



# 无线数字压力变送器使用说明书

## Wireless pressure transmitter operating instructions





## 1. 概述/Summarize

无线数字压力变送器是针对工业管道压力监测而设计，集不锈钢充油芯体检测元件、高精度PT100铂电阻A级、高精度测量电路，低功耗嵌入式单片机、低功耗无线数字通讯技术于一体的高性能无线数字化变送器，是随着多种低功耗无线通讯网络技术推进，而研发的油气生产物联网建设的重要前端采集设备之一。

适应工业环境的高可靠性设计，以及精度高、安装简单、维护方便、环保耐用等特点赢得用户认可，已广泛应用于全国各大油气田及其它工业压力测试领域。

Wireless pressure transmitter is designed for industrial pipeline pressure monitoring, set stainless steel oil-filled core detection components, high-precision PT100 platinum resistance class A, high-precision measurement circuit, low-power embedded microcontroller, low-power wireless digital communication technology in one of the high-performance wireless digital transmitter, is with a variety of low-power wireless communication network technology to promote, The research and development of oil and gas production of the Internet of things construction of one of the important front-end acquisition equipment.

The high reliability design adapted to the industrial environment, as well as the characteristics of high precision, simple installation, easy maintenance, environmental protection and durability, has been widely used in major oil and gas fields and other industrial pressure testing fields.

## 2. 技术指标/Technical index

### 2.1. 工作环境/Working environment:

- 温度/temperature:  $-40\sim 70^{\circ}\text{C}$ ; 相对湿度/relative humidity:  $0\sim 100\%\text{RH}$ ;
- 大气压力/atmospheric pressure:  $80\sim 110\text{ kPa}$ ;
- 振动/Vibration:  $10\sim 500\text{Hz}$ , 峰值加速度/Peak acceleration  $< 19.6\text{m/s}^2$ ;
- 交流外磁场/Ac external magnetic field  $\leq 400\text{A/m}$ .

### 2.2. 供电/Power supply:

- 武汉孚安特科技有限公司, 锂亚硫酰氯电池
- Wuhan Fuant Technology Co., LTD., lithium thionyl chloride battery
- ER34615H(能量型), 3.6V38Ah(2节ER34615电池并联)
- ER34615H(Energy type), 3.6V38Ah(2 ER34615 batteries in parallel)

### 2.3. 测量性能/Measurement performance:

- 量程:  $0\sim 110\text{MPa}$  可选;
- Measuring range:  $0\sim 110\text{MPa}$  optional;
- 精度: 0.5级、0.25级可选;
- Accuracy: 0.5, 0.25 optional;
- 过载能力: 120%FS;
- Overload capacity: 120%FS;
- 测量原理: 采用压阻式原理。
- Measurement principle: piezoresistive principle.

### 2.4. 显示/reveal:

- LCD组合信息显示, 压力值、电池电压、信道号、信号强度等;
- LCD combined information display, pressure value, battery voltage, channel number, signal strength, etc;
- LCD背光, 节电模式;
- LCD backlight, power saving mode;



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- 双色 LED 状态指示。
- Two-color LED status indicator.

## 2.5. 防爆/Explosion-proof:

- 防爆合格证证号/Explosion-proof certificate number: **CCRI 23.2494X**
- 防爆标志/Explosion-proof mark: **Ex ia II C T4 Ga**。
- **警告：设备使用在0区时，需注意防止由于冲击或摩擦引起的点燃危险；非金属外壳表面有潜在静电电荷危险，维护需用湿布擦拭。**
- Warning: When the equipment is used in zone 0, pay attention to prevent the ignition hazard caused by impact or friction; The surface of the non-metallic shell has potential electrostatic charges, and needs to be wiped with a damp cloth for maintenance.

## 2.6. 无线通讯/Wireless communication:

### 2.6.1 ZigBee

- 工作频率/Operating frequency: ISM2.4~2.483GHz
- 发射功率/transmit power ≤ 10mW (+10dBm)
- 接收灵敏度/Receiving sensitivity: -103dBm;
- 传输距离（空旷直视）/Transmission distance (open vision) ≥ 300m;

## 2.7. 结构/structure

- 防护等级: IP68 (1m, 1h) ;
- Protection degrees: IP68 (1m, 1h) ;
- 仪表外壳材质: 铸铝;
- Instrument housing material: cast aluminum;
- 接触介质材质: 316L;
- Contact medium material: 316L;
- 过程连接: M20X1.5、NPT1/2 可选可定制;
- Process connection: M20X1.5、NPT1/2 optional and customized;
- 重量: 1kg;
- Weight: 1kg;
- 外形尺寸: 高 225×宽 144×深 126;
- Dimensions: Height 225× width 144× depth 126;



