

BZL-10C 轴电流继电器保护装置

产品使用说明书



哈尔滨华新电力电子设备有限公司

企业简介

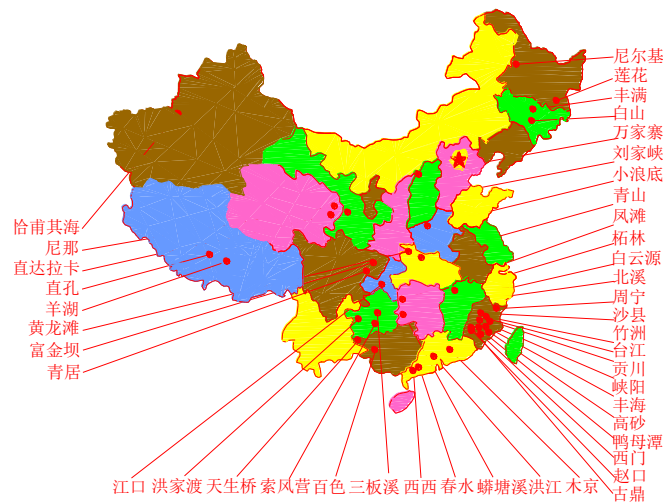
我厂成立于 1986 年，是生产低压配电设备、电源设备和发电机轴电流继电保护装置的专业厂。现有职工 30 人，技术人员 9 人，质管人员 4 人，固定资产 750 万。其产品多年来为国内外大中型水电站所采用并达到其使用性能的要求。如在丰满电站的监控报警，及时避免了重大事故的发生。

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各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-10C 轴电流继电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 工作原理

2.1 工作原理

BZL-10C 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-10C 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。

- 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，仪器可测量 50Hz 和 150Hz 信号，同时经滤波器滤除 50Hz 或 150Hz 以外的杂散干扰电流，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，仪器即按 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。

- 本机带有 485 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。
- 基波和三次谐波的 4-20mA 模拟量输出，供您选用。

2.2 原理框图

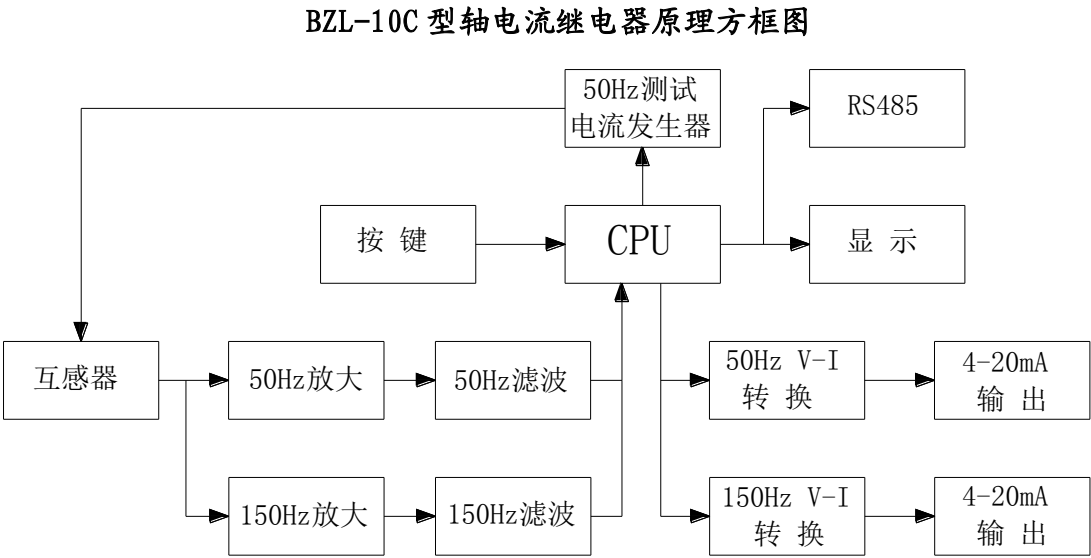


图 1

3 继电器部分

3.1 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
电源频率	50 Hz 或 60 Hz
输入阻抗	< 40 Ω (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	2 路继电器接点输出
接点容量	AC250V/5A, DC28V/5A
模拟量输出	4-20mA
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	1KV 1.5mA/1min
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。

0.4-量程最大值能够保证测量值精度在误差范围之内。

3.2 前后面板及按键说明

3.2.1 前面板

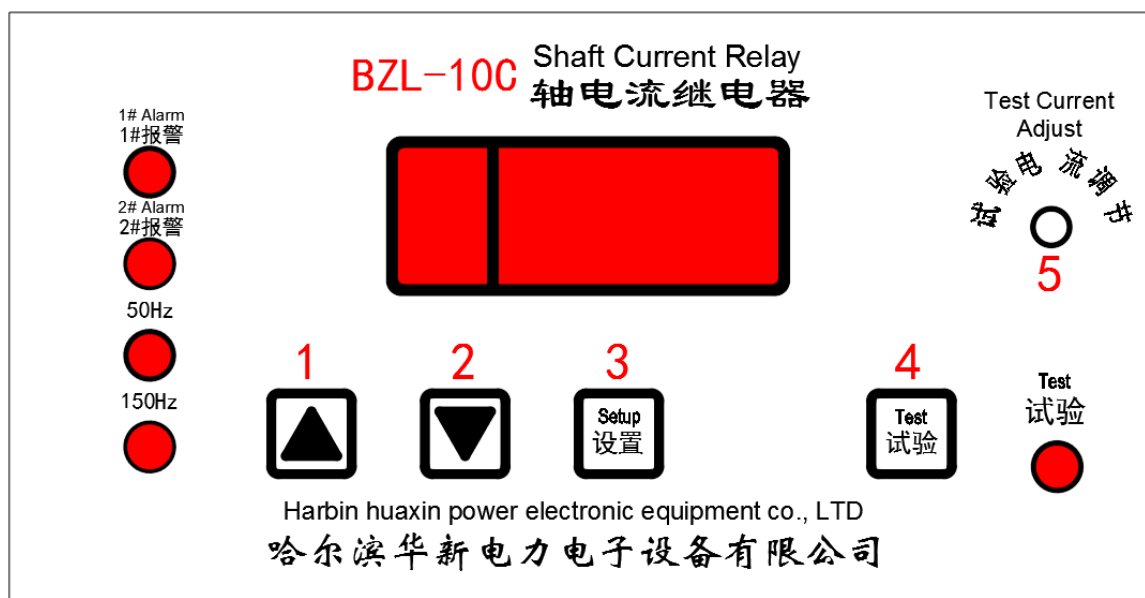


图 2

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

3.2.2 后面板

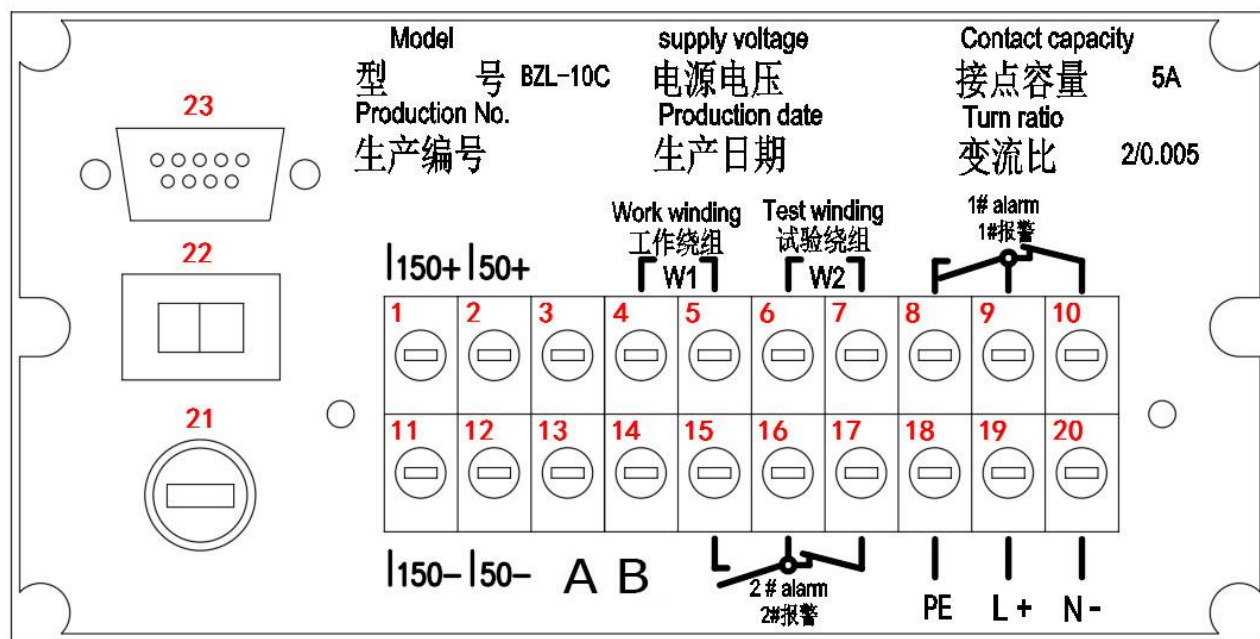


图 3 通用标准型号端子图

标准型后面板端子说明:

- 1、 2 -150Hz, 50Hz 模拟量输出正极
- 4、 5 -互感器工作绕组输入
- 6、 7 -互感器试验绕组输入
- 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 (RS-485)
- 15、 16、 17 -2#报警继电器接点输出
- 18 -PE (大地)
- 19、 20 -工作电源 (交流供电时接 L, N; 直流供电时正接+, 负接-)
- 21 -熔断器
- 22 -电源开关
- 23 -上位机通信端口 (DB9/RS-232)

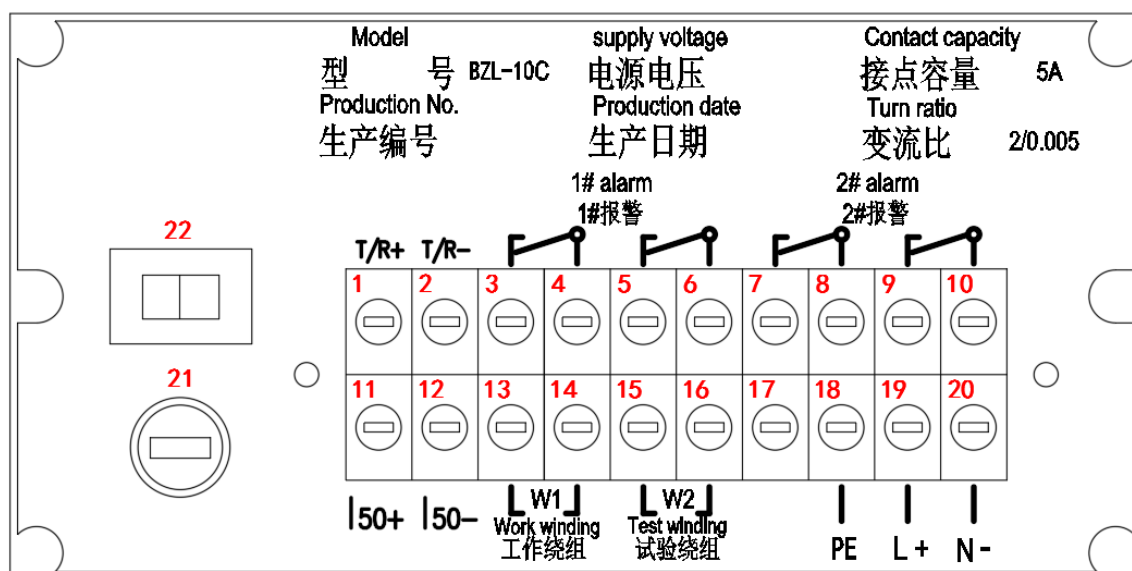


图 4 定制型号端子图

定制型后面板端子说明:

