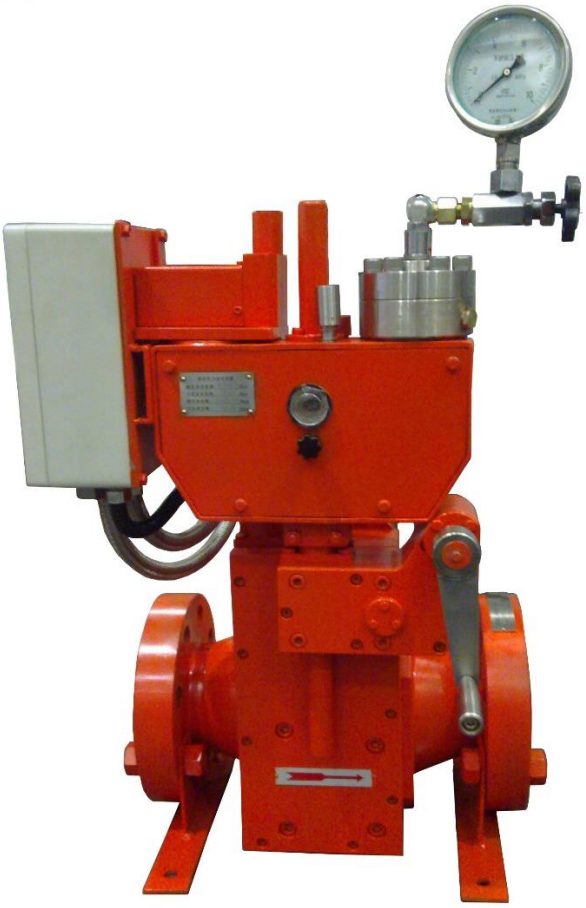
紧急切断阀

Emergency Cut-off Valve -Wuzhou Valve -



五洲阀门股份有限公司

Wuzhou Valve Co., Ltd.

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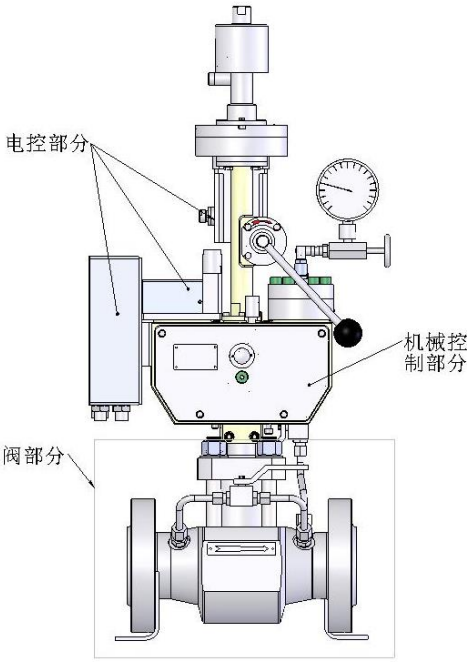
一、 概要 / General



本公司生产的紧急截断阀（Emergency Shut-Off Valve）是根据企业标准《Q/WZ-J02-19-2024》设计和制造的多功能、系列化产品。产品广泛应用于石油、天然气、煤层气等介质的集输系统，能在管线压力或温度出现异常时，自动、快速切断管路，保障系统安全。产品集机械控制与智能电控于一体，具备**远程控制、状态远传**等先进功能，满足数字化、智能化气田管理的需求，为用户提供经济、可靠、高效的安全解决方案。

Our Emergency Shut-Off Valve (ESD Valve), designed and manufactured in accordance with our enterprise standard Q/WZ-J02-19-2024, is a multi-function and serialized product widely used in gathering and transportation systems for oil, natural gas, and coal bed methane. It automatically and rapidly cuts off the pipeline in case of abnormal pressure or temperature, ensuring system safety. Integrating mechanical control with intelligent electric control, it features remote control, status telemetry, self-diagnostics, and human-machine interaction (HMI), meeting the needs of digital and intelligent gas field management and providing users with an economical, reliable, and efficient safety solution.

二、 用途及特点 / Application and Features

2.1 用途 / Application:

适用于石油天然气工业领域，公称压力 PN16-PN420 (Class 150-2500)，公称通径 DN25-DN400 (NPS1-NPS16)，端部连接为法兰或焊接，用于天然气等介质的管路紧急安全截断。

Applicable to the oil and natural gas industry, with nominal pressures from PN16 to PN420 (Class 150 to 2500), nominal diameters from DN25 to DN400 (NPS1 to NPS16), with flanged or welded ends, used for emergency safety shut-off of pipelines carrying natural gas and other media.

