TCPP3 three parameter combination sensor

Instructions

TCPP3 型三参数安全监控探头

常州天川机电科技有限公司（天川与中国煤炭科学研究总院自动化研究所组成），是一家集科研、生产、销售为一体的现代化管理企业。主要致力于传感技术的开发和实际应用，在电力系统，冷却塔安全系统，机电设备智能监测诊断与状态评估系统等方面拥有国内领先水平。

Changzhou Tianchuan Electromechanical Technology Co., Ltd. (composed of Tianchuan and Automation Research Institute of China Coal Research Institute), is a modern management enterprise for scientific research and production and sales. It is mainly committed to the development and practical application of sensor technology. It is mainly committed to the development and practical application of sensor technology.Tianchuan company has the domestic leading level in power system, cooling tower safety system, intelligent monitoring and diagnosis and condition evaluation system of mechanical and electrical equipment, etc.

天川公司位于历史悠久、人文荟萃、经济繁荣、制造业发达的长江三角洲经济区中心地带-江苏省常州市。主要产品有：冷却塔油温、振动、油位监控设备，冷却塔故障诊断设备，振动分析仪，数据采集分站，加速度传感器等产品。

Tianchuan company is located in Changzhou City, Jiangsu Province, which is the center of Yangtze River Delta economic zone with a long history, a gathering of talents, a prosperous economy and a developed manufacturing industry. The main products are: cooling tower oil temperature, vibration,oil level monitoring equipment, cooling tower fault diagnosis equipment, vibration analyzer,data acquisition substation, acceleration sensor and other products.

公司成立以来，依托煤炭科学研究总院自动化研究所力量，组成强大的研发和技术团队，自主研发，科技创新，努力开拓振动监测分析、故障诊断智能设备和工业自动化控制系统。现产品已
广泛应用于：电力、冶金、煤炭、化工行业中的风机、胶带输送机、提升机、水泵、瓦斯泵、压缩机、掘进机、采煤机、刮板机、电机、减速器等大型旋转机电设备以及汽轮发电机组、水轮机组等。并有部分产品销往印度、巴基斯坦、泰国、马来西亚、印尼等国家。

Since the establishment of the company, relying on the power of Automation Research Institute of Coal Science Research Institute, the company has formed a strong R & D and technical

team. independent R & D, scientific and technological innovation, striving to develop intelligent equipment for vibration monitoring and analysis,fault diagnosis and industrial automation control system. Now the products have been widely used in: electric power, metallurgy, coal, chemical industry fans, belt conveyor, elevator, water pump, gas pump, compressor, roadheader, shearer, scraper,motor, reducer and other large-scale rotating mechanical and electrical equipment as well as steam turbine generator unit, water turbine unit, etc. And some products are sold to India, Pakistan, Thailand, Malaysia, Indonesia and other countries.

TCPP3 三参数组合传感器是天川公司生产的 TCPP3 系列冷却塔风机安全监控系统中使用的非总线通用探头。在其内部分别集成了测量油温、油位、振动信号的传感、转换和变送电路，直接输出与这些安全参量对应的 4～20mA 标准电流信号，它可以直接与风机安全监控器配接，实现单台设备监控。也可以与多种通用二次仪表，或计算机数据采集测控系统(DCS、PLC 等)连接使用。还可以与公司 TCCD 型故障智能诊断设备连接，实时采集减速箱设备运行过程中振动、温度、油位等状态信息参数，智能诊断出设备可能存在的齿轮油泄漏、齿轮故障、轴承疲劳损伤等潜在故障，正确分析出设备故障原因与故障严重程度。

TCPP3 three parameter combination sensor is a non-bus universal probe used insafety supervision control system of TCPP3 series cooling tower fan produced by TIANCHUAN Company. Sensing, converting and transmitting circuits to measure oil temperature, oil level andvibration signal are integrated into the integral probe, which is used intelligent diagnosis equipment of the company to collect real-time state information parameters such as vibration, temperature, oil level, etc. during the operation of the reduction gearbox equipment, intelligently diagnose potential faults such as gear oil leakage, gear fault, bearing fatigue damage, etc., and correctly analyze the cause and severity of equipment faults.

