

D943H 不锈钢电动硬密封蝶阀系列

D943H Stainless Steel Electric Hard-seal Butterfly Valve Series

使
用
说
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书

Operating Instructions



上海美言壹泵阀有限公司
ShangHai MeiYan Yi Pump & Valve Co., LTD.

D943H 不锈钢电动硬密封蝶阀

D943H Stainless Steel Electric Hard-seal Butterfly Valve

型号: D943H	规格: DN50-DN2000
公称压力: PN10-PN40	适用介质: 水、油品及类似液体、气体
适用温度: -29℃~425℃/-40℃~650℃	阀体材质: 铸钢、不锈钢、双相不锈钢
连接方式: 法兰	驱动方式: 电动
Model: D943H	
Specifications: DN50 - DN2000	
Nominal Pressure: PN10 - PN40	
Applicable Media: Water, oil and similar liquids, gases	
Applicable Temperature: -29° C to 425° C / -40° C to 650° C	
Valve Body Materials: Cast steel, stainless steel, duplex stainless steel	
Connection Type: Flanged	
Actuation Mode: Electric	

概述

D943H 不锈钢电动硬密封蝶阀是一种采用全不锈钢阀体及金属硬密封结构,通过电动执行器驱动蝶板作 90° 回转运动,实现管道介质精确启闭或调节的阀门。该阀门采用三维偏心或多偏心设计原理,在启闭过程中蝶板密封面能迅速脱离与贴合阀座密封面,有效减小摩擦磨损。其传动机构通过电动执行器输出旋转扭矩,直接驱动阀杆带动蝶板在阀体内精准旋转。阀座与蝶板密封副均采用不锈钢或堆焊硬质合金等高硬度金属材料,通过精密加工形成可靠的金属对金属密封。D943H 电动硬密封蝶阀具备耐高温、耐高压、耐腐蚀及长寿命等特点,特别适用于化工、冶金、电力、制药及食品等行业的苛刻工况。

Overview

The D943H Stainless Steel Electric Hard-Sealed Butterfly Valve is a valve designed for precise on/off control or regulation of pipeline media. It features a fully stainless steel valve body with a metal hard-sealed structure and is driven by an electric actuator, which enables 90-degree rotary motion of the disc. Utilizing a triple-offset or multi-offset design principle, the sealing surfaces of the disc and the valve seat rapidly separate and re-engage during operation, effectively reducing friction and wear. The transmission mechanism transfers the rotational torque from the electric actuator directly to the valve stem, driving the disc to rotate accurately within the valve body. Both the valve seat and the disc sealing pair are made of high-hardness metal materials, such as stainless steel or hardfaced alloys, and are precision-machined to form a reliable metal-to-metal seal. The D943H Electric Hard-Sealed Butterfly Valve offers high-temperature resistance, high-pressure tolerance, corrosion resistance, and a long service life, making it particularly suitable for demanding applications in industries such as chemical processing, metallurgy, power generation, pharmaceuticals, and food processing.



D943H 不锈钢电动硬密封蝶阀产品图

D943H Stainless Steel Electric Hard-seal Butterfly Valve - Product Drawing

特点

- 1、全不锈钢结构：阀体、阀杆、蝶板等主要部件采用 304/316 不锈钢材质，具备优异的耐腐蚀性和卫生性能，适用于食品、制药等洁净要求高的场合。
- 2、金属硬密封设计：密封副采用不锈钢与硬质合金堆焊或喷涂工艺，形成高硬度金属密封面，耐磨损、耐冲刷，使用寿命远超软密封蝶阀。
- 3、多偏心技术：采用单偏心、双偏心或三偏心结构，在阀门启闭时蝶板与阀座能瞬间脱离接触，实现无摩擦启闭，操作扭矩小，密封面磨损极低。
- 4、电动智能控制：配备一体化或分体式电动执行器，支持 4-20mA 模拟量信号或开关量控制，可精确调节流量，实现远程自动化操作。
- 5、高温高压适用：金属硬密封结构使其能适应更高的工作温度（通常可达 425℃ 以上）和更高的工作压力，适用于蒸汽、导热油等高温高压介质。
- 6、优良密封性能：依靠偏心结构产生的楔形挤压作用，在关闭时能实现金属密封面的紧密贴合，具备良好的双向密封性能，泄漏等级可达 ANSI Class VI。
- 7、防火安全设计：部分型号具备防火功能，当发生火灾时，金属密封副仍能保持一定的密封性能，符合 API 607 等防火标准。
- 8、维护简便经济：结构设计合理，密封面耐磨损，维护周期长；电动执行器具备过载保护、断信号自锁等功能，运行安全可靠。