2.2 主要特点 / Main Features:

- （1）**高可靠性机械驱动**：核心切断功能为机械式，无需外部动力源，失电情况下仍能可靠动作。
  Highly Reliable Mechanical Actuation: **Core shut-off function** is mechanical, requires no external power, and remains operational during power loss.
- （2）**快速响应与关断**：超欠压响应时间≤1.5s (DN150 及以下) / ≤2.0s (DN200 及以上)，关断时间≤1s，最大限度降低风险。
  Fast Response & Shut-off: Response time ≤1.5s (≤DN150) / ≤2.0s (≥DN200); Closing time ≤1s, minimizing risk.
- （3）**高精度控制**：切断压力精度等级可达±1% (按标准 Ac 等级)，超/欠压设定误差≤±3.0%。
  High Precision Control: Cut-off pressure accuracy up to ±1% (According to standard Ac grade); Over/Under-pressure setting error ≤±3.0%.
- （4）**智能电控系统**：支持远程电动开启/关闭、阀位状态远传；具备自诊断功能，可通过人机界面(HMI)显示故障信息。
  Intelligent Electric Control System: Supports remote electric open/close, valve status telemetry; Equipped with self-diagnostic function, fault information displayed on HMI.

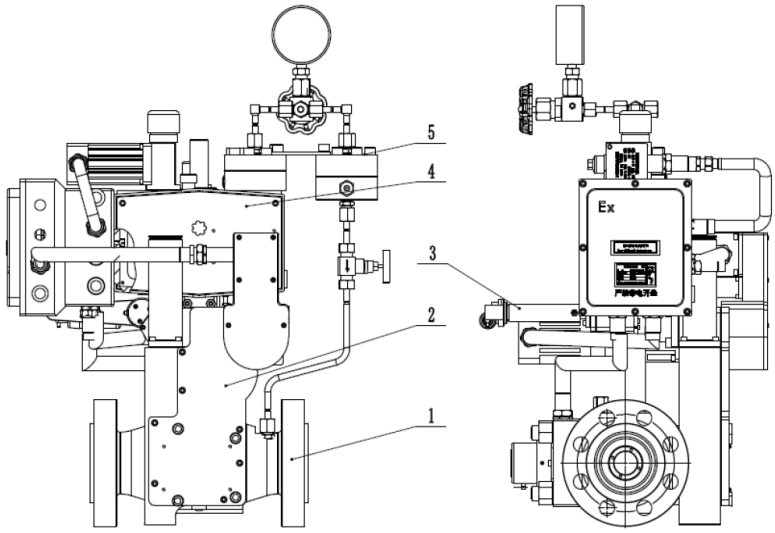
- （5）高环境适应性：工作温度-46℃ ~ +120℃，环境温度-30℃ ~ +60℃ （可定制），满足各种苛刻环境。
  High Environmental Adaptability: Working temperature -46℃ ~ +120℃; Ambient temperature -30℃ ~ +60℃ (Customizable), suitable for harsh conditions.
- （6）多重安全设计：具备超压、欠压、超温(易熔元件 120℃±10℃熔断)多重保护；内置 UPS 电源，保障断电时系统安全；防静电设计（电阻值≤10Ω）。
  Multiple Safety Designs: Features overpressure, under-pressure, and over-temperature (Fusible element melts at 120℃±10℃) protection; Built-in UPS ensures safety during power failure; Anti-static design (Resistance ≤10Ω).
- （7）robust 结构：阀体、阀盖等承压件符合 GB/T 26640 最小壁厚要求；壳体强度试验、密封试验严格按 GB/T 26480 执行**，泄漏率符合标准要求。
  Robust Structure: Pressure-containing parts like body and bonnet meet GB/T 26640 min. wall thickness requirements; Shell strength and seat leakage tests strictly per GB/T 26480, leakage rates meet standard.
- （8）便捷集成：提供 RS485 通讯接口及≥2 路 DI/DO 接口，便于接入 SCADA 或 ESD 系统。
  Easy Integration: RS485 communication interface and ≥2 channels of DI/DO provided for easy connection to SCADA or ESD systems.
- （9）耐久性强：启闭寿命≥100 次（室温下测试后，性能仍符合要求）。
  High Durability: Mechanical cycle life ≥100 cycles (Performance remains compliant after testing at room temperature).

