

# INSTRUCTIONS ON INSTALLATION, OPERATION AND MAINTENANCE FOR KIRLOSKAR KINETIC AIR VALVES



Enriching Lives



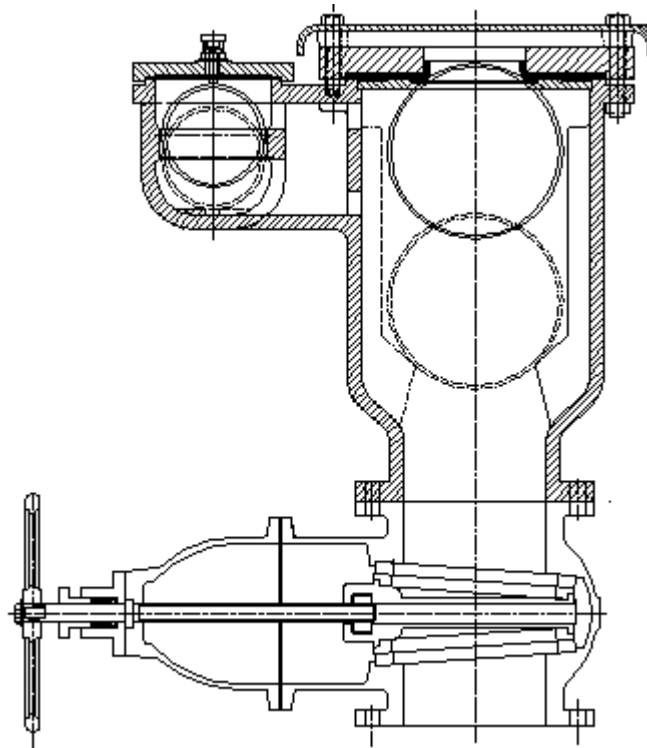
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MANUFACTURING UNIT, KONDHAPURI (PUNE)

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## **KIRLOSKAR KINETIC AIR VALVES**

### **1. INTRODUCTION**



Kinetic Air Valve with Isolating Sluice Valve

Typical View

**Figure 1.**

Kirloskar Kinetic Air Valves generally conform to IS 14845 standard for dimensions, materials of construction and constructional features. These Kinetic Air Valves are Double Ball, Resilient Seated type. Supply of additional isolating Sluice Valve with Non Rising Spindle or Rising Spindle Operation is as per the requirement of the customer.

Kinetic Air Valves are commonly used in air venting / admissions service in water pipelines and are designed to operate with floating balls inside. The valve has been designed to offer reliable service over a long period of time.

### **1.1 Kinetic Air Valve Operating Principle:**

The valve has two chambers viz. Low Pressure Chamber and High Pressure Chamber. The Low Pressure Chamber has large rubber orifice and High Pressure Chamber has small metallic orifice. Each chamber has rubber coated seasoned wood ball working as float.

As the Low Pressure Chamber mainly operates when there is no water pressure or low water pressure in the air valve it is called Low Pressure Chamber. Similarly, as the High Pressure Chamber mainly operates when there is full pressure or high pressure in the air valve; it is called as High Pressure Chamber.

When an empty pipeline starts getting filled up with water, the air valve normally, allows exit of air through both of its large and small orifices. As the air in pipeline gets progressively expelled, the level of water in pipeline rises and water enters the body of air valve. As the water level continues to rise, the two rubber lined balls start floating on the water and rise up along with the water level. Eventually the ball in low pressure chamber touches & closes small orifice. Thus air valve performs the function of removal of air in the pipeline during its filling up phase.

When normal flow in the pipeline gets established, the air bubbles carried along with the flow & this dissolved air finds its way to high-pressure chamber. Accumulation of such air leads to building up of pressure and exertion of downward force on ball, pushing it down. This downward movement of ball in high-pressure chamber temporarily opens up small orifice and allows accumulated air in high-pressure chamber to escape to atmosphere. Thus the air valve performs the function of releasing accumulated air during operation.

At the time when the pipeline is being emptied, water level in the air valve goes down, and the balls in both the chambers come down within the valve, due to gravity. They allow passage at the orifices to allow entrance of atmospheric air into the air valve and subsequently into the main pipeline.