- 1、 2 -RS485 通信接口
- 3、 4 -1#报警继电器常开接点输出
- 5、 6 -1#报警继电器常开接点输出
- 7、 8 -2#报警继电器常开接点输出
- 9、 10 -2#报警继电器常开接点输出
- 11、 12 -50Hz 模拟量输出
- 13、 14 -互感器工作绕组输入
- 15、 16 -互感器试验绕组输入
- 18 -PE (大地)
- 19、 20 -工作电源 (交流供电时接 L, N; 直流供电时正接+, 负接-)
- 21 -熔断器
- 22 -电源开关

3.3 操作说明

3.3.1 前面板:

- 50 Hz 、 150Hz 指示灯循环点亮，表示当前检测频率为 50 Hz 或 150Hz。
- 1#报警指示灯：当轴电流达到 1#报警设定值时，此灯亮。同时 1#报警继电器接点动作。
- 2#报警指示灯：当轴电流达到 2#报警设定值时，此灯亮。开始按设定时间延时，延时结束后 2#报警继电器接点动作。
- 试验按钮：按下此按钮装置进入试验状态。
- 试验指示灯：当装置进入试验状态时，此灯亮。
- 设置按钮，此按钮按下第一次进入 1#报警值设置状态，此按钮按下第二次进入 2#报警值设置状态，此按钮按下第三次进入延时（秒）设置状态，按钮按下第四次退出当前设置状态并进入检测状态（复位）。
- «△»、«▽»按钮，进入设置状态,通过此按钮设定整定值，«△»为加、«▽»为减。
- 数码显示，左起第 1 位为状态显示位（1-表示 1#报警值，2-2#报警值，3-2#报警继电器接点动作延时时间），第 2、3、4 位为数据显示位。
- 试验电流调节旋钮，在试验状态下，旋动此旋钮可调节送入互感器的试验电流的大小。

3.3.2 参数设置

接通电源后，工作频率指示灯(50HZ, 红色)亮，数码管开始显示，此时轴电流继电器已进入正常工作状态。面板上的轴电流指示仪表在发电机组轴承绝缘良好状态下指示应为零。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 1.20 时，表示发电机轴电流为 1.2A。

本型号轴电流继电器在出厂时，1#告警控制电流整定值为 0.5A，2#告警控制电流整定值为 1.5A，告警后延时 1~255 秒继电器接点动作。延时继电器为数字式，出厂时整定值为 30 秒，用户亦可根据需要自行设定。

设置：

- 按下**设置**键时进入设置状态。设置按钮还具有复位功能。
- 当数码管第四位显示«1»时，为 1#报警电流值设置；这时按«△»键或«▽»键调整报警电流。
- 当数码管第四位显示«2»时，为 2#报警电流值设置；这时按«△»键或«▽»键调整报警电流。
- 当数码管第四位显示«3»时，为 2#设置报警后延时继电器接点动作时间(秒)，这时按«△»键或«▽»键调整延时动作时间。
- 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,用户亦可根据需要自行设定。

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	0.4-1.99	0.5	1.5	30
10A	0.4-9.99	0.5	5.0	30
25A	0.4-24.9	5.0	15.0	30

- 试验电流：**用于仪器的自检，当需要验证新设定动作电流时，按下试验按钮，并调节试验电流调节旋钮，即由继电器送出的 50HZ 模拟轴电流信号加于试验绕组 W2 上，调节此电流至预定值，直到相应的报警信号灯亮，检验设定值的正确性。当按下此按钮调节或试验轴电流时，继电器与跳闸控制电路已经断

开，因此不会影响整个控制系统的运行。

3.4 上位机监测

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

- 将光盘放入计算机，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 485 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(下图):

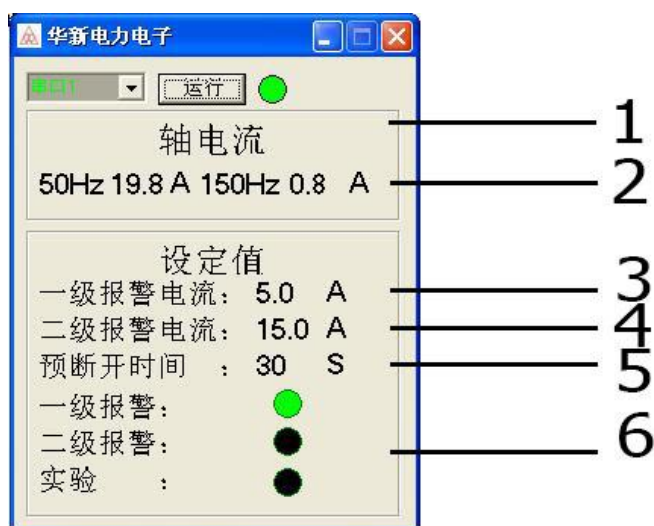


图 4

1. 监测窗口
2. 50/150HZ 监测通道数据显示
3. 一级报警设定值（出厂设置为 0.5A）
4. 二级报警设定值（出厂设置为 1.5A）
5. 预断开时间设定值（出厂设置为 30 秒）
6. 当前监测状态显示（一级报警/二级报警/实验）

●数据保存: 当轴电流的幅值及持续时间超过设定值，继电器动作（保护）。该数据将保存在继电器。

- 485 接口: 按下图正确接线

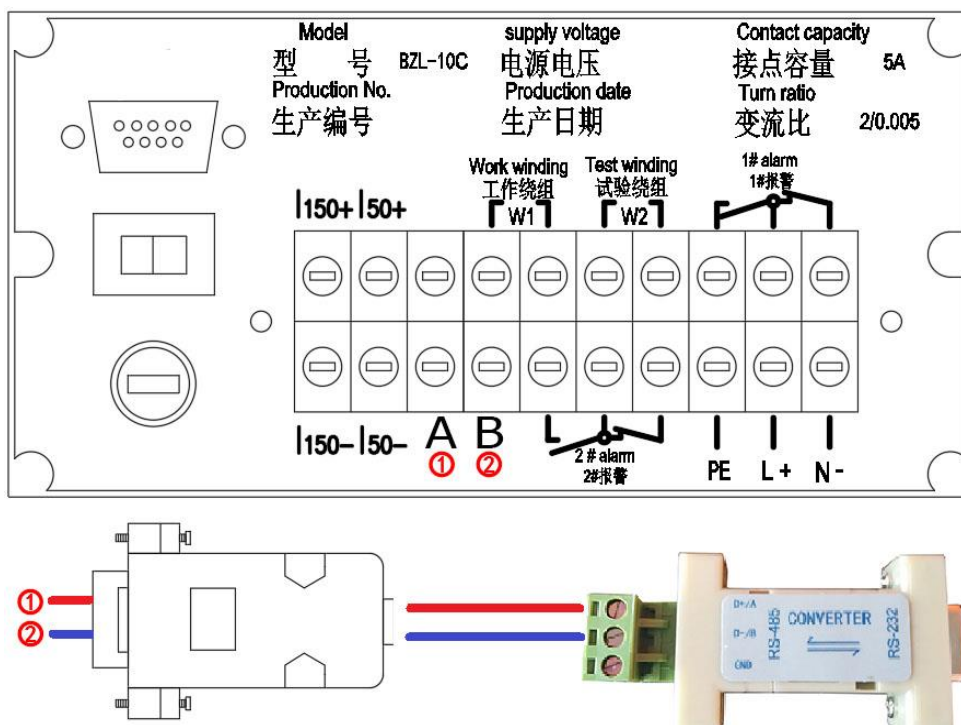


图 5

3.5 模拟量输出（4-20mA）

本装置设有两路直流模拟量输出，用户可自行选用。

- 基波（50Hz）4-20mA 模拟量输出（正负）。
- 三次谐波（150Hz）4-20mA 模拟量输出（正负）。

3.6 外形尺寸与安装:

外形尺寸：160 × 85 × 272

面板式插入安装：开孔尺寸: 151 × 76

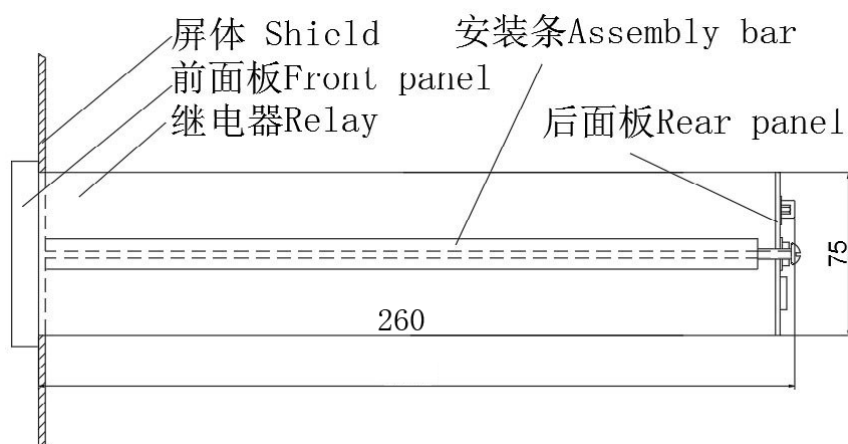
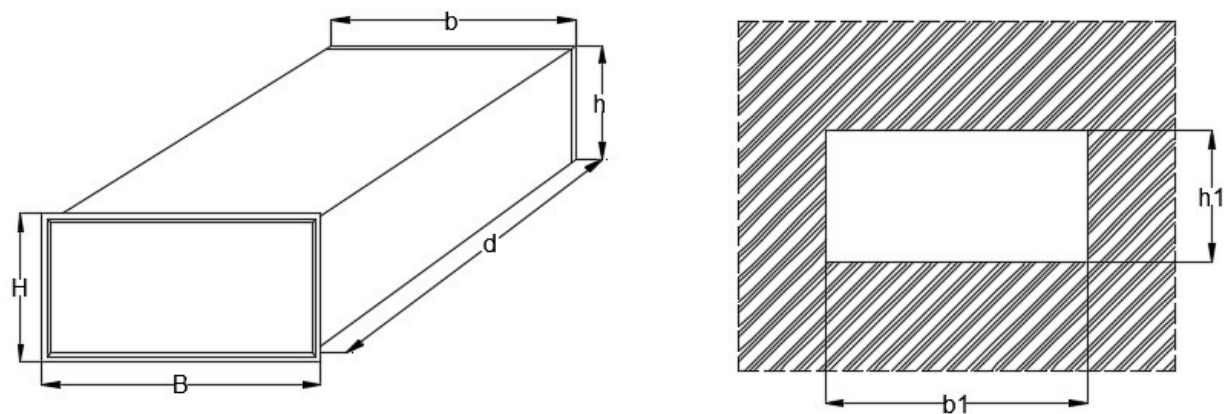


图 6

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

4 互感器部分

4.1 概述(互感器部分):

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。

4.2 互感器主要技术指标:

- 互感器型号：BZL-10C- ϕ □ □ □ □ （例：BZL-10C- 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。输出 0.5 ~ 5mA, 50 ~ 60HZ 的交流电流。
- 最小内径：通常主轴直径加 20mm，分两半或四半，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 $>100M\Omega$ 。
- 负载阻抗： $<40\Omega$ 。

4.3 互感器结构：

互感器为穿心式，为便于用户安装分成两半（至四半），配有连接板，经螺栓紧固即可构成环形整体，通过四（到八）个安装支架固定在发电机机体上，详见安装示意图。

安装示意图

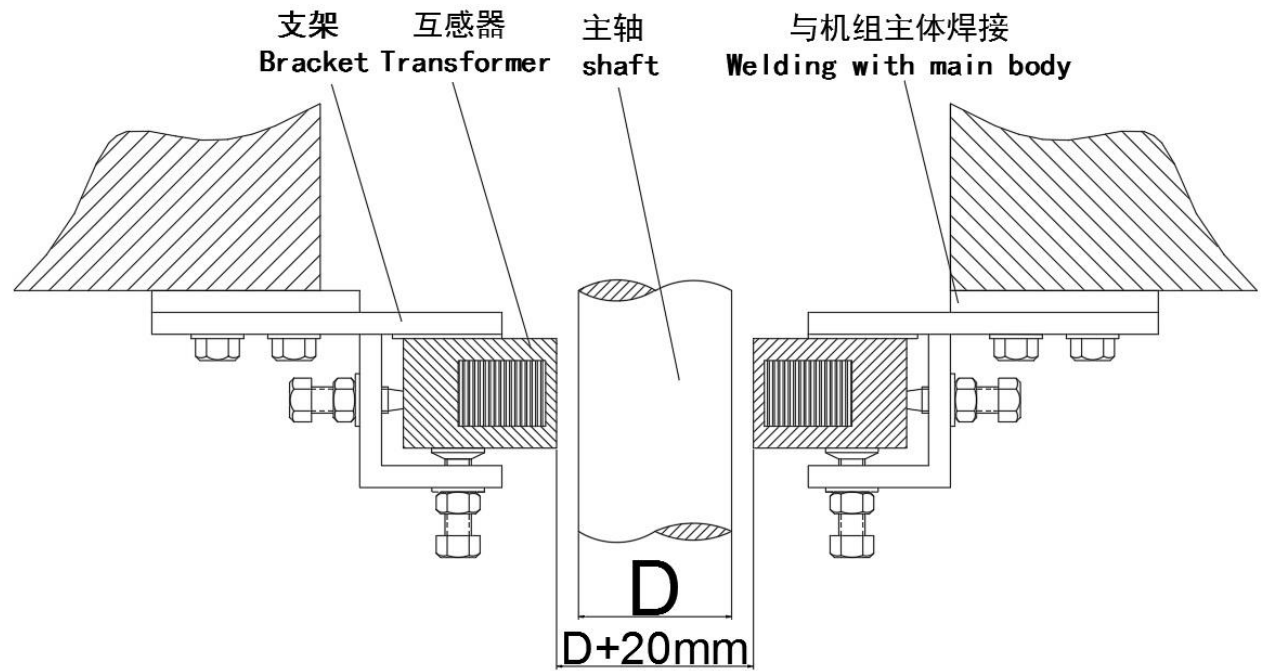


图 7

- D 为发电机轴直径
- D+20mm 为互感器内径
- D+20mm+ (206mm × 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)

4.4 安装要求

4.4.1 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。

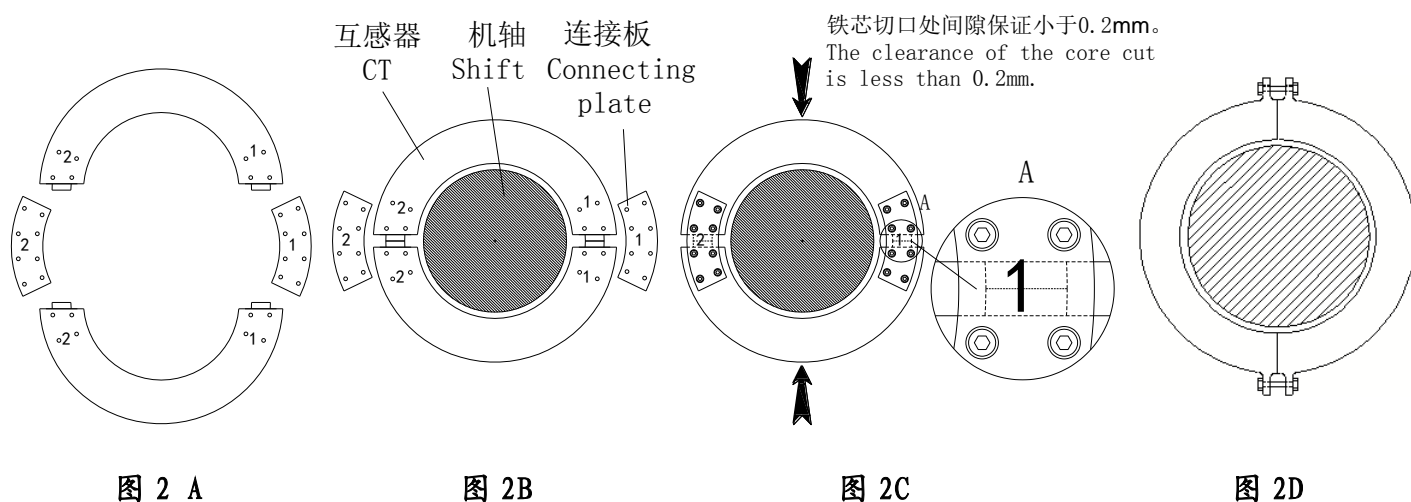
4.4.2 互感器的试验绕组和工作绕组均用 2×1.0 或 2×1.5 屏蔽电缆引出机体外。电缆每 1-1.5 米用一个线夹固定，电缆经过线夹处时应用绝缘纸包紧，线夹固定在机体上。

4.4.3 互感器长期存放应水平放置，以避免变形。

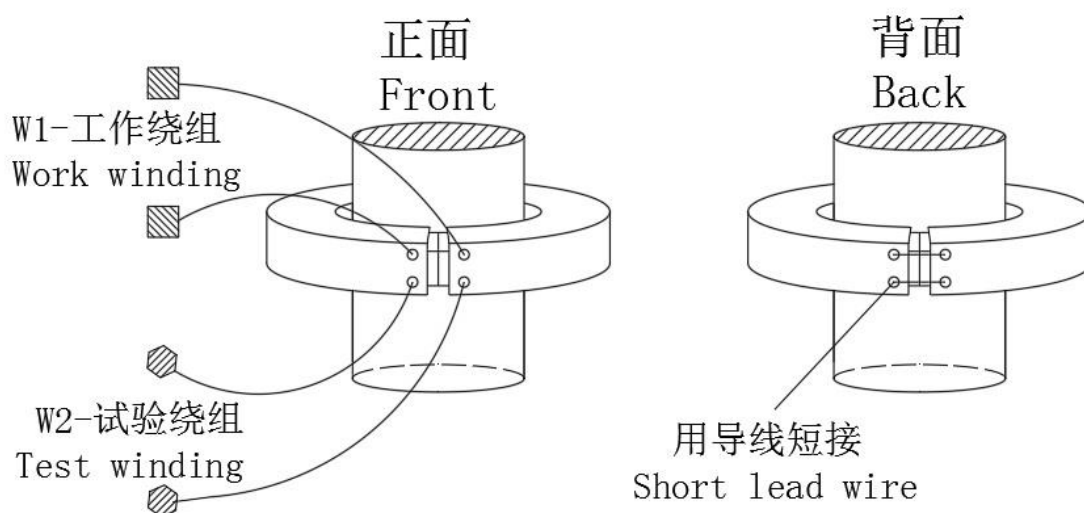
4.4.4 互感器连接螺栓及支架定位螺栓应以适当力矩扭紧以免损坏互感器。

4.4.5 互感器的安装

- 互感器解体，旋下连接板螺栓，卸下连接板（图 2A）。
- 将互感器按标识两瓣对接套在机轴上并用螺栓把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）。