Features

- 1、Full Stainless Steel Construction: Main components such as the valve body, stem, and disc are made of 304/316 stainless steel, offering excellent corrosion resistance and hygiene. Suitable for applications with high cleanliness requirements, such as food and pharmaceutical industries.
- 2、Metal Hard-Seal Design: The sealing pair utilizes processes like stainless steel with hardfacing or thermal spraying to form high-hardness metal sealing surfaces. This provides exceptional wear and erosion resistance, resulting in a service life far exceeding that of soft-sealed butterfly valves.
- 3、Multi-Offset Technology: Employs single-offset, double-offset, or triple-offset designs. This allows the disc and seat to separate instantly during valve operation, enabling frictionless

opening and closing. Benefits include low operating torque and minimal sealing surface wear.

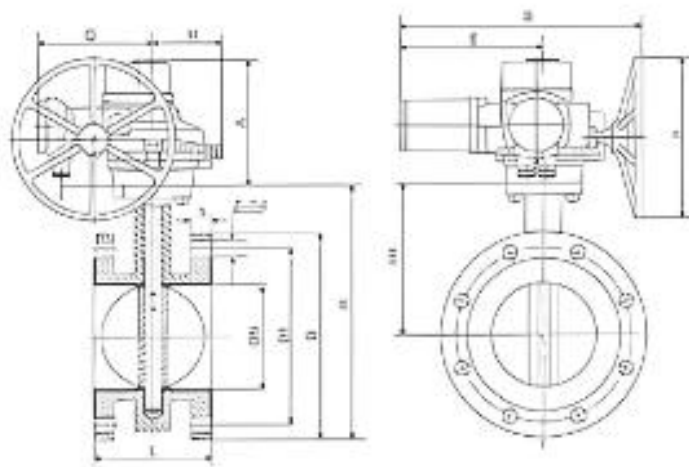
4、Electric Intelligent Control: Equipped with integrated or split-type electric actuators. Supports 4-20mA analog signals or on/off control for precise flow regulation and remote automated operation.

5、High-Temperature & High-Pressure Suitability: The metal hard-seal construction allows it to withstand higher working temperatures (typically up to 425° C or above) and higher working pressures. Suitable for high-temperature, high-pressure media like steam and thermal oil.

6、Superior Sealing Performance: Leverages the wedge-like compression effect generated by the offset design to achieve tight metal-to-metal contact upon closing. Provides reliable bidirectional sealing, with leakage levels potentially meeting ANSI Class VI.

7、Fire-Safe Design: Some models incorporate fire-safe features. In the event of a fire, the metal sealing pair can maintain a degree of sealing integrity, complying with standards such as API 607.

8、Easy and Economical Maintenance: Features a rational structural design and wear-resistant sealing surfaces, leading to extended maintenance intervals. The electric actuator includes functions like overload protection and signal-loss self-locking, ensuring safe and reliable operation.