## **1.2 ISOLATING VALVE FOR THE AIR VALVE:**

Along-with the Air Valve, normally an isolating valve is provided. Most of times, that is Sluice Valve. All the times the isolating sluice valve is kept 'OPEN'. Only when the Air Valve is to be isolated or removed from pipeline for maintenance or some other purpose, the isolating valve is closed to isolate the Air Valve or to blank-off the pipe extension piece.

## **2. INSPECTION ON RECEIPT, HANDLING, STORAGE & PRESERVATION**

### **2.1 INSPECTION ON RECEIPT AND HANDLING**

- a. At receipt of the product, ensure that there are no transit damages to the product received, especially on valve flanges, on operating mechanism of isolating valves, if any.
- b. Ensure that Parts and Accessories are received as per ordered scope of supply.
- c. Ensure that adequate numbers of fasteners (if in scope of supply) are received for mounting the air-valve assembly on pipeline.
- d. While unloading the product, please use the provision of lifting made on the valve (e.g. Lifting Lugs, Lifting eye bolts).
- e. Use the safe lifting devices (e.g. slings, hoists, hooks etc.) of adequate capacity.
- f. Do not pass the slings through the weak parts of the product / accessory (e.g. Hand Wheels, Gear Box Body – when it is coupled with the valve, threaded portion of the rising spindles).
- g. The valve should be transported so that the valve remains in balanced condition.
- h. Support the valve properly during transportation to avoid toppling.
- i. Handle the product carefully – do not push, drag, drop from height.

If damages, short supply or wrong supply are observed, report the same immediately to the contact person mentioned in this manual.

### **2.2 STORAGE & PRESERVATION**

If the valve has to be stored at site before installation,

- a. Store it on horizontal level surface in dry and clean atmosphere.
- b. Store the products in well-covered sheds, protected from sun, rain and dust.

- c. In the instance if the valve is required to be stored for long duration, ensure that rust preventive is applied on the machined & corrodible surfaces.
- d. It is advisable to give a coat of grease on seat rings of the isolating sluice valve during the storage period and keep the valves in partly open position so that the seat surfaces do not gall. Keep the seat rings away from dusty atmosphere.

### **3. INSTRUCTIONS FOR INSTALLATION**

#### **3.1 CHECKS ON THE VALVE ASSEMBLY BEFORE INSTALLATION**

- a. Before taking the Air Valve for pipe installation, make sure that it is cleaned from inside and outside and there are no foreign or metallic objects sticking on to its sealing elements. Also clean the valve interior passages to remove any foreign matter & rust preventive on machined surfaces.
- b. While installing the operating element, make sure that the isolating Sluice Valve, the operating element and the intermediate gear box, if any are in fully closed position.
- c. Ensure that the entire rust preventive on the machined surface in the flow area is removed, before the valve is put in pipe-line.
- d. Note the name plate details on valve body and valve pressure rating adequacy with respect to operating pressure.
- e. Air Valves are to be mounted only in VERTICAL position.
- f. Operate the isolating Sluice Valve manually from Full Close to Full Open and Full Open to Full Close, with the operator / hand wheel. Ensure that there is no undue resistance / friction in the operation.
- g. Before mounting the valve & pipe flange, ensure that flanges match with respect to dimensions & mating surfaces. While fitting the valve in pipeline, ensure that diagonally opposite bolts are simultaneously & uniformly tightened.

#### **3.2 CHECKS FOR THE PIPE-LINE BEFORE INSTALLATION**

- a. Clean the pipeline thoroughly so that it does not contain any solid matters, which may find entry into the valve and damage the valve internals.
- b. The pipe piece on which the Air Valve is to be mounted, should be adequately supported and anchored (if required)

- c. For the valve supplied with Isolating Sluice Valve of Rising Spindle type, ensure that there is adequate space available to accommodate the rising spindle when valve is in fully Open condition.
- d. It is advisable to use a screen of non corrosive metal between bottom flange of the isolating valve and flange on the pipe piece provided for mounting the air valve. This is to avoid entrance of any solid floating foreign matters into the isolating valve or air valve, which could cause malfunction of the air valve.
- e. The valves are mainly designed for handling clear water with maximum impurities of 5000 PPM.