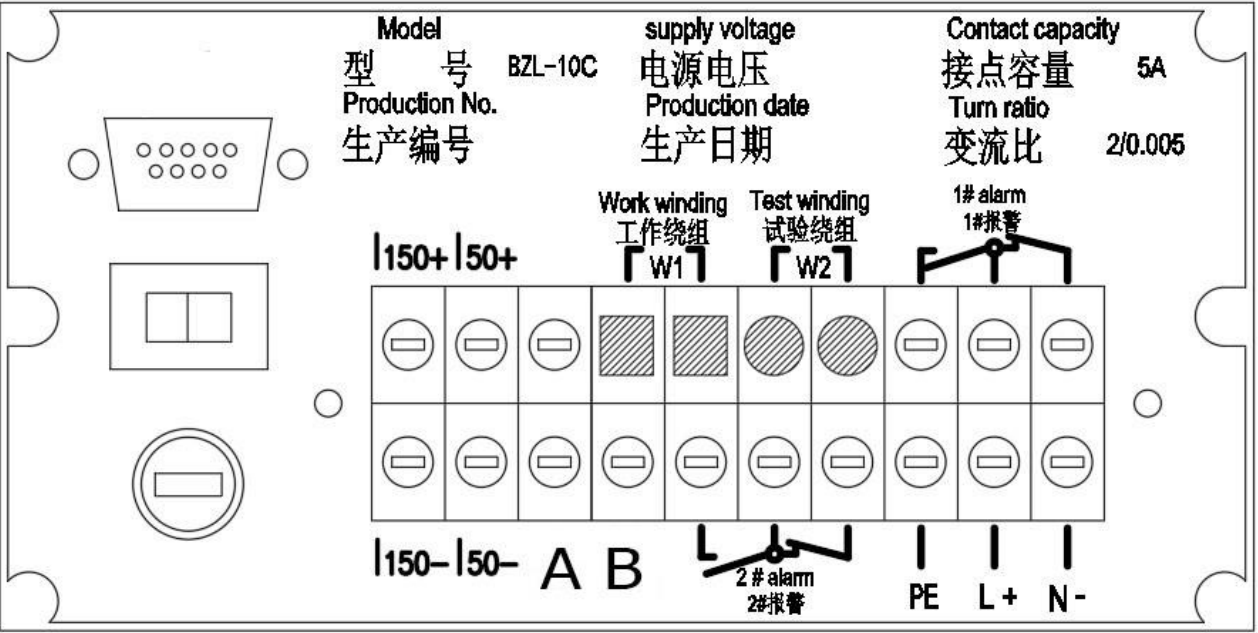


4.4.6 互感器接线示意图

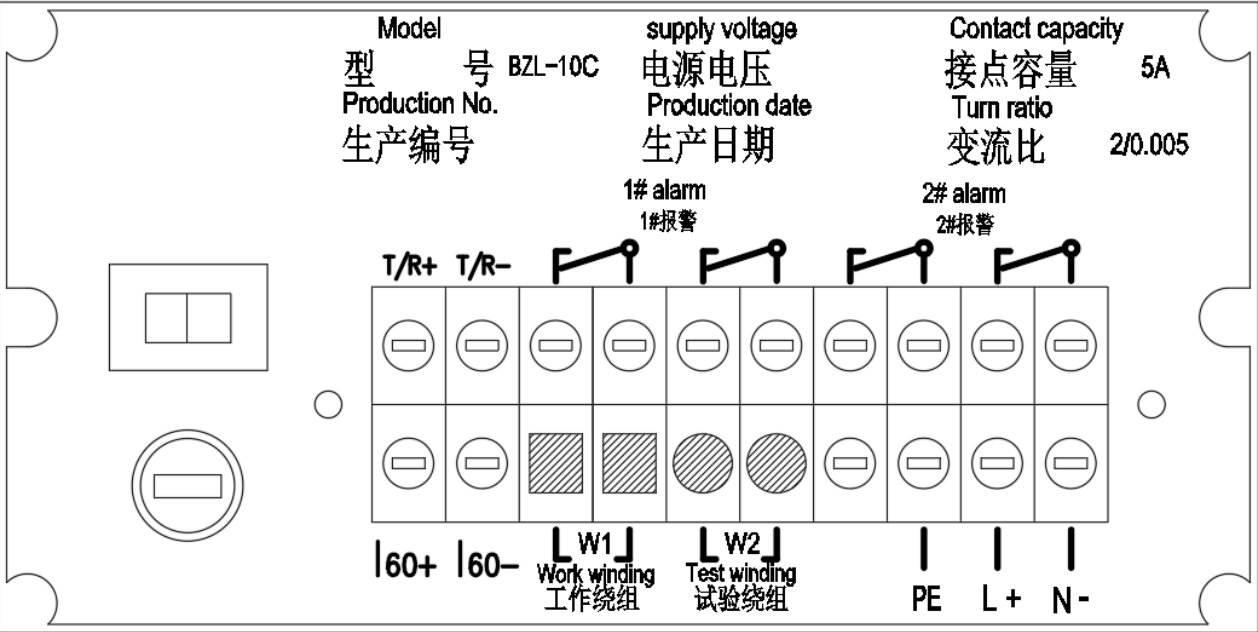


互感器的连接线（图 8）

- 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相应端子（图 8 中正面）。



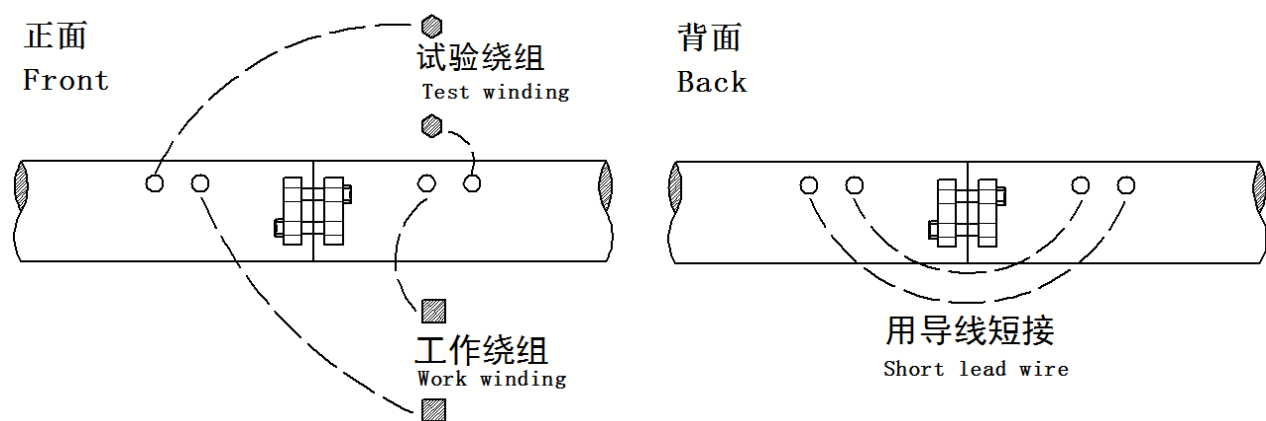
标准型后面板接线示意图



定制型后面板接线示意图

图 9

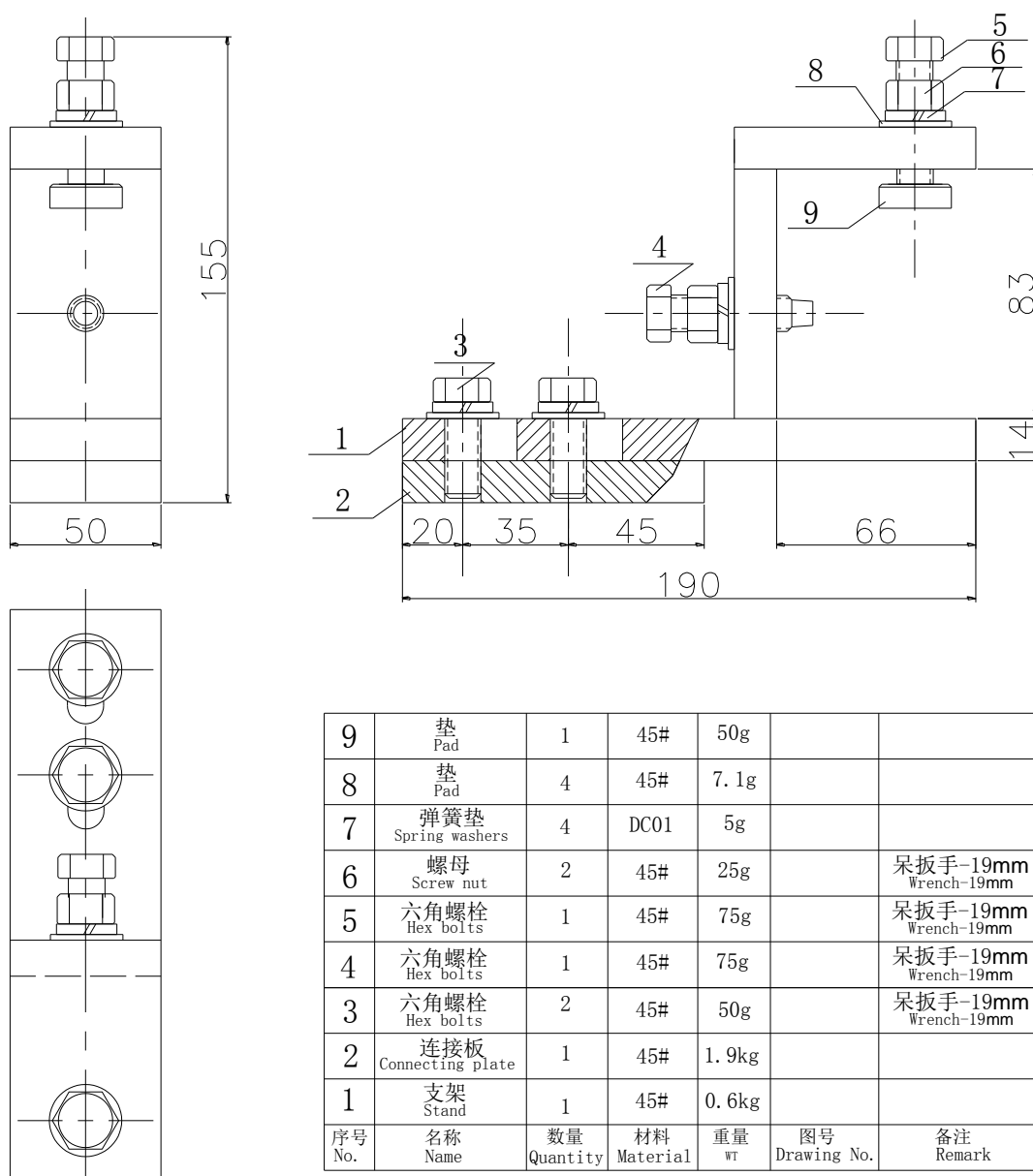
- 特殊端子接线示意



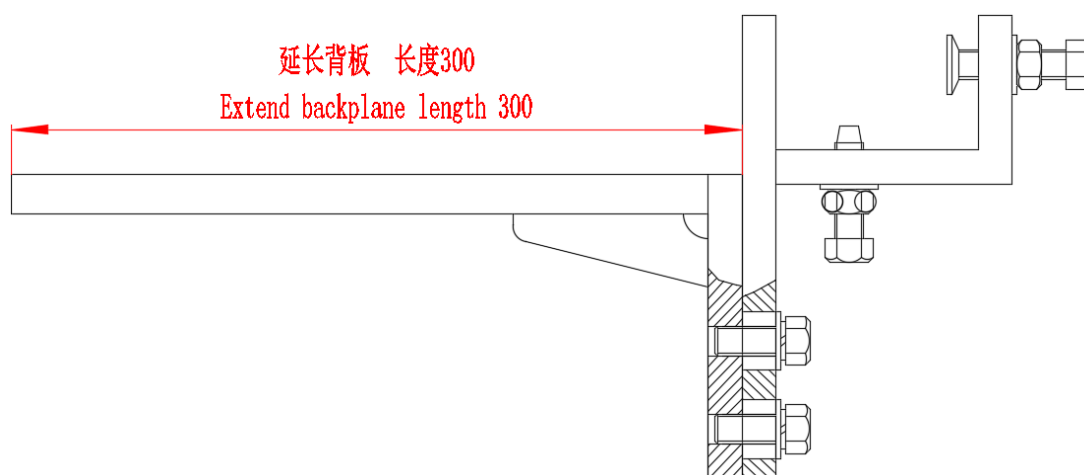
附图：互感器配套支架外形及参数

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：



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。



5 常见故障处理方法:

5.1 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。

5.2 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。

5.3 若调节过程一切正常，则说明继电器部分没有问题，请安下面步骤查找故障点：用数显万用表 200 Ω 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 Ω ，在继电器端子处阻值 < 40 Ω ），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。

6 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）

7 订货时需提供:

- 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:

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BZL-10C 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”, “Liujia gorge”, “Tuolin”, “Mujing”, “Zhuzhou”, “Qingju”, “Shan county”, “Gongchuan”, “Qingshan”, “Mangtang brook”, “North brook”, “Xiayang”, “Nina”, “Fengtian”, “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

The BZL-10C Shaft Current Relay Protection Equipment is mainly used to detect the current in the big shaft of generator, and prevent the damage and other parts of the bearing when the insulation is broken down. The utility model is composed of two parts of a transformer and a relay, and the mutual inductor is customized according to the shaft diameter of the generator.

2 Working principle

2.1 Overview

The BZL-10C shaft current relay is used to detect the insulation state of the bearing by detecting the fundamental current or the three harmonic current signal of the shaft current transformer. When the motor shaft insulation is low or there is breakdown, because the motor bearings are asymmetric, the shaft will produce axial current and damage its insulation, failure occurs. The degree of damage will depend on the magnitude and duration of the shaft current. In order to make the motor run safely and detect the insulation fault of the shaft in advance, in order to take corresponding measures, it is necessary to have a sensitive shaft current relay protection equipment.

This relay is composed of amplifier, double channel filter, A/D conversion, single chip microcomputer, intelligent analysis, judgement, control and overcurrent action. The axis current indicating instrument adopts advanced digital technology, with sensitive action, precise control and visual display. The block diagram is shown in principle block diagram.

BZL-10C t shaft current relay adopts two operation modes, that is, according to the three harmonic component of current fundamental component or current.