三、 功能及原理 / Function and Principle

该紧急截断阀通常由阀门主体、机械控制部分（含压力检测装置）和电控部分构成。

The ESD valve typically consists of the valve body, mechanical control section (including pressure detection device), and electric control section.

紧急截断阀典型结构如图 1 所示。



1-紧急截断阀阀体　2-手/自动阀门开启控制机构　3-操作手柄　4-机械控制装置　5-压力检测装置

图 1 紧急截断阀典型结构

3.1 机械控制部分 / Mechanical Control Section

a) 自动紧急切断 / Automatic Emergency Shut-off

当压力检测装置检测到管线压力高于超压设定值或低于欠压设定值时，机械控制机构自动触发，释放与阀瓣连接的机构，在弹簧力作用下快速关闭阀门。

The mechanical control mechanism triggers automatically when the pressure detection device detects pressure exceeding the overpressure set value or below the under-pressure set value, releasing the mechanism connected to the disc, rapidly closing the valve via spring force.

b) 现场手动操作 / Local Manual Operation

开启/复位 (Start-up/Reset): 故障排除后，通过手柄和复位按钮进行就地开启和机构复位。

After troubleshooting, open the valve and reset the mechanism locally via handle and reset button.

紧急关闭 (Emergency Shut-off): 按下控制箱上的红色紧急按钮(防误操作设计)，可手动紧急关闭阀门。

Press the red emergency button (anti-misoperation design) on the control box to manually close the valve urgently.

3.2 电控部分原理及主要功能 / Principle and Main Function of Electric Control Section

电讯号通过无线通讯从中控室传至井场综合箱，再经电缆传至阀门电控盒。

Electric signals are transmitted from the control room to the field control box via wireless communication, then to the valve's electric control box via cable.

电控盒内置专用模块、UPS 电源及自诊断单元，负责所有远程操作与状态监控。

The electric control box contains a dedicated module, UPS power supply, and self-diagnostic unit, managing all remote operations and status monitoring.

电控部分主要有以下功能：

Main function of electric control part

◎ 远程关闭 / Remote Close: 接收指令后，电机驱动机械部分关闭阀门。

Upon receiving the command, the motor drives the mechanical part to close the valve.

◎ 远程开启 / Remote Open: 接收指令后，电机驱动齿轮箱和阀杆提升机构开启阀门，并复位机械控制机构。

Upon receiving the command, the motor drives the gearbox and stem lift

mechanism to open the valve and reset the mechanical control.

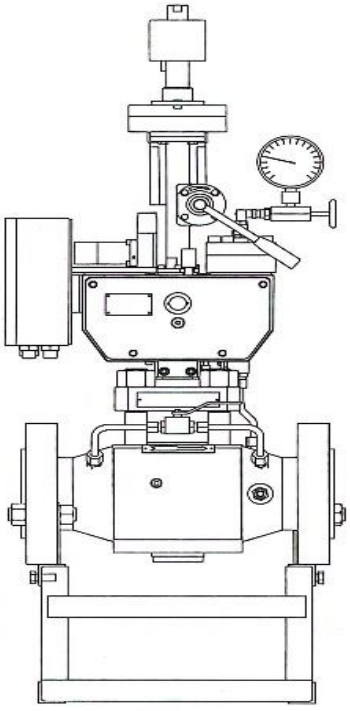
◎ 状态远传与自诊断 / Status Transmission & Self-diagnostics: 箱内传感器实时远传阀门开关状态。系统具备自诊断功能，可检测内部故障并通过人机界面显示故障信息。
Sensors in the box transmit valve status in real-time. The system has self-diagnostic 功能， detecting internal faults and displaying fault information on the HMI.

四、结构形式 / Valve Structure Types

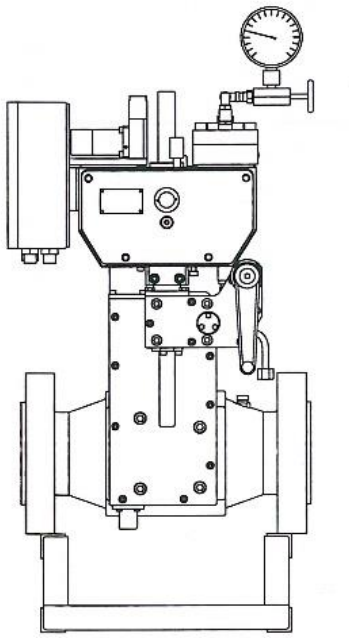
4.1 截止阀式 / Globe Valve Type

特点 / Features: 结构简单，密封可靠，关闭性能好，易于维护。适用于对密封要求极高的场合。

Simple structure, reliable sealing, excellent shut-off performance, easy maintenance. Suitable for applications requiring high sealing performance.