#### **4. COMMISSIONING**

##### **4.1 PRE-COMMISSIONING CHECKS**

- a. Ensure manually that the isolating valve operates smoothly.
- b. The entire pipe flange bolting is properly tightened.
- c. Ensure that the Isolating Valve is OPEN.

##### **4.2 COMMISSIONING**

- a. Charge the pipe-line with water.
- b. Ensure that the Air escapes out of air valve and once the air valve is filled with water, it does not leak through its orifices.
- c. Allow the flow to stabilize in main pipeline for 10 to 15 minutes. See if the small orifice can escape the trapped air from high pressure chamber. (Note: If there is no entrapped air or very little amount of entrapped air in the high-pressure chamber, this test may indicate negative results.)
- d. Ensure that there is no leakage through flange gaskets and stuffing box - gland packing of the isolating sluice valve.
- e. Empty the pipe-line and ensure that the air valve allows inward passage of air into the main pipeline.

Now the valve is commissioned for its Operation.

#### **5. OPERATION**

- a. Keep the isolating valve OPEN all the times, unless the air valve is to be isolated.
- b. The air valve itself functions automatically according to the operating principle explained above.

## 6. MAINTENANCE INSTRUCTIONS

Maintenance Check Points:

Sr.	Parameter to Check	Method of Checking	Weekly	During Overhaul
	<b>Kinetic Air Valve</b>			
01	Leakage through gasket for small orifice nipple	Visual	•	
02	Leakage through Rubber Seal in Low Pressure Chamber	Visual	•	
03	Air Valve allows Air to enter into or escape out of the pipeline.	•	During fill up or emptying pipeline	
04	Continuous leakage through the Low Pressure (Large) Orifice / High Pressure (Small) Orifice.	Visual	•	
05	Condition of Float Balls, Rubber Seal in Low Pressure Chamber	Visual		•
06	Eventual passage of air through vent in small orifice plug (for High Pressure Chamber)	Visual	•	
	<b>Isolating Sluice Valves</b>			
01	Leakage through Stuffing Box / Gland, Body-Dome, Dome-Stuffing Box and side flange gaskets	Visual	•	
02	Noise / Vibrations while Opening or Closing the Valve	Feel	During opening / closing	
03	Condition of Body Seat Ring / Wedge Seat Ring faces – scratches, dent marks, intactness	Visual & feeler gauge		•
04	Condition of Spindle & Spindle Nut / Yoke Sleeve threads	Visual		•

Kirloskar Kinetic Air Valves require very little maintenance if maintenance check point are attended to during periodic inspection & during overhaul. However valves could malfunction in unusual conditions of usage, water contamination and may require maintenance as below:

## 7. TROUBLE SHOOTING OF KIRLOSKAR KINETIC AIR VALVES

Sr.	Problem	Probable Reason	Action Required
<b>Trouble Shooting of Kinetic Air Valve</b>			
01	Leakage through gasket for small orifice nipple	Gasket for the small orifice nipple is damaged.	Replace the gasket for small orifice nipple.
02	Leakage through Rubber Seal in Low Pressure Chamber	a. Solid materials caught between the low pressure float and the rubber seal b. Damaged rubber seal or the low pressure float ball.	a. Remove the solid after isolating the air valve and opening the cowl. b. Replace the rubber seal / float ball – as needed.
03	Air Valve does NOT allow Air to enter into our escape out of the pipe line.	a. Isolating valve is Closed b. Low pressure ball has got stuck with the low pressure rubber seal.	a. Open the isolating valve b. Open the cowl and release the low-pressure ball, which has stuck the rubber seal.
04	There is continuous leakage through the Low Pressure (Large) Orifice / High Pressure (Small) Orifice.	Damaged lining on the Balls or seats of orifices	Replace the damaged balls or seats of orifices
05	Small orifice nipple is not functioning to release the air	Solid foreign particle(s) got stuck into the nipple holes.	Open the nipple cap and clean the same for making the orifice holes through.