- When the motor is in strong magnetic field interference, containing three harmonic component and the transformer output current when the instrument can be used to measure the 50Hz and 150Hz signals, at the same time by 50Hz or 150Hz outside the filter to remove stray current interference, so that the relay can stably detect.
- When the motor is very small magnetic interference, nor harmonic interference—shift current instrument 50Hz frequency shaft current monitoring. The shaft current signal 50Hz working channel, and filter out other interference to prevent

a malfunction, the current shaft current 50Hz and 150Hz signal turns the indicators on the front panel displays the current operating frequency. The relay is removed from the shaft current transformer CT fault current signal is amplified by IC1, fed 50Hz and 150Hz dual channel filter, dual-channel filter output rectifier synthesized, were sent to the two-way A / D analog-to-digital conversion, and then fed to the MCU for analysis, judgment display shaft current value, the comparison performed by the MCU and the set value of the two fault current, sends a control signal to trigger the corresponding relay CZ1, CZ2, to control the alarm and trip signal.

- This machine has 485 interfaces, which can upload data to the host computer, have independent management program and interface with the configuration software.
- fundamental and third harmonic 4-20mA analog output, for you to use.

2.2 Schematic block diagram

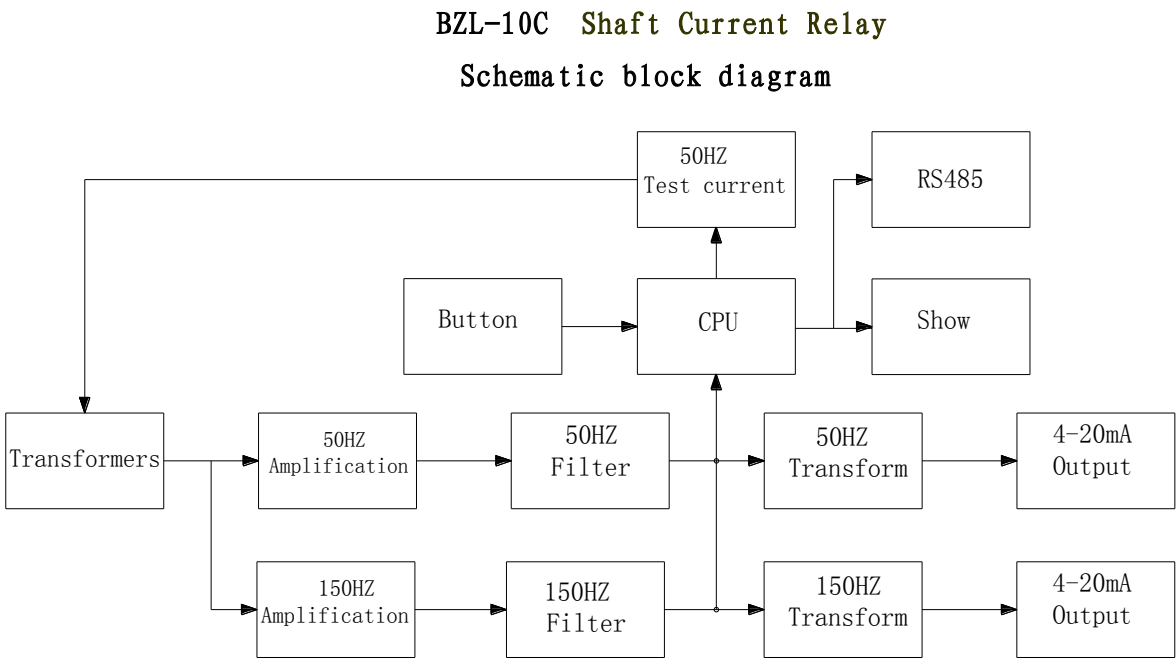


Figure 1

3 Relay part

3.1 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 impedance	< 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
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.

Between 0.4 and maximum range to ensure the accuracy of the measured values within the tolerance range.

3.2 Front and rear panel figure

3.2.1 Front panel

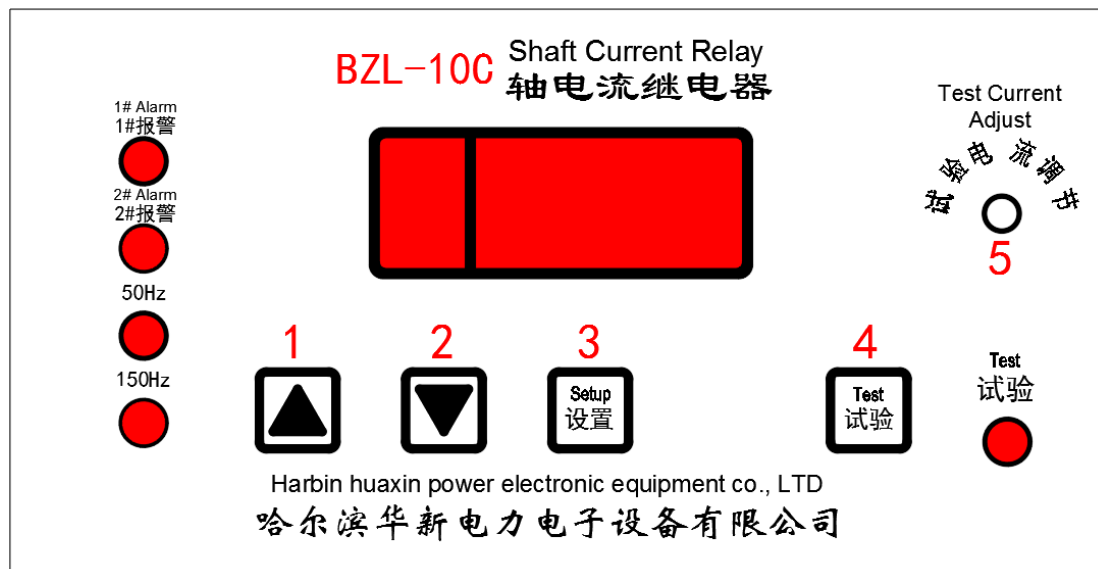
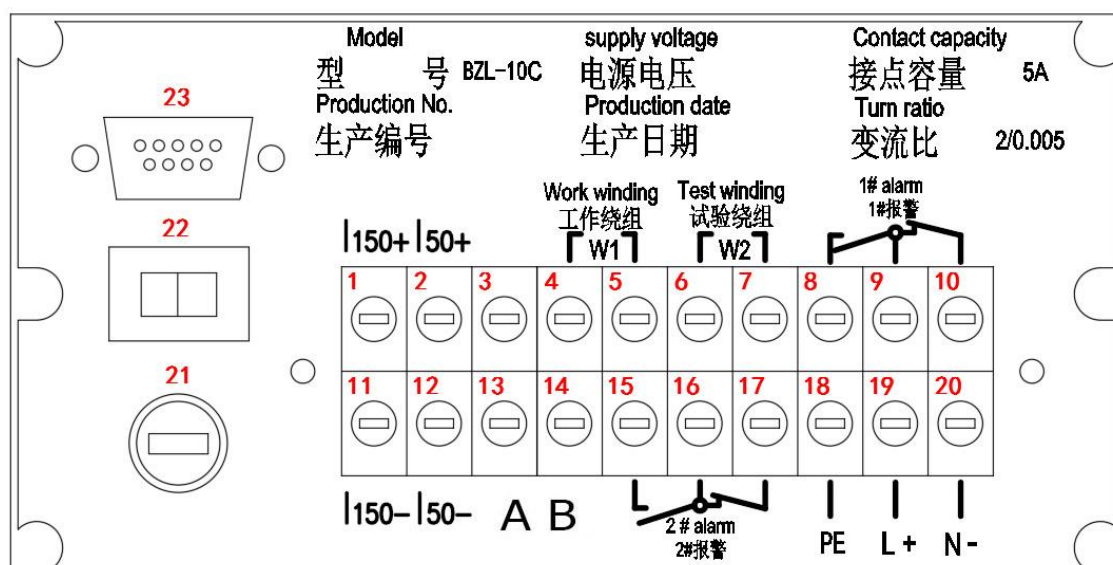


Figure 2

Front panel Key description:

- 1 plus key, press the value after 1
- 2 minus key, press down the value minus 1
- 3 set the key and press enter to set the status
- 4 test keys, press to enter the self-test status
- 5 test current adjustment potentiometer, adjust test current regulation under test condition

3.2.2 Rear panel



General standard type terminal diagram

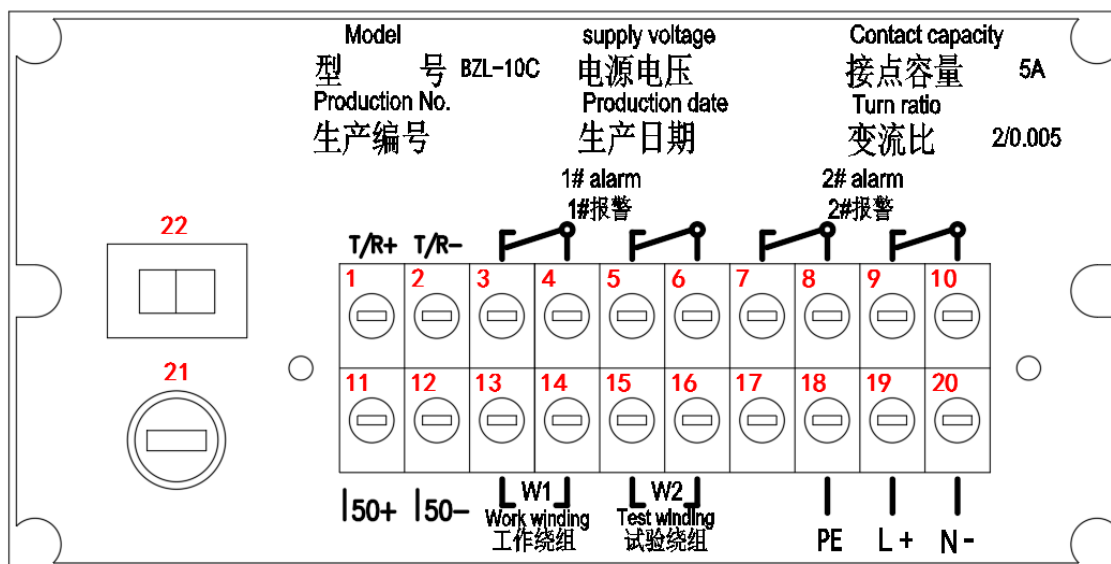
Figure 3

Standard type rear panel terminal specification:

- 1, 2 - 150Hz, 50Hz analog output positive pole
- 4, 5 - transformer work winding input
- 6, 7 - transformer test winding input
- 8, 9, 10 - 1# alarm relay contact output
- 11, 12 - 150Hz, 50Hz analog output negative pole
- 13, 14 - RS-485 communication interface
- 15, 16, 17 - 2# alarm relay contact output
- 18 - PE (earth)
- 19, 20 - work power supply

(AC is connected L, N; DC is connected +, -)

- 21 - fuse
- 22 - power switch
- 23 - RS-232 communication interface (DB9)



Custom type terminal diagram

Figure 4

Custom type rear panel terminal instructions:

- 1, 2 - RS485 communication interface
- 3, 4 - 1# alarm relay normally open contact output
- 5, 6 - 1# alarm relay normally open contact output
- 7, 8 - 2# alarm relay normally open contact output
- 9, 10 - 2# alarm relay normally open contact output
- 11, 12 - 50Hz analog output
- 13, 14 - transformer work winding input
- 15, 16 - transformer test winding input
- 18 - PE (earth)
- 19, 20 - work power supply

(AC is connected L, N; DC is connected +, -)

- 21 - fuse
- 22 - power switch

3.3 Operating Instruction

3.3 Operation instructions

3.3.1 front panel:

- The 50Hz and 150Hz lights are circulating to indicate that the current detection frequency is 50 Hz or 150Hz.
- 1# alarm indicator: when the current reaches 1# the alarm settings, the lights. Meanwhile, 1# alarm relay contact action.
- 2# alarm indicator: when the current reaches 2# the alarm settings, the lights. Start to set the time delay, after the end of the delay, 2# alarm relay contact action.
- Test button: press this button, device into the test status.
- Test lamp: when the device enters the test condition, the light is on.
- Set button, the button is pressed into the first 1# set the alarm value, press the button two times to enter the 2# alarm limit settings, press the button three times to enter the delay (in seconds) settings, press the button four times from the current settings and into the detection state (reset).
- «△»、«▽»Button, enter setup mode, this button by setting the value, «△» is add ,«▽» is Subtraction.
- Digital display, left first for status display bit (1- means 1# alarm value, 2-2# alarm value, 3-2# alarm relay contact action delay time), second, third, fourth bit for data display bit.
- Test current adjustment knob, in the test state, this knob can adjust the test current sent into the transformer.