D943H 不锈钢电动硬密封蝶阀结构图

D943H Stainless Steel Electric Hard-seal Butterfly Valve - Structure Drawing

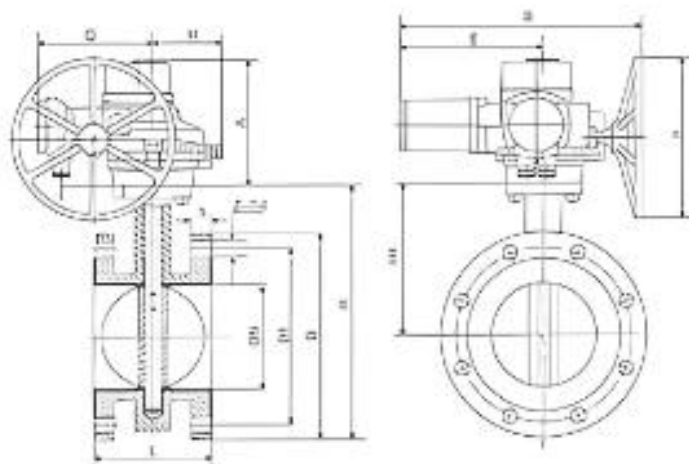
零部件名称材料表 List of Component Names and Materials

名称 Name	材料 Material
阀体 Valve Body	铸钢、不锈钢、双相不锈钢 Cast steel, stainless steel, duplex stainless steel
蝶板 Disc	WCB 碳钢（密封面堆焊钴基硬质合金）WCB Carbon Steel (Hardfaced sealing surface with Cobalt-based alloy)
阀座 Valve Seat	不锈钢 Stainless Steel
阀轴 Valve Stem	2Cr13 不锈钢 2Cr13 Stainless Steel

填料 Packing	柔性石墨 Flexible Graphite
电动执行器 Electric Actuator	铸铝（外壳） Cast Aluminum (Housing)

性能规范表 Performance Specification Table

性能规范表 Performance Specification Table		
公称压力 Nominal Pressure	1.0/1.6/2.5/4.0	MPa
强度试验压力 Strength Test Pressure	1.5/2.4/3.75/6	
密封试验压力 Sealing Test Pressure	1.1/1.76/2.75/4.4	
适用温度 Applicable Temperature	-29℃~425℃/-40℃~650℃	℃



D943H 不锈钢电动硬密封蝶阀外形尺寸图

D943H Stainless Steel Electric Hard-seal Butterfly Valve - Overall Dimension Drawing

D943H 不锈钢电动硬密封蝶阀外形尺寸表

D943H Stainless Steel Electric Hard-seal Butterfly Valve - Overall Dimension Table

公称通径 (DN)	主要尺寸 main size			法兰尺寸和螺栓规格 Flange dimensions and bolt specifications				
				1.0MPa			1.6MPa	
	L	H1	H	D	D1	n-Φd	D	D1
50	108	530	112	165	125	4-18	165	125
65	112	530	115	185	145	4-18	185	145
80	114	565	120	200	160	4-18	200	160
100	127	600	138	220	180	8-18	220	180
125	140	640	164	250	210	8-18	250	210
150	140	705	175	285	240	8-22	285	240
200	152	775	200	340	295	8-22	340	295

250	165	945	243	395	350	2-22	405	355
300	178	1070	250	445	400	12-22	460	410
350	190	1140	280	505	460	16-22	520	470
400	216	1210	305	565	515	16-26	580	525
450	222	1335	350	615	565	20-26	640	585
500	229	1415	380	670	620	20-26	715	650
600	267	1605	445	780	725	20-30	840	770
700	292	1844	480	895	840	24-30	910	840
800	318	2040	530	1015	950	24-33	1025	950
900	330	2255	580	1115	1050	28-33	1125	1050
1000	410	2380	650	1230	1160	28-36	1255	1170
1200	470	2640	760	1455	1380	32-39	1485	1390
1400	530	2886	850	1675	1590	36-42	1685	1590
1600	600	3156	1030	1915	1820	40-48	1930	1820
1800	670	3421	1230	2115	2020	44-48	2130	2020
2000	760	3685	1350	2325	2230	48-48	2345	2230

安装与维护须知

一、安装说明

1. 安装前检查:

核对验证: 仔细核对阀门铭牌上的型号 (D943H)、公称通径 (DN)、压力等级 (PN/Class)、温度范围及阀体/密封材质, 确保其与管道设计要求完全一致。特别注意密封材料的适用温度与介质。