<b>Trouble Shooting of Isolating Sluice Valve</b>			
01	Leakage through the valve in fully closed condition	a. External object caught between body ring & wedge ring.  b. Worn out / Deformed or damaged seat rings	a. Try to flush away the external object by opening & closing the valve & creating flow to flush it away. If it does not work, open flanged joint to reach the object and remove it manually (**).  b. Replace the Body / Wedge seat rings (%%)
02	Leakage through Stuffing Box / Gland	a. Loose gland packing b. Old gland packing rings, due for replacement	a. Tighten the gland gradually and uniformly b. Replace the gland packing rings (##)
03	Leakage through Body-Dome / Dome-Stuffing Box gaskets	a. Loose bolting of Body-Dome / Dome-stuffing box fasteners. b. Old gaskets due for replacements	a. Tighten the joint fasteners gradually and uniformly. b. Replace the gaskets (**).

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04	Leakage through side flanges	a. Inadequate tightening of flanged joint b. Damaged gasket	a. Re-tighten the flanged joint b. Replace gasket (**)
05	Noise / vibrations while opening or closing valve	Inadequately supported / inadequately fixed piping / valve	Support / fix piping & valve with proper support / anchoring.
06	'Loose' rotations of the spindle of Non Rising Spindle Sluice Valve, without causing the valve to open / close	a. Damaged / worn-out threads in spindle or spindle nut. b. In case of gear box operation, possibility of worn-out or damaged gear teeth.	a. Replace Spindle nut. Spindle also may be replaced if the threads are excessively worn-out or damaged. (**) b. Repair / replace the gear box components – as required.

**IMPORTANT** (\*\*): All these procedures require emptying the piping and removal of the valve from the pipeline.

(##): If Repacking / Back Seat Bush arrangement is not provided in the valve, then stopping the pump operation or depressurizing the pipe-line is necessary before removing the gland packings for replacement.

(%%): As the Body Rings / Wedge Rings require very precise machining & matching of angles of body rings & wedge rings. We strongly recommend that this operation be performed at KBL factory.

## **8. Recommended Spares for Kinetic Air / Isolating Sluice Valves**

Product Cross Sectional and General Assembly Drawing attached with this manual indicates the components of the respective valves, alongwith the recommended spares.

We strongly recommend to keep the spares handy all the time to be able to eliminate delays in attending the operation troubles and scheduled replacements / overhauls.



## **9. SAFETY INSTRUCTIONS FOR “KIRLOSKAR” MAKE VALVES TO BE FOLLOWED BY USER, AT SITE**

[These Safety Instructions are the integral part of “Instruction Manual for Installation, Operation and Maintenance of Kirloskar Make Valves”]

### **PART – A: GENERAL INFORMATION & SAFETY REQUIREMENTS**

1. The Products supplied by KBL have been designed with safety in mind. Where hazards can not be eliminated, the risk has been minimized by the use of guards and other design features. Some hazards can not be guarded against and the instructions below **MUST BE COMPLIED WITH** for safe operations. These instructions can not cover all circumstances; **USER** of the product is responsible for using safe-working practices at all times.
2. KBL product are designed for installation in designated area, which are to be kept clean and free of obstructions that may restrict safe access to the controls and maintenance access points.
3. Access to the equipment should be kept restricted to the personnel responsible for installation, operation and maintenance and they must be trained, adequately qualified and supplied with adequate tools for their respective tasks.
4. KBL requires that, all personnel that are responsible for installation, operation or maintenance of the equipment, have access to study the product instruction manual **BEFORE** any work is done and they will comply with all local and industry based safety instructions and regulations.
5. Personnel protection safety equipment must be worn where local rules apply.
6. Read the instruction manual before installation, operation and maintenance of the equipment.
7. Note that the limit of product application and permissible use of the product is according to the respective product design & testing standard and product pressure rating. Operation of the equipment beyond these limits will increase risk from hazards and may lead to premature and hazardous failure of the valve / accessories.
8. Clear and easy access to all controls etc. must be maintained at all times. Hazardous or flammable materials must not be stored near valves unless safe areas or racking and suitable containers have been provided.
9. **IMPROPER INSTALLATION, OPERATION OR MAINTENANCE OF THE KBL PRODUCT COULD RESULT IN INJURY OR DEATH.**

