

TK-3051-DPG井下压力计/变送器

TK-3051-DPG downhole pressure gauge/transmitter

一、工作原理

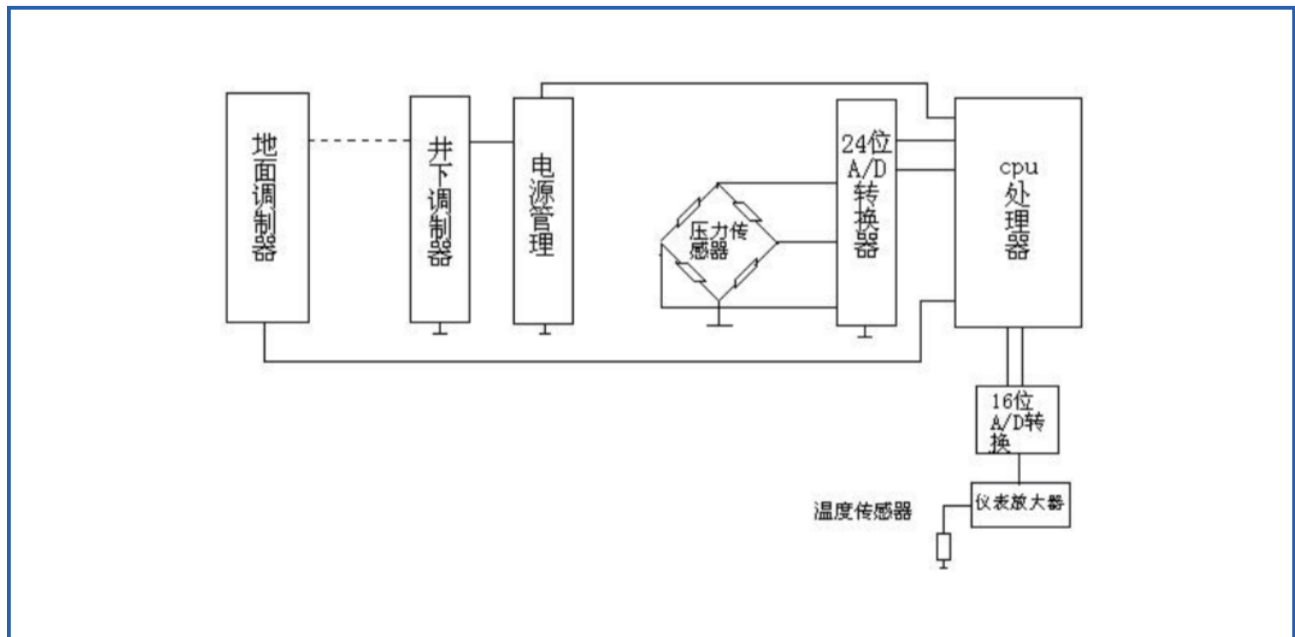
数字井下压力计的工作原理，压力传感器将压力信号变换为电压信号，经仪表放大器放大后再经A/D变换器变换为数字信号，然后由微处理器采样并处理，采用测井专用电缆传送至地面，由地面的调制解调器传给测控系统。

原理图如下：

Working principle

Working principle of digital downhole pressure gauge: The pressure sensor converts the pressure signal into a voltage signal, and the instrument amplifier is amplified and then converted to digital signal by A/D converter. After that, It is sampled and processed by the microprocessor. The special logging cable is sent to the ground, and the modem on the ground is transmitted to the measurement and control system.

The schematic is as follows



二、主要特点

井下压力计的稳定性，可靠性，漂移量是压力计的核心指标，其性能的优劣，主要取决于以下几个方面：

- 1、天康TK-3051-DPG系列数字井下压力计均选用进口压力传感器；
- 2、天康TK系列数字井下压力计均进行温压补偿，以消除不同温度工作条件下可能产生的漂移；
- 3、采用进口24位高精度转换电路。

Main features

The stability, reliability and drift quantity of downhole pressure gauge are the core indexes of pressure gauge. Its performance mainly depends on the following aspects:

- 1.Tiankang Tk-3051-DPG series digital downhole pressure gauge adopts imported Pressure sensor.
- 2.Tiankang TK series digital downhole pressure gauge are compensated for temperature and pressure to eliminate drift that may occur under different operating conditions.
- 3.Imported 24 - bit high - precision conversion circuit is adopted.