外观与内部检查: 检查阀门及电动执行器外观, 确认无运输损伤。由于采用三偏心硬密封结构, 密封面无橡胶/塑料等软质材料, 严禁敲击或刮擦金属密封面。清除阀腔内的所有防锈油、包装物及杂物。

手动功能测试: 将电动执行器切换至 “手动” 模式, 转动手轮或手柄, 确认蝶板启闭过程 平滑无卡涩, 且能感受到三偏心结构特有的 “楔紧” 和 “脱离” 过程。测试后, 将蝶板置于 微开状态 (约 15° 开度), 以便安装对准。操作完毕切换回 “自动” 模式。

2. 安装位置与方向:

阀门可安装于水平或垂直管道上。三偏心蝶阀通常用于苛刻工况, 安装位置必须预留充足空间, 便于执行机构维护、散热及手动操作。

流向确认: 必须严格遵守阀体上的流向箭头指示。三偏心蝶阀一般为 双向密封 或 指定流向 (优先密封方向) 设计。若为后者, 则必须按照箭头方向安装, 以确保最佳密封性能和寿命。

3. 管道对接要求:

使用与阀门法兰匹配的标准管道法兰。确保管道法兰的密封面形式（如突面 RF、环连接面 RJ）、尺寸及光洁度与阀门法兰一致。

严禁通过强力拧紧螺栓来纠正管道法兰的错位或倾斜。安装前应校准管道，确保两端法兰平行对中，避免对阀门施加额外的管道应力。

精密紧固步骤：

将阀门置于两法兰之间，穿入所有螺栓并用手拧上螺母。

通过手动机构将蝶板旋转至 全开位置，以减少干扰。

使用扭矩扳手，严格按照对角线顺序，分三轮（如 30%， 70%， 100%）逐步均匀地将所有螺栓拧紧至规定扭矩值。此步骤对保证三偏心密封副的精密配合至关重要，能防止阀体变形导致泄漏。

4. 电动执行机构安装与调试：

执行机构通常已预装。阀门就位后，进行电气连接和精细调试。

电气连接： 由专业电工按接线图进行。确保电源、控制信号与执行器要求一致，并可靠接地。对于防爆型产品，需严格遵守防爆规范。

手动操作： 通电前，确认执行器处于 “手动” 模式，手动操作应平稳。

行程与限位调试（关键步骤）：

- 切换至 “自动” 模式，通过控制系统或执行器面板操作阀门至 完全关闭 位置。
- 极其精细地 调节执行器内部的 关向限位（机械限位或电子行程设定），使蝶板达到预设的密封关闭位置。由于三偏心结构的非线性特性，过调或欠调均会显著影响密封效果，需反复微调验证。
- 操作阀门至 完全开启 位置（通常为 90° ）。
- 调节 开向限位，设定全开位置。
- 进行多次完整的开关循环，观察动作是否平滑、无冲击，终点位置是否精确、重复性好。

力矩与保护设定： 正确设定执行器的工作力矩 和 过力矩保护值。三偏心阀门在关闭末段需要较高的密封力矩，但应避免过大导致卡死或损坏。

二、使用与操作说明

1. 开启与关闭操作：

首次或长期停用后启用：强烈建议在系统低压或无压状态下，通过手动模式 极其缓慢地 进行数次全开全关操作。这有助于清除密封面可能的微观高点，实现 初始磨合，是建立良好密封的关键步骤。

正常操作： 通过控制系统平稳操作。三偏心蝶阀的启闭力矩在接近全关时会显著增大，此为正常现象。

手动操作： 仅用于调试或断电应急。操作前必须切换至 “手动” 模式，操作力应平稳均匀，切勿使用加力杠杆。

2. 开度调节：

当配备高性能 调节型电动执行器 时，本阀门可用于精确调节。其硬密封特性在部分开度下比软密封阀

门具有更优的抗冲蚀性。

避免长期极小开度运行： 尽管密封面为硬质材料，但仍 不建议 长期在 极小开度（如 $<20^{\circ}$ ） 下作为节流阀使用，尤其是高压差工况，以免对密封面特定区域造成严重冲蚀。