3.3.2 Parameter setting

After the power is turned on, the operating frequency of light (50HZ, red) light, digital tube began to show the shaft current relay into the normal working state. The shaft current indicating instrument panel in the good state of the turbine bearings insulation indicator should be zero. When the meter with digital display the unit readings before the decimal point in amperes, corresponding with the current transformer primary side, for example: when a reading of 1.20, indicating that the machine shaft current is 1.2A.

Shaft current relay in the factory, the # 1 alarm control current setting value is 0.5A 2 # alarm control current setting fixed value of 1.5A, alarm delay of 1 to 255 seconds after the relay contact action. Delay relay digital factory setting is 30 seconds, the user can also set according to their needs.

Settings:

- Press the settings button to enter the set status. The settings button also has the reset function.
- When digital tube display «1», 1# alarm current value setting; Press the « Δ » key, or « ∇ » keys to adjust the alarm current.
- When digital tube display «2», 2# alarm current value setting; Press the « Δ » key « ∇ » keys to adjust the alarm current.
- When digital tube display «3», 2# alarm delay relay contact operation time (in seconds) setting; then « Δ » the key or « ∇ » key to adjust the delay action time.
- The relay in the factory, the alarm control current setting value and the alarm delay values have been set as shown in the following table2, the user can according to need to set their own.

Measure range	Measure value (A)	Set value (May be regulate in range)		
		1# alarm (A)	2# alarm (A)	Delay time (S)
2A	0.4-1.99	0.5	1.5	30
10A	0.4-9.99	0.5	5.0	30
25A	0.4-24.9	5.0	15.0	30

table 2

- Test current: for instrument self-test, when the need to verify that the new set operating current, press the test button, and adjust the test current adjustment knob, that is sent out by the relay the 50HZ analog shaft current signal is applied to test winding W2 and adjust the current to a predetermined value, until the corresponding alarm signal light, the correctness of the test set value. When you

press this button to adjust or test shaft current relay and tripping control circuit has been disconnected, and therefore does not affect the operation of the entire control system.

3.4 Host computer monitoring

Before you use the BZL-10 C series axial current relay protection device produced by our factory, please install the device monitoring software (random configuration) on your computer.

- CD into your computer, follow the prompts to install the program.
- The relay and computer 485 interface accordance with product instructions properly connected can be used.
- monitoring window (below):

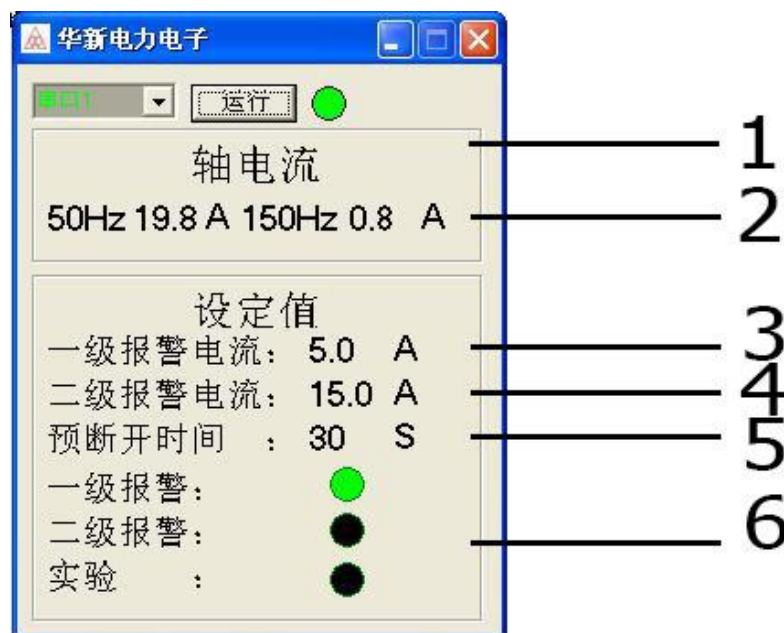


Figure 4

1. Monitoring window
2. 50/150HZ monitoring channel data show.
3. 1# alarm settings (factory set to 0.5A)
4. 2# alarm settings (factory set to 1.5A)
5. Delay time setting (factory setting is 30 seconds)
6. The current monitoring status display (one alarm/ two alarm / test)

- Data Retention: When the shaft the amplitude and duration of the current exceeds

a set value, the relay action (protection). The data will be stored in the relay.

- 485 Interface: correct wiring as shown in the following figure

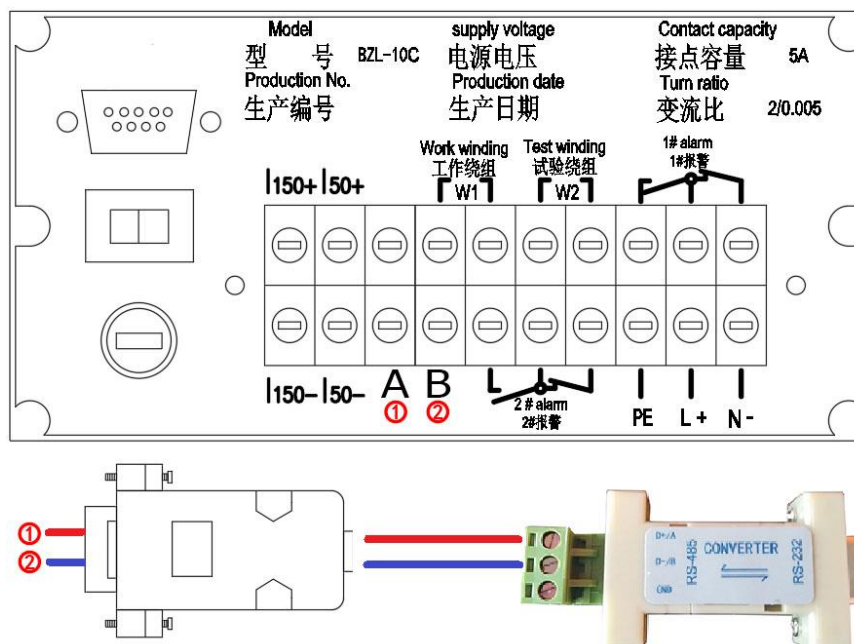


Figure 5

3.5 Analog output (4-20mA)

The device is provided with two direct current analog output, and the user can select the device by himself.

- Fundamental (50Hz) 4-20mA analog output (+, -).
- 3 sub-harmonic (150Hz) 4-20mA analog output (+, -).

3.6 Outline dimensions and installation:

- Outline Size: 160 * 85 * 270 (Length * Width * Depth)
- Panel mounting: hole size: 151 x 76 (Length * Width)

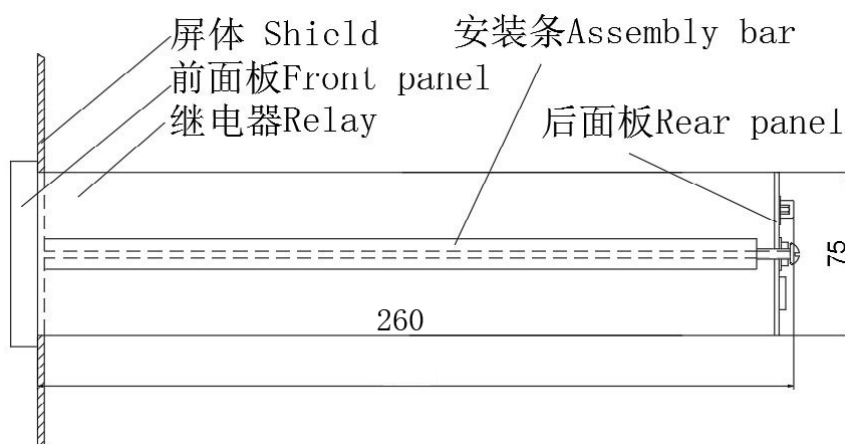
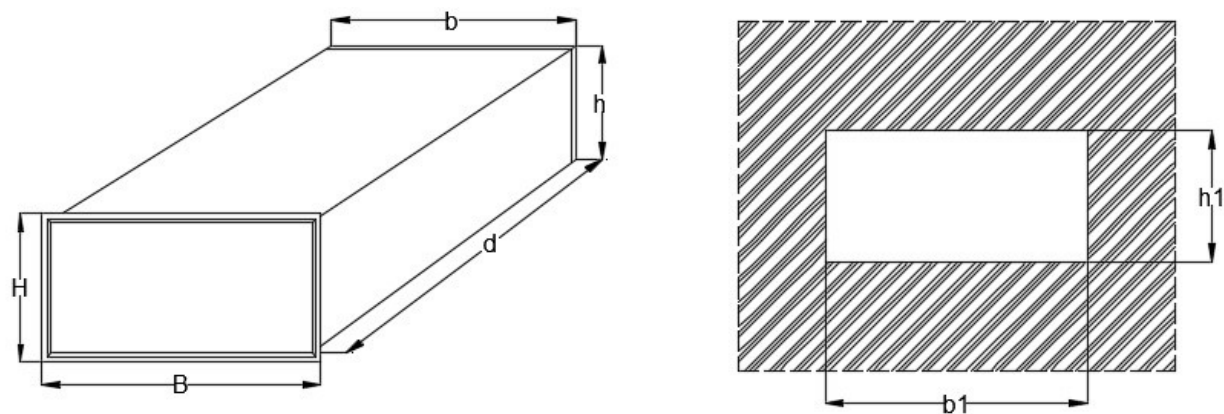


Figure 6

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

4 Transformer part

4.1 Overview

Asymmetry stator core and pole configuration, causing the magnetic flux imbalance, the imbalance flux shaft cutting to produce axial potential distribution along the axial direction of the rotor. Although this shaft potential value is small (typically about ten V), but due to the rotor shaft resistance is small, and if it is to form a closed loop along the bearing and the bottom plate, the shaft current up to a large value (hundreds to thousands of A) it will lead to changes in the oil bearing vibration increases, bearing burn accident. Commonly used insulation boards bearing insulation.

Despite these measures, but it does not mean that the bearing security will have to ensure, in a sense, bearing the extent of the damage depends on the amplitude and duration of action of the shaft current; From an operational perspective, the run at any time or to know in advance the extent of damage to the shaft current changes or bearing insulation. Shaft current transformer is designed for this purpose a special transformer, can be detected shaft current of less than 1A.