三、主要参数

1. 技术标准

供应商制造的井下压力计应遵循以下技术标准：

- JG875-2005《数字压力计检定规程》
- SY/T6231-2006《电子式井下压力计》

2. 主要技术指标

- 压力测量范围：0.6~60MPa；
- 压力测量精确度：0.05%Fs；
- 压力读数分辨率：0.05KPa；
- 温度测量范围：-40℃~150℃；
- 温度测量精确度：0.25℃；
- 温度读数分辨率：0.1℃；
- 供输出信号：MODBUS-RTU协议，RS485通讯；
- 输入电源：直流24V，18V~30VDC；
- 工作温度范围：从机 -40℃~150℃，主机 -25℃~80℃（含LCD显示）；
- 能接受外部指令完成现场零点校准、大气压校准；
- 井下密封：不小于60MPa

3.2、井口密封：不小于5MPa。支持级联式安装，在发生井口漏气时能无关井实施补救措施。

3. 井下安装

提供井下固定底座安装，有配套减震措施。

4. 电缆选型

- 外径不大于8毫米，耐磨抗拉，能支持重复作业；
- 信号电缆能支持压力和温度同步传输；
- 电缆内部应有阻气工艺，在电缆蹭破后能避免气体从电缆内部窜出。

四、压力计密封性

TK-3051-DPG系列数字井下压力计均采用行业成熟的封装技术，重要部位采用传感器行业的特别焊接工艺。保证产品的密封耐压下限大于60MPa，或量程的200%。

五、电磁兼容性

井下压力计符合“JB/T3369”工业仪表电磁兼容。

数字井下压力计符合Modem通讯协议的相关要求，可在恶劣电磁环境下，长距离可靠的传送信号。

六、维护与校准

井下压力计需定期（不长于三年零位校准）取到井上在实验室校准，主要是消除零位误差。

数字井下压力计可地面或远程无线人工定期对井下压力计的在线调整，迁移或设置。以满足使用过程中符合用户实用需求，故可长期工作于井下，必要时可协助用户进行实验室检定（提供检定软件及技术支持）。

Main parameters

1. Technical standard

Downhole pressure gauges manufactured by the supplier shall comply with the following technical standards

- 1.1 JG875-2005 Verification regulation of digital pressure gauge
- 1.2 SY/T6231-2006 Electronic downhole pressure gauge

2. Main Technology Parameters

- 2.1 Pressure Measuring Range: 0.6~60MPa.
- 2.2 Accuracy of pressure measurement: 0.05%Fs.
- 2.3 Pressure reading resolution: 0.05KPa.
- 2.4 Temperature Measuring Range: -40℃~150℃.
- 2.5 Accuracy of temperature measurement: 0.25℃.
- 2.6 Temperature reading resolution: 0.1℃.
- 2.7 Supply output signal: MODBUS-RTU protocol, RS485 communication.
- 2.8 Input Current: DC 24V, 18V~30VDC
- 2.9 Operating Temperature Range: slaves -40℃~150℃, master -25℃~80℃ (Including LCD indication).
- 3.0 Can accept external instructions to complete on-site zero point calibration and atmospheric pressure calibration.
- 3.1 Downhole seal: not less than 60MPa.
- 3.2 Wellhead seal: not less than 5MPa. Support cascaded installation. In the event of wellhead leakage can be closed to implement remedial measures.

3. Downhole installation

Provide underground fixed base installation, with supporting shock absorption measures.

4. Selection of the cable

- 4.1 Outside diameter not more than 8 mm, wear-resistant tensile, can support repeated operations.
- 4.2 A signal cable that supports simultaneous transmission of pressure and temperature.
- 4.3 The inside of the cable should have a gas blocking process, which can prevent the gas from escaping from the inside of the cable after the cable is damaged.

Pressure gauge tightness

TK-3051-DPG series digital downhole manometer adopts the mature packaging technology of the industry, and the special welding technology of sensor industry for the important parts. Make sure the lower limit of sealing pressure of the product is more than 60MPa, or 200% of the range.

Electromagnetic compatibility

The downhole pressure gauge is electromagnetic compatible with "JB/T3369" industrial instrument.

The digital downhole pressure gauge conforms to the requirements of Modem communication protocol and can reliably transmit signals over long distances in harsh electromagnetic environment.

Maintenance and calibration

The downhole manometer should be taken to the well regularly (not longer than three years) and calibrated in the laboratory, mainly to eliminate zero error.