定期全行程运动： 若长期用于调节，应 定期（如每半月） 进行一次全行程操作，以保持机构灵活性，防止杂质堆积。

3. 重要注意事项：

温度与热膨胀： 用于高温或深冷工况时，三偏心结构对热膨胀补偿设计精密。在冷态安装紧固后，系统首次升温（或降温）至工作温度并稳定运行后，必须 在热态（或冷态）下对所有法兰螺栓进行 二次均匀紧固。

流向与压力： 若为单向密封设计，严禁 在反向压力下关闭阀门，否则将导致密封失效。

颗粒介质： 介质含固体颗粒时，建议在上游安装过滤器。关闭阀门时，应快速通过易卡滞的中间开度区域。

三、维护与保养说明

1. 日常维护：

定期巡检阀门外部、法兰连接处有无泄漏。

保持阀门及执行机构清洁。

监听启闭过程有无异常声响。

检查执行器指示、状态是否正常。

2. 定期检查：

根据工况苛刻程度，建议每 3 至 12 个月进行一次全面检查。

阀门部分：

检查阀杆填料处有无泄漏，适度调整。

检查法兰螺栓预紧力。

重点检查密封副：通过性能测试或视检（如内窥镜）检查金属密封面有无划痕、冲蚀、点蚀或热粘着磨损迹象。轻微的划痕或均匀磨损通常不影响性能，但严重的局部损伤需专业处理。

执行机构部分：

检查执行器紧固件。

检查手动机构功能。

严格按照制造商要求，定期对执行器齿轮箱加注或更换指定型号的耐高温/低温润滑脂。

检查电气连接、限位开关及力矩保护功能。

3. 存放要求：

长期存放时，阀门应处于 微开状态（约 10° ），避免密封副长期接触受压。

封闭阀门两端法兰口。

执行器切换至“手动”模式。
断开电源，做好电气接口防护。
存放于干燥、无腐蚀性气体的室内。

4. 常见故障与处理:

泄漏（关闭不严）:

检查并重新 精细调整关向限位。
检查密封面是否有微小异物嵌入。
检查阀门是否因管道应力或热膨胀而变形。
检查密封面是否有损坏。

操作扭矩异常增大:

检查是否介质参数（温度、压力）超限。
检查是否发生热粘着或介质结晶卡滞。
检查润滑是否失效。
检查管道应力。

阀门动作不顺畅:

检查执行器输出力矩是否足够。
检查阀杆轴承是否损坏。
检查内部是否有异物。

核心提示: 三偏心硬密封蝶阀的阀座（通常为不锈钢基体+STL 硬质合金或复合层）与蝶板密封圈（多层金属或特殊合金）是高精度核心部件。其修复、研磨或更换工作需要专用工具、严格工艺和专业经验。除非用户具备专门的维修能力和设备，否则所有涉及密封副的维修工作，必须委托给阀门制造商或经其认证的专业服务商进行，以确保阀门性能恢复至出厂标准。

Installation and Maintenance Guidelines

I. Installation Instructions

1. Pre-Installation Checks

Verification: Carefully verify that the model (D943H), nominal diameter (DN), pressure rating (PN/Class), temperature range, and valve body/seal materials on the nameplate fully comply with the pipeline design. Pay special attention to the suitability of the seal materials for the operating temperature and medium.

Visual & Internal Inspection: Inspect the exterior of the valve and electric actuator for shipping damage. Due to the triple-offset hard-seal design, the sealing surfaces are metal with no soft materials like rubber/plastic. Avoid any impact or scratching on the metal sealing surfaces. Remove all rust preventive oil, packaging, and debris from the valve cavity.