### 3. 外形结构/Outline structure

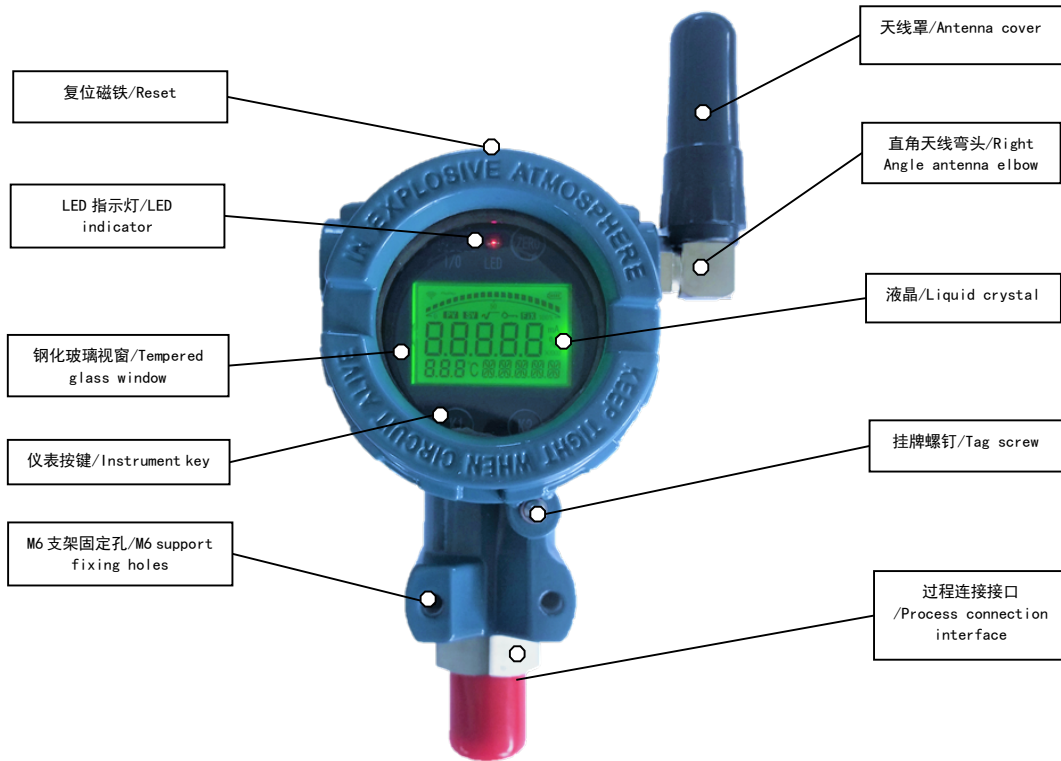


图 1. 无线数字压力变送器 功能部件指示图

Figure 1. Wireless pressure transmitter functional component indication diagram

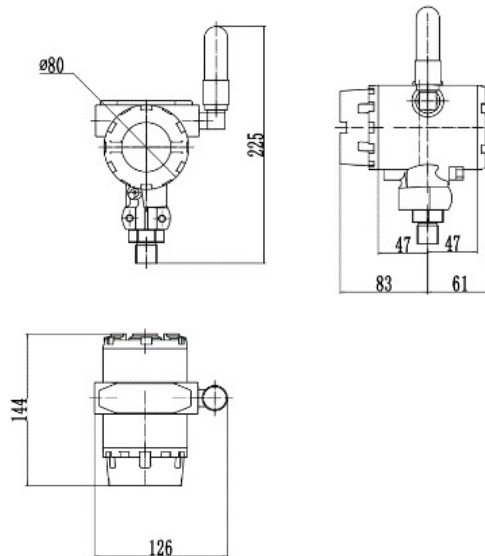


图 2. 无线数字压力变送器 外形尺寸图

Figure 2. Outline dimensions of wireless pressure transmitter



4.选型表/Selection list

<b>SM39PWB</b>		<b>无线数字压力变送器/Wireless pressure transmitter</b>		
SM39PWB	无线数字压力变送器/Wireless pressure transmitter			
	<input type="checkbox"/>	无线形式/Wireless		
		Z: ZigBee		
	<input type="checkbox"/>	量程/Range		
		M: 2    3.5    7    10    20    35    70    100    (单位: MPa)		
		k: 7    20    35    70    100    200    350    1000    (单位: kPa)		
	<input type="checkbox"/>	过程接口/Screw thread		
		M: M20×1.5	N: NPT1/2	G: G1/2    R: R1/2
	<input type="checkbox"/>	供电方式/Power supply		
		C: 3.6V/38Ah 一次性锂电池 disposable lithium battery	S: 3.6V/6.6Ah 太阳能充电电池 Solar rechargeable battery	
	<input type="checkbox"/>	防爆型式/Explosion-proof type		
		I: 本质安全型 (Ex ia IIC T4 Ga) /Intrinsically safe	N: 标准型 (不防爆) /Standard type (non-explosion-proof)	

5.调试手册/Debugging manual

软件协议参考“中石化胜利四化协议”，技术文档。调试过程中，使用蚌埠日月仪器研究所有限公司的上位机服务器软件。

Software agreement refer to "Sinopec victory Four Modernizations Agreement", technical document. In the debugging process, the upper computer server software of Bengbu Riyue Instrument Research Institute Co., Ltd. is used.