Digital downhole manometer can be manually adjusted, migrated or set up on the ground or by remote wireless. in order to meet the practical needs of users in the process of use. It can work in the underground for a long time and assist users in laboratory verification (providing verification software and technical support) when necessary.



TK-3051-DPG-1系列井下压力计/变送器
TK-3051-DPG-1 Series downhole pressure gauge/transmitter

参数名称 Parameter	技术指标 Technical indicators	参数名称 Parameter	技术指标 Technical indicators
压力测量范围 Pressure measuring range	0~10MPa	温度测量范围 Temperature measuring range	-4~150℃
压力测量精度 Accuracy of pressure measurement	0.1%FS	温度测量精度 Accuracy of temperature measurement	0.5℃
压力分辨率 Pressure resolution	1KPa	温度分辨率 Temperature resolution	0.1℃
压力刷新周期 Pressure refresh cycle	1S	温度刷新周期 Temperature refresh cycle	1S
适用井深 Apply well depth	0~1200米	工作温度 Working temperature	-20~85℃
配套选型 The selection			
井下附件 Downhole accessories	用户定制 Users to customize		
井口附件 Wellhead accessories	用户定制 Users to customize		
配套电缆 Suitable cable	单芯测井电缆 Single-core logging cable		

应用范围

- 煤层气直井、油气井；
- 深水井、水平井。

主要特点

高性价比，稳定可靠，安装方便。

Main purpose

Straight coalbed methane wells, oil and gas wells.
Deep wells, horizontal wells.

Main features

High cost performance, stable and reliable, easy to install.



TK-3051-DPG-2系列井下压力计/变送器
TK-3051-DPG-2 Series downhole pressure gauge/transmitter

参数名称 Parameter	技术指标 Technical indicators	参数名称 Parameter	技术指标 Technical indicators
压力测量范围 Pressure measuring range	0~6~25MPa	温度测量范围 Temperature measuring range	-40~150℃
压力测量精度 Accuracy of pressure measurement	0.1%FS	温度测量精度 Accuracy of temperature measurement	0.25℃
压力分辨率 Pressure resolution	0.5KPa	温度分辨率 Temperature resolution	0.1℃
压力刷新周期 Pressure refresh cycle	1S	温度刷新周期 Temperature refresh cycle	1S
适用井深 Apply well depth	0~2000米	工作温度 Working temperature	-30~105℃
配套选型 The selection			
井下附件 Downhole accessories	用户定制 Users to customize		
井口附件 Wellhead accessories	用户定制 Users to customize		
配套电缆 Suitable cable	单芯钢制测井电缆 Single-core steel logging cable		

应用范围

- 煤层气直井、定向井；
- 油气井、水平井等重点井。

Main purpose

Straight coalbed methane wells, Directional well.
Oil and gas wells, horizontal wells etc.

主要特点

支持电缆通路双备份，可靠性高，抗干扰能力强。

Main features

Support cable channel double backup, high reliability, strong anti-interference ability.



TK-3051-DPG-3系列井下压力计/变送器

TK-3051-DPG-3 Series downhole pressure gauge/transmitter

参数名称 Parameter	技术指标 Technical indicators	参数名称 Parameter	技术指标 Technical indicators
压力测量范围 Pressure measuring range	0~6~60MPa	温度测量范围 Temperature measuring range	-40~150℃
压力测量精度 Accuracy of pressure measurement	0.1%FS	温度测量精度 Accuracy of temperature measurement	0.5℃
压力分辨率 Pressure resolution	1KPa	温度分辨率 Temperature resolution	0.1℃
压力刷新周期 Pressure refresh cycle	1S	温度刷新周期 Temperature refresh cycle	1S
适用井深 Apply well depth	0~5000米	工作温度 Working temperature	-40-150℃ (MAX)
配套选型 The selection			
井下附件 Downhole accessories	用户定制 Users to customize		
井口附件 Wellhead accessories	用户定制 Users to customize		
配套电缆 Suitable cable	单芯钢制测井电缆 Single-core steel logging cable		

应用范围

- 常规油气井、页岩气井；
- 煤层气超深直井、定向井；
- 水平井。

主要特点

可承受高温高压，采用钢制电缆。

Main purpose

Conventional oil and gas Wells, shale gas Wells.
Coal-bed methane ultra-deep vertical Wells, directional Wells.
Horizontal wells.

Main features

High temperature and high pressure, steel cable.