Manual Function Test: Switch the electric actuator to "Manual" mode. Rotate the handwheel or crank to confirm the disc operates smoothly without sticking, and to feel the characteristic "wedging" and "detaching" action of the triple-offset mechanism. After testing, leave the disc in a slightly open position (approx. 15°) to facilitate alignment during installation. Switch

back to "Automatic" mode when finished.

2. Installation Position and Direction

The valve can be installed in horizontal or vertical pipelines. Triple-offset butterfly valves are often used in severe service, so the installation location must allow sufficient space for actuator maintenance, heat dissipation, and manual operation.

Flow Direction Confirmation: Strictly adhere to the flow direction arrow on the valve body. Triple-offset valves are typically designed for bidirectional sealing or have a specified flow direction (preferred sealing side). For the latter type, installation must follow the arrow direction to ensure optimal sealing performance and service life.

3. Pipeline Connection Requirements

Use standard pipeline flanges that match the valve flanges. Ensure the pipeline flange face type (e.g., Raised Face RF, Ring Joint RJ), dimensions, and finish are identical to those of the valve flange.

NEVER use excessive bolt force to correct misalignment or tilting of the pipeline flanges. Align the pipeline before installation to ensure both end flanges are parallel and centered, avoiding any undue pipe stress on the valve.

Precision Tightening Procedure:

Position the valve between the two flanges, insert all bolts, and hand-tighten the nuts. Rotate the disc to the fully open position using the manual override to minimize interference. Using a torque wrench, tighten all bolts gradually and uniformly to the specified torque value in three stages (e.g., 30%, 70%, 100%), strictly following a diagonal sequence. This step is critical for ensuring the precise fit of the triple-offset sealing pair and prevents leaks caused by valve body distortion.

4. Electric Actuator Installation and Commissioning

The actuator is typically pre-mounted. Finalize electrical connections and perform fine-tuning after the valve is positioned.

Electrical Connection: A qualified electrician must perform the wiring per the diagram. Ensure power supply, control signals, and grounding meet the actuator requirements. For explosion-proof models, strictly adhere to explosion-proof codes.

Manual Operation: Before applying power, confirm the actuator is in "Manual" mode. Manual operation should feel smooth.

Stroke and Limit Adjustment (Critical Steps):

- Switch to "Automatic" mode. Operate the valve to the fully closed position via the control system or actuator panel.
- Extremely carefully adjust the close-direction limit (mechanical stop or electronic

travel setting) inside the actuator to position the disc at the preset sealing closed point. Due to the non-linear characteristic of the triple-offset mechanism, over- or under-adjustment can significantly affect sealing. Repeated micro-adjustments and verification are necessary.

- c. Operate the valve to the fully open position (typically 90°).
- d. Adjust the open-direction limit to set the full open position.
- e. Perform several complete open-close cycles. Observe if the action is smooth without impact, and if the end positions are precise and repeatable.

Torque & Protection Setting: Correctly set the actuator's operating torque and over-torque protection value. Triple-offset valves require higher sealing torque at the end of the closing stroke, but excessive torque should be avoided to prevent jamming or damage.

II. Operation and Usage Instructions

1. Opening and Closing Operation

Initial or Post-Long-Term Startup: It is strongly recommended to perform several full open-close cycles extremely slowly in manual mode under low or no system pressure. This helps remove potential microscopic high spots on the sealing surfaces and achieves initial break-in, which is key to establishing a good seal.

Normal Operation: Operate smoothly via the control system. A significant increase in operating torque near the fully closed position is normal for triple-offset butterfly valves.

Manual Operation: Use only for commissioning or during power failure emergencies. Always switch to "Manual" mode first. Apply force steadily and evenly. Do not use levers for extra force.

2. Throttling Operation

When equipped with a high-performance modulating electric actuator, this valve can be used for precise regulation. Its hard-seal characteristics provide better erosion resistance at partial openings compared to soft-sealed valves.

Avoid Prolonged Operation at Very Small Openings: Although the sealing surfaces are hard materials, it is not recommended to use the valve as a throttle for extended periods at very small openings (e.g., <20°), especially under high pressure drop conditions, to prevent severe erosion on specific areas of the seal.