SM39PWB 是一款电池供电、超低功耗、压力板卡模块、ZIGBEE 无线协议输出，采用先进的 32bit 微处理器和 24bit ADC，产品兼顾高精度的同时具有超低的功耗。

SM39PWB is a battery-powered, ultra-low power, pressure board module, ZIGBEE wireless protocol output, using an advanced 32bit microprocessor and 24bit ADC, the product combines high precision with ultra-low power consumption.

特点:

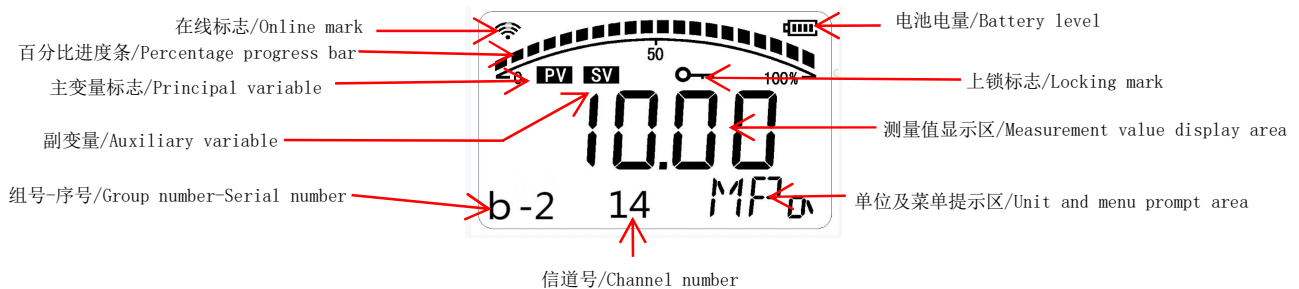
- 采用先进的 32bit 微处理器和 24bit ADC
- Zigbee 无线协议
- 温压一体化设计，可做单独压力、单独温度，也可做温压一体
- 5 位液晶 8 段数码显示，无视值误差
- 支持用户清零，反清零等操作
- 磁控背光，磁控快速采集模式
- 报警功能，报警值可设置，报警使能可设置
- 具有上位机调试功能，同时兼容现场的按键调试过程，大大提高调试效率

Features:

- Uses an advanced 32bit microprocessor and 24bit ADC

- Zigbee wireless protocol
- Integrated temperature and pressure design, can do single pressure, single temperature, can also do temperature and pressure together
- 5-bit LCD 8-segment digital display, ignoring value errors
- Supports user clear and anti-clear operations
- Magnetron backlight, magnetron fast acquisition mode
- Alarm function, alarm value can be set, alarm enable can be set
- It has the function of host computer debugging, and is compatible with the field debugging process of key, which greatly improves the debugging efficiency

## 5.1 面板说明/Panel description



在线标志显示，表示仪表与现场 RTU 通讯交互正常，且在线。

The online mark display indicates that the instrument interacts with the field RTU communication normally and is online.