Its core wound with special silicon steel sheet. The coil is divided into two

the winding: test winding and winding. Working winding load impedance $< 40 \Omega$, protection devices provide monitoring signals.

4.2 Main Technical parameters of transformer

- Transformer type: BZL-10C- ϕ □ □ □ □ (Example: BZL-10C- 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)
- saturated multiples: 10
- change error: $\leq 10\%$.
- Insulation class: B class.
- secondary windings for the two groups, a test winding, winding to another for work. Output 0.5 ~ 5mA, 50 ~ 60HZ AC current.
- 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.
- between the two windings and winding the shell insulation voltage 2kv.
- insulation resistance between the windings and the shell $> 100M\Omega$.
- load impedance: $< 40\Omega$.

4.3 Transformer structure

Transformer feed through for easy user installation in half (or four and a half), with connecting plate, bolt tightening can have a ring as a whole, through four mounting bracket fixed on the generator body, refer to the installation diagram transformer wiring diagram.

Transformer installation diagram

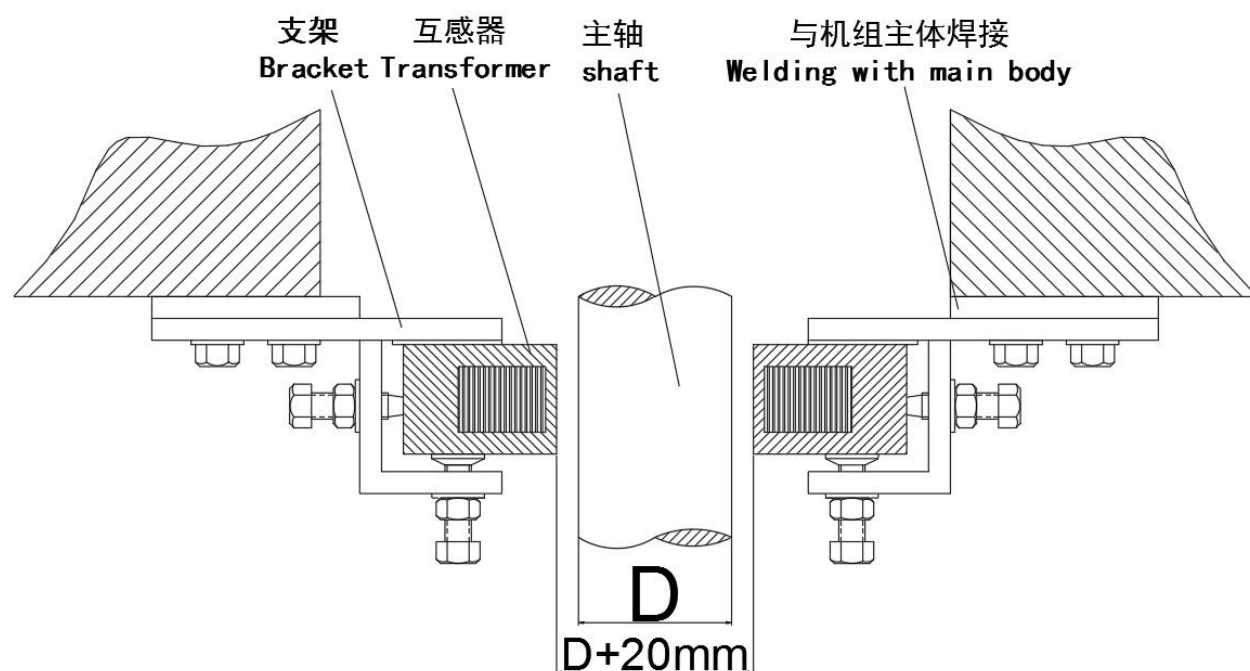


Figure 7

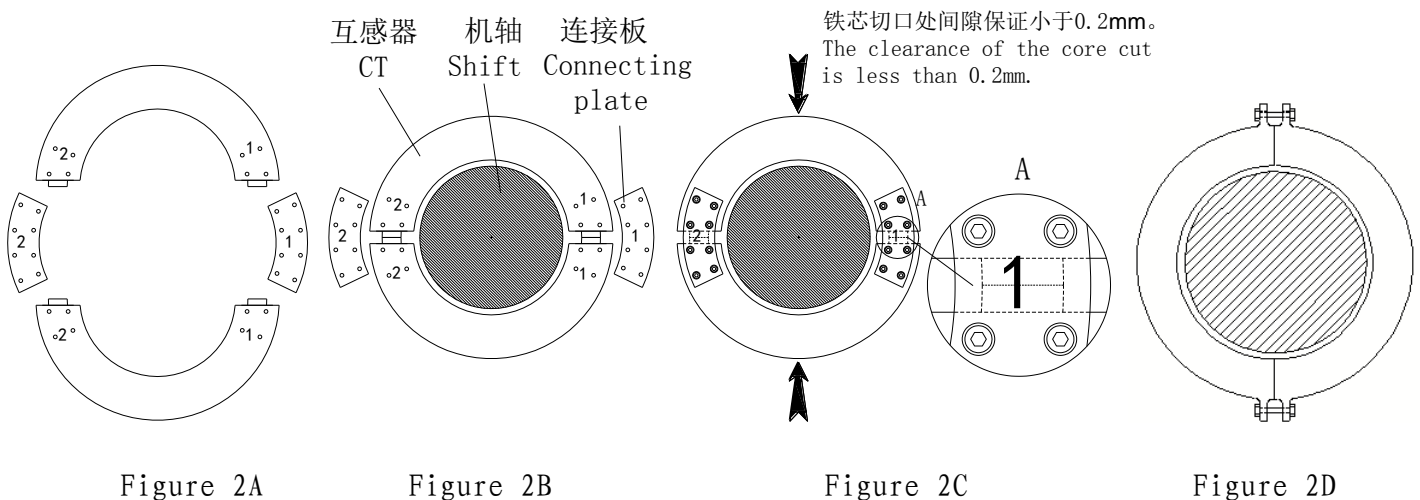
- D is generator shaft diameter
- D+20mm is the transformer inner diameter
- $D+20\text{mm}+(206\text{mm}\times 2)$ is the largest transformer radial size (including stent)
- The maximum axial size of the transformer is 155mm
- Suitable for mounting shaft diameter 300–1500mm The supporting bracket transformer (standard)

4.4 Installation

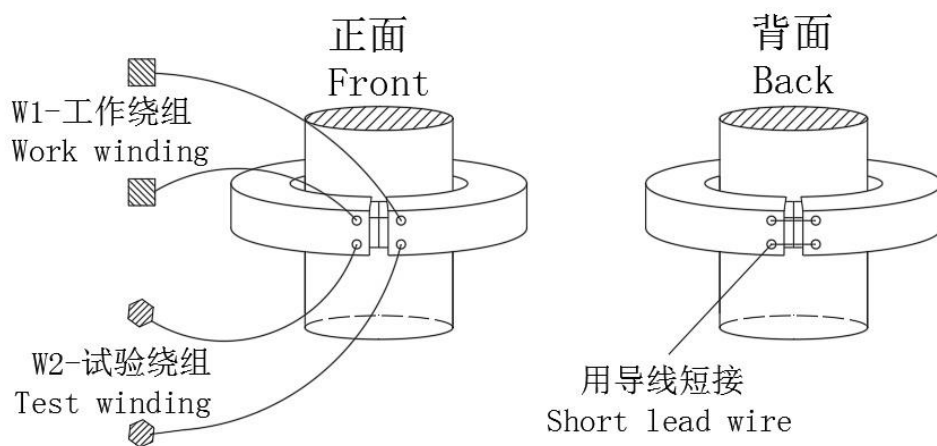
- 4.4.1 The transformer and generator shaft of the concentric degree tolerance are $10\pm 1\text{mm}$, the level tolerance are 2mm.
- 4.4.2 The test winding and the working winding of the transformer are made of 2 * 1 or 2 * 1.5 shielded cable. Wire each 1–1.5 meter with a wire clip is fixed, the cable through the wire clip when the application of the insulation paper package, wire clip is fixed on the body.
- 4.4.3 The transformer should be kept in a long time to avoid deformation.
- 4.4.4 Transformer connecting bolts and bracket positioning bolt should be in a proper torque tightening so as not to damage the transformer.

4.4.5 Installation of transformer

- The transformer disintegrated, unscrew the connecting plate by bolts, remove the connecting plate (Figure 2A).
- The transformer according to mark two valve set in the shaft butt and bolt connecting plate and a transformer connected together (Figure 2B).
- Please mark the installation of the cut. After the installation of the cut gap is not greater than 0.2 mm, otherwise it 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).



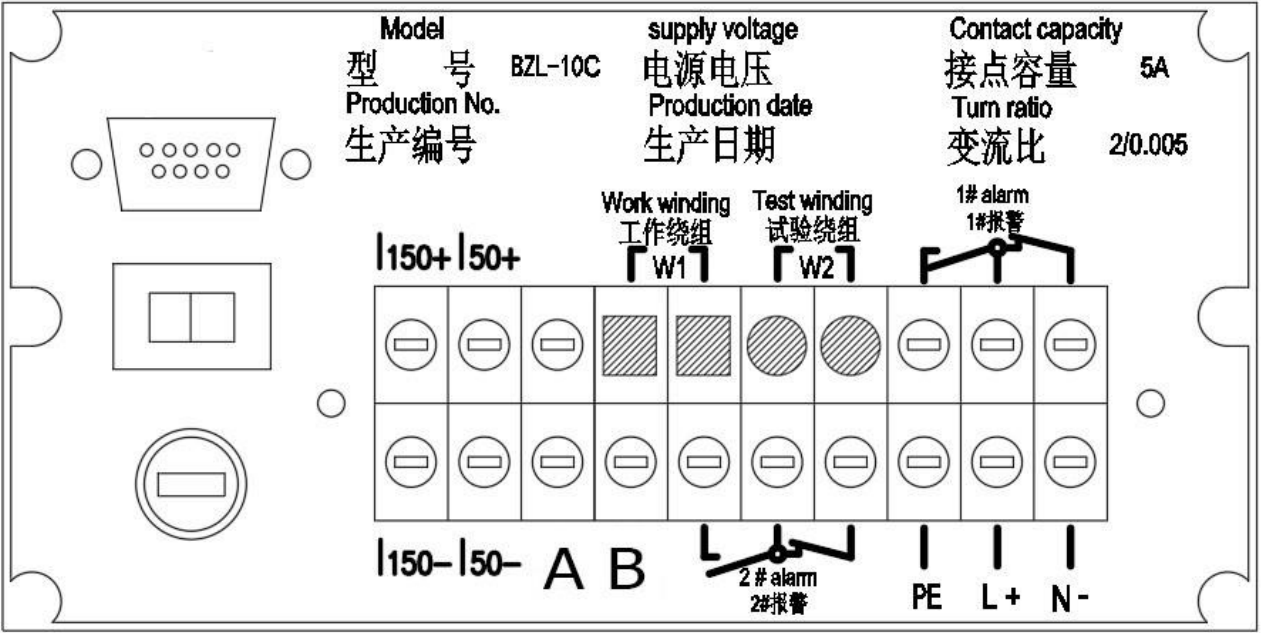
4.4.6 Schematic diagram of transformer connection