4.2 球阀式 / Ball Valve Type



特点 / Features: 流阻小，通径能力好，开关扭矩小，不易积液。适用于要求低流阻、快速启闭的场合。

Low flow resistance, full bore capability, low operating torque, not prone to fluid accumulation. Suitable for applications requiring low pressure drop and rapid operation.

五、性能参数 / Performance Parameters

参数 / Parameter	值 / Value	备注 / Notes
公称通径 / Nominal Diameter	DN25 ~ DN400	NPS 1 ~ NPS 16
公称压力 / Nominal Pressure	PN16 ~ PN420	Class 150 ~ Class 2500
压力-温度额定值 / P-T Rating	按 GB/T 12224 / According to GB/T 12224	
超压设定范围 / Overpressure Setting	> (欠压设定值 + 3MPa)	参见标准表 4 / Ref. Std Table 4
欠压设定范围 / Under-pressure Setting	< (超压设定值 - 3MPa)	参见标准表 4 / Ref. Std Table 4
切断压力精度 / Cut-off Accuracy	可达 Ac 1 级 (±1%)	参见标准表 2 / Ref. Std Table 2
超/欠压设定误差 / Setting Error	≤ ±3.0%	

响应时间 / Response Time	≤ 1.5 s (≤DN150/NPS6) ≤ 2.0 s (≥DN200/NPS8)	参见标准表 3 / Ref. Std Table 3
关闭时间 / Closing Time	≤ 1 s	
工作温度 / Working Temperature	-46℃ ~ +120℃	
环境温度 / Ambient Temperature	-30℃ ~ +60℃	可定制 / Customizable
泄漏等级 / Seat Leakage	符合 GB/T 26480 / Q/WZ-J02-19-2024 表 1 / Ref. Std Table 1	
防静电 / Anti-static	电阻 ≤ 10 Ω	@12VDC
易熔元件 / Fusible Element	120℃ ±10℃	可选 / Optional
操作力 / Operating Force	≤ 250 N	
启闭寿命 / Cycle Life	≥ 100 次	室温 / Room Temp
电源 / Power	标准外部供电，内置 UPS / Standard external supply, Built-in UPS	
通讯接口 / Communication	RS485	
I/O 接口 / I/O	≥2 路 DI / DO	
安装位置 / Installation	推荐水平管道，执行机构向上 / Horizontal pipeline, actuator upward	

六、 材料 / Materials (标准型 / Standard)

- **阀体 / Body:** 碳钢锻件 (A105 / GB/T 12228 / NB/T 47008), 合金钢, 不锈钢 (CF8M/A351 Gr.CF8M / NB/T 47010) 或按订单要求 / or as per order.
- **阀盖 / Bonnet:** 材料同阀体 / Material same as Body.
- **阀杆 / Stem:** 不锈钢 (SS 316, 17-4PH, F6a) / Stainless Steel.
- **阀瓣/球体 / Disc/Ball:** 不锈钢 (SS 304, SS 316) + 硬质合金或表面处理 (如 STL) / Stainless Steel + Hardfacing or Surface Treatment (e.g., STL).
- **阀座 / Seat:** 金属/软密封 (不锈钢 + STL, 增强 PTFE, NBR, FKM) / Metal/Soft Seat (SS+STL, Reinforced PTFE, NBR, FKM).
- **弹簧 / Spring:** 不锈钢 (SS 316, 51CrV4) / Stainless Steel.
- **密封件 / Seals:** 氟橡胶(FKM)/丁腈橡胶(NBR)/聚四氟乙烯(PTFE) 或同等材料 / or equivalent.
- **螺栓 / Bolts:** 合金钢 (ASTM A193 B7/B7M), 不锈钢 (A193 B8/B8M) / Alloy Steel, Stainless Steel.
- **螺母 / Nuts:** 合金钢 (ASTM A194 2H/2HM), 不锈钢 (A194 8/8M) / Alloy Steel, Stainless Steel.
- **操作部件 / Operating Parts:** 碳钢镀锌或不锈钢 / Carbon Steel Galvanized or Stainless Steel.

酸性环境材料需符合 **NACE MR0175/ISO 15156** 要求。

Materials for Sour Service shall comply with NACE MR0175/ISO 15156.