## 5.2 按键操作说明/Key operation instruction

### 1. 磁控操作/Magneto operation

将强力磁铁放在仪表霍尔元件附近，保持 3-5 秒，LED 蓝灯常亮时，迅速磁铁离开，仪表闪烁三次刷新复位可以进入配置模式，如果磁铁保持大于 6 秒，LED 蓝灯常亮自熄灭，仪表进入快速压力刷新模式，累计测试 300 秒，方便现场用户观察压力实时变化。

Place the strong magnet near the hall element of the instrument, hold for 3-5 seconds, when the LED blue light is steady on, the magnet will leave quickly, the instrument will blink three times to refresh and reset to enter the configuration mode, if the magnet is kept for more than 6 seconds, the LED blue light will self-extinguish, the instrument will enter the rapid pressure refresh mode, and the accumulated test will be 300 seconds, which is convenient for on-site users to observe the real-time change of pressure.

节能技巧：平时可慢速周期刷新采集，需要观看测量值时通过磁铁可打开背光和激活快速

压力刷新模式，快速压力刷新模式 300 秒后程序自动退出，退出后仪表进入慢速采集模式，即周期采集上报模式。

Energy-saving tips: Usually can be slow cycle refresh collection, need to watch the measured value through the magnet can turn on the backlight and activate the fast pressure refresh mode, fast pressure refresh mode 300 seconds after the program automatically exit, exit the instrument into the slow acquisition mode, that is, periodic collection and reporting mode.

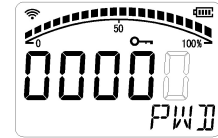
这里的周期采集上报是指仪表同 RTU 直接的通讯间隔，参数设置为 RTU 下发命令给仪表，仪表相应并修改参数。

Periodic collection and reporting here refers to the direct communication interval between the instrument and RTU. The parameter is set as RTU sends commands to the instrument, and the instrument modifies parameters accordingly.

## 2. 仪表参数设置 A/Instrument parameter setting A

①在普通测量模式，长按 K1 或 K2 任意键，进入输入密码状态，屏幕显示：空白表示闪烁，即光标位置；

① In the ordinary measurement mode, long press any key K1 or K2 to enter the password state, the screen displays: blank indicates blinking, that is, the cursor position;



②按 K1 键移动光标往左移，按 K2 键更改光标位的数值，输入密码 00066 或者 00088，按 ZERO 键确定，进入仪表参数设置状态；

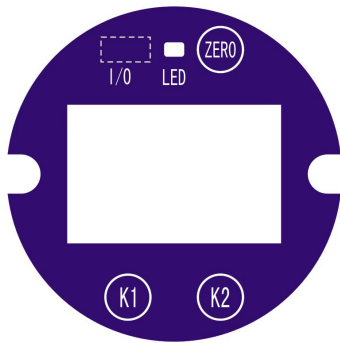
② Press K1 key to move the cursor to the left, press K2 key to change the value of the cursor bit, enter the code 00066 or 00088, press ZERO key to confirm, enter the instrument parameter setting state;

③各菜单项可分为查看状态和设置状态，查看状态可查看此菜单项的值，按 K1 键或 K2 键可在各菜单项间切换，按 ZERO 键可进入当前菜单项的设置状态，设置状态可更改此菜单项的值，更改完成后按 ZERO 键可返回此菜单项的查看状态；

③ Each menu item can be divided into viewing state and setting state, viewing state can view the value of this menu item, press K1 key or K2 key to switch between menu items, press ZERO key to enter the setting state of the current menu item, setting state can change the value of this menu item, press ZERO key to return to the viewing state of this menu item after the change is completed;

④轻触一下 K1 按键，液晶显示网络号，轻触一下 K2 按键，液晶显示错误代码。

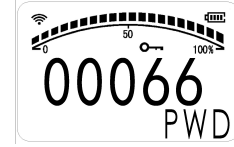
④ Touch K1 button, LCD display network number, touch K2 button, LCD display error code.





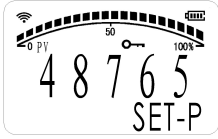
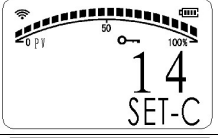
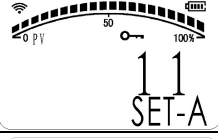
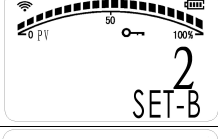
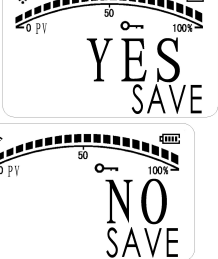
⑤按键操作，输入密码 00066，进入仪表参数设置 A；可以改井名对应的网络号，信道号，仪表组号，仪表序号。

⑤ Key operation, enter the password 00066, enter the instrument parameter setting A; The network number, channel number, instrument group number and instrument serial number corresponding to the well name can be changed.