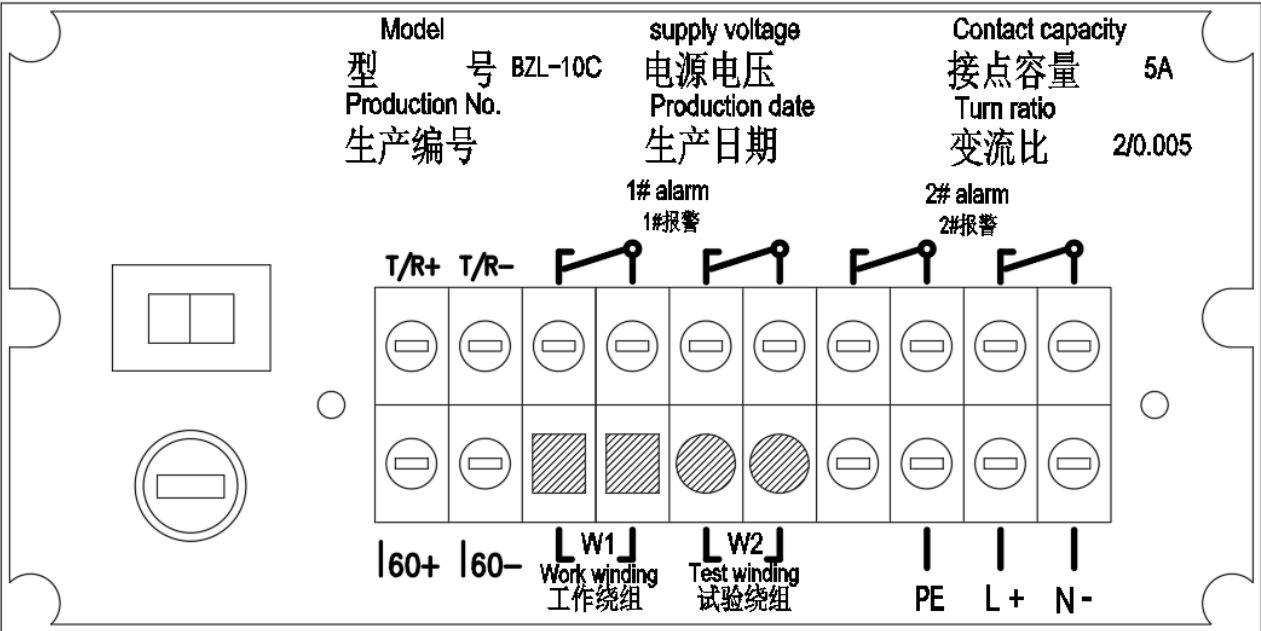
Connecting line of instrument transformer

Figure 8

- One terminal horizontal direction is respectively arranged in the short terminal (Figure 8 Back).
- On the other side, the corresponding terminal of the relay is respectively (Figure 8 Front).



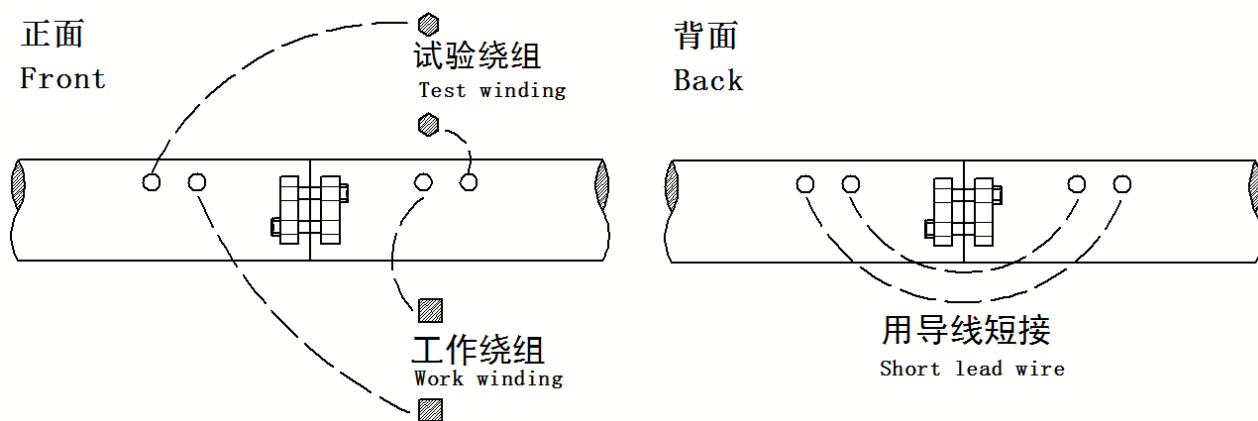
Standard model rear panel wiring diagram



Custom type rear panel wiring diagram

Figure 9

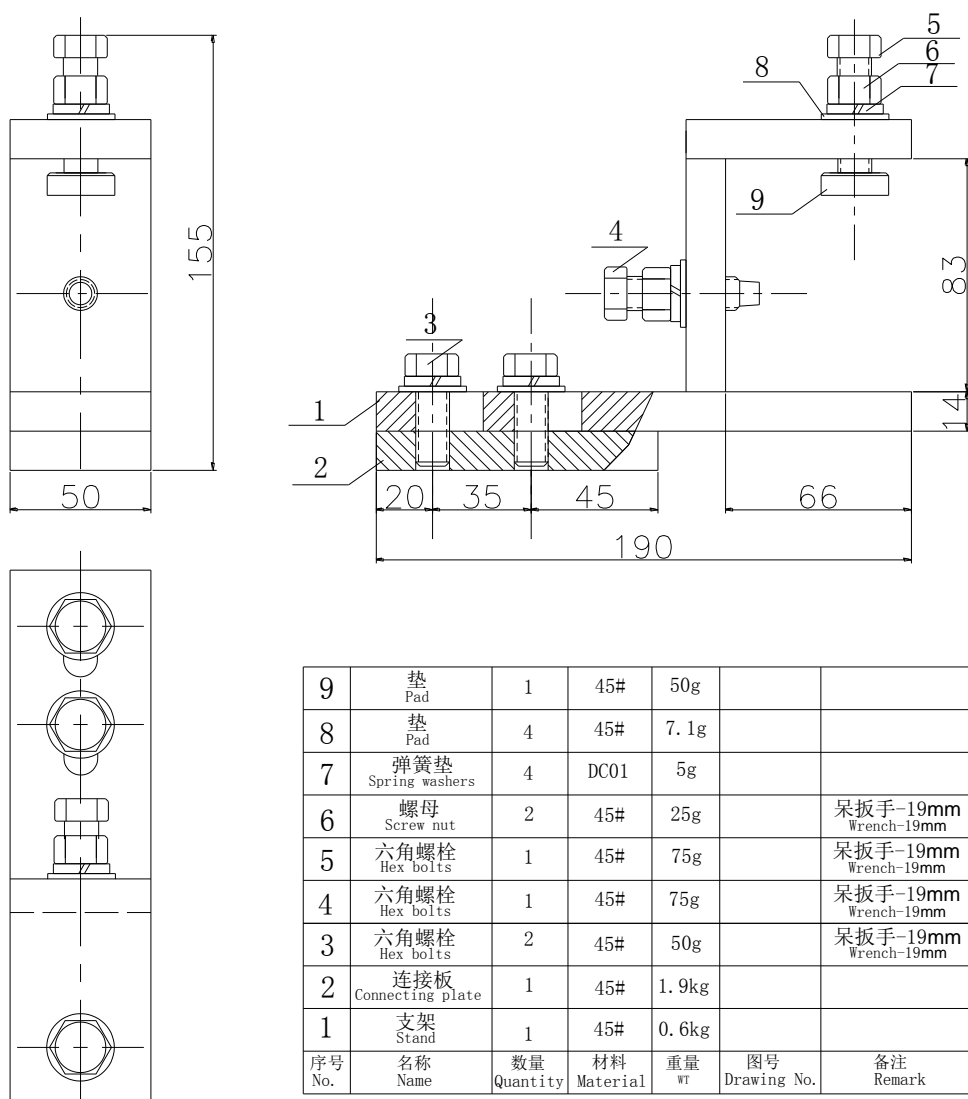
- Special terminal wiring indicatio



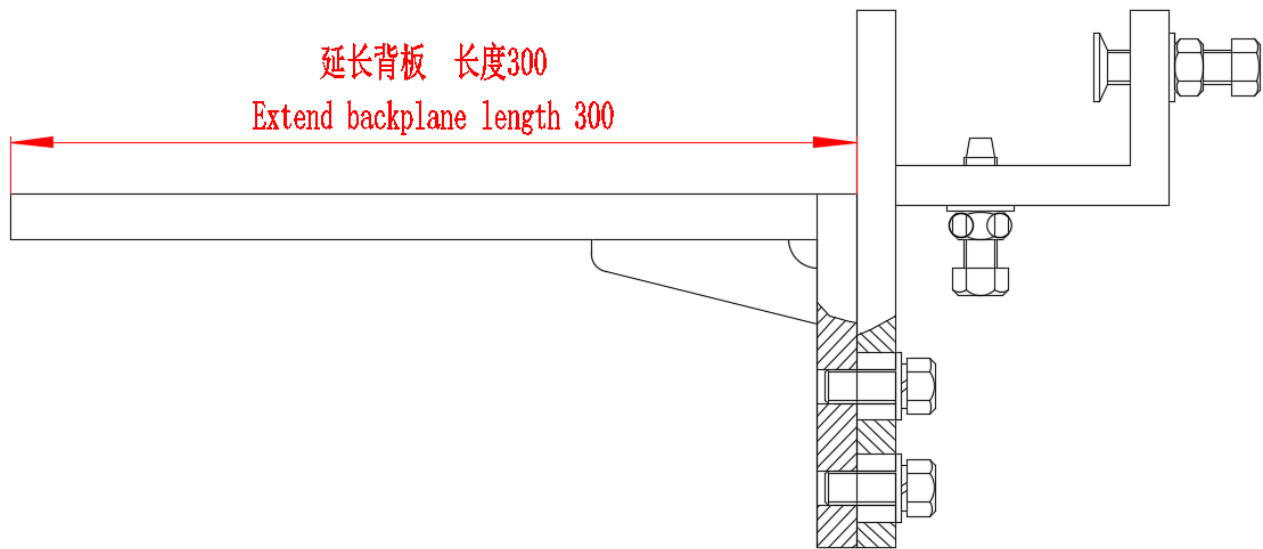
The shape and parameters of the supporting frame of transformer

1, support bracket for standard size.

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



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.



5 Common fault treatment method:

5.1 when feeding into the test current, the indication value has no change. First, remove the wiring on the four terminals of W1 and W2 on the rear panel.

5.2, W1 and W2 adjacent two terminals, that is, 2 and 3 connected with a wire, and then adjust the relay part according to the test current adjustment procedure, if the indication value is still unchanged, please contact our factory.

5.3 if the adjustment process is part of the relay are all normal, no problem, but the following steps: fault point resistance measurement W I and W II in two groups of windings are respectively 200 ohm meter with digital display million (each winding in transformer terminal is about 1.5, in the relay terminal resistance less than 40 ohm), if resistance is too large that CT to the relay circuit problems, according to the transformer wiring diagram check wiring CT if there is a problem.

6. Random file

- User' s Manual
- Guide of Debug and operation
- Certificate
- Product inspection records
- Store equipment (program, electronic version of the product manual, operation

and debugging guide, etc.)

7. 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.

Note: specifications, debugging guide and other technical information, the company will upgrade or other reasons were not updated regularly, want to pay attention to our website, you can contact our company, get the latest version.

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