安全监控探头温度测量使用铂电阻传感器和半导体集成器件；油位测量采用了热导式传感原理；用于振动测量的磁电式传感器，可以直接获取机械振动的速度信号，经放大器、带通滤波器、真有效值（RMS）变换器，将有效带宽内的复杂振动波形进行真有效值转换，最终由电压/电流驱动电路产生4～20mA输出。

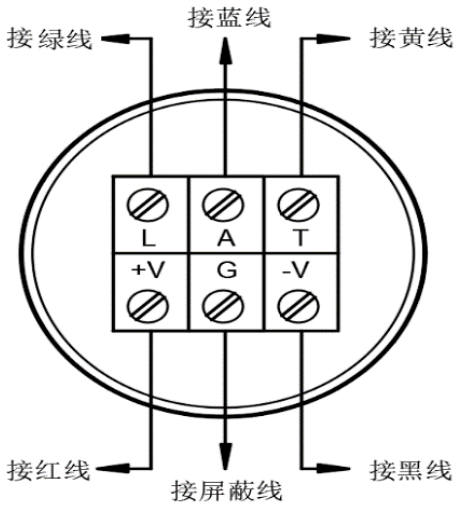
Semiconductor sensor is used for temperature measurement inside the probe, and thethermal conductance sensing theory is applied to oil level measurement.Magnetoelectricity sensor used for vibration measurement can directly obtainvibration velocity signal of machine and transmit complicated vibration waveform ineffective bandwidth into RMS by amplifier, bandpass filter and RMS converter.Finally voltage/current drive circuit produces 4~20mA output.

该组合安全监控探头可以方便获得与被测设备安全运行密切相关的重要参量，因此它也非常适用于其它旋转机械、往复运动机械等设备的直接安全监测，是现代工业、国防、科研必不可少的振动安全监测单元。

The probe can easily obtain important parameters relating to safety operation ofmeasured object. Therefore it is directly used in safety supervision for rotatingmachine and reciprocating machine .The probe is an indispensable vibration safetysupervision cell in modern industry, national defence and scientific research.

电缆接线颜色对应关系如下

(The corresponding relationship of cable wiring color is as follows)：



L：油位输出接绿色。

The oil level output is connected to green.

A：振动输出接蓝色。

Vibration output is connected to blue.

T：温度输出接黄色。

Temperature output is connected to yellow

+V：电源+24V 接红色。

Power + 24V is connected to red.

-V：公共地-24V 接黑色。

Power - 24V is connected to brack.

G：外壳接屏蔽线。

Shell connected with shield wire.

主要技术性能和指标

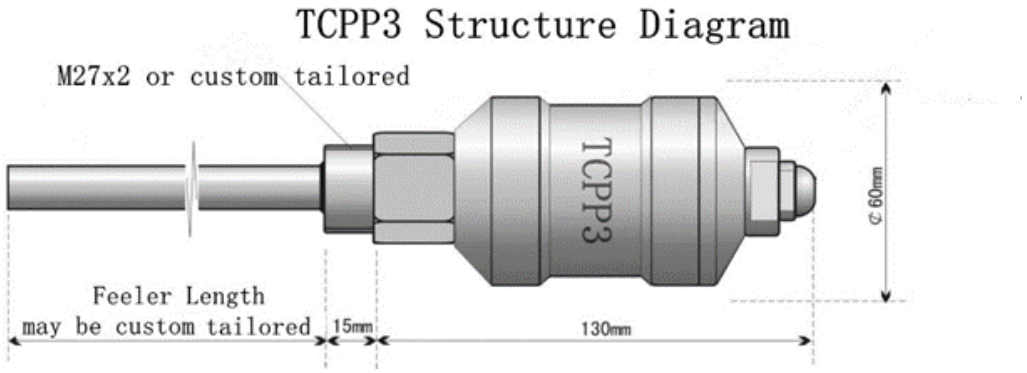
Main technique performance and index

- 外型和安装结构(Appearance and installation structure)：

TCPP3 型一体化三参数安全监控探头为不锈钢全封闭防水结构，重量约 0.8 kg ，安全监控探头是以外螺纹形式，安装于风机减速箱的螺纹安装孔中，探杆插入减速箱内，从而获取减速箱中润滑油温度、润滑油油位和箱体振动信号，完成变送输出。螺纹规格和探杆插深需在定货时申明。

TCPP3 three parameter safety monitoring probe is a stainless steel fully enclosed waterproof structure, It weighs about 0.8 kg. The safety monitoring probe is in the form of external thread. It is installed in the threaded mounting hole of the fan gearbox, and the probe rod is inserted into the gearbox, so as to obtain the lubricating oil temperature, lubricating oil level and vibration signal of the gearbox, and complete the transmission output.The thread specification and probe rod insertion depth shall be stated at the time of ordering.