进入后第一个仪表右下角程序代号为 SET-P，按 ZERO 键可进入当前菜单项的设置状态，按 K1 键移动光标，按 K2 键更改光标位的值，改为正确数值后按 ZERO 键确定，直到最后一个菜单 YES 保存。具体操作功能如下表：

After entering, the program code in the lower right corner of the first instrument is SET-P. Press ZERO to enter the setting state of the current menu item. Press K1 to move the cursor, press K2 to change the value of the cursor bit, and press ZERO to confirm after changing to the correct value until the last menu YES is saved. The specific operation functions are as follows:

液晶屏显示	右下角代号	输入密码 00066
	SET-P	井名对应的网络号，代号：P Network number( ) corresponding to well name, code:P
	SET-C	井名对应的信道号，代号：C Channel number corresponding to well name, code: C
	SET-A	仪表组号 代号：A Instrument group number: A
	SET-B	仪表序号 代号：B Instrument serial number: B
	SAVE	是否保存退出 YES 表示保存退出，NO 表示不保存退出，按 K2 键切换，按 ZERO 键确定并退出设置 YES indicates to save and exit. NO indicates to exit without saving. Press K2 to switch. Press ZERO to confirm and exit the Settings

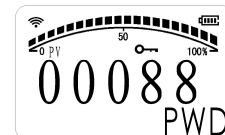
注：无按键按下 60 秒，仪表自动退出仪表参数设置模式。

Note: If no button is pressed for 60 seconds, the instrument automatically exits the instrument parameter setting mode.

### 1. 仪表参数设置 B/Instrument parameter setting B

按键操作，输入密码 00088，进入仪表参数设置 B；

读取 RTU 上报周期、仪表设备类型、压力小数位、温度小数位、







物理量单位切换、厂家代码、标定使能的开关等用户调参功能。

(备注：这里的功能主要是小部分用户调试，集成商调试人员，密码 00088 进入修改。)

Key operation, enter the password 00088, enter the instrument parameter setting B;

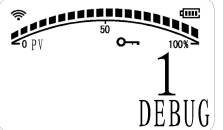
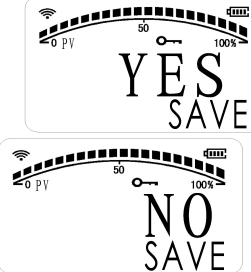
Read RTU escalation cycle, instrument type, pressure decimal, temperature decimal,

Physical quantity unit switch, manufacturer code, calibration enable switch and other user adjustment functions.

(Note: The function here is mainly a small number of users debugging, integrator debugging personnel, password 00088 enter to modify.)

液晶屏显示	右下角代号	输入密码 00088
	UP-P	与 RTU 上报周期，单位秒 Reporting interval with RTU, in seconds
	TYPE	仪表类型 2 压力 3 温度 11 压力温度一体 Meter Type 2 Pressure 3 Temperature 11 Pressure temperature integrated
	DOT-P	液晶显示压力小数位：0—3 LCD pressure digit: 0—3
	DOT-T	液晶显示温度小数位：0—3 LCD temperature decimal place: 0—3
	SET-M	物理量单位切换：0-MPa 1-kPa 2 -℃ Physical quantity unit switch: 0-MPa 1-kPa 2-℃
	CLR-P	当前压力表处于非压力状态，即压力 0 点，可以使用清零功能，按 ZERO 键进入仪表参数设置状态，按 K2 键液晶显示为 000.00 这个状态下，按 ZERO 键确定。使得液晶显示当前压力值变化到 0.00 The current pressure gauge is in the non-pressure state, that is, the pressure 0 point, you can use the ZERO function, press the ZERO key to enter the instrument parameter setting state, press the K2 key when the liquid crystal display is 000.00, press the zero key to determine. Causes the current pressure value of the LCD to change to 0.00.
	CTO-S	厂家代码（蚌埠日月） Manufacturer Code (Bengbu SUNMOON INSTRUMENT)



	DEBUG	标定使能的开关 Calibrate the enable switch
	SAVE	是否保存退出 YES 表示保存退出, NO 表示不保存退出, 按 K2 键切换, 按 ZERO 键确定并退出设置 YES indicates to save and exit. NO indicates to exit without saving. Press K2 to switch. Press ZERO to confirm and exit the Settings

注: 无按键按下 60 秒, 仪表自动退出仪表参数设置模式。

Note: If no button is pressed for 60 seconds, the instrument automatically exits the instrument parameter setting mode.