Regular Full-Stroke Cycling: If used for prolonged modulation, perform a full-stroke cycle periodically (e.g., bi-weekly) to maintain mechanism flexibility and prevent debris accumulation.

3. Important Precautions

Temperature & Thermal Expansion: For high-temperature or cryogenic service, the triple-offset design precisely compensates for thermal expansion. After initial cold tightening, a secondary, uniform tightening of all flange bolts is mandatory at the stabilized operating temperature (hot or cold state).

Flow Direction & Pressure: For unidirectional sealing designs, NEVER close the valve against

reverse pressure, as this will cause sealing failure.

Particulate Media: For media containing solids, installing an upstream filter is recommended. When closing the valve, move quickly through the intermediate opening range where jamming is more likely.

III. Maintenance and Servicing Instructions

1. Routine Maintenance

Periodically inspect the valve exterior and flange connections for leaks.

Keep the valve and actuator clean.

Listen for unusual noises during operation.

Check actuator indicators and status for normal operation.

2. Periodic Inspection

Depending on service severity, a comprehensive inspection every 3 to 12 months is recommended.

Valve Section:

Check for leaks at the stem packing and adjust if necessary.

Check flange bolt preload.

Key Inspection – Sealing Pair: Inspect metal sealing surfaces for scratches, erosion, pitting, or galling via performance testing or visual means (e.g., borescope). Minor scratches or uniform wear typically do not affect performance, but significant localized damage requires professional attention.

Actuator Section:

Check actuator fasteners.

Check manual override function.

Strictly follow the manufacturer's schedule to lubricate the actuator gearbox with the specified high/low-temperature grease.

Check electrical connections, limit switches, and torque protection function.

3. Storage Requirements

For long-term storage, the valve should be in a slightly open position ($\sim 10^\circ$) to avoid prolonged pressurized contact of the sealing pair.

Seal both flange ends with protective covers.

Switch the actuator to "Manual" mode.

Disconnect power and protect electrical connections.

Store indoors in a dry, non-corrosive atmosphere.

4. Common Troubleshooting

Leakage (Failure to Seal):

Check and carefully readjust the close-direction limit.

Check for small debris lodged on the sealing surfaces.

Check if the valve is deformed due to pipe stress or thermal expansion.

Inspect sealing surfaces for damage.

Abnormally High Operating Torque:

Check if medium parameters (temperature, pressure) exceed limits.

Check for galling or media crystallization causing binding.

Check if lubrication has failed.

Check for pipe stress.

Unsmooth Valve Operation:

Check if actuator output torque is sufficient.

Check if stem bearings are damaged.

Check for internal obstructions.

Key Notice: The valve seat (typically stainless steel base + STL hard alloy or composite layer) and the disc sealing ring (multi-layer metal or special alloy) of the triple-offset hard-seal butterfly valve are high-precision core components. Their repair, grinding, or replacement requires specialized tools, strict procedures, and expertise.

Unless the user possesses specific repair capabilities and equipment, all work involving the sealing pair must be delegated to the valve manufacturer or their authorized professional service provider to ensure performance is restored to factory standards.

非常感谢您的阅读！

Thank you very much for reading!

开维喜阀门集团有限公司

地址：浙江省温州市永嘉县瓯北街道三桥工业区林下路1号

电话：+86 18967796392

网址：<https://www.kaiweixi.com>

mail: karrie@kaiweixi.com

Kaiweixi Valve Group Co., Ltd

Address: No.1 Linxia Road, Sanqiao Industrial Zone, Oubei Street, Yongjia County, Wenzhou City, Zhejiang Province



开维喜阀门

Phone: +86 18967796392

URL: <https://www.kaiweixi.com>

E-mail: karrie@kaiweixi.com

开维喜阀门集团

Kaiweixi valve group

<https://www.kaiweixi.com>

E-mail: sales@kaiweixi.com