七、 试验与检验 / Testing & Inspection

每台阀门均经过严格的出厂检验，型式试验按标准 Q/WZ-J02-19-2024 要求进行。

Each valve undergoes strict routine tests. Type tests are performed as per Q/WZ-

试验项目 Test Item	执行标准 Standard	要求 Requirement
壳体试验 Shell Test	GB/T 26480 / GB/T 13927	无可见泄漏 No visible leakage
密封试验 Seat Test	GB/T 26480	泄漏量≤标准表 1 Max. leakage ≤ Std Table 1
切断压力精度 Accuracy	Q/WZ-J02-19-2024	符合标准表 2 要求 Meet Std Table 2
响应时间 Response Time	Q/WZ-J02-19-2024	符合标准表 3 要求 Meet Std Table 3
壁厚测量 Wall Thickness	GB/T 26640	不小于标准要求值 Not less than required by standard
操作力 Operating Force	Q/WZ-J02-19-2024	≤ 250 N
防静电 Anti-static	Q/WZ-J02-19-2024 第 5.11 条	电阻 ≤ 10 Ω Resistance ≤ 10 Ω
无损检测 NDE	NB/T 47013.3 (UT)	适用于 PN≥CL600/10MPa 阀门 For Valves ≥ CL600/10MPa
材料试验 Material Tests	GB/T 223, 228.1, 229, etc.	符合第 6 章要求 Meet requirements of Section 6
外观 Appearance	Visual Inspection	符合第 5.13 条要求 Meet requirements of Clause 5.13

试验项目 Test Item	执行标准 Standard	要求 Requirement
耐久性 Endurance	Q/WZ-J02-19-2024	100 次循环后性能达标 Performance compliant after 100 cycles

八、订货须知 / Ordering Information

为确保提供最适合的产品，订货时请提供以下信息：

To ensure the most suitable product, please provide:

1. **工况信息 / Operating Conditions**
    - 介质类型、成分 (如 H_2S, CO_2含量) / Medium Type, Composition (e.g., H_2S, CO_2 content)
    - 最大工作压力、温度 / Max. Working Pressure, Temperature
    - 环境温度 / Ambient Temperature
    - 安装位置与方向 / Installation Position & Orientation
2. **阀门信息 / Valve Information**
    - 公称通径 (DN/NPS) / Nominal Diameter
    - 公称压力 (PN/Class) / Nominal Pressure
    - 结构长度标准 / Face-to-Face Standard
    - 连接端标准 (法兰标准/焊接端型式) / End Connection Standard (Flange Std./WE Type)
    - 结构形式 (截止阀/球阀) / Body Type (Globe/Ball)
    - 阀体阀盖材料 / Body & Bonnet Material

- 内件材料 (阀座、阀瓣、阀杆) / Trim Materials (Seat, Disc, Stem)
- 密封材料 / Seal Materials

3. **控制参数 / Control Parameters**
   - 超压切断设定值 / Overpressure Set Value
   - 欠压切断设定值 / Under-pressure Set Value
   - 是否需要超温切断 (易熔元件) / Overtemperature Shut-off required (Fusible element)
   - 控制电压 / Control Voltage
   - 通讯协议及接口特殊要求 / Special Requirements for Protocol & Interfaces
4. **其他要求 / Other Requirements**
   - 特殊涂层要求 / Special Coating Requirements
   - 第三方检验要求 / 3rd Party Inspection Requirements
   - 认证要求 (如 SIL, PED, API) / Certification Requirements (e.g., SIL, PED, API)

九、包装、贮存与运输 / Packaging, Storage & Transportation

- **包装 / Packaging:** 试验后阀腔内水分吹干，进出口用坚固堵盖保护 (符合标准第 9.1 条要求)。包装坚固，适于长途运输。

  Moisture blown dry after testing, ends protected by sturdy covers (Meet Clause 9.1). Robust packaging for long-distance transport.

- **贮存 / Storage:** 存放于干燥、通风、防雨的室内库房，远离腐蚀性介质。

  Store in a dry, ventilated, rain-proof indoor warehouse away from corrosive media.

- **运输 / Transportation:** 阀门处于关闭状态，避免剧烈振动、碰撞、雨淋和化学侵蚀。

  Valves shall be closed during transport. Avoid severe vibration, impact, rain, and chemical corrosion.

联系我们
五洲阀门股份有限公司
地址：浙江省温州市龙湾区永强高新技术产业园区
电话：+86-577-86916818
传真：+86-577-86933224
邮箱：wz@wuzhou-valve.com
网站：http://www.wuzhou-valve.com