见［图 1］外型结构示意图



- **温度测量特性(Temperature measurement features)：**

润滑油温度测量范围：0～100 ℃ ， 温度测量综合误差：±1℃。

Temperature measurement range:0~100 Degree,temperature measurement comprehensive error:±1.

- **振动测量特性(Vibration measurement features)：**

振动测量范围:0～20 ㎜/s ,测量输出与振动速度的真有效值(RMS)成正比,振动测量频带范围:10～1000HZ,振动测量综合误差:±1 ㎜/s。

Vibration measurement range:0~20mm/s,measurement output is in direct proportionto RMS of vibration velocity, vibration measurement frequency bandrange:10~1000HZ, vibration measurement comprehensive error: ±1mm/s.

- **油位测量特性(Oil level measurement features)：**

润滑油油位测量范围：-10～40 ㎜（0 ㎜处为减速箱正常油位下油限位置）， 油位测量综合误差： ±5 ㎜

初上电时需稳定预热约 2 分钟；响应阻尼时间约 1 分钟；被测介质必须是非导电性介质。

Lubrication level measurement range:-10~40mm, oil level comprehensive error:±5mm (0mmis the lower limit of the oil level in reduction gear box., dielectric mustbe nonconductor)

- **信号输出特性(Signal output trait)：**

有源电流型输出：DC/4～20mA ，要求无源电阻性负载。最大负载电阻测算（含传输线内阻）： Rmax=（V－15）/0.02 （其中 V 为供电电压）

Current output: DC/4~20mA, Maximum load resistance (including inner resistanceof transmission line): Rmax=(V-15)/0.02 (in which, V— power voltage).

- **供电特性(Power supply trait)：**

工作电压：DC/24V±2V，空载工作电压：DC/18V，最高保护电压：DC/30V ，额定电流：DC/80mA,最大瞬时工作电流：150mA，内设电压极性反接保护。

Recommended operation voltage: DC/24V±2V, open-circuit voltage: DC/15V,maximum overload voltage: DC/36V, maximum instantaneous current: 200mA,voltage polarity backing protection is furnished.

- **环境特性(Environment trait)：**

环境温度范围：－20～80℃，环境湿度范围：0～100％（端口使用704 硅橡胶密封）。

Environmental temperature range:-20~80,environmental humidity range: 0~100%(704 silicon rubber is used for airproof in the port), environmental vibrationcondition: three times of the upper limit of vibration range or more.

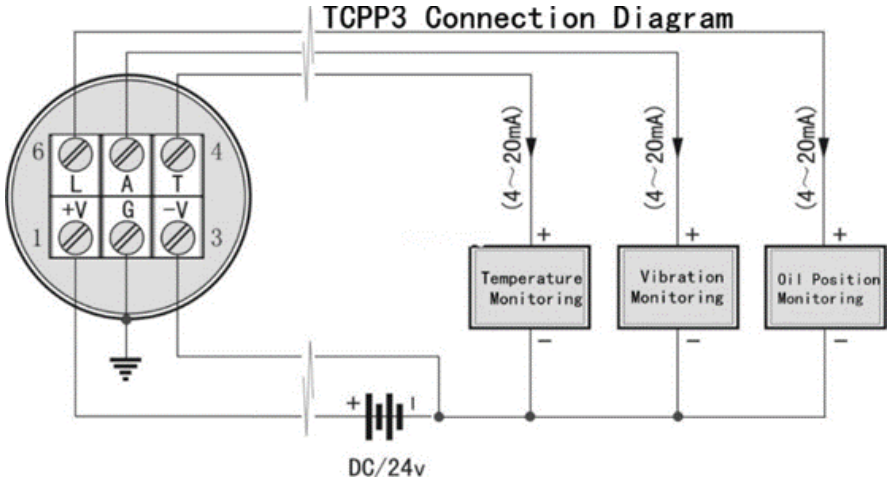
- **电气连接（Electric connection）：**

5 线 6 端子连接： 1# +V：+24V 电源； 2# G：与外壳连通可接屏蔽； 3# -V：公共地线； 4# T：温度信号输出； 5# A：振动信号输出； 6# L：油位信号输出。