**PART – B: SAFETY INSTRUCTIONS WHILE HANDLING, STORAGE AND USAGE**

1. For handling / lifting the valves, use devices of adequate capacities certified by competent authorities. Use lifting provisions e.g. lifting eyebolts, lifting lugs etc. wherever provided on the valves.
2. Before fitting the valve in pipeline, ensure that Pressure Rating of the valve is suitable for maximum working pressure / surge pressure that may arise in the pipeline.
3. Non Return Valves / Reflux Valves with Dash-pot arrangement & Counter weight arrangement: Safety Guard for the counter weight & cylinder arrangement shall be provided by the customer to avoid accidents, as the lever with counterweight falls down rapidly during valve closure. It may come down without warning in case of power failure.
4. Electrically Operated Valves –
  - a. It is to be ensured before operation that proper earthing connection is provided to the actuators.
  - b. While wiring the actuator in circuit, ensure that direction of actuator rotation which 'Opens' / 'Closes' the valve is according to 'Open' / 'Close' switch.
5. User is solely responsible to refer to and follow Instructions stated in 'Instruction & Operation Manual' (I.O.M. manual) of the Gearbox / Electric Actuator / Hydraulic Power Pack. These IOM Manuals are supplied along-with the operator(s), wherever applicable.
6. Open type Gear Arrangement: Due care shall be taken by user while operating valves with Open type Gear Arrangement. The user shall ensure that no part of body or clothing gets caught between pair of Open type gears.
7. In case of manual operated valves, avoid excessive torquing at valve hand wheel / hand lever. Do not use extra leverage to Open / Close the valves.
8. User shall prevent any unauthorized person to mount, dismantle or remount, operate and repair the valves.
9. During using the valve, ensure that approved technical rules & regulations e.g. trading regulations, regulations for prevention of accidents, steam boiler regulations, regulations of gas mains under high pressure, regulations for combustible fluids, local safety regulations etc. are followed.

10. During repairs / maintenance of the valve at site, the user shall take minimum following precautions:
- a. Provide adequate working platform near the valve.
  - b. Make pipelines pressureless and harmless i.e. switch off the pumps, empty the pipelines, remove and switch-off all electric connections (in case of electric operated valves).
  - c. If work is carried-out in vicinity of the valve, which leads to dusty atmosphere (e.g. concrete work, masonry, painting, sandblasting etc.) the valve / valve components must be covered effectively.

## **10. ORDERING INFORMATION**

(To be sent to the Contact Person mentioned in this manual)

Details required to be furnished while ordering Spares

- a. KBL Order Acceptance Number (O/A No. or Sale Order No.)
- b. Product Description – Type, Size, Pressure Rating etc.
- c. Product Serial No. (This is hard punch marked on Valve Flange)
- d. KBL SAP Product Code – This code is mentioned in the Invoice though which the product has been dispatched.
- e. KBL Cross Sectional Assembly Drawing No. for the product (if provided)
- f. Required Part Name & Part No. as shown in the Cross Sectional Assembly drawing.
- g. Material of construction of the required part, as that appears in the Cross Sectional Assembly drawing.

## **INTIMATING PRODUCT / PERFORMANCE COMPLAINT**

(Information to be sent to the Contact Person mentioned in this manual)

While communicating product complaint, furnish following information to help us to resolve the problem promptly.

- a. KBL Order Acceptance Number (O/A No. or Sale Order No.)
- b. Product Description – Type, Size, Pressure Rating etc.
- c. Product Serial No. (This is hard punch marked on Valve Flange)
- d. KBL SAP Product Code – This code is mentioned in the Invoice though which the product has been dispatched.
- e. KBL Cross Sectional Assembly Drawing No. for the product (if provided)
- f. Exact nature of complaint

If the complaint is related to Short Supply, Wrong Supply, Transit Damage, it is necessary to communicate the Invoice Number which will help in tracking the cause of the problem.

In case if you need additional information or help, please contact:

**Customer Service and Support Sector**

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