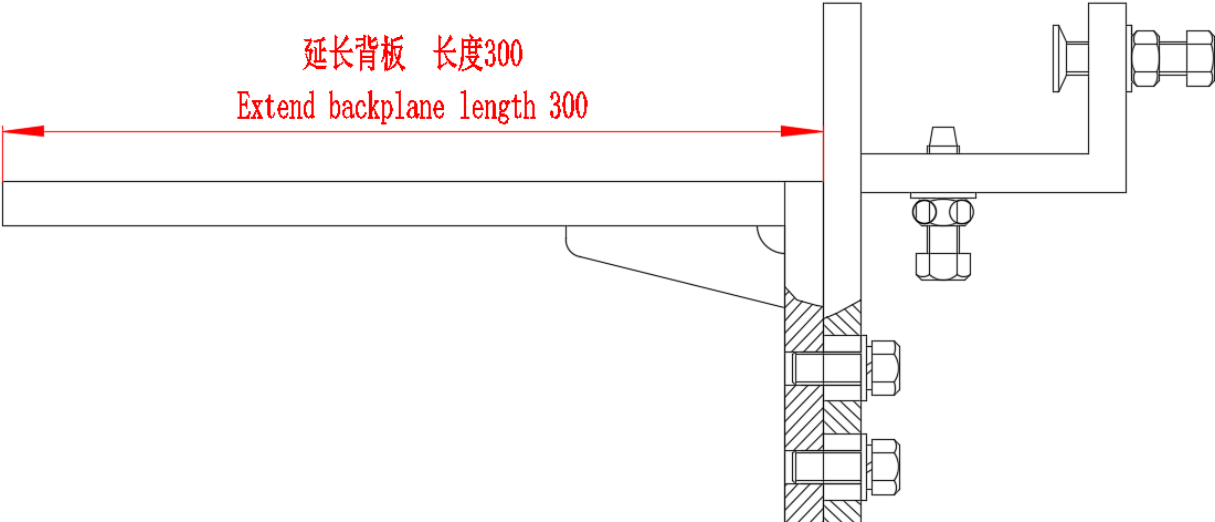


Figure 9

3, according to the user drawings requested to extend the preparation board, size as shown below. When the transformer is installed, the length of the preparation plate can be adjusted according to the actual situation in the field.



4 Deal method for normal malfunctions

4.1 No change in the inductor value while test current is given. At first, remove connect lines of four terminations W1 and W2 on the back panel, connect two neighboring terminations (2, 3) between W1 and W2 with a single lead.

4.2 Debug the relay part according to the adjusting process of the test current. If no abnormality in this process, the relay part should be well balanced, and the following process can be used to detect the malfunction point.

4.3 Test the resistance of both winds W1 and W2, if the resistance, each of which is equal to or less than 40Ω , is excess larger, the malfunction point should exist in the connect line between the CT and relay. Test the connect line to CT according to the figure of the connecting to mutual-inductor.

5 Random file

- User' s Manual
- Guide of Debug and operation
- Certificate
- Product inspection records
- Can store equipment (program, electronic version of User' s Manual, Guide of Debug and operation, etc.)

6 Order declare

- The inner diameter of the diameter of the shaft or motor current transformer shaft.
- Relay Voltage: AC220V, DC220V, DC110V, DC24V.
- Detection range: 2A, 10A, 25A.
- Fundamental frequency: 50Hz or 60Hz.
- Contact output type: a NO and a NC or Two-way NO.

Manual, debugging guide and other technical information, the company will due to upgrade or other reasons not be updated regularly, to keep an eye on our website can also be linked to our company, access to the latest version.

Harbin Huaxin Power Electronic Equipment Co.,LTD

Address: No.79, WenHua, XiangFang District of Harbin,HeiLongJiang Province

Tel:+86451-86679103 Fax:+86451-86677645 Postcode:150040

<http://www.hxdldz.cn>

E-mail:hxdldz@126.com