Line 5, and 6 rotor connections: 1 # : + 24 V power supply + V red, # 2: shell GND shielded wire, 3 # : public - V black, 4 # : output temperature T pick yellow, # 5: vibration output A pick blue, # 6: oil level signal output L pick green (Note:Power lines are reversed, which can cause electrical damage and affect the use)

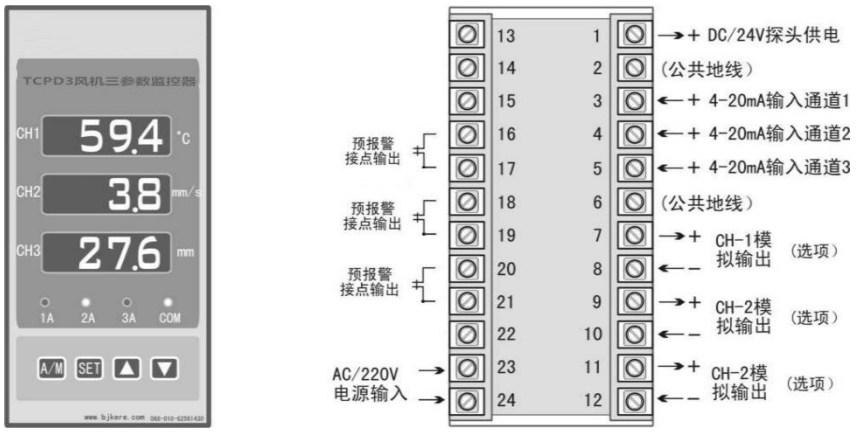
[图 2] 安全监控探头接线原理示意图

Wiring diagram of safety monitoring probe



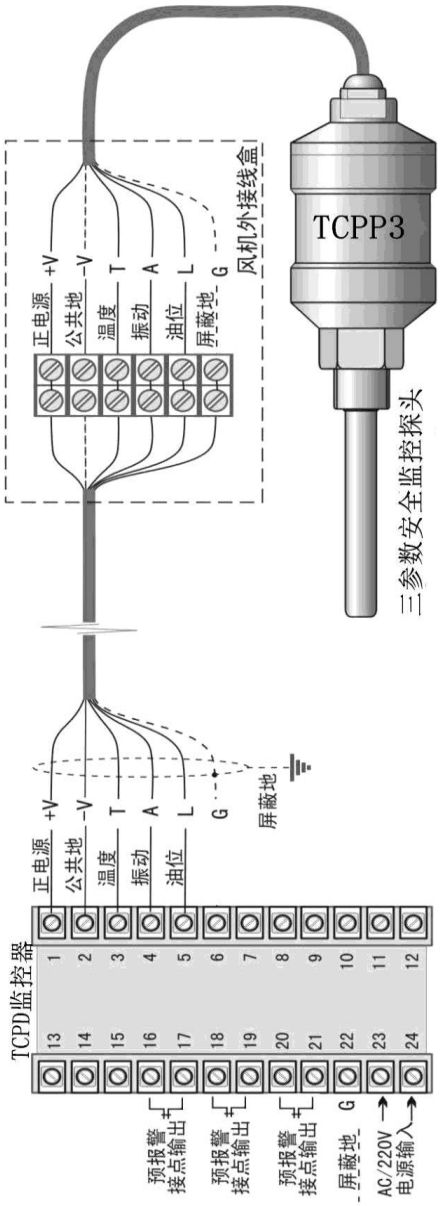
[图 3] TCPD3 监控器面板示意图

Schematic diagram of TCPD3 monitor panel



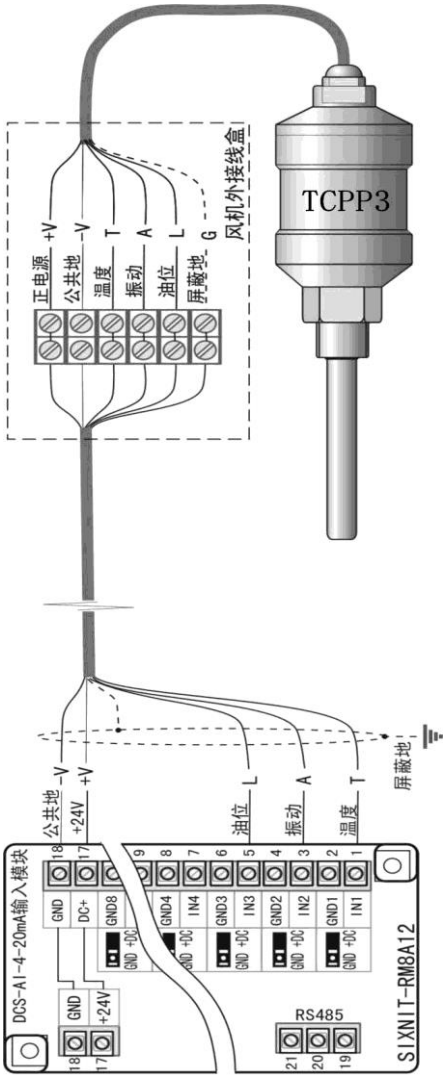
［图 4］安全监控探头与监控器接线示意图

Schematic diagram of wiring with monito



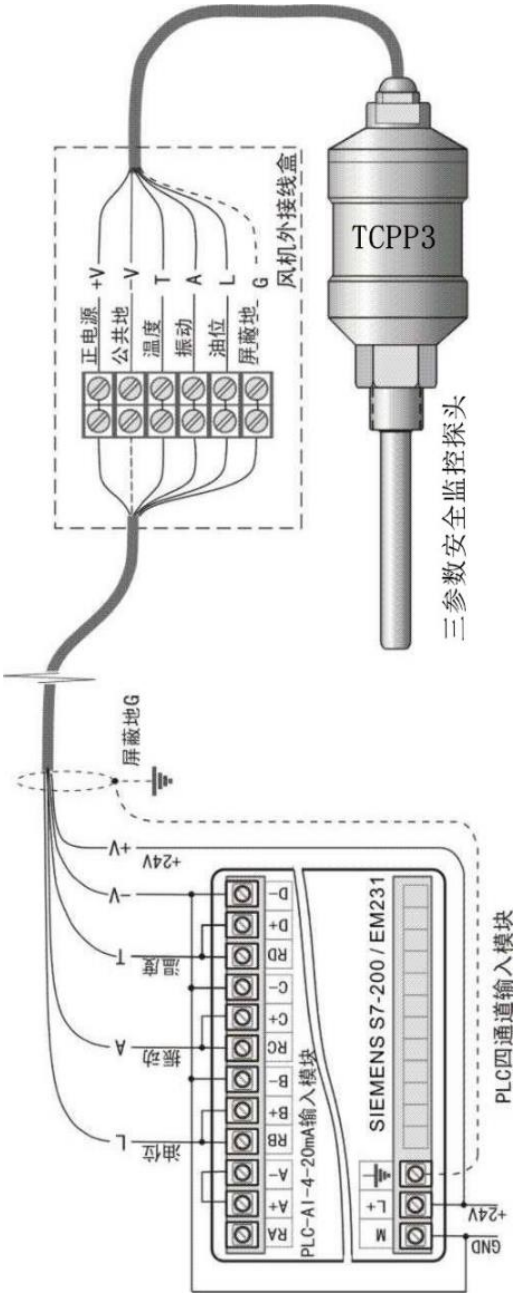
[图 5] 与 DCS-AI 输入模块接线示意图例

Schematic diagram of wiring with DCS-AI input module



[图 6] 与 PLC-AI 输入模块接线示意图例

Schematic diagram of wiring with PLC-AI input module



- **防爆型产品（Explosion proof products）：**

  在爆炸性气体环境下,可选择具有相应防爆等级的防爆型产品 TCPP3T， 防爆等级 ExdⅡCT6 。防爆型安全监控探头的外壳接地线“G”必须良好接地。

  用户在选用 TCPP3 型组合安全监控探头时，请注明受监控设备的型号或设备结构、安装尺寸。

  Under the explosive gas environment, We can select the explosion-proof products TCPP3T , and corresponding explosion-proof grade is ExdⅡCT6 . The shell ground wire "G" of explosion-proof safety monitoring probe must be well grounded.

  When selecting please state: applied condition, assembly pattern, structure dimension,and measurement range.